Grade 8
E1 – Geometric and Spatial Reasoning

	Curriculum Expectations	Pages That Cover the Expectations
E1.1	identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations	5 - 20
E1.2		
E1.3	use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios	47 - 66
E1.4	describe and perform translations, reflections, rotations, and dilations on a Cartesian plane, and predict the results of these transformations	67 - 116

Preview of 130 pages from this product that contains 438 pages total.

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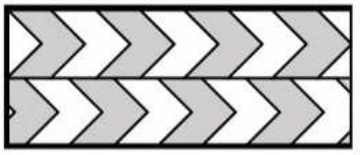
Curriculum Connection
E1.1

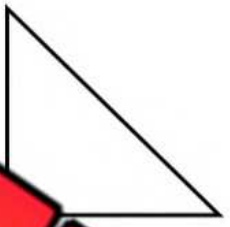
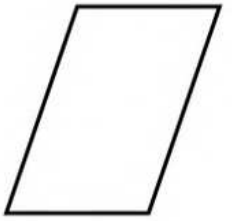
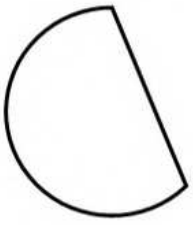
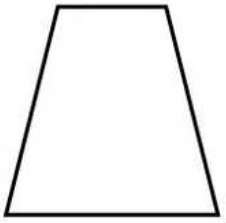
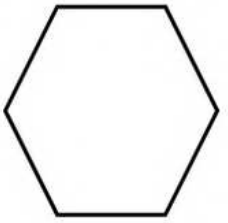
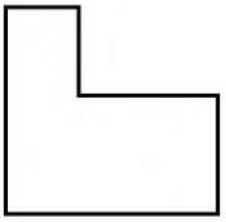
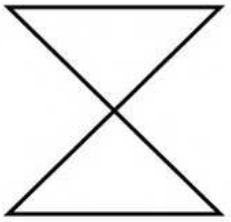
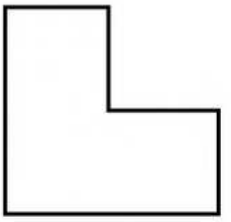
Intro to Tessellations



A **tessellation** is a tiling pattern in which shapes are fitted together with no gaps or overlaps. In the example tessellation, a white and grey chevron are tiled with no gaps and are not overlapping.

Questions Can the shapes below be used by themselves in a tessellation?

PREVIEW

		
1) Yes No	2) Yes No	3) Yes No
		
4) Yes No	5) Yes No	6) Yes No
		
7) Yes No	8) Yes No	9) Yes No
		
10) Yes No	11) Yes No	12) Yes No

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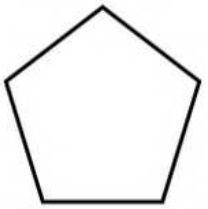
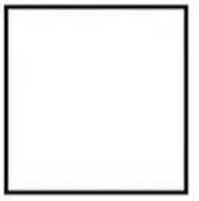
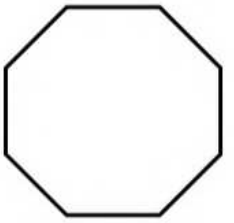
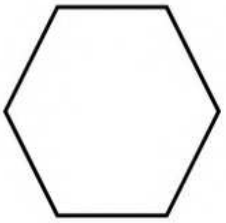
Curriculum Connection
E1.1

Regular Polygons That Tessellate

A **regular polygon** is a shape that has equal sides and equal angles. There are only 3 regular polygons that can form tessellations by themselves. Other regular polygons can be used together to form a tessellation.

Part 1 Will the regular polygon tessellate?

 1) Yes No	 2) Yes No	 3) Yes No
 4) Yes No	 5) Yes	 Yes No
 7) Yes No	 8) Yes No	 9) Yes No

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Part 2 Describe the 3 regular polygons that will tessellate

Regular Polygon	Number of Sides	Angle Measurements	Interior Angle Total
1)			
2)			
3)			

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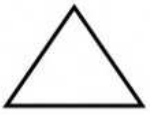
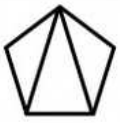
Curriculum Connection
E1.1

Tessellating with Regular Polygons

Polygons will only tessellate if their interior angles add up to a multiple/factor of 360°. A triangle's interior angles always add up to 180°.

Instructions Use the information above to fill in the tables

Terms	Definition – What does the term mean?
Regular P	
Interior	
Su	

Regular Polygo	Triang	Sum of Interior Angles of Triangles x 180)	Multiple/Factor of 360° Yes/No
1) 			
2) 			
3) 			
4) 			
5) 			
6) 			
7) 			
8) 			

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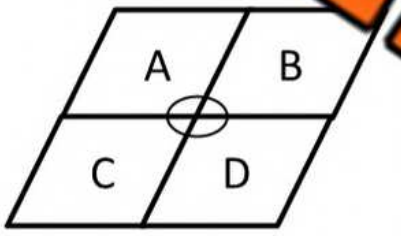
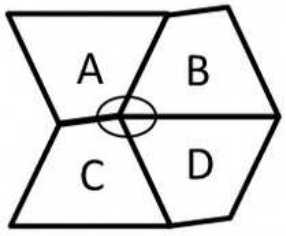
Curriculum Connection
E1.1

Tessellating with Quadrilaterals

Every quadrilateral can be used to tessellate the plane. This is because a quadrilateral's interior angles always add up to 360°. A regular quadrilateral is easy to tessellate, whereas an irregular quadrilateral is sometimes more challenging to fit together.

Part 1 Fill in the table below

Tessellation	Sum of the Circled Angles	Describe Transformation
		*From Shape A to Shape D*
		*From Shape A to Shape B*
		*From Shape A to Shape C*

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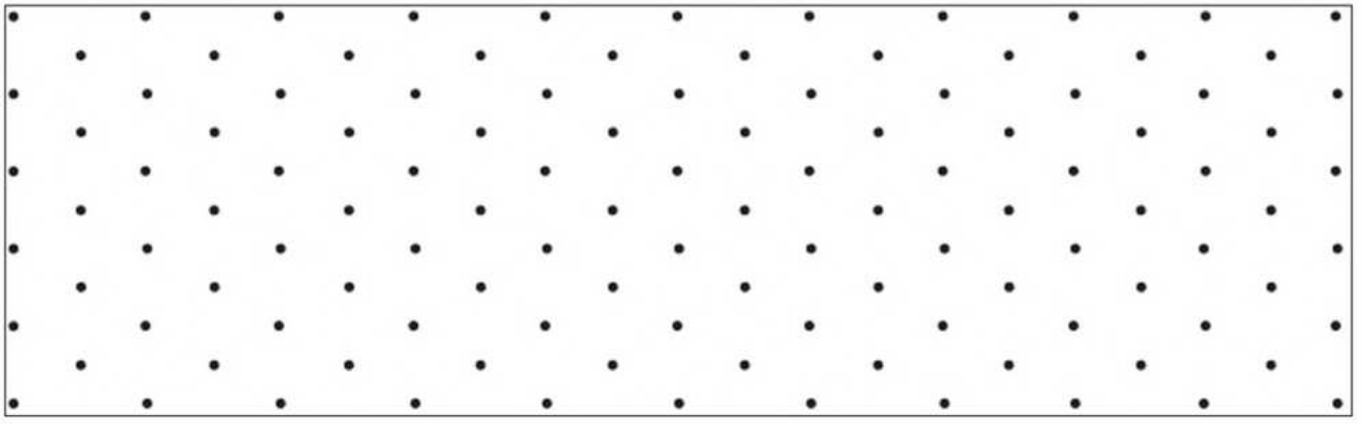
Part 2 Create a tessellation using one or multiple quadrilaterals



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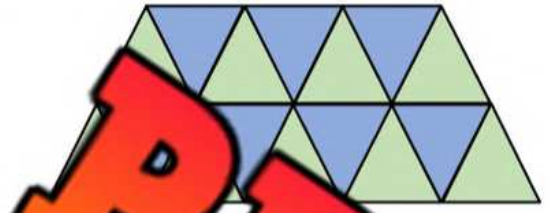
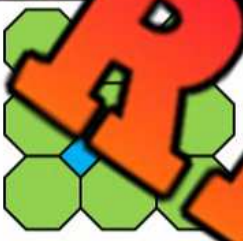
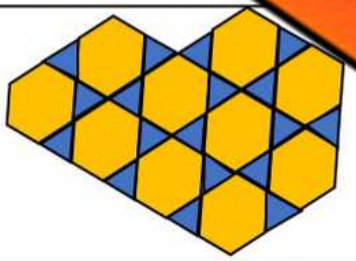
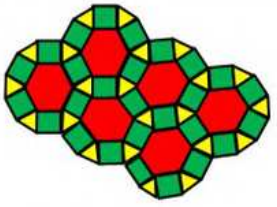
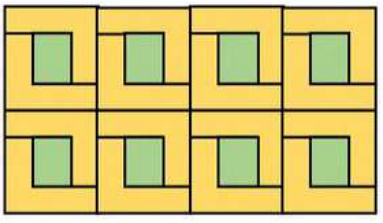
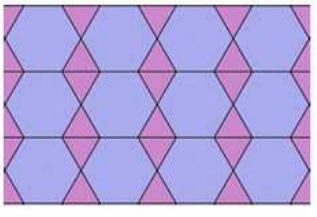
Curriculum Connection
E1.1

Types of Tessellation

Questions What type of tessellation are the examples below?

Tessellation	Type of Tessellation Regular, Semi-Regular, Irregular
1) 	
2) 	
3) 	
4) 	
5) 	
6) 	

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Curriculum Connection
E1.1

Creating Translation Tessellation

Directions Follow the instructions to create your own translation tessellation

When creating a tessellation, we move a "tile" repeatedly to create a pattern. We can move the tile in 4 different ways – translations, reflections, rotations, and dilations.

A **translation tessellation** is a tessellation that has been created by the translating (sliding) of a tile.

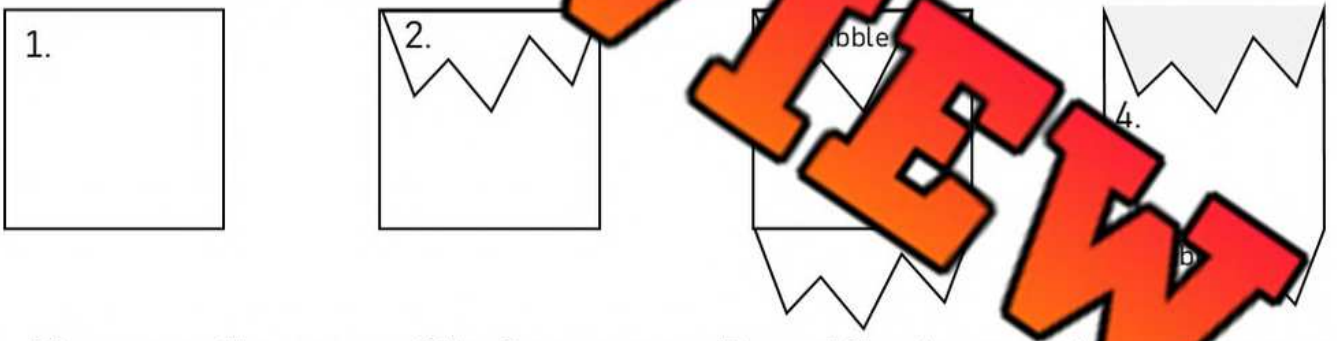
Instructio

1) Use [illegible] with strong paper, like cardboard, cardstock or index cards.

2) [illegible] a desi[illegible] pencil from one corner of the square to an adjacent corner. D[illegible]ago[illegible]y and do not stop halfway.

3) Cut along you[illegible]cil li[illegible] have two pieces. The piece that you designed is calle[illegible].

4) Translate (slide) the nibb[illegible]ce t[illegible] side and tape the straight edges together. These two pieces need t[illegible]rectly [illegible]no overlapping.

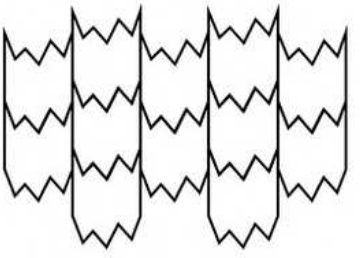


5) Place your tile on one of the four corners. To avoid having gaps, h[illegible]e corner of the paper align with the original square you started with. The first tile you trace can hang off the edge of the paper.

6) Since this is a translation tessellation, you will translate (slide) the tile so that it fits together like a puzzle.

7) Continue translating the tile until the page is covered.

8) Colour your tessellation in a pattern



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Curriculum Connection
E1.1

Creating Rotational Tessellation

Directions Follow the instructions to create your own rotational tessellation

When creating a tessellation, we move a "tile" repeatedly to create a pattern. We can move the tile in 4 different ways – translations, reflections, rotations, and dilations.

A **rotational tessellation** is a tessellation that has been created by the rotating (turning) of a tile.

Instructio

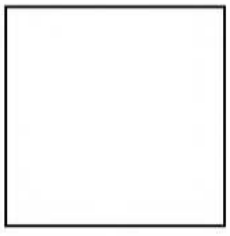
1) Use with strong paper, like cardboard, cardstock or index cards.

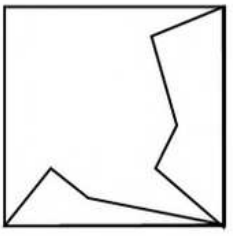
2) Cr a des pencil from one corner of the square to an adjacent corner. Tr rea ject, such as a bird or other animal. Do not draw diagonally ot sto

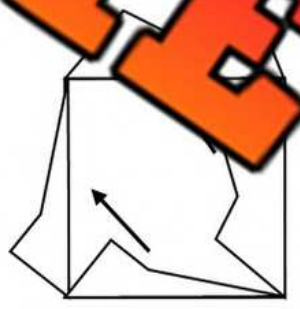
3) Repeat the step ab t you o designs to cut out

4) Cut both designs out. You uld s.

5) **Rotate** the cut-out pieces by turni hem to adj t sides – do not flip them. Tape the edges together making su line ut overlapping.







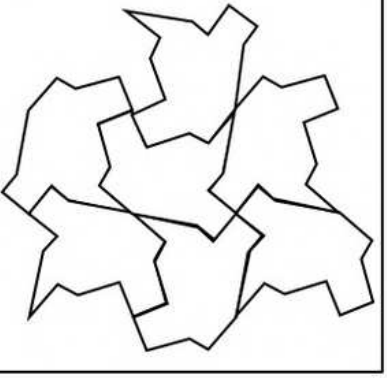


6) Place your tile on one of the four corners. To avoid having gaps, have the corner of the paper align with the original square you started with. The first tile you trace can hang off the edge of the paper.

7) Rotate (turn) the tile to fit it next to your original tile.

8) Continue rotating the tile until the page is covered.

9) Colour your tessellation in a pattern



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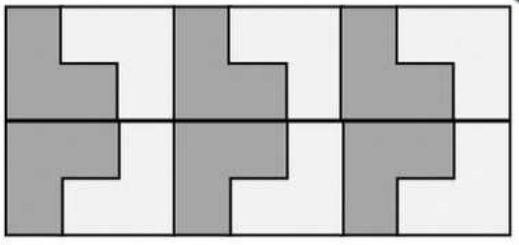
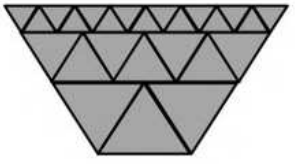
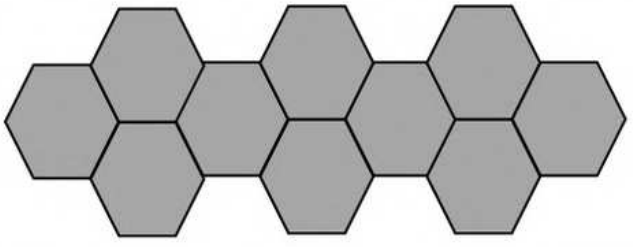
Curriculum Connection
E1.1

Describing Tessellations

Directions Choose one tile and describe how it is being transformed – rotated, translated, reflected and/or dilated

Tessellation	Description
1) 	
2) 	
3) 	
4) 	
5) 	

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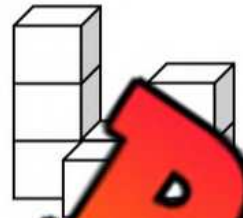
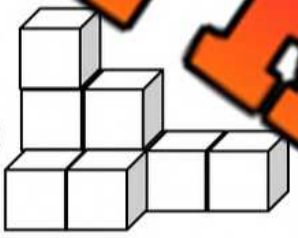
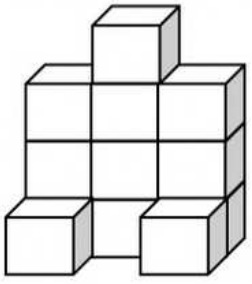
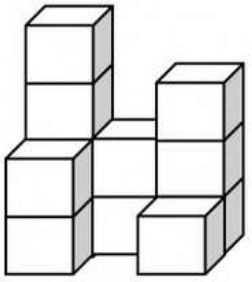
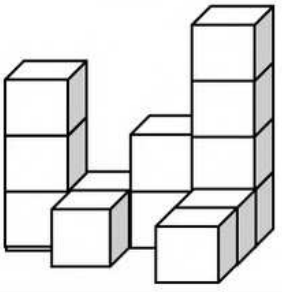
Curriculum Connection
E1.2

Drawing Top, Front, and Side Views of Objects

Instructions Draw the top, front, and side view of the objects below

Original Shape	Top View	Front View	Side View
1) 			
2) 			
3) 			
4) 			
5) 			

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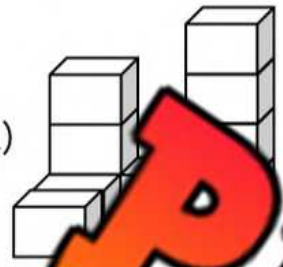
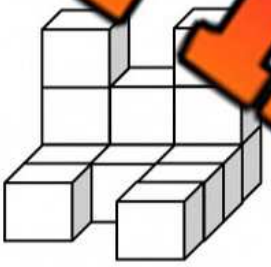
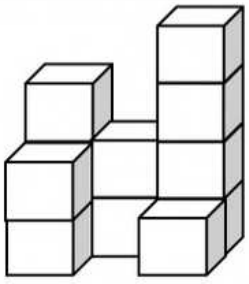
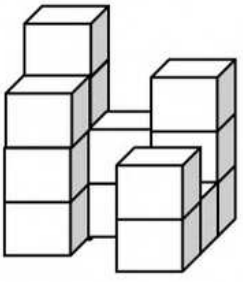
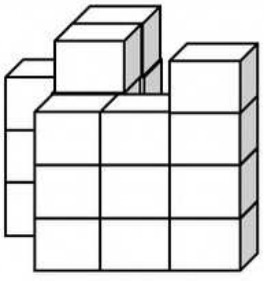
Curriculum Connection
E1.2

Drawing Top, Front, and Side Views of Objects

Instructions Draw the top, front, and side view of the objects below

Original Shape	Top View	Front View	Side View
1) 			
2) 			
3) 			
4) 			
5) 			

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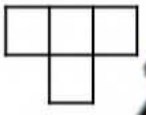
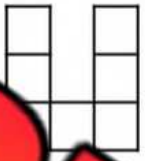
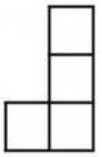
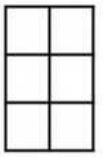
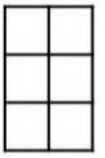
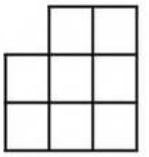
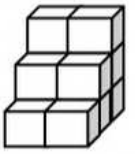
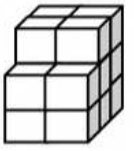
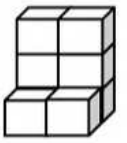
Curriculum Connection
E1.2

Drawing Top, Front, and Side Views of Objects

Instruction Look at the front, top, and side views and circle the matching 3D object

1) Top View	Front View	Side View
		
		

2) Top View	Front View	Side View
		
		

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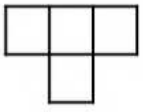
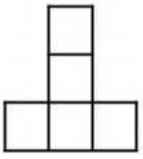
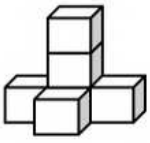
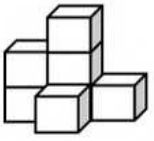
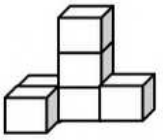
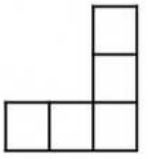
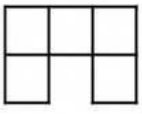
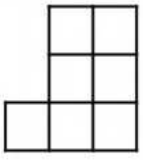
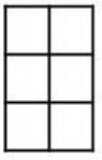
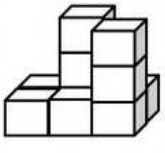
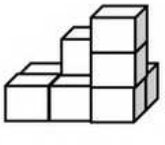
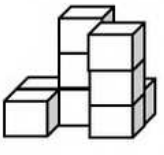
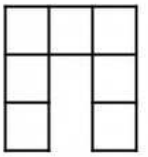
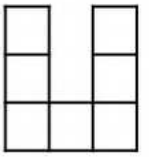
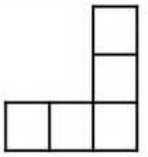
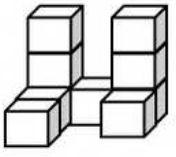
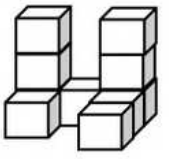
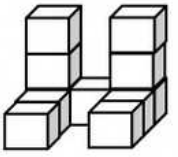
		
		

p View	Front View	Side View
		
		

5) Top View	Front View	Side View
		
		

6) Top View	Front View	Side View
		
		

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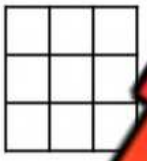
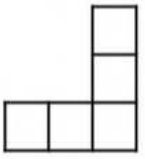
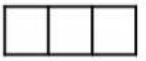
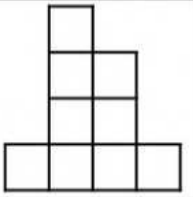
Curriculum Connection
E1.2

Drawing Top, Front, and Side Views of Objects

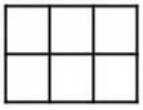
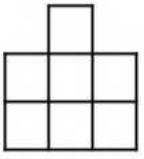
Instruction Draw the 3D objects by using the top, front, and side views

Top View	Front View	Side View
		

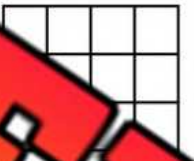
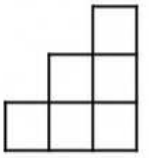
1)

Top View	Front View	Side View
		

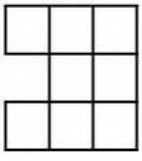
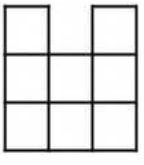
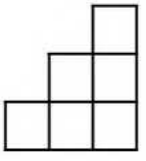
2)

Top View	Front View	Side View
		

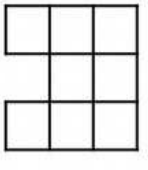
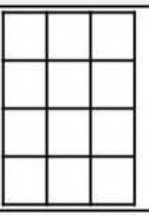
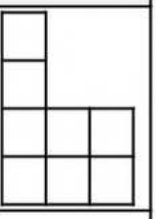
3)

View	Front View	Side View
		

4)

Top View	Front View	Side View
		

5)

Top View	Front View	Side View
		

6)

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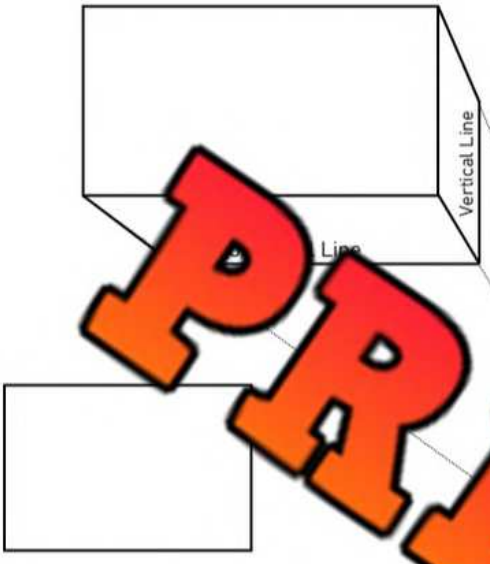
Curriculum Connection
E1.2

Drawing Perspective Views - Boxes

Questions

1) Connect the corners of the boxes to the vanishing point
2) Draw the sides of the boxes with horizontal lines and vertical lines



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Curriculum Connection
E1.2

Perspective Drawings – Stars

Questions

1) Connect the corners of the stars to the vanishing point
2) Draw the sides of the stars parallel to the shape of the star



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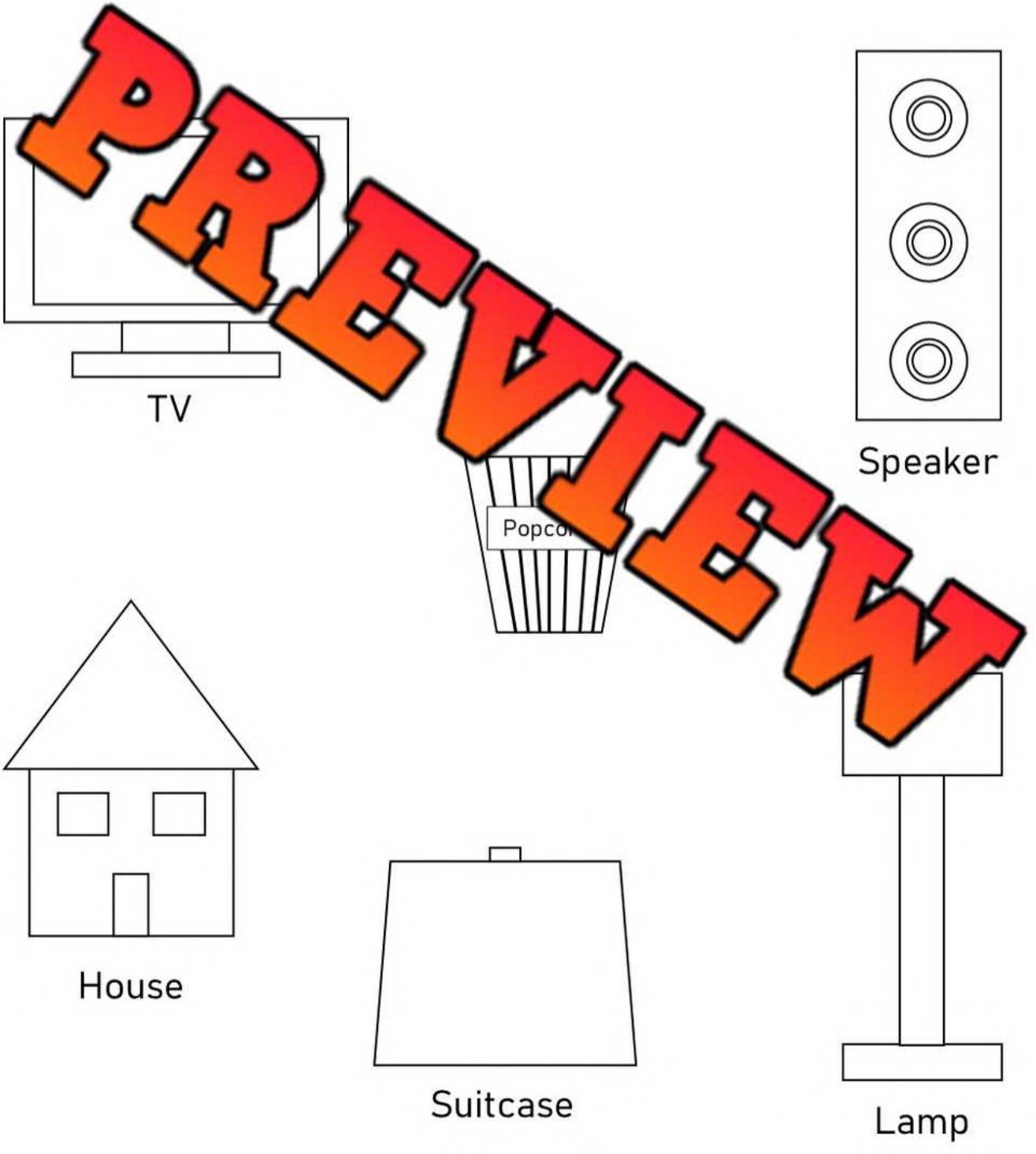
Curriculum Connection
E1.2

Perspective Drawings – Real-Life Objects

Questions	1) Connect the corners of the objects to the vanishing point 2) Draw the sides of the objects with parallel lines



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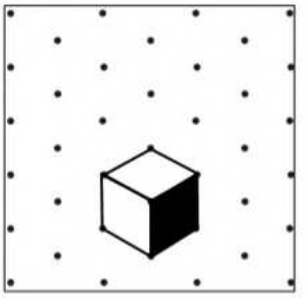
Curriculum Connection
E1.2

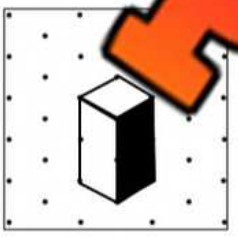
Isometric Projections

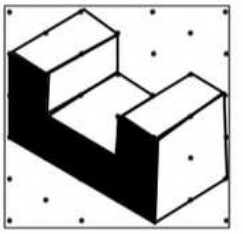
Isometric projections are drawn on a triangular grid. They are used to represent 3D objects in a 2D drawing. The projections show all lengths in the same scale, including the lines that show depth. However, angles are distorted to create the appearance of perspective. Therefore, a 90° angle in real life appears as 60° in an isometric projection.

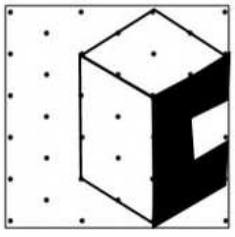


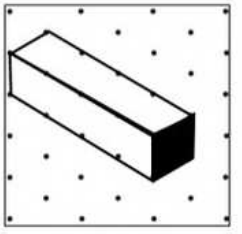
Questions

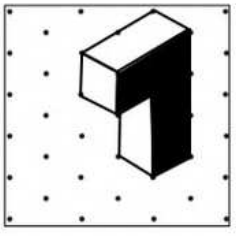
Copy the 8 three-dimensional drawings using the isometric dot paper

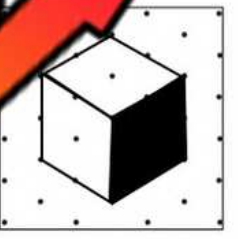


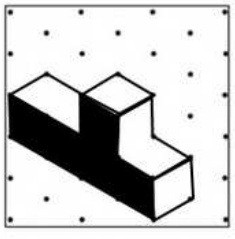


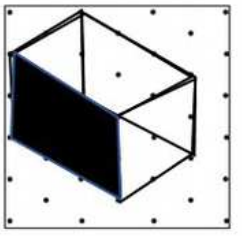












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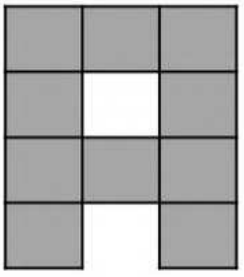
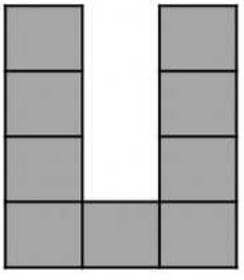
Curriculum Connection
E1.2

Isometric Projections

Questions Draw the isometric view of each letter. Use a scale of 1:1.

Letter	Front View	Isometric View
T		
A		
U		

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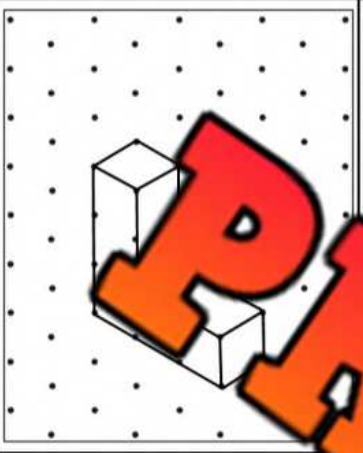
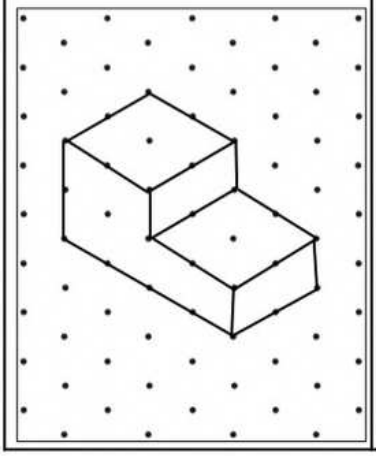
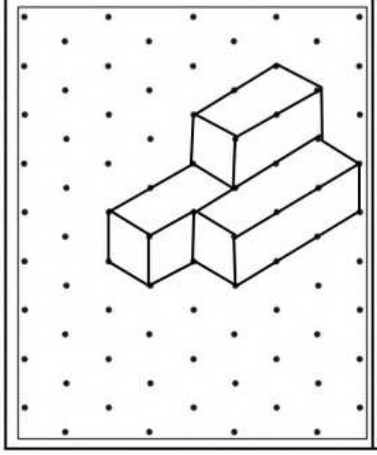
Curriculum Connection
E1.2

Isometric Projections

Questions Draw the top, front, and side views of the isometric drawing

Isometric View	Top View	Front View	Side View
			

Isometric View	Top View	Front View	Side View
			

Isometric View	Top View	Front View	Side View
			

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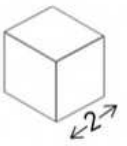
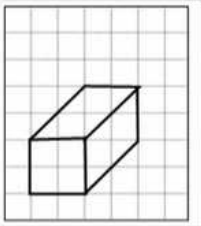
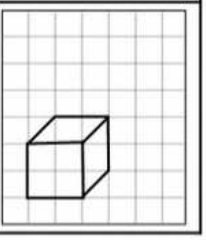
Curriculum Connection
E1.2

Cavalier vs Cabinet Drawings

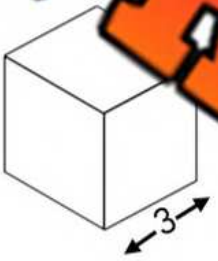
Cavalier Drawings – Full size – All 3 Dimensions
1) Draw the front view first
2) Use the same depth as the isometric view

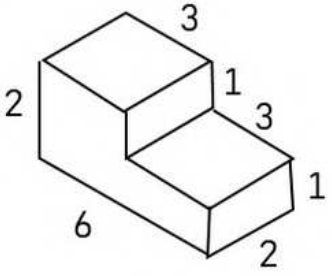
Cabinet Drawings – Depth is projected in half
1) Draw the front view first
2) Use half of the depth as the isometric view

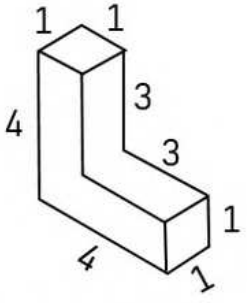
Isometric View	Cavalier	Cabinet
Cube 		

Questions Draw the top, front, and side views of the isometric drawing

PREVIEW

Isometric View	Cavalier	Cabinet
1) Cube 		

Isometric View	Cavalier	Cabinet
2) 		

Isometric View	Cavalier	Cabinet
3) 		

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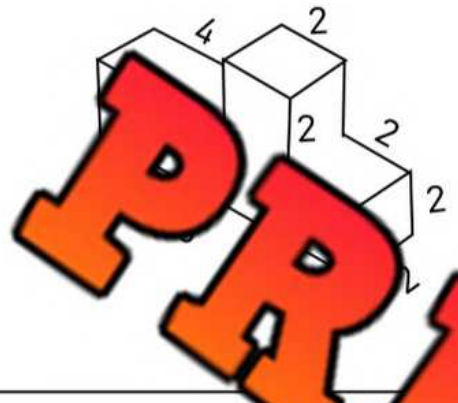
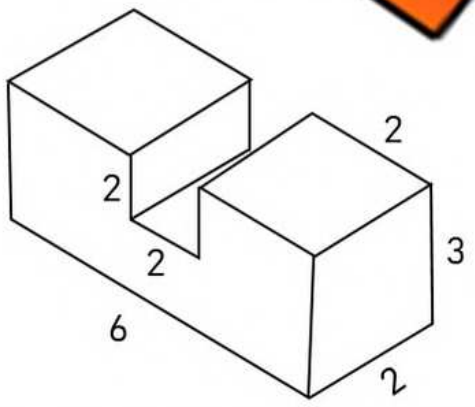
Name: _____ 45

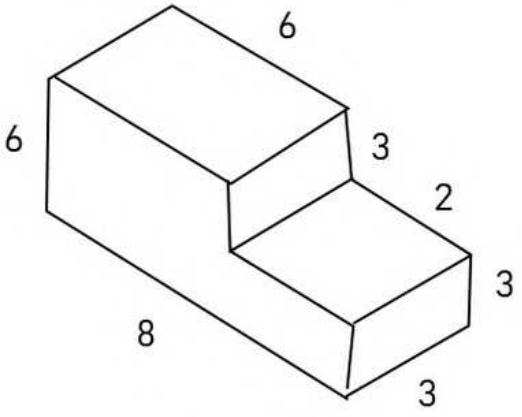
Curriculum Connection
E1.2

Cabinet Projections

Questions Draw the top, front, and side views of the isometric drawing

Isometric Drawing	Cabinet Drawing
1) 	

Isometric Dra	Cabinet Drawing
2) 	

Isometric Drawing	Cabinet Drawing
3) 	

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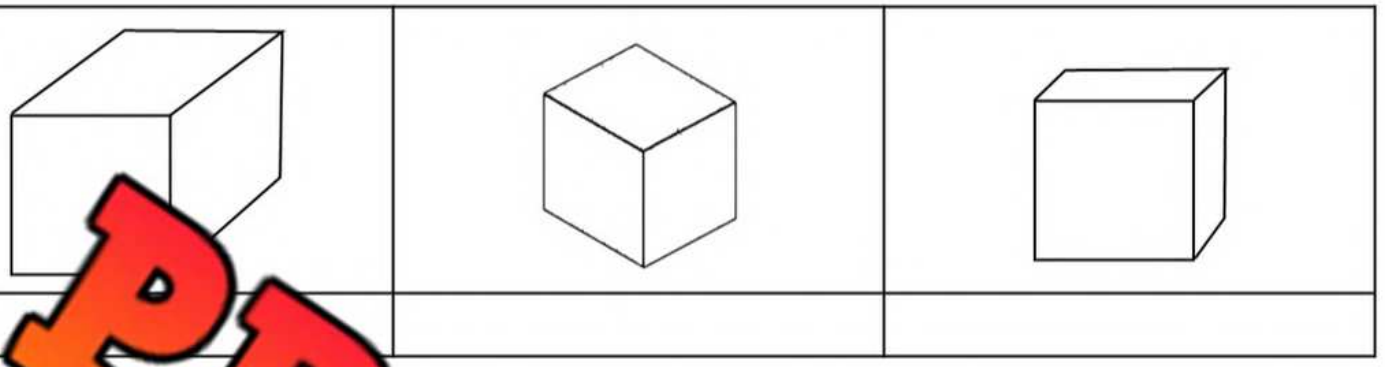
E1.2

Different Drawing Types

Part 1 Label the drawings – isometric, cavalier, or cabinet

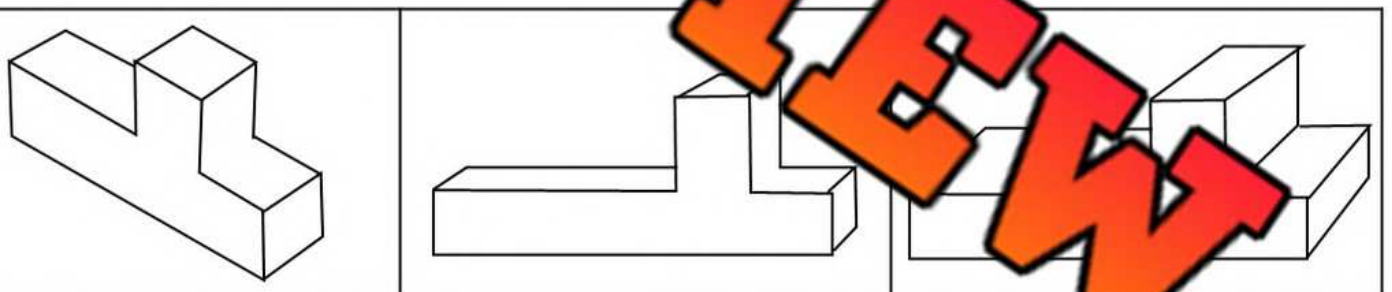
1)



2)



3)



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Part 2 Answer the questions below

1) Which type of drawing uses the exact measurements – side lengths and angles?

2) Which type of drawing gives the most realistic representation? Explain.

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Scale Drawings

Scale Drawings
A scale drawing is used to draw a shape or object smaller or larger than the original but keeping the proportions the same. For example, the CN Tower is 553m tall. The tower on the right is to scale, with a scale of 1cm to 100m, or 1:10000.

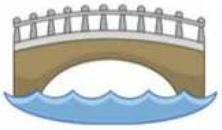


1cm:100m

Questions Answer the questions below

PREVIEW

1) If a [illegible] ng and 1cm equals [illegible]m, ho[illegible] long would the bridge be [illegible]



2) The dimensions of a house are 18m by 34m. If one cm equals 2m, what are the scaled dimensions of the house?



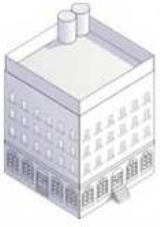
3) If one cm equals 250km on a map, how many centimetres would be used to represent 3000km?



4) T[illegible]ength[illegible]ad is 660km. If 1cm e[illegible]20k[illegible]W[illegible]cm would repre[illegible]ngth o[illegible]oad?



5) Dimensions of a building are 120m by 90m. If one cm equals 15m, what are the dimensions of the building?



6) If one cm equals 18km on a map, how many cm would be used to represent 162km?



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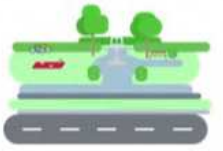
Scale Drawings

Questions | Answer the questions below

1) An engineer used a scale of 1cm:20m to design a city park. The park will be 360m by 140m. What should the dimensions of the park be on the map?



2) A [illegible] been drawn to scale. The height of the building on the map is [illegible]m tall [illegible] is 1cm to 6m. What is the height of the building in real-life?



3) An artist builds a model of a car to [illegible] 25cm long. The scale is 1cm to 25cm.

a) What is the length of the car in centimet[illegible]

b) What is the length of the car in metres?



4) The height of a tree is 11 metres tall and 2.5 metres wide. Li[illegible]aw it to scale so she chooses a scale of 1cm to 0.5m. What will the dimens[illegible] the tree be on her page in centimetres?



5) Carter is figuring out the distance to drive from Toronto to Ottawa on a map. The scale is 1cm to 100km. The distance on the map is 4.6cm. What is the distance from Toronto to Ottawa in kilometres?



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Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Questions: Answer the questions below

1) A road map uses a scale of 1 cm to 15 km. The distance between two cities on the map is 7.8 cm. What is the actual distance between the two cities?

2) A blueprint of a house has a scale of 1 cm to 5 m. If the living room measures 4.5 cm by 6 cm on the blueprint, what are the real-life dimensions of the living room?

Name: _____

Questions: Answer the questions below

1) A road map uses a scale of 1 cm to 15 km. The distance between two cities on the map is 7.8 cm. What is the actual distance between the two cities?

2) A blueprint of a house has a scale of 1 cm to 5 m. If the living room measures 4.5 cm by 6 cm on the blueprint, what are the real-life dimensions of the living room?

Name: _____

Questions: Answer the questions below

1) A road map uses a scale of 1 cm to 15 km. The distance between two cities on the map is 7.8 cm. What is the actual distance between the two cities?

2) A blueprint of a house has a scale of 1 cm to 5 m. If the living room measures 4.5 cm by 6 cm on the blueprint, what are the real-life dimensions of the living room?

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Drawing Buildings Using Scale Factors

Questions | Use the grid to draw the dimensions of the buildings



1 square = 1cm

1) A building's base is 36m wide and 54m long. Use a scale of 1cm to 6m.

2) A b[illegible]g has a[illegible]h the following dimensions: 90m by [illegible]m. Use [illegible]1cm to 10m.

3) A chocolate bar is 35cm long and [illegible]de. U[illegible] scale of 1:5 to draw the chocolate ba[illegible] the gri[illegible]

4) A phone is 15cm by 8cm. Use a scale of 1:2 to draw the phone on the grid.

5) A book is 18cm by 28cm. Use a scale of 1:4 to draw the book on the grid.

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Creating Scaled Drawings

Questions Draw the objects on the grid by choosing an appropriate scale. 1 square = 1cm

1) Building 1: 16m by 12m	Building 2: 24m by 32m	Building 3: 56m by 22m
Car: 2m by 4m	Transport: 2m by 10m	Parking lot: 26m by 16m

Scale: _____

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2) Building 1: 48m by 18m	Building 2: 78m by [illegible]	Build[illegible]2m by 30m
Parking lot 1: 9m by 18m	Parking lot 2: 24m by 36m	Parki[illegible] 21[illegible]by 54m

Scale: _____

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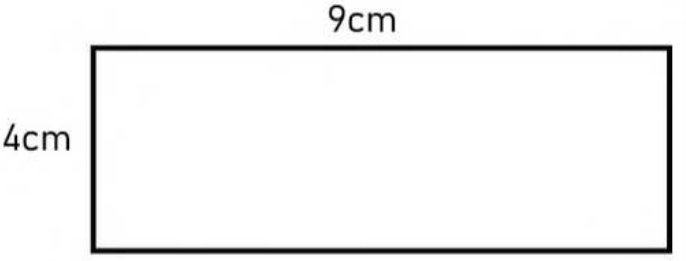
Determining the Scale

Questions | Answer the questions below

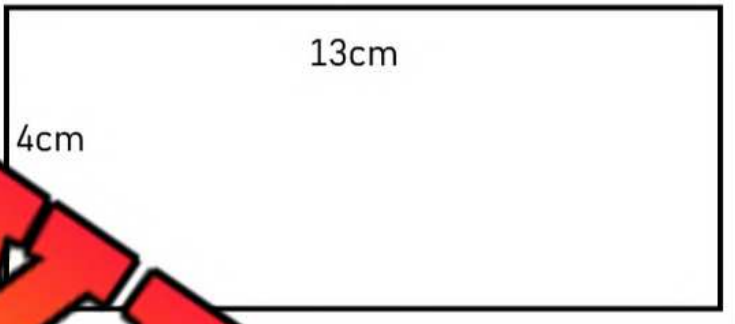
1) A park is 54m long and 24m wide. A scaled drawing was created to represent the park.

What scal[illegible] used in the drawing?



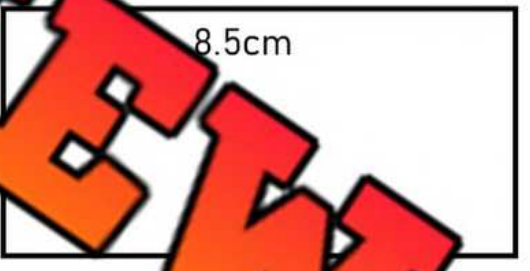
2) A [illegible] the fol[illegible] imensions: 117cm by [illegible]86cm. A [illegible]raw[illegible]g was created to rep[illegible] TV.

What scale was used [illegible]



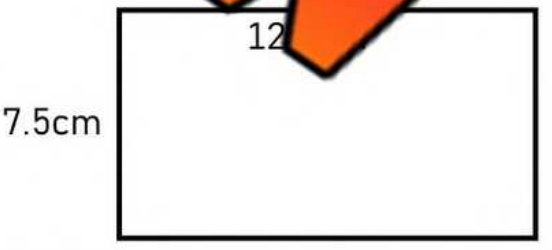
3) A tabletop has the following dimen[illegible]ns: 102cm by 48cm. A scaled drawing was used to represent the tabletop.

What scale was used in the drawing?



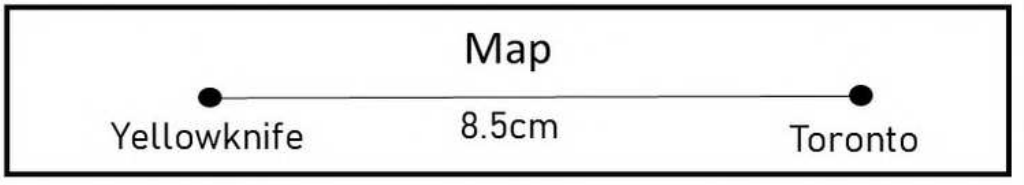
4) A computer monitor is 100cm wide and 60cm tall. A scaled drawing was used to represent the monitor.

What scale was used in the drawing?



5) The distance from Yellowknife to Toronto is 4,250km. Vincent measured the distance on a map and determined it was 8.5cm.

What scale was used on the map?



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Using Scale on Map of Canada

Questions | Print this using default settings to achieve a friendly scale



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Using Scale on Map of Canada

Use the legend on the map of Canada to determine the distances between cities.

1) Measure the length of the scale provided on the legend. Use the kilometre measurement (not miles).
2) Determine the scale by comparing the length of the line to the measurement provided.

For example: km 0 100 200 300

The length of the line is 3cm total. This means 1cm = 100km.



Question: Use the scale to determine the distance from city to city

	City 1	City 2	Distance - cm	Distance - km
1)	Toronto			
2)	Winnipeg	Ottawa		
3)	Victoria	Regina		
4)	Kingston	Saskatoon		
5)	Vancouver	Charlottetown		
6)	Prince Rupert	St. John's		
7)	Calgary	Timmins		
8)	Thunder Bay	Moncton		
9)	Sudbury	Whitehorse		
10)	Dawson City	Brandon		
11)	Edmonton	Yellowknife		
12)	Iqaluit	Montreal		
13)	Halifax	Fort McMurray		

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Calculating Area Using Scale Drawings

We can determine the area of region or object by using its scaled dimensions. We do this by determining the actual dimensions and then using them in the formula for area – length times width (A = L x W)

Example: A park is 8cm by 9cm on a map. The scale is 1cm:20m.

Actual Dimension: 160m x 180m
Area = 160 x 180 = 28 800 m^2

Questions | Calculate the area using the scaled dimensions

1) A drive[illegible]8cm by 8cm on a scaled drawing. The scale is 1cm:12m. What is the actual ar[illegible]driveway?

2) A TV has been d[illegible]to [illegible]by 9cm. The scale is 1cm:8cm. What is the actual area of the T[illegible]

3) You are deciding whether to buy the lates[illegible]e but[illegible]ow the area of it. A scaled drawing shows it is 8mm by 4mm. The [illegible]What is the actual area of the phone?

4) A painting you are thinking of buying online has been drawn to sc[illegible]with the following dimensions: 9cm by 16cm. The scale in centimetres is 1:12. What is the actual area of the painting?

5) Neill is buying a lot to build his house on. He has seen a scaled drawing of the lot that measured 14cm by 22cm. The scale used was 1cm to 4m. What is the area of the lot?

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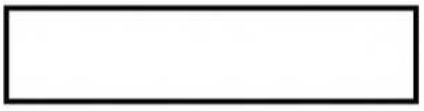
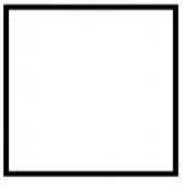
Calculating Area Using Scale Drawings

Questions | Fill in the table below

Scaled Drawing	Area of Scaled Drawing	Area of Actual Region
1) 		
2)  Scale = 1cm:8m		
3)  Scale = 1cm:10m		
4)  Scale = 1cm:20m		
5)  Scale = 1cm:1000m		

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E1.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Calculating Area Using Scale Drawings

Scale = 1cm:3m



Area of Scaled Region = _____

2) A scaled blueprint of a rectangular park shows dimensions of 25 cm by 10 cm. The scale is 1 cm:5 m. What is the actual area of the park?

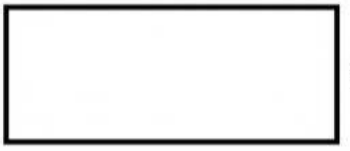
_____

Name: _____

1) Calculating Area Using Scale Drawings

Scale = 1cm:3m

7cm



5cm

Area of Scaled Region = _____

2) A scaled blueprint of a rectangular park shows dimensions of 25 cm by 10 cm. The scale is 1 cm:5 m. What is the actual area of the park?

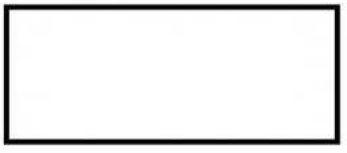
_____

Name: _____

1) Calculating Area Using Scale Drawings

Scale = 1cm:3m

7cm



5cm

Area of Scaled Region = _____

2) A scaled blueprint of a rectangular park shows dimensions of 25 cm by 10 cm. The scale is 1 cm:5 m. What is the actual area of the park?

_____

Name: _____

1) Calculating Area Using Scale Drawings

Scale = 1cm:3m

7cm



5cm

Area of Scaled Region = _____

2) A scaled blueprint of a rectangular park shows dimensions of 25 cm by 10 cm. The scale is 1 cm:5 m. What is the actual area of the park?

_____

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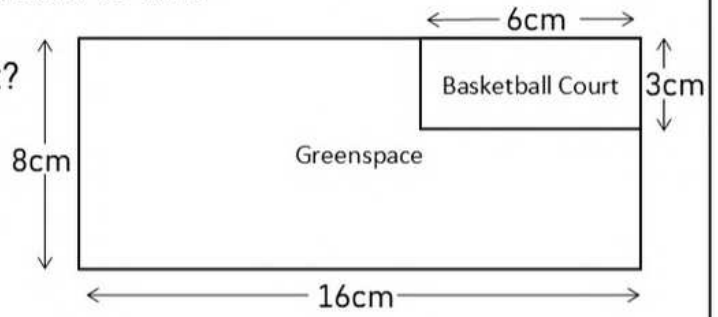
Calculating Area Using Scale Drawings

Questions | Answer the word problems below

1) A scale drawing for a park is shown below. The park has some greenspace and a basketball court. The scale in the drawing is 1cm to 5m.



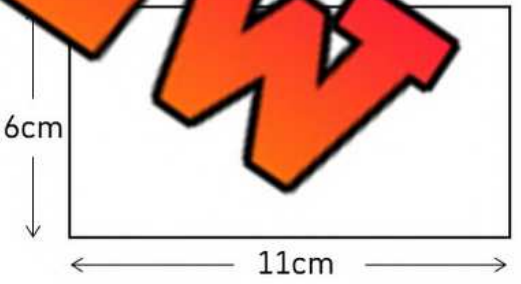
a) What is the area of the basketball court?

b) What is the area of the entire park?

c) What is the area of the greenspace?

PREVIEW

2) Courtney is painting a wall in her house. She is painting the wall that is shown below. The scale that was used in centimetres was 1:50.



a) What is the area of the wall in centimetres?

b) If the paint for the wall costs $5.35 to cover 1 metre of wall, how much will it cost Courtney to paint her wall?

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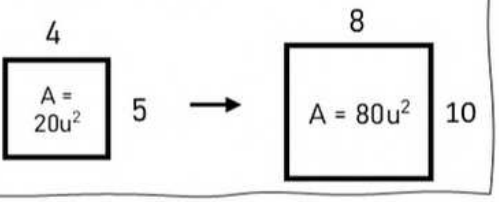
Area Using Scale Factor

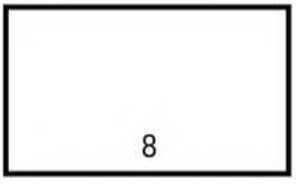
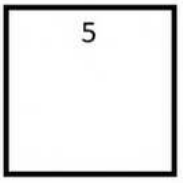
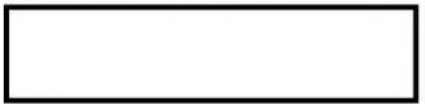
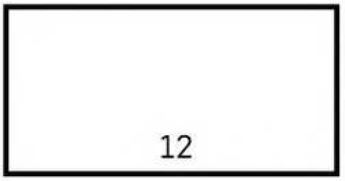
A scale factor is the number by which all dimensions of an object are multiplied in order to create a proportionally larger or smaller representation. If the scale factor is a **whole number**, the representation will be **larger**. If the scale factor is a **fraction** or **decimal smaller than 1**, it will become **smaller**.

Example using 2 as scale factor:



Questions Calculate the area of the original shape and the area of the scaled drawing

PREVIEW

Original Shape	Scaled Drawing
1) 	Scale Factor = 2 Area = _____
2)  Area = _____	Scale Factor = 3 Area = _____
3)  Area = _____	Scale Factor = 3 Area = _____
4)  Area = _____	Scale Factor = 0.5 Area = _____
5)  Area = _____	Scale Factor = 1/3 Area = _____

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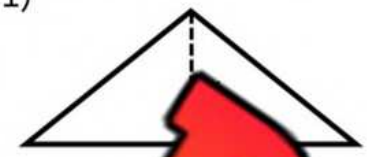
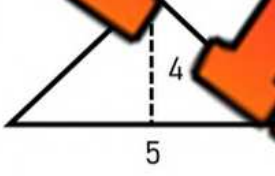
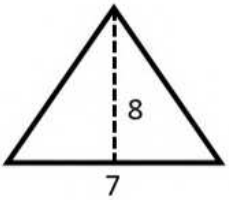
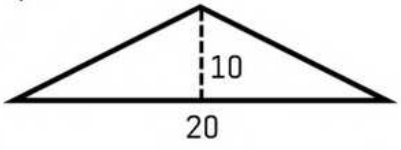
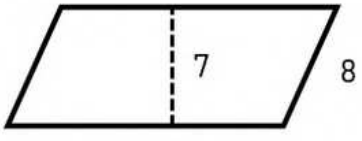
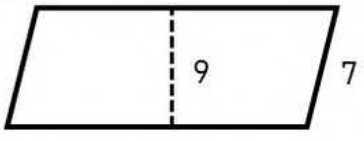
E1.3

Area Using Scale Factor

Questions Calculate the area of the original shape and the area of the scaled drawing

Original Shape	Scaled Drawing
1)  Area = _____	Scale Factor = 1/2 Area = _____
2)  Area = _____	Scale Factor = 4 Area = _____
3)  Area = _____	Scale Factor = 1/2 Area = _____
4)  Area = _____	Scale Factor = 1/2 Area = _____
5)  Area = _____	Scale Factor = 2 Area = _____
6)  Area = _____	Scale Factor = 3 Area = _____

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Curriculum Connection
E1.4

Enlargement and Reductions

An **enlargement** is when we enlarge a shape by a scale factor to form a similar shape. A **reduction** is when we shrink a shape by a scale factor to form a similar shape. A **similar shape** is a shape that has the same angles and the side lengths have been changed proportionally. For example, if we change the length by 2 times, we change the width by 2 times as well.

Questions e the scale factor to perform enlargements/reductions of the original shape

Ex.) Scale ... 2 (...large 2 times)

Orig...al (O)

Example A...

1) Scale Factor = 1:2

O

2) Scale Factor = 1:3

O

3) ...le Fa... 1:4

O

4) Scale Factor = 2:1 (reduction)

O

5) Scale Factor = 3:1

O

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Curriculum Connection
E1.4

Intro to Dilations

A **dilation** is a transformation that stretches or shrinks a figure by a certain scale factor. Unlike translations, reflections, and rotations, a dilation does not produce a congruent image. Instead, a dilated image produces a similar figure that has the same shape with equal angles and proportional side lengths.

When the scale factor is greater than 1, we are enlarging the original figure. If it is less than 1, we are reducing the original figure.

PREVIEW

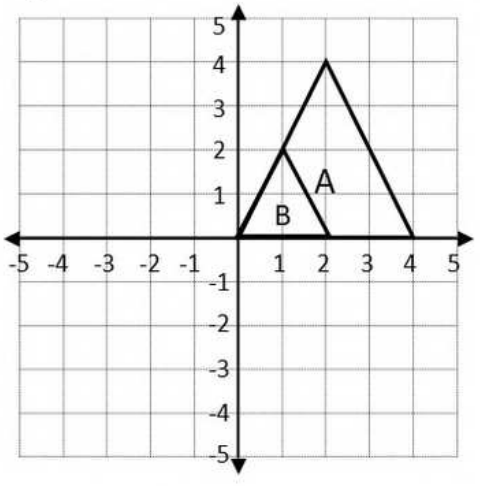
Part 1 St…er a dilation with the given scale factor is a reduction or enlargement

	Facto…	…tion Type
1)	k = …	
2)	k = 2	
3)	$k = \frac{1}{2}$	
4)	k = 0.5	
5)	k = 0.75	

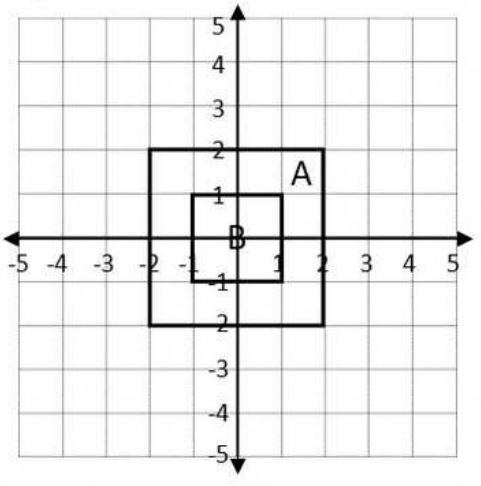
	Scale Factor	Dilation Type
6)	$k = \frac{6}{3}$	
7)	k = 5	
8)	k = 0.25	
9)	k…	
10)		

Part 2 Is the dilation from figure A to B an enlargeme… r re…

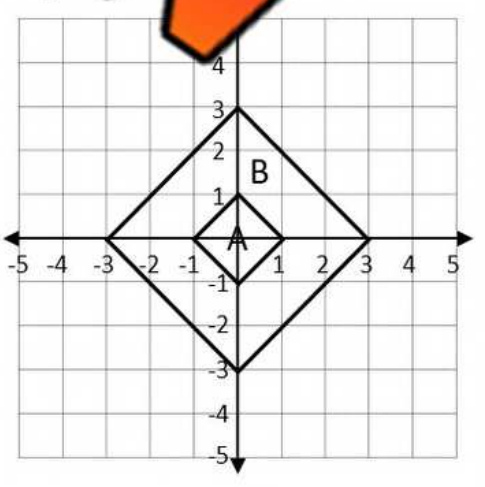
1)



2)



3)



_____ _____ _____

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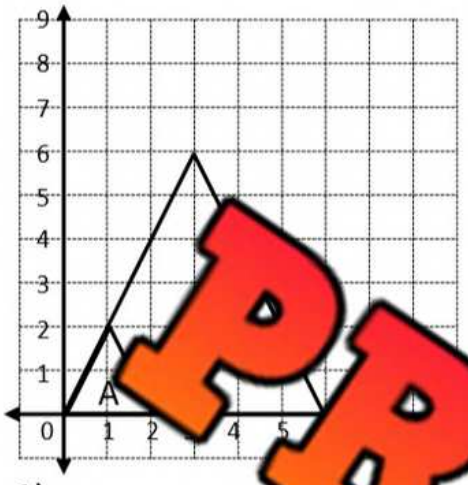
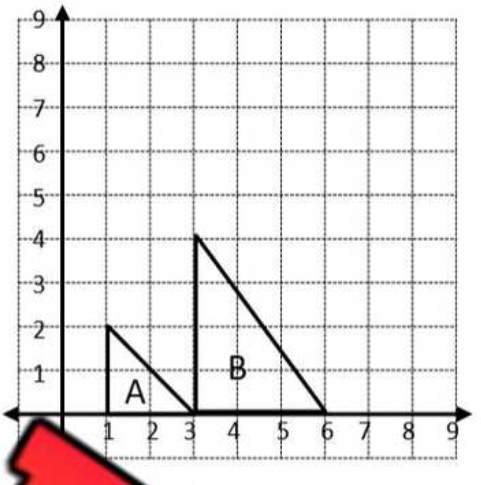
Curriculum Connection
E1.4

Dilations – Determining Scale Factors

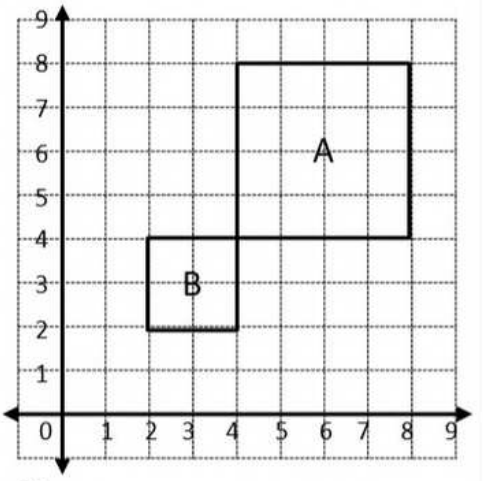
Questions Is the dilation from A to B an enlargement or reduction? What is the scale factor?



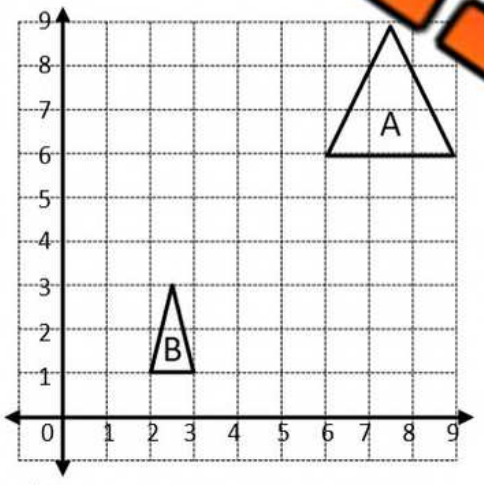
1) _____ k = ____



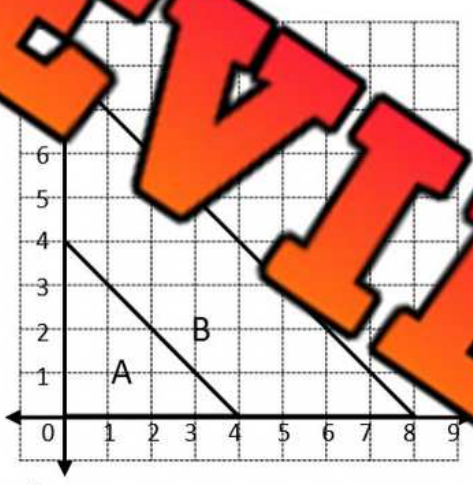
2) _____ k = ____



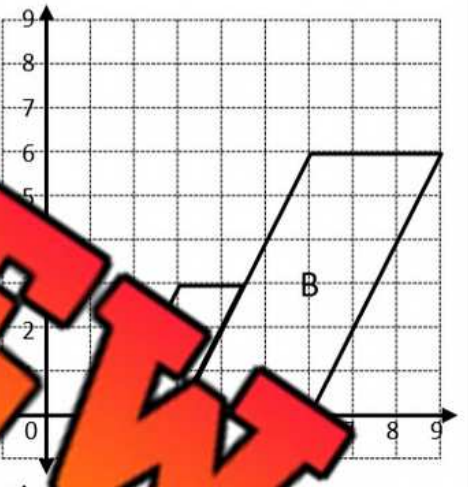
3) _____ k = ____



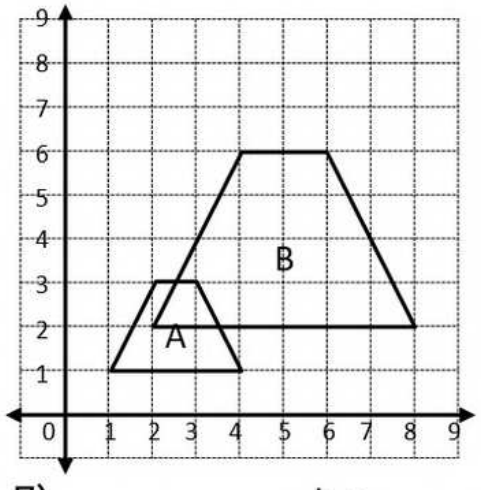
4) _____ k = ____



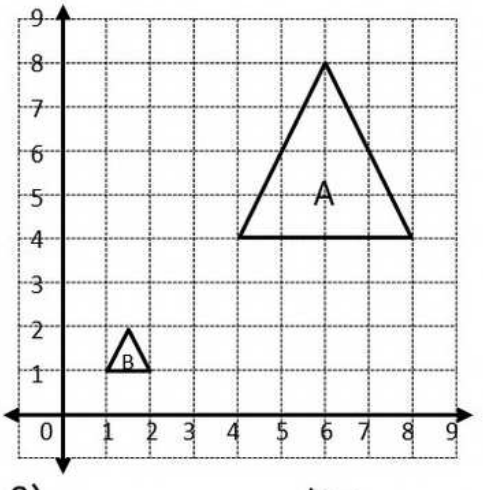
5) _____ k = ____



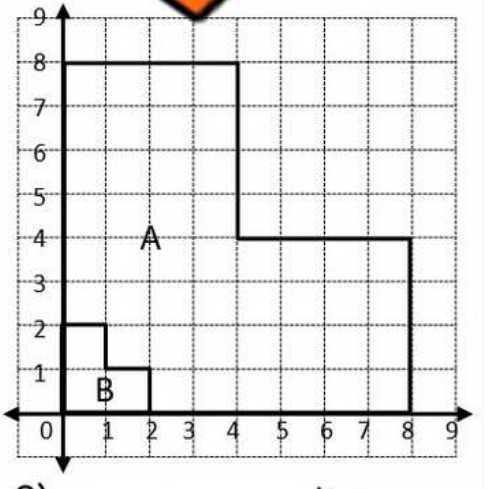
6) _____ k = ____



7) _____ k = ____



8) _____ k = ____



9) _____ k = ____

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Curriculum Connection
E1.4

Dilations – Finding New Coordinates

The mapping rules for dilations help us determine where the new coordinates will be after we have transformed the original points by a scale factor.

Mapping Rule: $(x, y) \rightarrow (kx, ky)$ where k = scale factor

For example, $(x, y) \rightarrow (2x, 2y)$; each of the image points are double the original points because the scale factor is 2. Therefore, the image point for (−3, 4) would be (−6, 8).

Part 1 Find the dilated coordinates of the triangles below

	Coordinate A	Coordinate B	Coordinate C
Original Coordinates	(3, 4)	(-3, 5)	(0, 0)
Dilated Coordinates			

2) k = 1/4	Coordinate A	Coordinate B	Coordinate C
Original Coordinates	(-2, -4)	(4, 12)	(-2, 4)
Dilated Coordinates			

3) k = 1.5	Coordinate A	Coordinate B	Coordinate C
Original Coordinates	(2, -4)	(6, -10)	(8, -10)
Dilated Coordinates			

Part 2 Find the dilated coordinates of the quadrilaterals

1) k = 3	Coordinate A	Coordinate B	Coordinate C	Coordinate D
Original Coordinates	(-2, 5)	(-1, 4)	(4, 5)	(-3, 7)
Dilated Coordinates				

2) k = 2	Coordinate A	Coordinate B	Coordinate C	Coordinate D
Original Coordinates	(1, 5)	(-4, 3)	(2, -6)	(5, -8)
Dilated Coordinates				

3) k = 1/2	Coordinate A	Coordinate B	Coordinate C	Coordinate D
Original Coordinates	(-4, 6)	(-10, 6)	(5, -8)	(12, -9)
Dilated Coordinates				

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Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Questions: Answer the questions below

State the new coordinates of a point after a dilation with the given scale factor. Use the point (x, y) = (3, 2) as the original.

A) Scale Factor k = 3 _____

B) Scale Factor k = 0.5 _____

C) Scale Factor k = 3/4 _____

D) Scale Factor k = 0.25 _____

E) Scale Factor k = 4/2 _____

Name: _____

Questions: Answer the questions below

State the new coordinates of a point after a dilation with the given scale factor. Use the point (x, y) = (3, 2) as the original.

A) Scale Factor k = 3 _____

B) Scale Factor k = 0.5 _____

C) Scale Factor k = 3/4 _____

D) Scale Factor k = 0.25 _____

E) Scale Factor k = 4/2 _____

Name: _____

Questions: Answer the questions below

State the new coordinates of a point after a dilation with the given scale factor. Use the point (x, y) = (3, 2) as the original.

A) Scale Factor k = 3 _____

B) Scale Factor k = 0.5 _____

C) Scale Factor k = 3/4 _____

D) Scale Factor k = 0.25 _____

E) Scale Factor k = 4/2 _____

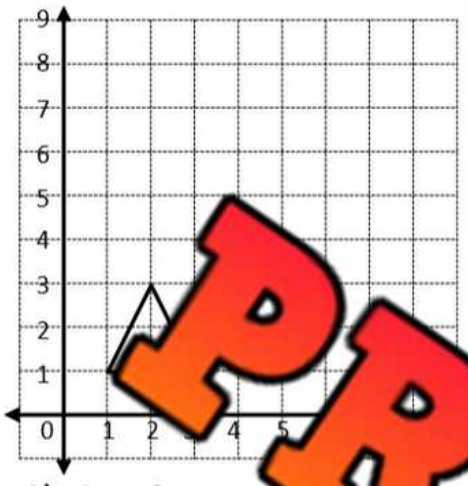
PREVIEW

Name: _____ 74

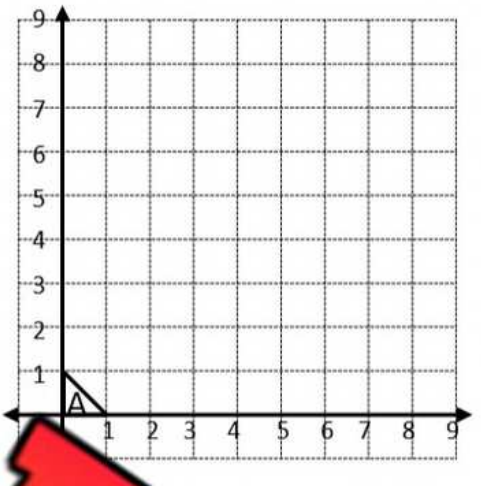
Curriculum Connection
E1.4

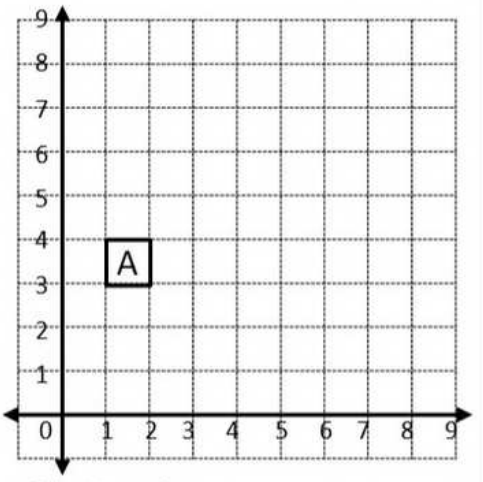
Performing Dilations

Instructions Draw the dilated shape on the grid

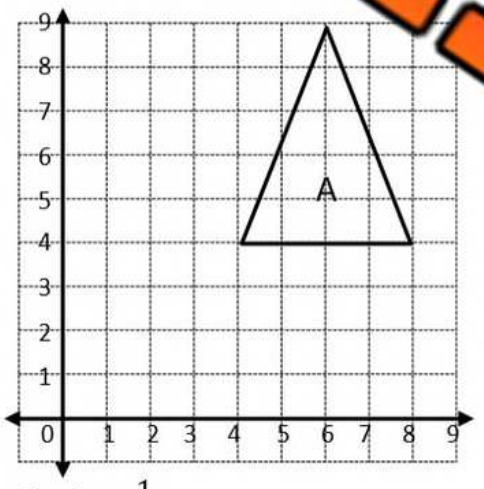


1) k = 3

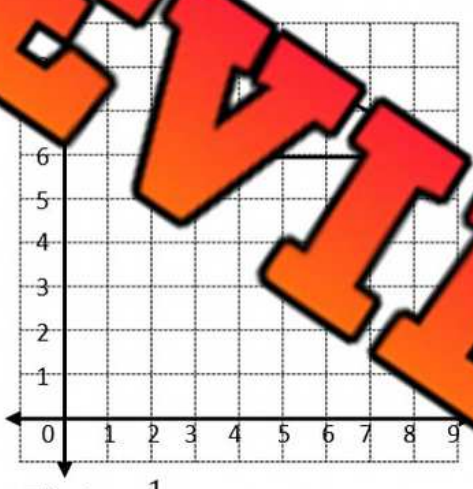




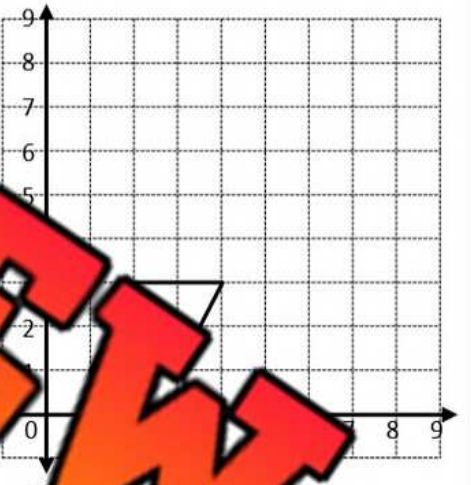
3) k = 2



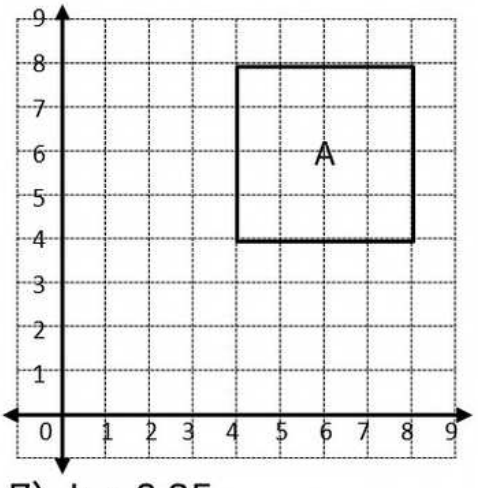
4) $k = \frac{1}{2}$



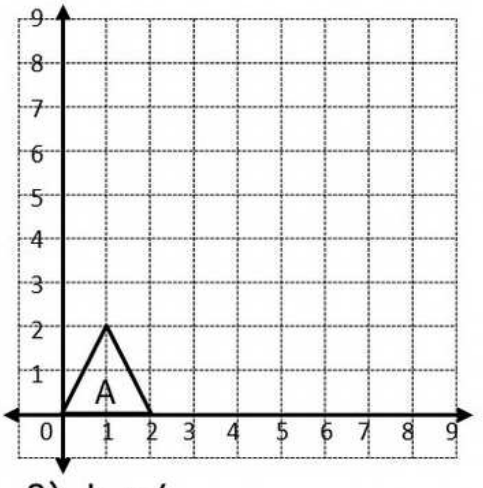
5) $k = \frac{1}{3}$



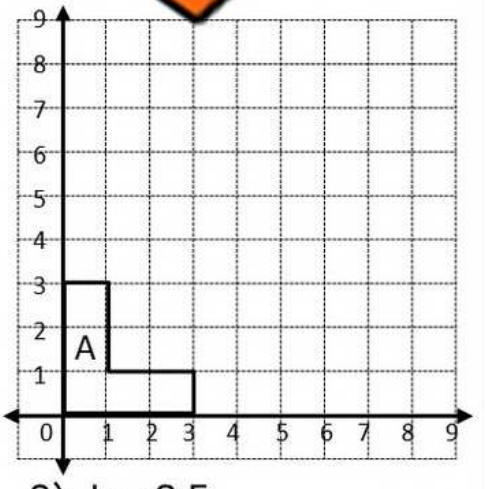
6) k =



7) k = 0.25



8) k = 4



9) k = 2.5

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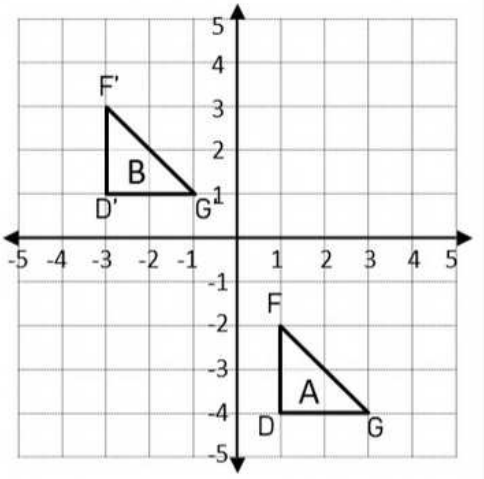
E1.4

Translations – Mapping Rules

Mapping Rules for Translations

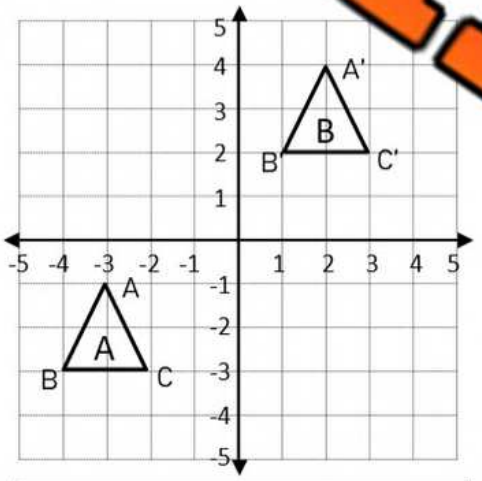
Each point on a shape slides according to the mapping rule.
The rule is (x, y) → (x + a, y + b)

1) Choose 1 coordinate from the shape to translate
2) We need to move the x coordinate -4 spaces to the left. This means we subtract 4.
3) We need to move the y coordinate +5 spaces up. This means add 5.
4) The **mapping rule** is: (x, y) → (x – 4, y + 5)
5) Remember if we move to the left or down, we are adding a negative number (subtracting) and if we move right or up, we are adding a positive number.

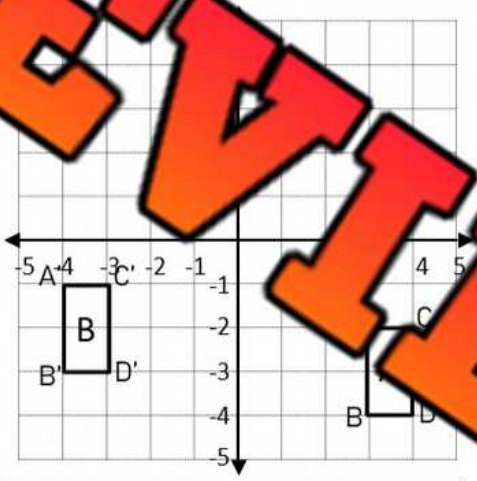


PREVIEW

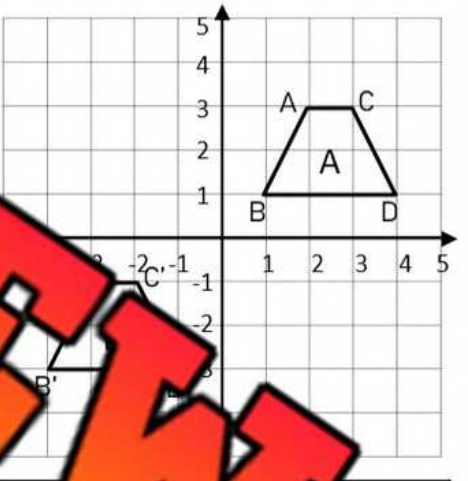
Instructions Find the mapping rule that translates figure A to figure B



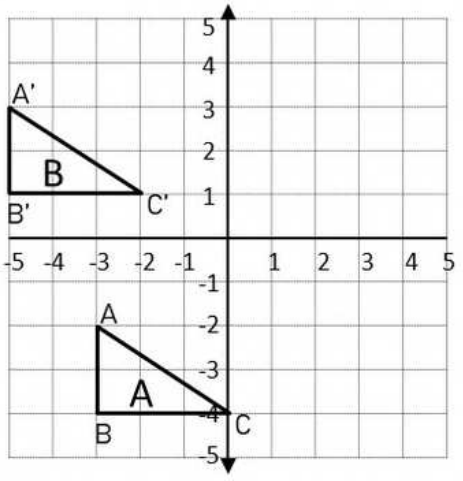
Mapping Rule	(x☐ __, y☐ __)



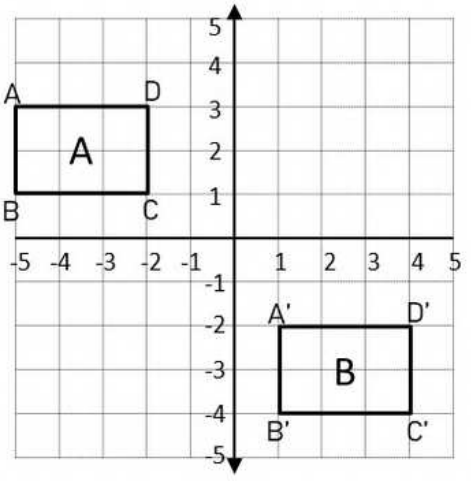
Mapping Rule	(x☐ __, y☐ __)



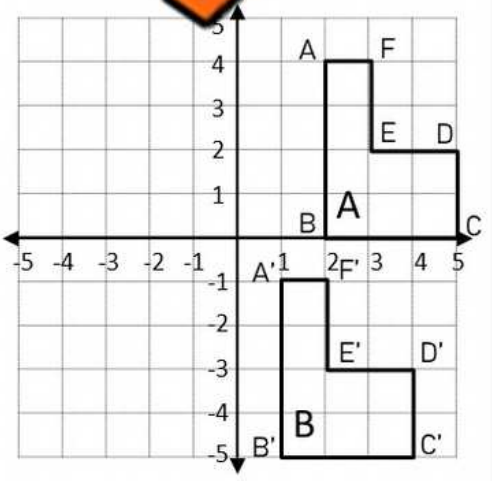
Mapping Rule	(x☐ __, y☐ __)



Mapping Rule	(x☐ __, y☐ __)



Mapping Rule	(x☐ __, y☐ __)



Mapping Rule	(x☐ __, y☐ __)

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Curriculum Connection
E1.4

Math Activity: Translation Relay Race

Objective

What are we learning about?

To help students understand and describe translations using mapping rules on a Cartesian plane through a fun and engaging relay race activity.

Materials

What you will need for the activity.



- Grap
- R
- ed penci kers
- Penc and e
- Translatio

PREVIEW

Instructions

How y plete tivity

1. Explain Translations: Start b expla tions on the Cartesian plane involve moving shapes without rot resizi n. Introduce the concept of mapping rules (e.g., (x, y) → (x+3, y).
2. Distribute Materials: Provide each team wi -draw ap per and a set of translation task cards with mapping rules.
3. Form Teams: Divide the class into small teams, each be desk with their graph paper and task cards.
4. Translation Task: The first student in each team picks a transla ta nd then plots the point on the grid at the given coordinates - e.g., (2, 3).
5. Perform Translation: The student then applies the mapping rule from the task card to the point's coordinates and draws the new position on the grid.
6. Pass to Next Student: The student then goes to the end of the line, and the next student steps up.
7. Repeat Process: The next student repeats the process.
8. Continue Relay: Continue the relay until all team members have had a turn or all task cards are used.
9. Verification and Discussion: The teacher verifies the translations, and the class discusses the different translations and observations.

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E1.4

Task Cards	Cut out the task cards below

Card 11:

Start: (0, -4)
Mapping Rule: (x, y) → (x+5, y+2)

Card 16:

Start: (4, 4)
Mapping Rule: (x, y) → (x+3, y+1)

Card 12:

Start: [illegible])
Mapping Rule: [illegible]) → ([illegible])

Card 17:

Start: (0, -3)
Mapping Rule: (x, y) → (x+5, y+4)

Card 13:

Start: (-5, 1)
Mapping Rule: (x, y) → (x+2, y+5)

Card 18:

Start: (2, 2)
Mapping Rule: [illegible]) → (x-8, y-8)

Card 14:

Start: (-2, -5)
Mapping Rule: (x, y) → (x+7, y+4)

Card 19:

Start: (5, 1)
Mapping Rule: (x, y) → (x+3, y+3)

Card 15:

Start: (-4, 1)
Mapping Rule: (x, y) → (x+6, y+4)

Card 20:

Start: (-3, 0)
Mapping Rule: (x, y) → (x+4, y+4)

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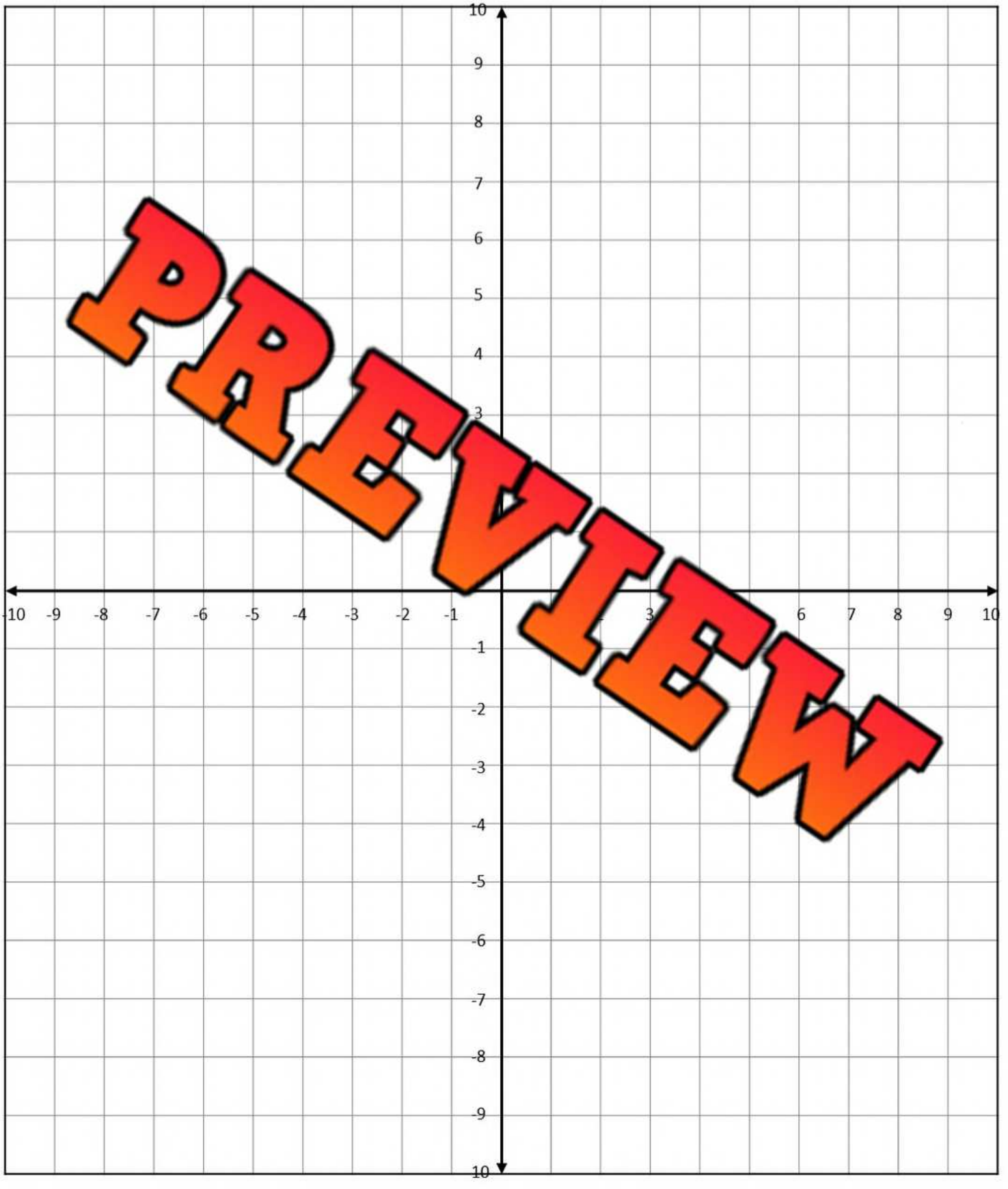
Curriculum Connection
E1.4

Grid Paper | Use the cartesian plane to perform the translations



PREVIEW

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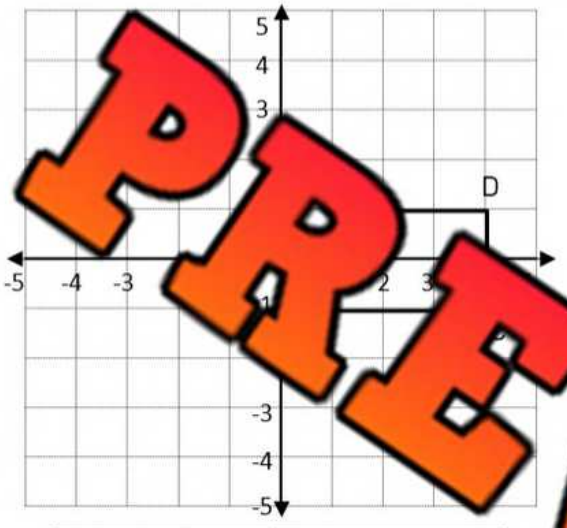
Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

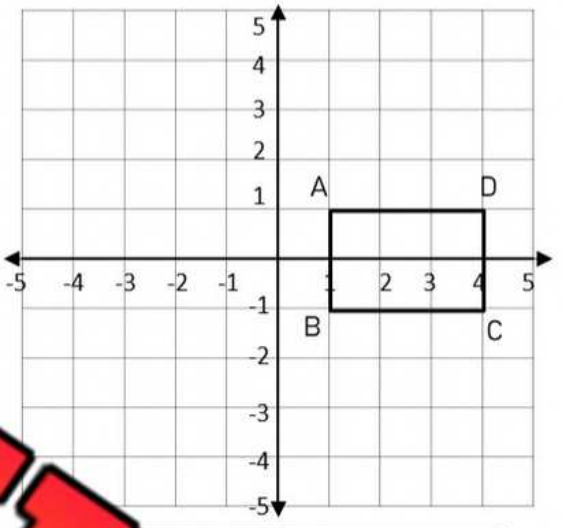
Translate the shape using the mapping rule.



Mapping Rule	(x + 4, y – 3)

Name: _____

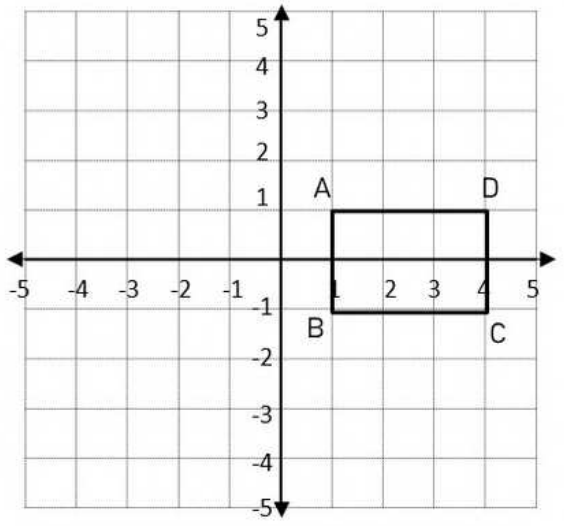
Translate the shape using the mapping rule.



Mapping Rule	(x + 4, y – 3)

Name: _____

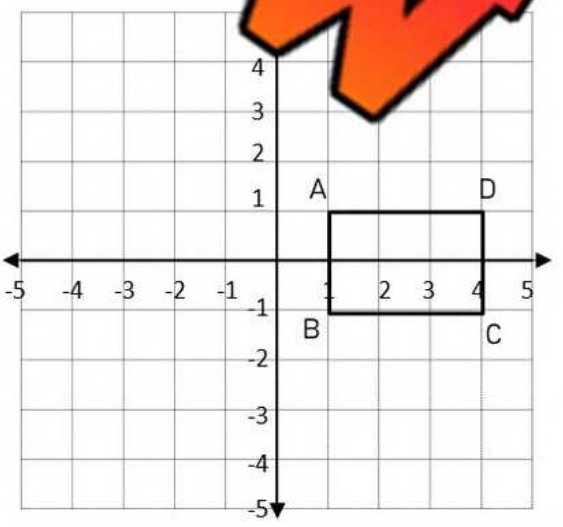
Translate the shape using the mapping rule.



Mapping Rule	(x + 4, y – 3)

Name: _____

Translate the shape using the mapping rule.



Mapping Rule	(x + 4, y – 3)

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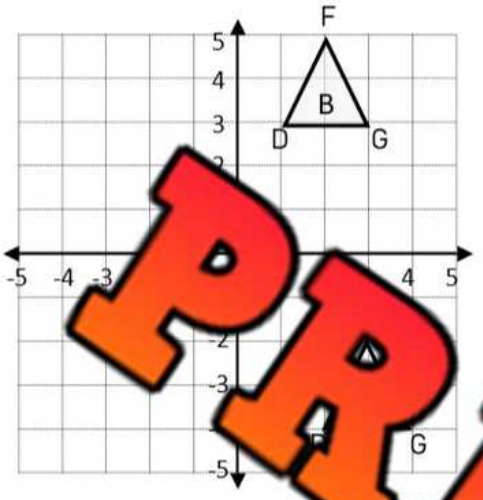
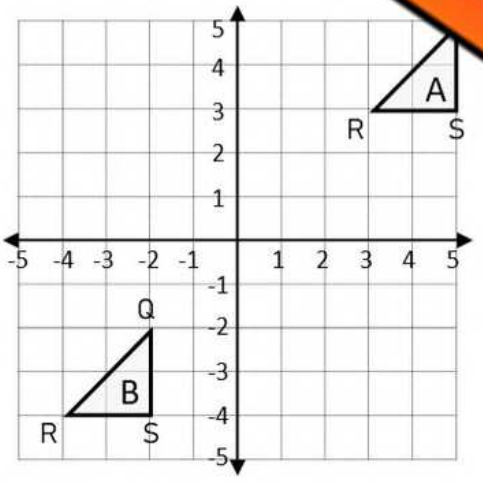
Curriculum Connection
E1.4

Transformations -Translations

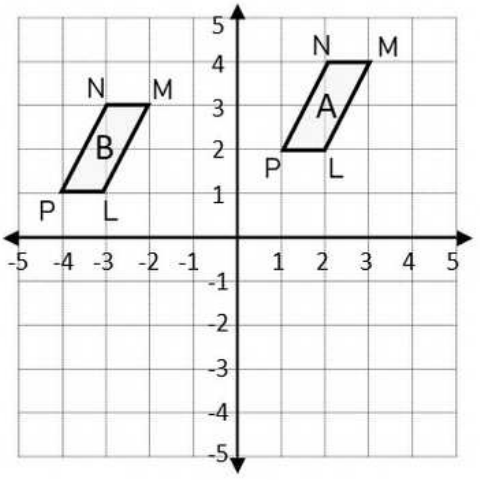
Instructions 1) Fill in the coordinates 2) Describe the translation 3) Translate shape C



Coordinates A	Coordinates B
D(__, __) F(__, __) G(__, __)	D(__, __) F(__, __) G(__, __)
Mapping Rule (x, y) → (x, y) → (x + a, y + b)	
Translate Shape B to Shape C (x – 4, y – 5)	**Coordinates C**



Coordinates A	Coordinates B
Mapping Rule (x, y) → (x, y) → (x + a, y + b)	
Translate Shape B to Shape C (x, y + 6)	**Coordinates C**



Coordinates A	Coordinates B
Mapping Rule (x, y) → (x, y) → (x + a, y + b)	
Translate Shape B to Shape C (x + 4, y – 5)	**Coordinates C**

PREVIEW

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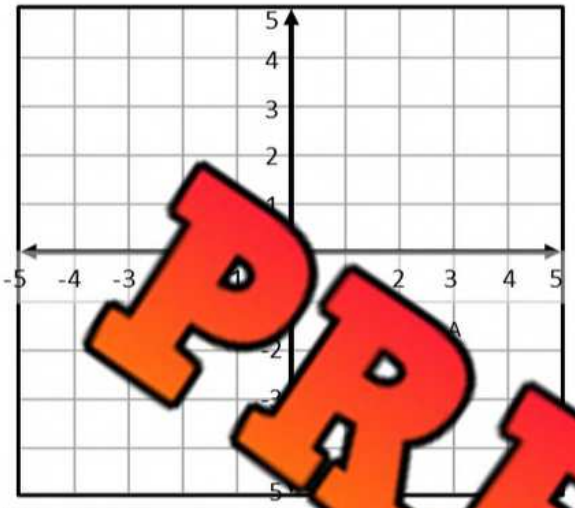
Name: _____ 87

Curriculum Connection
E1.4

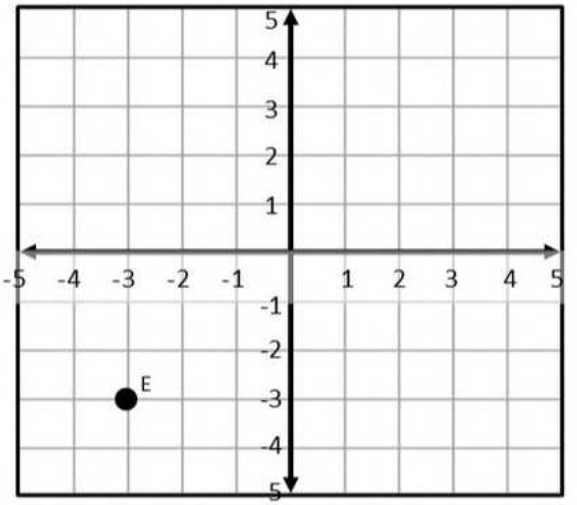
Reflecting a Point Using a Mirror Line

Instructions Graph the new position of each point

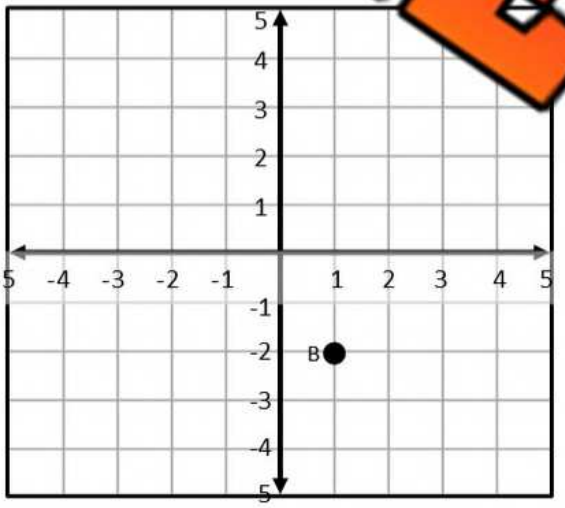
1) Reflection across the line x = 1



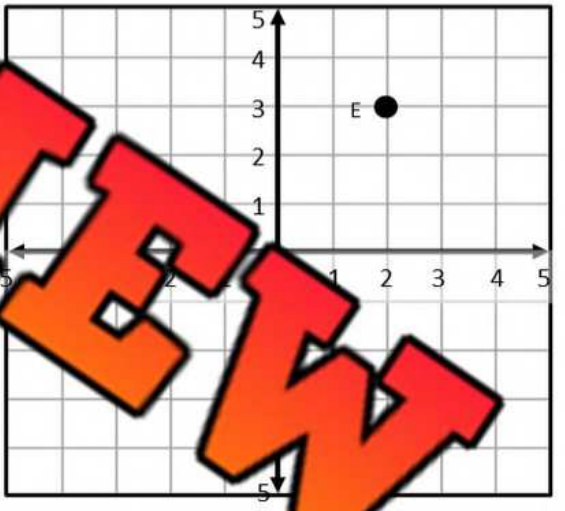
2) Reflection across the line y = -1



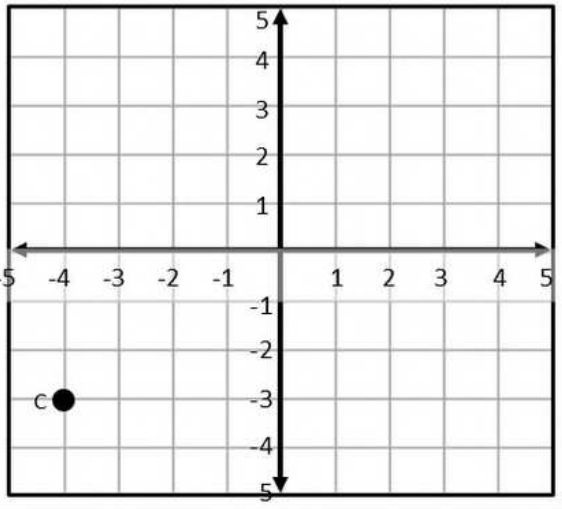
3) Reflection across th[illegible]



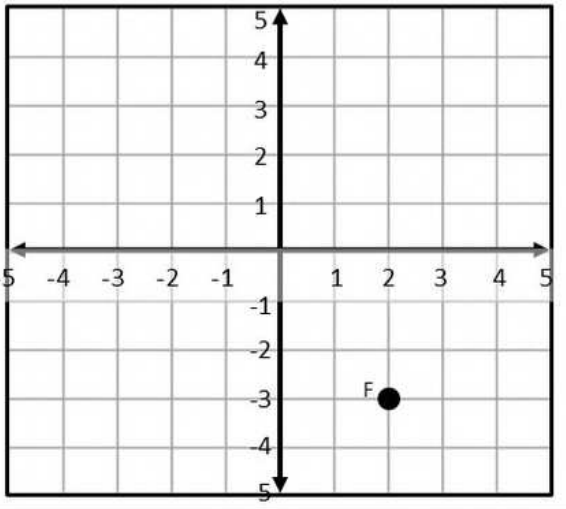
4) Reflection across the line x = -1



5) Reflection across the line y = -1



6) Reflection acros[illegible] the line y = -2



PREVIEW

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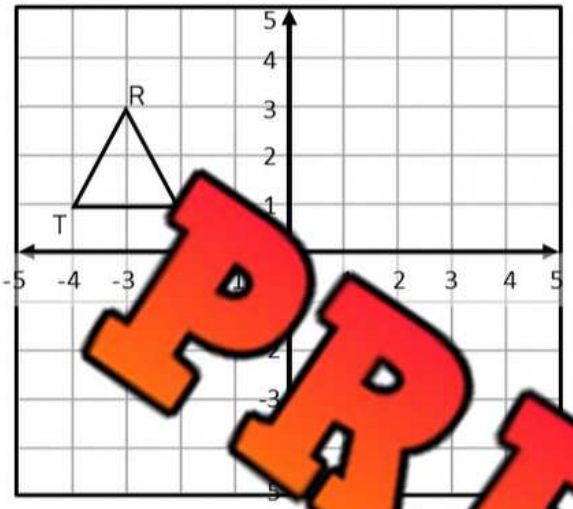
Name: _____ 89

Curriculum Connection
E1.4

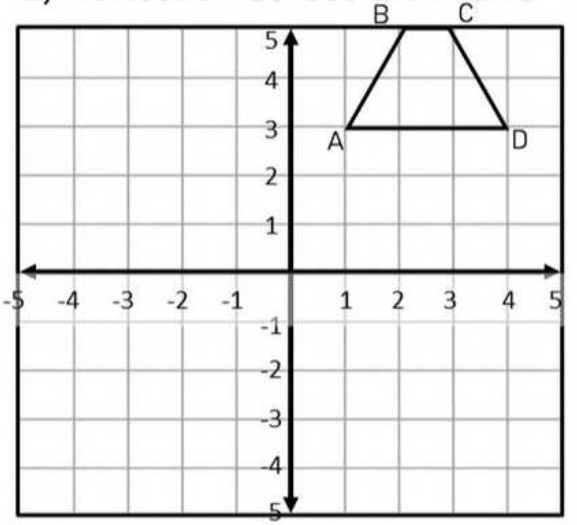
Reflecting a Shape Using a Mirror Line

Instructions Graph the new position of each shape after the given reflection

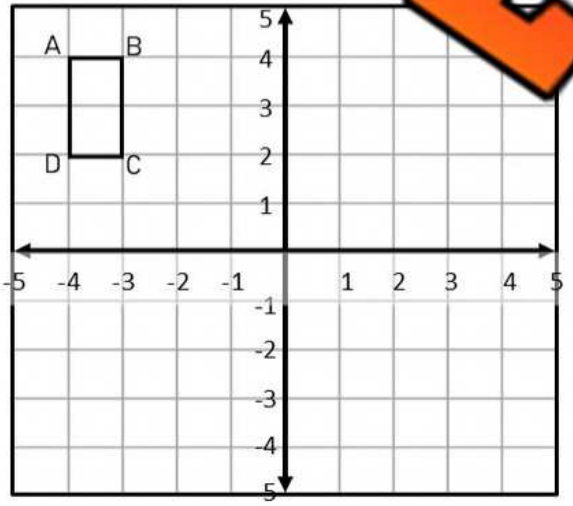
1) Reflection across the y-axis



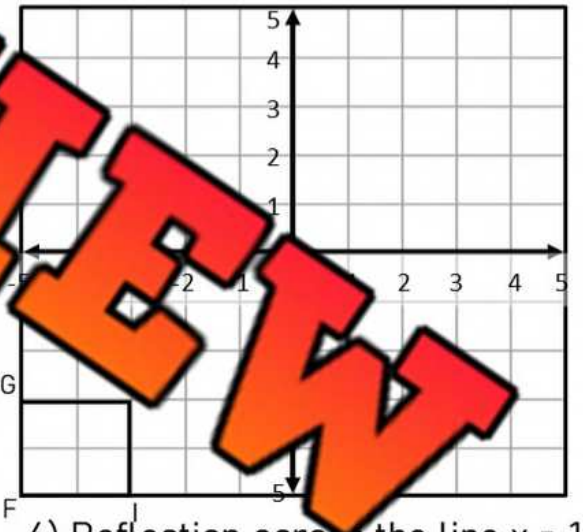
2) Reflection across the x-axis



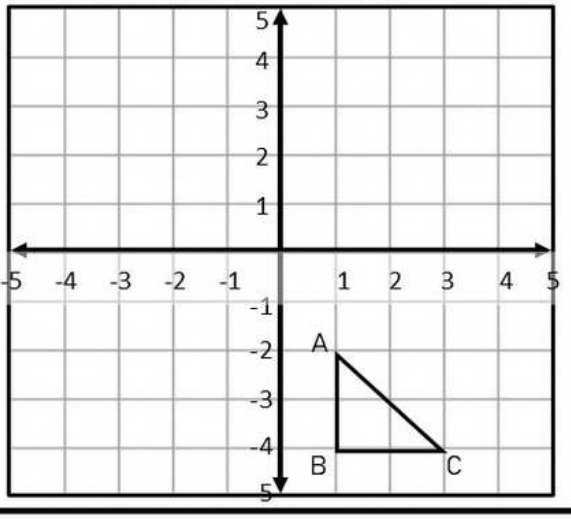
3) Reflection across the [illegible]



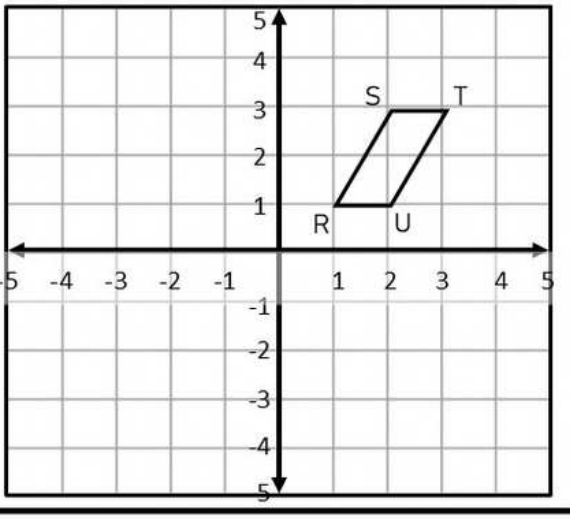
4) Reflection across the line x = -1



5) Reflection across the line y = -1



6) Reflection across the line x = 1



PREVIEW

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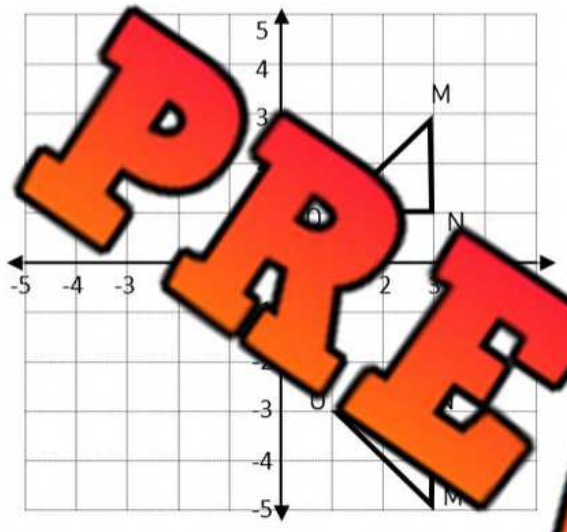
Curriculum Connection
E1.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

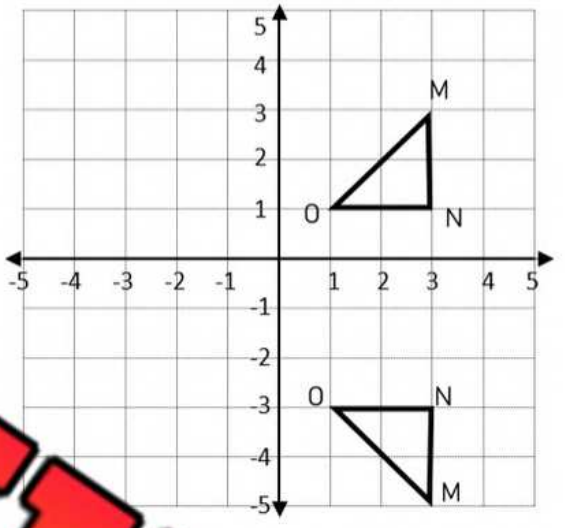
Describe the rule for the reflection line



Answer: _____

Name: _____

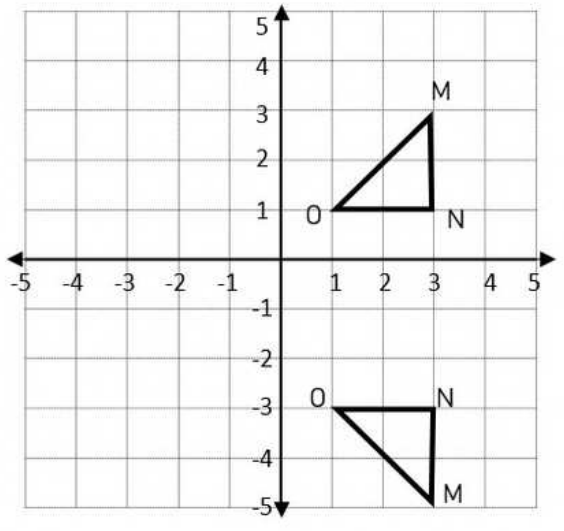
Describe the rule for the reflection line



Answer: _____

Name: _____

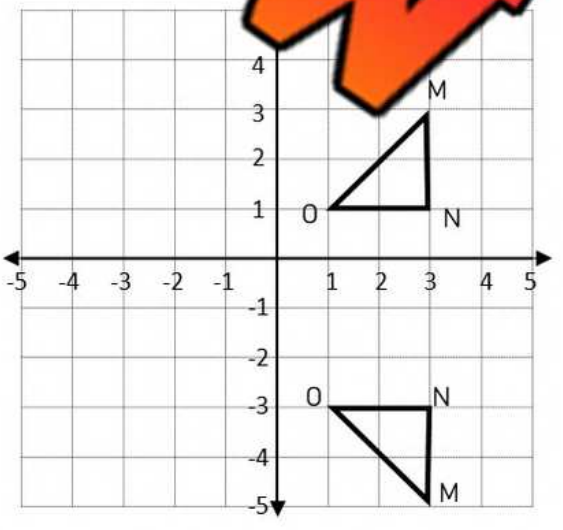
Describe the rule for the reflection line



Answer: _____

Name: _____

Describe the rule for the reflection line



Answer: _____

PREVIEW

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Name: _____ 92

Curriculum Connection
E1.4

Reflections – Mapping Rules

Mapping Rules for Reflections

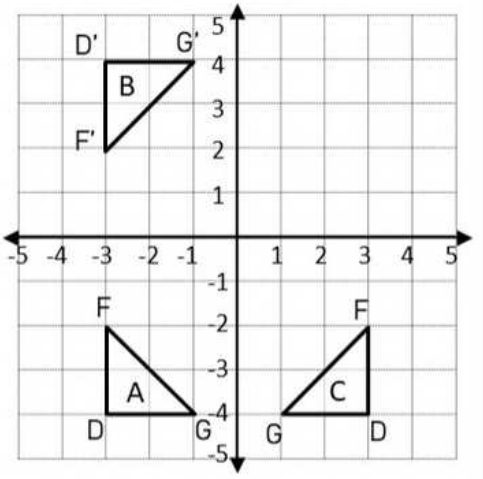
Each point on a shape moves according to the mapping rule.

The rule for a reflected shape in the x-axis is (x, y) → (x, -y)

The rule for a reflected shape in the y-axis is (x, y) → (-x, y)

In the example of Shape A being reflected to Shape B, point F (-3, -2) has been reflected across the x-axis, which means the new coordinates for F are (-3, 2).

If Shape A is reflected across the Y axis to Shape C, point F becomes



PREVIEW

Instructions Use the mapping rules to write the new coordinates

	Original Coordinate(s)	Reflection across the	New Coordinates
1)	P(5, 4)	y-axis	P(-5, 4)
2)	S(8, -3)	x-axis	
3)	Q(-6, 7)	y-axis	
4)	P(-4, -2)	y-axis	
5)	T(-5, 9) Y(-11, -15)	x-axis	
6)	S(-12, -3) R(7, 13)	x-axis	
7)	N(-4, 9) K(8, -17)	y-axis	
8)	P(13, -5) E(-6, 15)	x-axis	
9)	S(-18, -13) R(9, 14)	y-axis	
10)	N(-6, 11) K(7, -23)	x-axis	

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Name: _____ 93

Curriculum Connection
E1.4

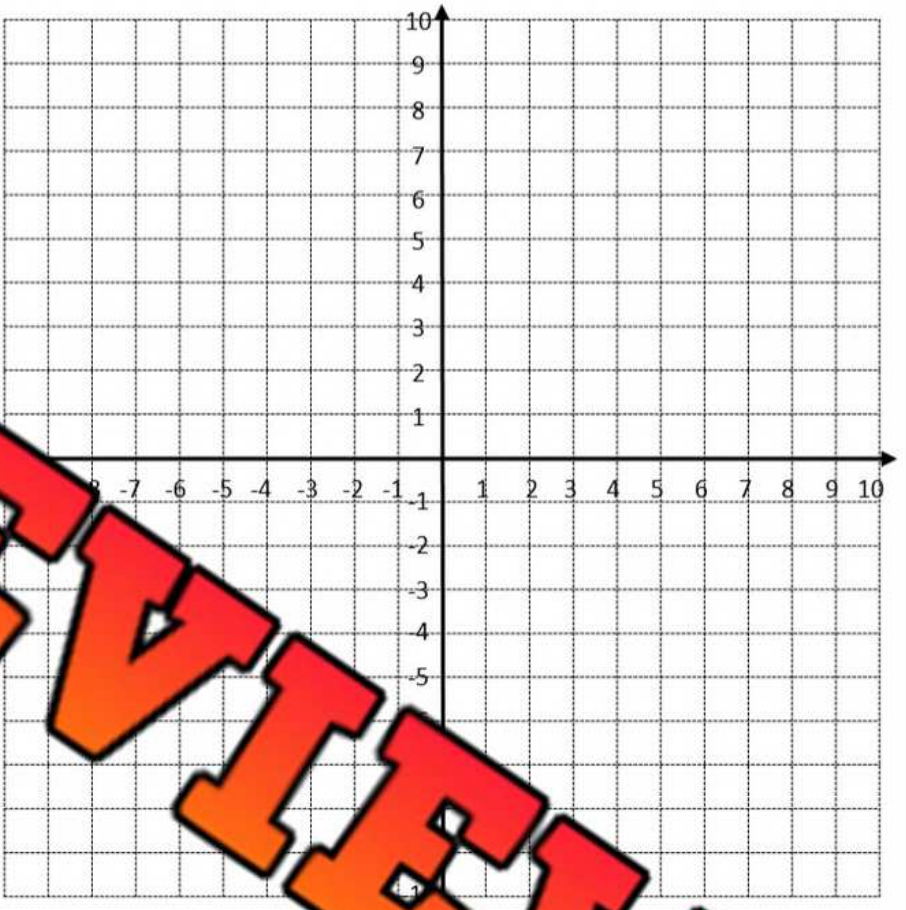
Reflections – Coordinates

Part 1 Draw the shapes using the coordinates provided. Then reflect the shapes

Shape A
P(5,4), Q(3,7), R(3,3)
Reflect over the x-axis
New Coordinates
P(,), Q(,), R(,)

Shape B
F(-8,[illegible]), G(-4,[illegible])
Reflect over the x-axis
New Coordinates
F(,), G(,), H(,)

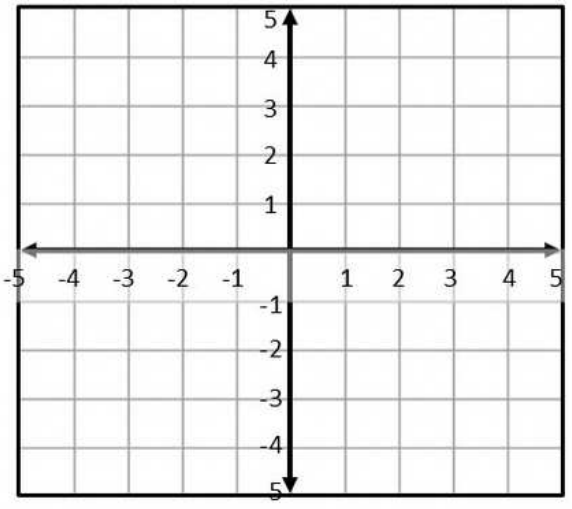
Shape C
J(-7,-4), K(-4,-9), L(-3,-3)
Reflect over the y-axis
New Coordinates
J(,), K(,), L(,)



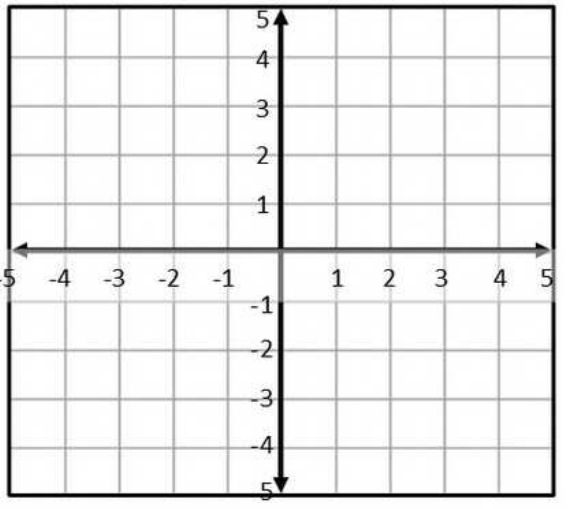
PREVIEW

Part 2 Draw your own shape and then perform the reflection

1) Reflection across the y-axis



2) Reflection across the line x = -1



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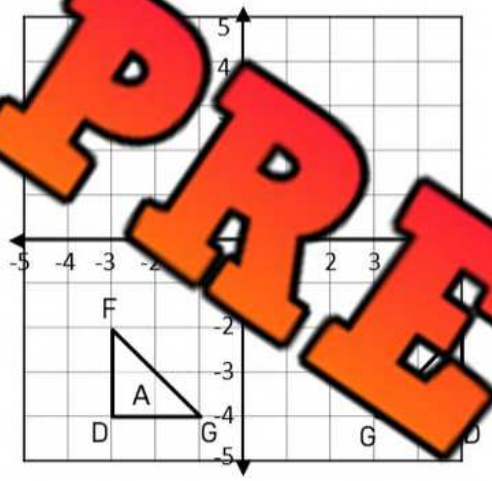
Curriculum Connection
E1.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

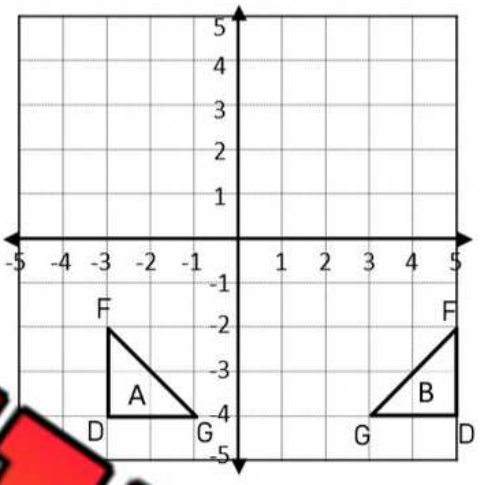
Name: _____

Describe the rule for the reflection line



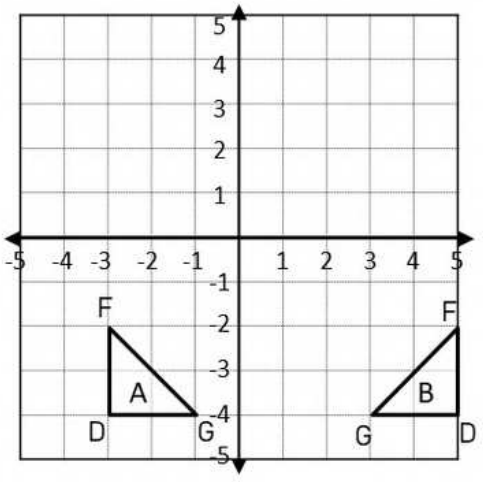
Name: _____

Describe the rule for the reflection line



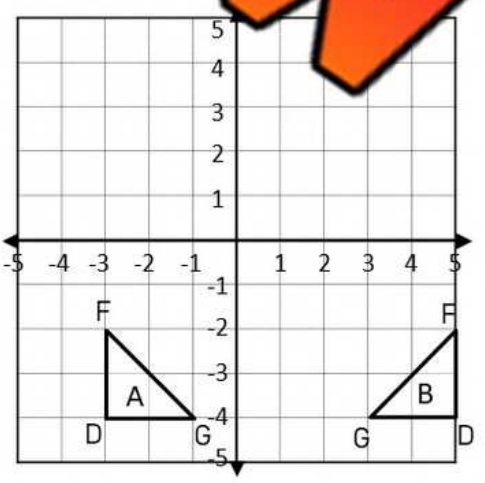
Name: _____

Describe the rule for the reflection line



Name: _____

Describe the rule for the reflection line



PREVIEW

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Name: _____ 97

Curriculum Connection
E1.4

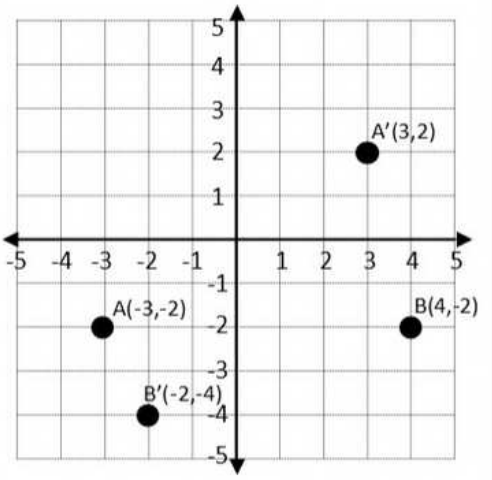
Rotating a Point

Mapping Rules for Rotations

Each point on a shape moves according to the mapping rule.

- a shape rotated 90° counterclockwise has a mapping rule of: $(x, y) \rightarrow (-y, x)$.
- a shape rotated 180° counterclockwise has a mapping rule of: $(x, y) \rightarrow (-x, -y)$.
- a shape rotated 270° counterclockwise has a mapping rule of: $(x, y) \rightarrow (y, -x)$.

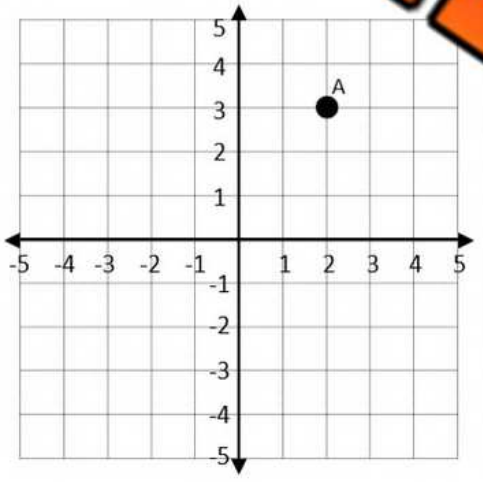
In the example, A was rotated 180° counter-clockwise
In the example, B was rotated 90° clockwise.



PREVIEW

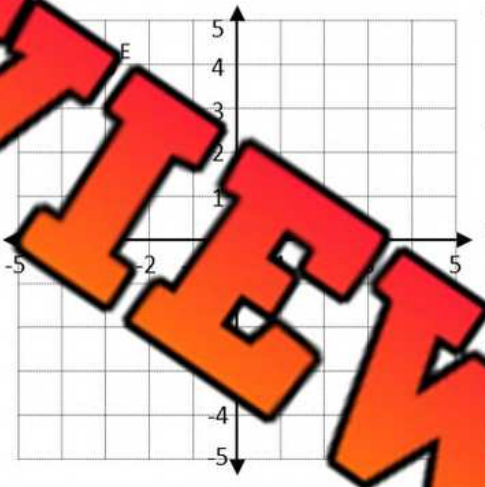
Instructions Graph the new position after rotating around the origin

1) 180° rotation



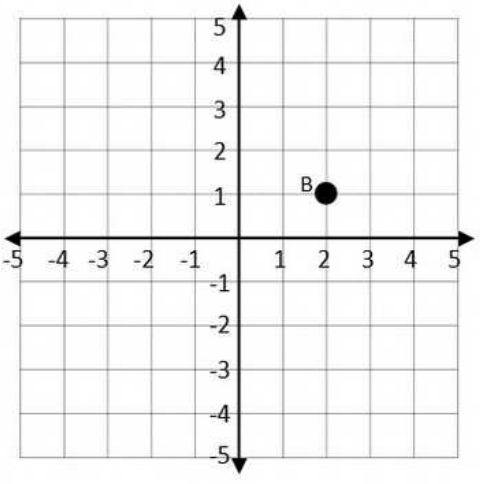
Original Coordinates
A(,)
Rotated Coordinates
A(,)

2) 90° clockwise rotation



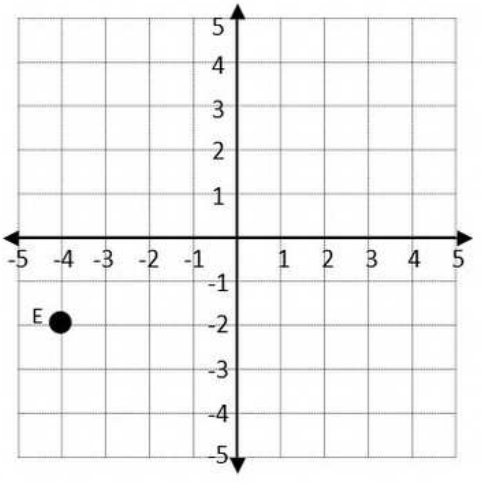
Original Coordinates
E(,)
Rotated Coordinates
(,)

3) 90° counterclockwise rotation



Original Coordinates
B(,)
Rotated Coordinates
B(,)

4) 90° clockwise rotation



Original Coordinates
E(,)
Rotated Coordinates
E(,)

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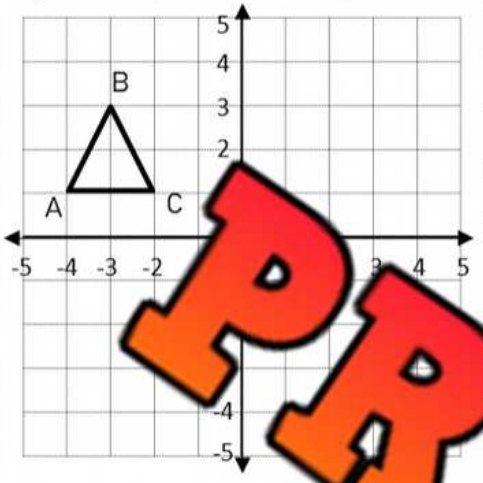
Name: _____ 99

Curriculum Connection
E1.4

Rotating Shapes

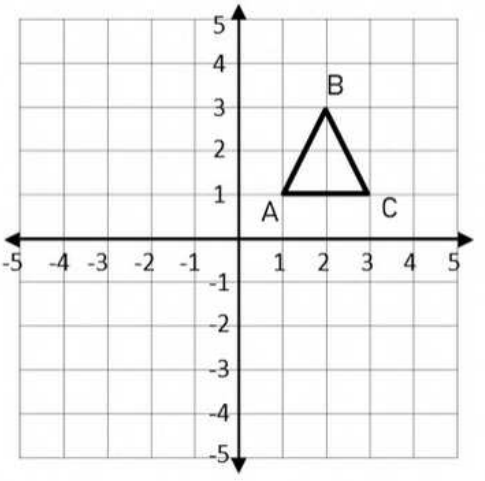
Instructions Graph the new position of each shape after the given rotation

1) 90° clockwise rotation



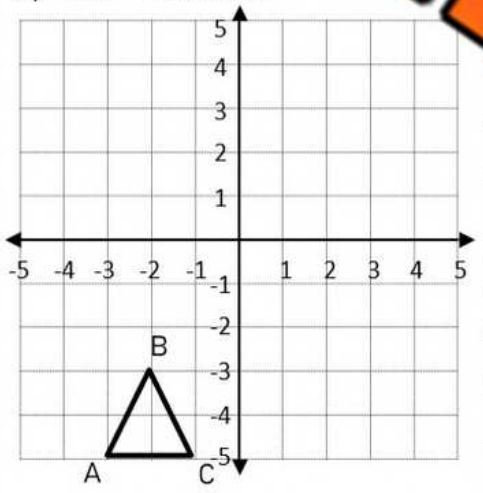
Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

2) 90° counterclockwise rotation



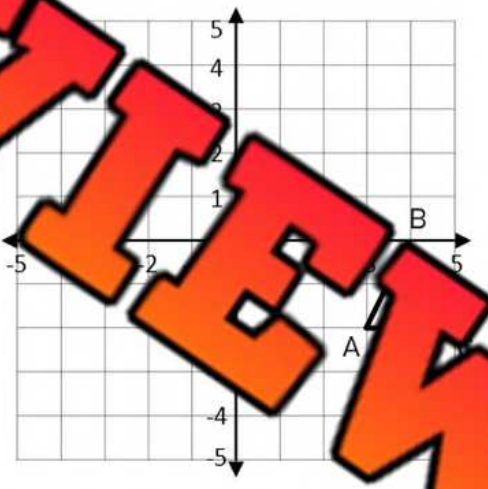
Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

3) 180° rotation



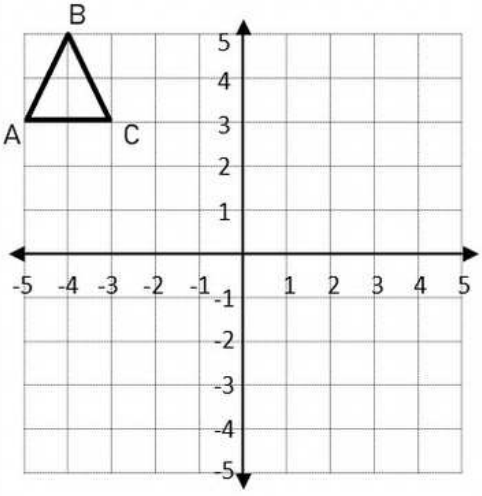
Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

4) 270° clockwise rotation



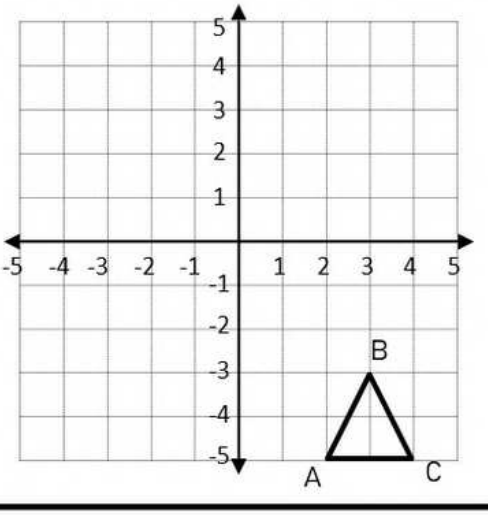
Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

5) 90° clockwise rotation



Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

6) 90° counterclockwise rotation



Original Coordinates
A(,)
B(,)
C(,)
Rotated Coordinates
A(,)
B(,)
C(,)

PREVIEW

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Name: _____ 101

Curriculum Connection
E1.4

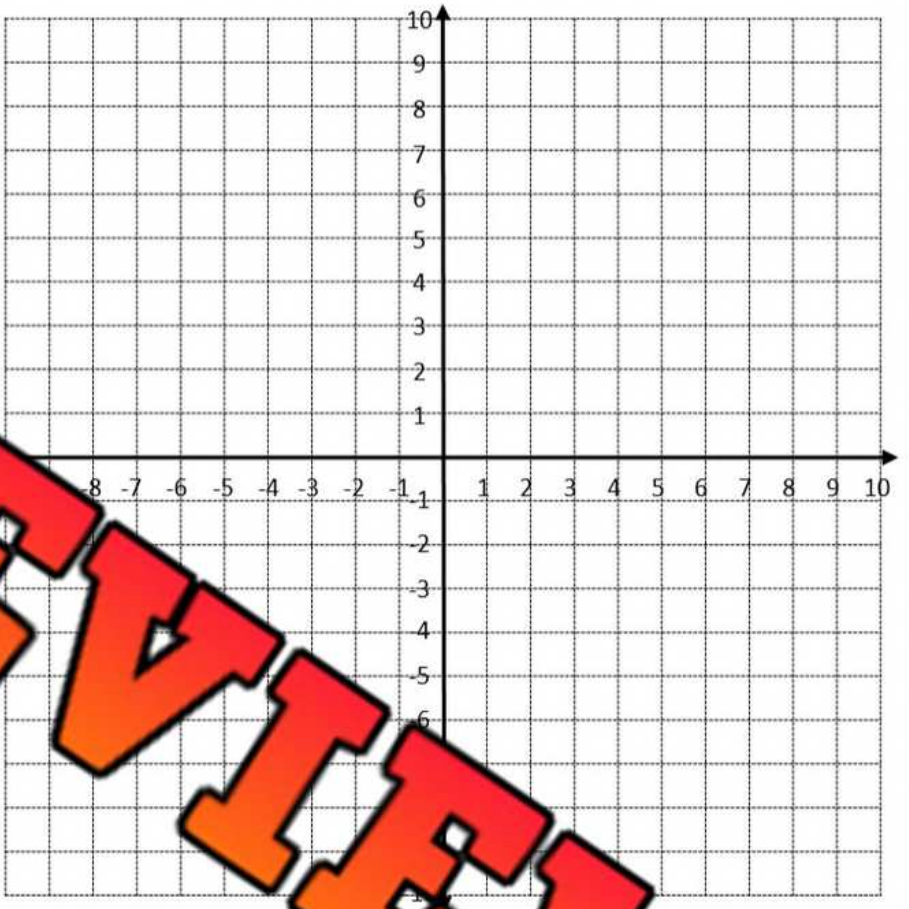
Rotations – Coordinates

Part 1 Draw the shapes using the coordinates provided. Then rotate the shape about the origin

Shape A
P(8,4), Q(5,7), R(4,3)
90° counterclockwise rotation
New Coordinates
P(,),), R(,)

F(G(-9,5
180°
New Coord
F(,), G(,), H(

Shape C
J(-1,-8), K(-4,-6), L(-1,-3)
270° counterclockwise rotation
New Coordinates
J(,), K(,), L(,)



PREVIEW

Part 2 Provide the coordinates of each point after the rota

	Original Coordinate	Rotations Across The Line...	New dinates
1)	P(5, 4)	90° counterclockwise rotation	P(-4, 5)
2)	S(3, -6)	180° rotation	
3)	Q(-4, 9)	360° rotation	
4)	P(-7, -11)	270° counterclockwise rotation	
5)	T(-5, 1) Y(-4, -7)	90° clockwise rotation	
6)	S(-7, -5) R(8, 2)	180° rotation	
7)	N(-5, 8) K(4, -9)	270° clockwise rotation	
8)	P(3, -5) E(-6, 2)	180° rotation	

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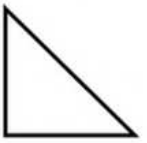
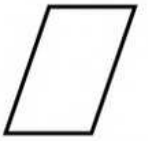
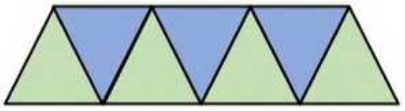
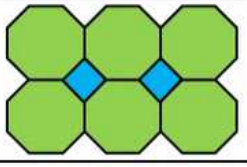
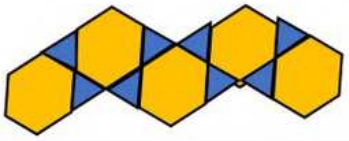
Name: _____ 113

Geometry Test

Part 1 Can the shapes below be used by themselves in a tessellation?

		
1) Yes No	2) Yes No	3) Yes No
		
4) Yes	5) Yes No	6) Yes No

Part 2 What type of tessellation are the examples below

Tessellation	Type of Tessellation Regular, Semi-Regular, Irregular
1) 	
2) 	
3) 	

Part 3 Draw a tessellation using the combination of polygons below

Pentagon and Triangle	

PREVIEW

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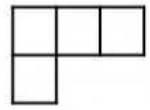
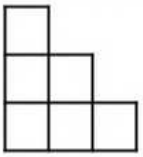
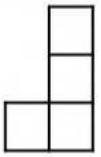
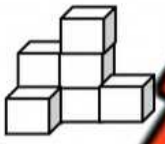
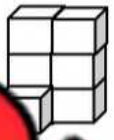
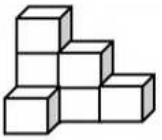
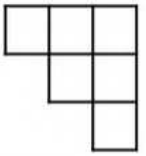
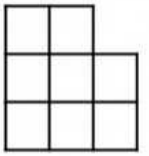
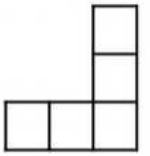
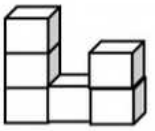
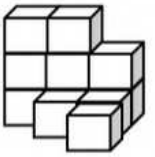
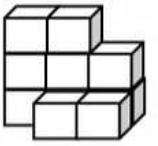
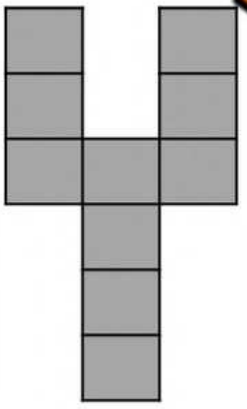
Part 4 Look at the front, top, and side views and circle the matching 3D object

Top View	Front View	Side View
		
		

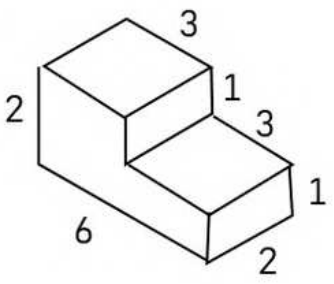
Top View	Front View	Side View
		
		

Part 5 Draw a[illegible]ric view of the letter. Use a scale of 1:1.

Letter	Front	Isometric View
Y		

PREVIEW

Part 6 Draw the top, front, and side views of the isometric drawing

Isometric View	Cavalier	Cabinet
2) 		

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Part 7 — Fit your drawing on the grid by choosing an appropriate scale

1) A garage door has the dimensions 225cm by 175cm. Draw the garage door by determining the scale.

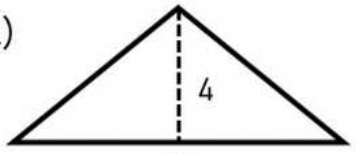
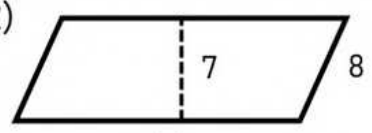
Scale = 1cm to _____

2) A stree[illegible] has the following dimensions: 88cm by 66cm. Dra[illegible]gn by determining the scale.

Scale = 1cm t[illegible]

PREVIEW

Part 8 — Calculate th[illegible] the o[illegible] shape and the scaled drawing

Original Shape	Scaled Drawing
1)  Area = _____	Scale F[illegible]/2 [illegible]ea = _____
2)  Area = _____	Scale Factor = 4 [illegible]a = _____

Part 9 — Give the coordinates of each point after the translation

	Original Coordinate	Translation – Mapping Rule	New Coordinates
1)	P(3, -4)	(x - 6, y + 4)	P(-3, 0)
2)	S(-5, 8)	(x + 3, y - 5)	
3)	Q(-9, -5)	(x + 2, y - 7)	
4)	L(10, 5) P(-3, -8)	(x - 5, y + 8)	
5)	T(-8, 7) Y(-9, -5)	(x + 8, y + 5)	

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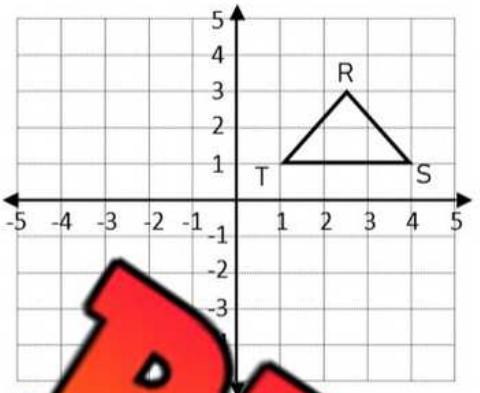
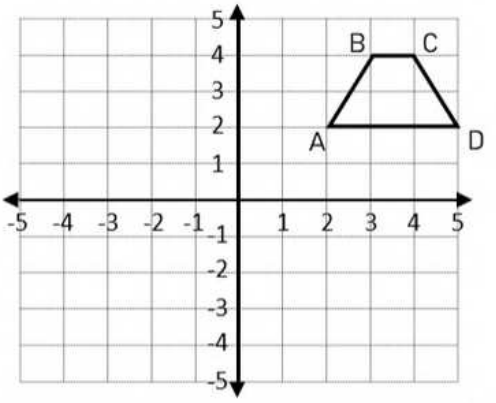
Part 10 Graph the new position of each shape after the given reflection

1) Reflection across the line y = -1

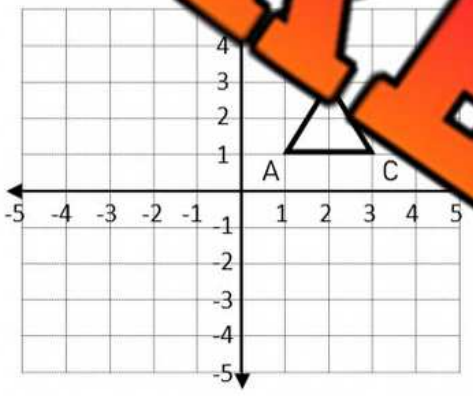


2) Reflection across the line x = 1



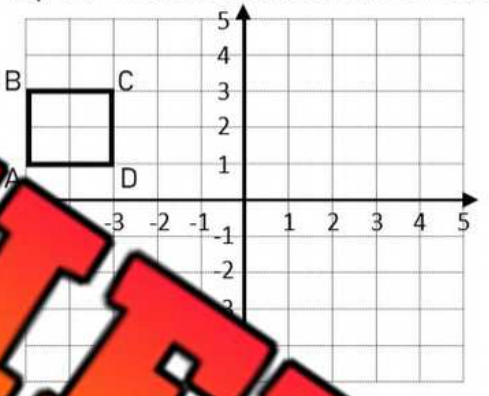
Part 11 Graph the new position of each shape after the given rotation

1) 270° c



Original	A(,)	B(,)	C(,)
Rotated	A(,)	B(,)	C(,)

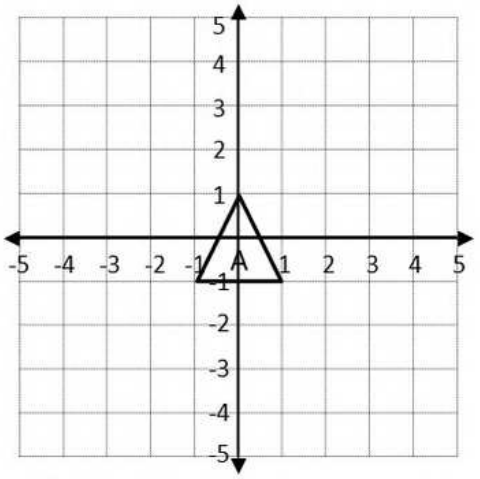
2) 90° counterclockwise rotation



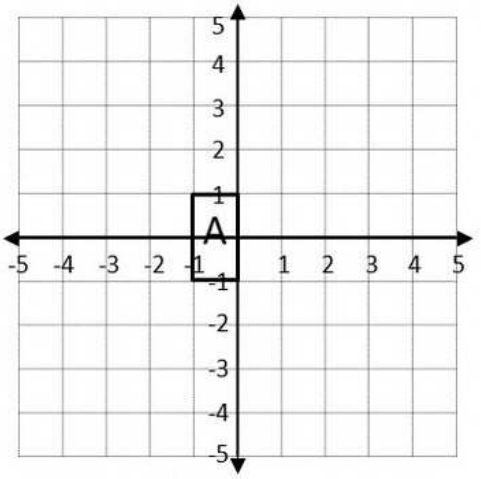
Original		B(	,)	D(,)
Rotated	A(,	B(		,)

PREVIEW

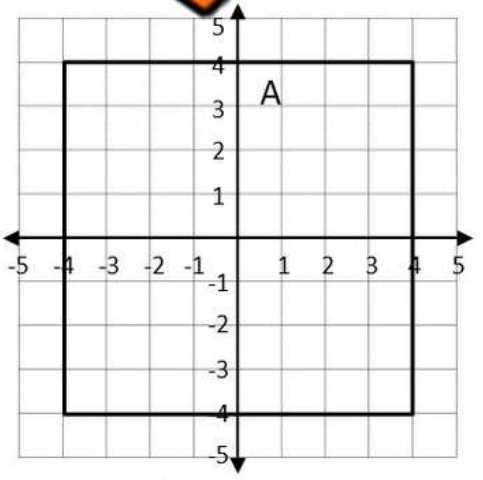
Part 12 Draw the dilated shape on the grid



1) k = 3



2) k = 4



3) k = ¼

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Grade 8
E2 – Measurement

	Curriculum Expectations	Pages That Cover the Expectations
E2.1	represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships, and exponential notation	118 - 128
E2.2	solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons	129 - 150
E2.3	solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional objects, using appropriate formulas	151 - 202
E2.4	describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle	203 - 228

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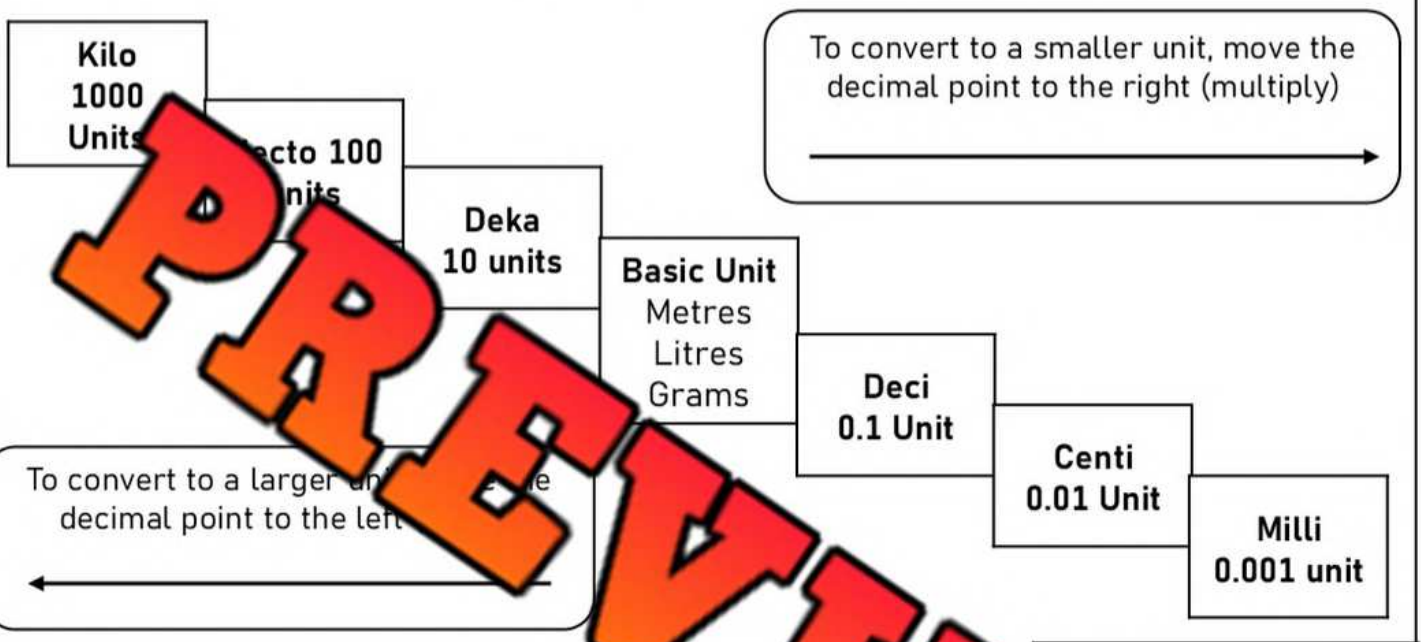
Name: _____ 118

Curriculum Connection
E2.1

Converting Units - Ladder Method

We can use the ladder method to convert any metric unit of measurement to another simply by following the rules below.

Ladder Method



PREVIEW

Instructions

1. Find your starting unit of measurement
2. Count the jumps to get to your ending unit of
3. Move the decimal the number of jumps up or dow
   Moving Up = Left and Moving Down = Right

EXAMPLE

_____ mL
(s down –
m ecimal 3 right)
_____ L

Practice Convert the units of measurement below

1) 3.8L	_____mL	5) 7.4kg	_____g	9) 723.3L	_____kL
2) 453mg	_____g	6) 954mg	_____g	10) 251.1kg	_____g
3) 1.32cL	_____mL	7) 231.7m	_____mm	11) 15.85m	_____km
4) 605.3m	_____km	8) 735.4mg	_____kg	12) 5243.2mL	_____kL

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Name: _____ 119

Curriculum Connection
E2.1

Large Metric Units – Mega, Giga, Tera

When we buy a hard-drive for a computer, they are sold based on their size. The first hard drive ever made was in 1956 and it held 5 megabytes. 5 megabytes is 5 000 000 bytes. In the year 2000, the best-selling hard drive was 8.4 gigabytes, which holds 8 400 000 000 bytes. Today, most hard drives hold over 1 terabyte. A terabyte holds 1,000,000,000,000 Although bytes are not part of the metric system, they are closely related and can help us remember the prefixes – mega, giga, and tera.



Instead of writing all the zeros, it is common to use exponents (scientific notation) to represent large numbers.

PREVIEW

Part 1 Write the scientific notation of the numbers below

Number	Scientific Notation
1) 15,000,000,000	
2) 3 000 000	
3) 82 000 000	
4) 103 000 000 000	
5) 7 000 000 000 000	

Number	Scientific Notation
6) 18 000 000 000 000	
203 000 000 000	
000 000 000	
9) 75 000 000	
00 00	

Part 2 Fill in the table below using bytes as the unit

Number of Bytes	Word Form	Mega, Giga, or Tera	Scientific Notation
1) 1 000 000 000	One-billion bytes	1 Gigabyte	1×10^9
2) 6 000 000			
3) 12 000 000 000			
4) 110 000 000 000			
5) 26 000 000 000 000			
6) 91 000 000 000 000			

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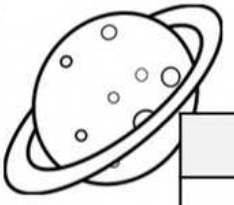
Name: _____ 121

Curriculum Connection
E2.1

Large Metric Units – Mega, Giga, Tera

Part 1 Fill in the tables below



Tg	Gg
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Gm	Mm
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

PREVIEW

Part 2 Fill in the table below using metre

Tera Metres	Giga Metres	Mega Metres	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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Name: _____ 122

Curriculum Connection
E2.1

Very Small Units – Mega, Nano, Pico

To measure things that are very small, we need to be able to use very small units. We commonly use milli-units to measure small things, but scientists often need to use even smaller units to measure things like atoms, molecules, and germs. A typical germ is about 1,000 nanometres.

Unit	Meaning	Scientific Notation
Micro-unit (μ)	One millionth of a unit	1×10^{-6}
[illegible]nit (n)	One billionth of a unit	1×10^{-9}
[illegible]	One trillionth of a unit	1×10^{-12}

Part 1 Writ[illegible]ific[illegible]otation of the numbers below

Number	[illegible]cient[illegible]	Number	Scientific Notation
1) 0.00000005	[illegible] $^{-8}$	[illegible] 0.0000000006	
2) 0.00000013	1.[illegible] $^{-7}$	[illegible]00017	
3) 0.00000009		8) 0.0[illegible]0[illegible]9	
4) 0.000002		9[illegible]00000[illegible]	
5) 0.000000008		10) [illegible]00[illegible]8	

Part 2 Fill in the table below using grams as the u[illegible]

Number of Grams	Word Form	Metric System Symbol	S[illegible]c Notation
1) 0.000007	Seven Micrograms	7 μg	1×10^{-6}
2) 0.000000000004			
3) 0.000000005			
4) 0.000003			
5) 0.000000009			
6) 0.000000000002			

PREVIEW

Name: _____ 123

Curriculum Connection
E2.1

Very Small Units – Micro, Nano, Pico

Part 1 Fill in the table to learn more about the small metric units

Metric Prefix	Number of Units	Number	Scientific Notation
Base-unit	1	1	1×10^{0}
Deci-unit (d)			
Centi[illegible] (c)			
Milli[illegible]			
[illegible]	1/1 000 000	0.000001	1×10^{-6}
Na[illegible]unit (n)			
Pico-uni[illegible]			

PREVIEW

Part 2 Con[illegible]rt[illegible]s bel[illegible]

To convert units, use the follow[illegible]eps [illegible]ove
1) Start with the first unit/number you [illegible]verti[illegible] and use its scientific notation to find out its exponent – powers o[illegible] Exampl[illegible]o [illegible] an exponent of -12
2) Determine the value of the exponent of the u[illegible]nber [illegible] converting to
3) Subtract the 2nd unit from the first
4) The answer you get will tell you how many tim[illegible]o [illegible]e d[illegible]. If the number is positive, move the decimal place to the right. If it i[illegible]tiv[illegible] mov[illegible]ecimal left.

		An[illegible]
1)	5cm → nm (-2 – (-9) = 7)	5.0000000[illegible]500
2)	2mm → µm	
3)	3000µg → cg	
4)	80000nL → µL	
5)	40cm →nm	
6)	750mm → µm	
7)	3000ng → mg	
8)	58cm → mm	
9)	4350µg → ng	
10)	820 nL → cL	

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Name: _____ 125

Curriculum Connection
E2.1

Converting Small and Large Metric Units

Part 1 Put the units in order from least to greatest

1)	5mm	40 000µm	520 000nm
2)	2 Mg	1Tg	400 000 000µg
3)	8 000 00	5L	500 000nL
4)	25 000mm		2500Gm
5)	20 000 000ng	1.5G	300 0000 000pg

PREVIEW

Part 2 Convert the units of measurement below

1) 500 000m	_____Mm	2) 50µm	_____mm
3) 1 000 000Mg	_____Tg	4) 1.1nL	_____pL
5) 50 000 000pL	_____µL	6) 72m	_____mm
7) 3.3Gm	_____km	8) 2505.1kg	_____Mg
9) 29.5gL	_____kL	10) 3cm	_____µm

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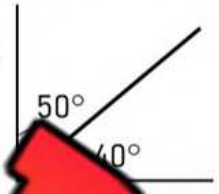
Name: _____ 129

Curriculum Connection
E2.2

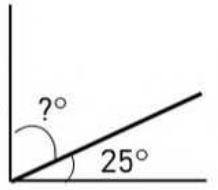
Complementary Angles

Complementary Angles are two angles that add up to 90°. Therefore, the angles 40° and 50° are complementary angles because they add up to 90°. Together, complementary angles add up to make a right angle.

Example:



We can determine the missing complementary angle by subtracting the known angle from 90.

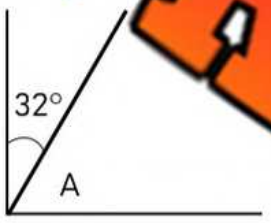


90 – 25 = ?
? = 65

Practi… …e the complementary angles

PREVIEW

1)



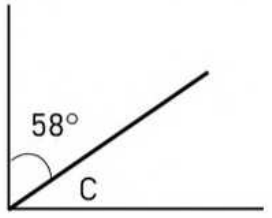
∠A= _____°

2)



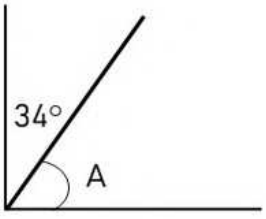
_____°

3)



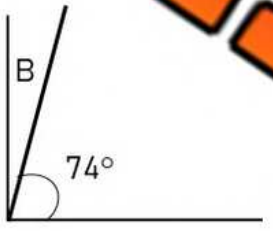
∠C= _____°

4)



∠A= _____°

5)



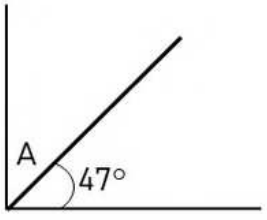
∠B= _____°

6)



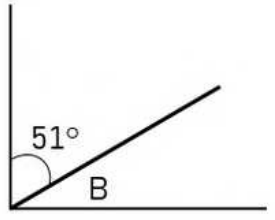
∠C= _____°

7)



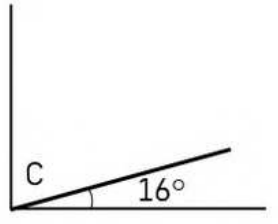
∠A= _____°

8)



∠B= _____°

9)



∠C= _____°

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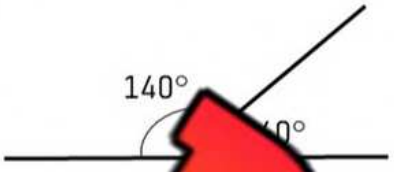
Name: _____ 131

Curriculum Connection
E2.2

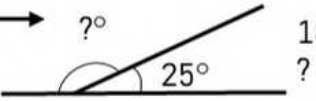
Supplementary Angles

Supplementary Angles are two angles that add up to 180°. You will notice that two supplementary angles make a straight angle of 180°.

Example:



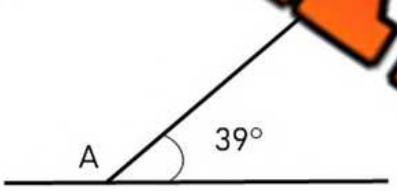
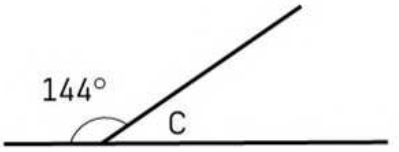
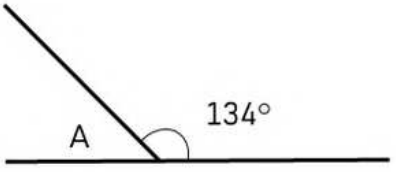
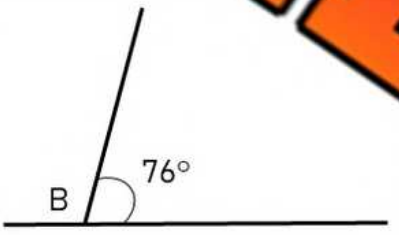
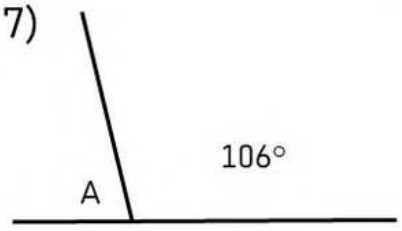
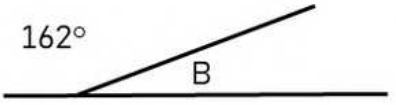
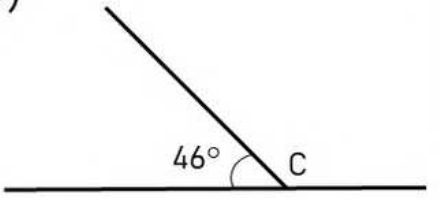
We can determine the missing supplementary angle by subtracting the known angle from 180.



180 – 25 = ?
? = 155

PREVIEW

Practice: Determine the supplementary angles

1) 		3) 
∠A= _____°	∠B= _____°	∠C= _____°
4) 	5) 	
∠A= _____°	∠B= _____°	∠C= _____°
7) 	8) 	9) 
∠A= _____°	∠B= _____°	∠C= _____°

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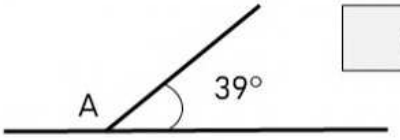
Name: _____ 134

Curriculum Connection
E2.2

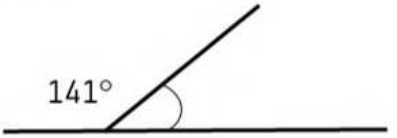
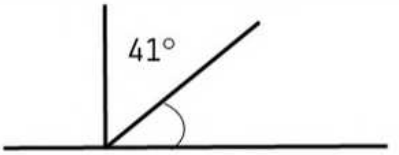
Complementary and Supplementary Angles

Part 1 Analyze the angles below. Are they complementary, supplementary or neither?

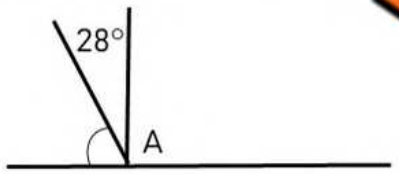
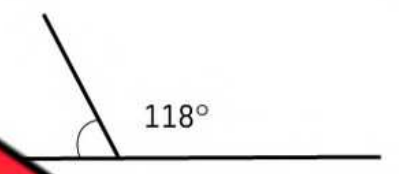
1)



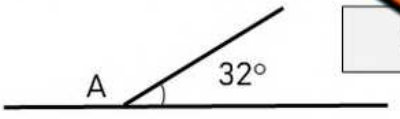
Original Angle

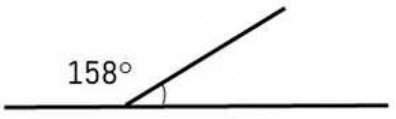
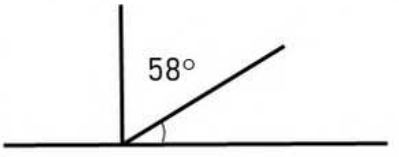
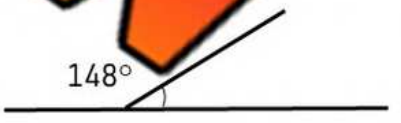
Original Angle

3)



Original Angle

PREVIEW

Part 2 Fill in the table by writing in the complementary and supplementary angles.

Angle	Supplementary	Complementary
12°		
64°		
81°		

Angle	Supplementary	Complementary
74°		
26°		
59°		

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Name: _____ 135

Curriculum Connection
E2.2

Complementary and Supplementary Angles

Part 1 — Write the complementary angle for each angle below

#	Angle	Complementary
1	34°	
2	66°	
3		
4		

#	Angle	Complementary
5	31°	
6	74°	
7	87°	
8	25°	

Part 2 — Are pairs of angles complementary? Yes or No?

#	Pair	Yes/No
1	33°, 57°	
2	64°, 36°	
3	118°, 62°	

#	Pair	Yes/No
4	34°, 56°	
5	66°, 34°	
6	, 49°	

Part 3 — Write the supplementary an each ow

#	Angle	Supplementary
1	143°	
2	151°	
3	137°	
4	112°	

#		pplementary
5	92	
6	165°	
7	103°	
8	114°	

Part 4 — Are the given pairs of angles supplementary? Yes or No?

#	Pair	Yes/No
1	134°, 56°	
2	47°, 33°	
3	112°, 82°	

#	Pair	Yes/No
4	166°, 14°	
5	58°, 112°	
6	123°, 47°	

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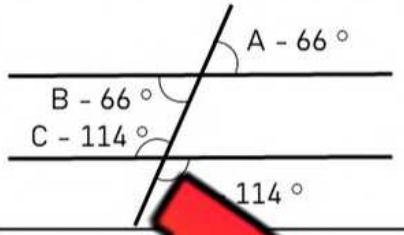
Curriculum Connection
E2.2

Introduction – Opposite Angles

Opposite angles are a pair of angles that are directly opposite to each other and are formed by two intersecting lines.



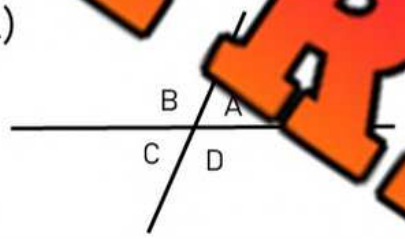
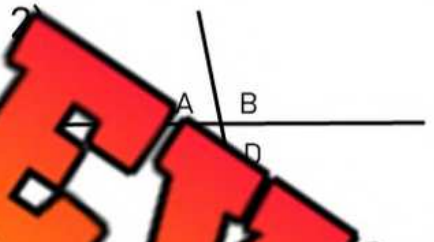
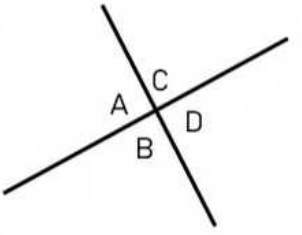
Angles A and B are opposite angles that are congruent, meaning they have the same angle measurement.

Angles C and D are also opposite angles which means they have the same angle measurements.

PREVIEW

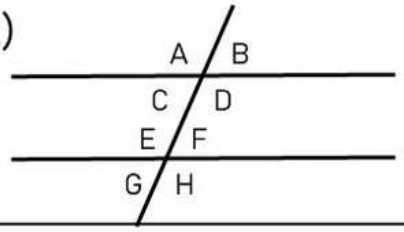
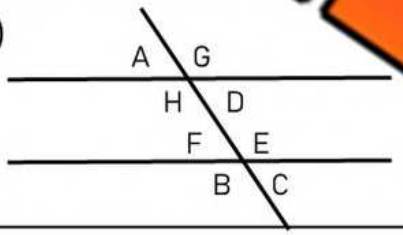
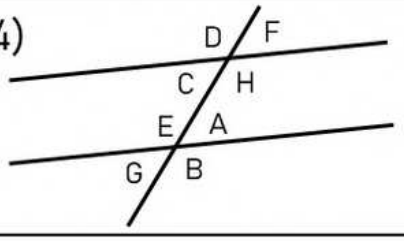
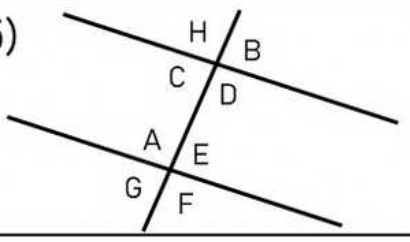
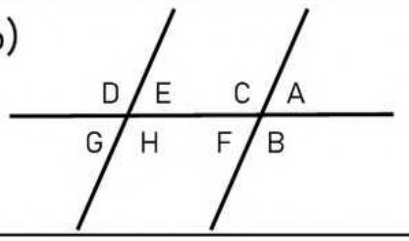
Part 1

Which angles are opposite in the two intersecting lines below?

1)	2)	3)
		
___, ___ and ___, ___	___, ___ and ___, ___	___, ___ and ___, ___

Part 2

Which angles are opposite in the intersecting lines below?

1)	2)	3)
		
___, ___ and ___, ___ ___, ___ and ___, ___	___, ___ and ___, ___ ___, ___ and ___, ___	___, ___ and ___, ___ ___, ___ and ___, ___
4)	5)	6)
		
___, ___ and ___, ___ ___, ___ and ___, ___	___, ___ and ___, ___ ___, ___ and ___, ___	___, ___ and ___, ___ ___, ___ and ___, ___

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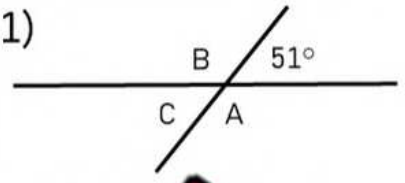
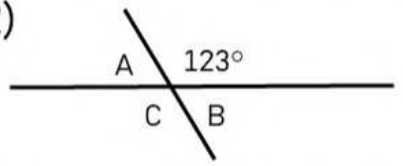
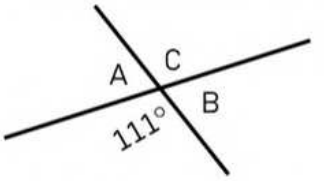
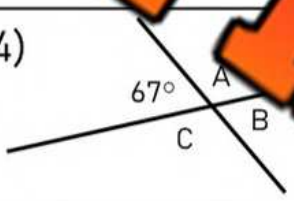
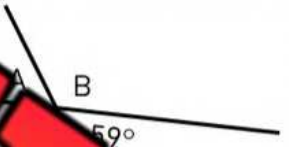
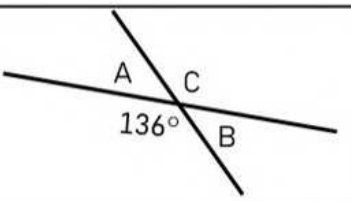
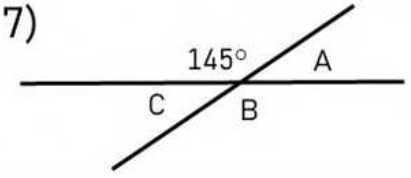
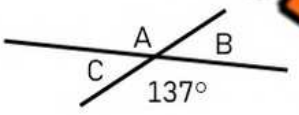
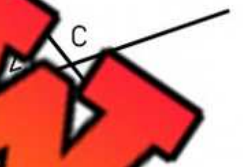
Curriculum Connection
E2.2

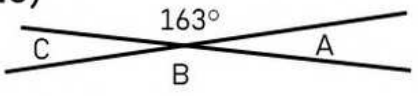
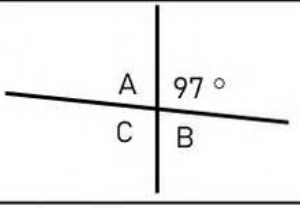
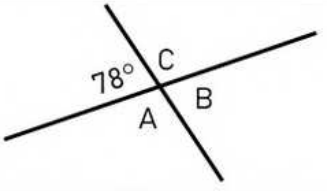
Determining Angles Using Opposite and Supplementary Angles

Questions Find the values of the unknown angle measurements

1) 	2) 	3) 
A = 129°	A =	A =
B = 129°	B =	B =
C = 51	C =	C =

4) 		6) 
A =		A =
B =	B =	B =
C =	C =	

7) 	8) 	
A =	A =	A =
B =	B =	B =
C =	C =	C =

10) 	11) 	12) 
A =	A =	A =
B =	B =	B =
C =	C =	C =

PREVIEW

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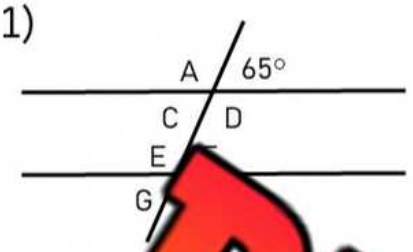
Curriculum Connection
E2.2

Determining Angles Using Angle Properties

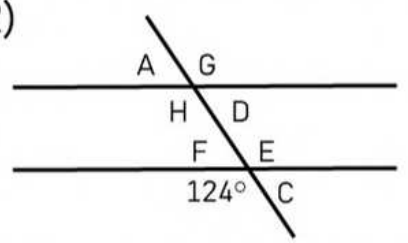
Questions Find the values of the unknown angle measurements

1)



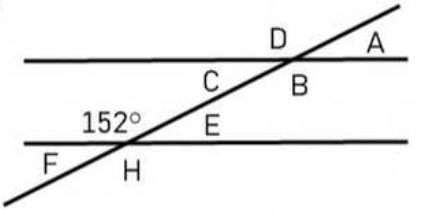
A = ___, ___

2)



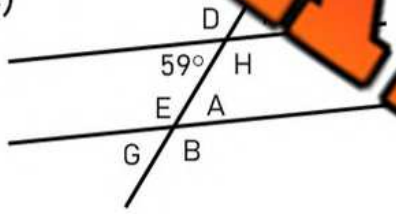
A = ___, E = ___, D = ___

3)



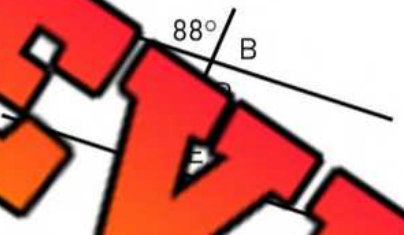
E = ___, B = ___, D = ___

4)



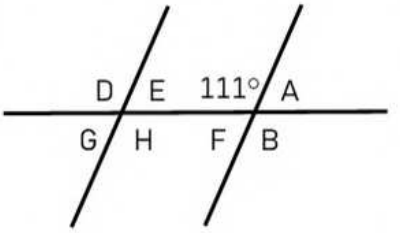
A = ___, H = ___, G = ___

5)



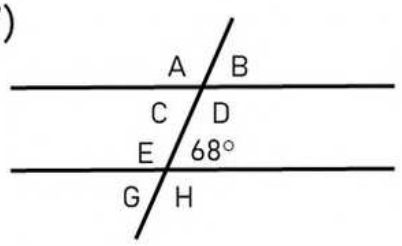
A = ___, ___ = ___

6)



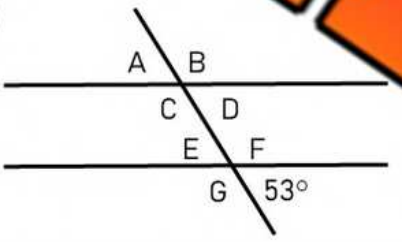
___, H = ___, G = ___

7)



C = ___, B = ___, A = ___

8)

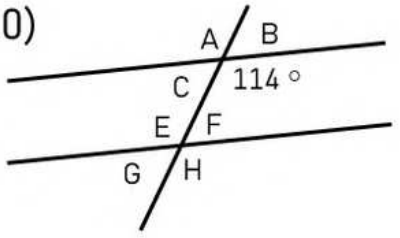


B = ___, D = ___, E = ___



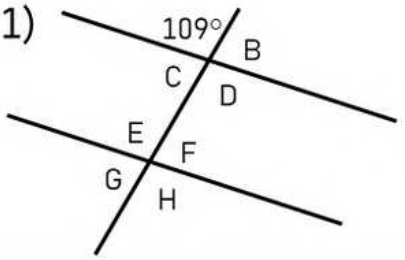
D = ___, B = ___, G = ___

10)



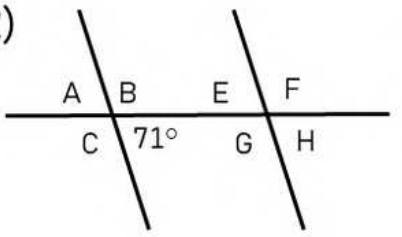
H = ___, G = ___, B = ___

11)



G = ___, F = ___, C = ___

12)



A = ___, F = ___, H = ___

PREVIEW

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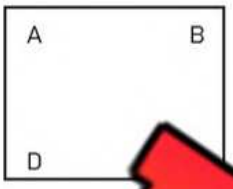
Curriculum Connection
E2.2

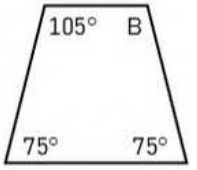
Interior Angles - Quadrilaterals

Interior angles are the angles inside a shape. The interior angles of a quadrilateral will always equal 360°. We can use this information to solve for unknown angle measurements.



A rectangle has 4 equal angles that are 90°.

__ + __ + __ + __ = 360
90 + 90 + 90 + 90 = 360

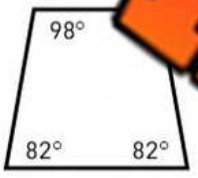


The trapezoid has 2 pairs of equal angles.

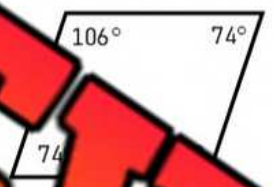
75 + 75 + 105 + B = 360
B = 105

Instru[illegible]s [illegible] values of the unknown angle measurements

1)

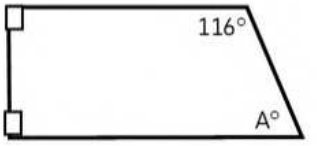


A =



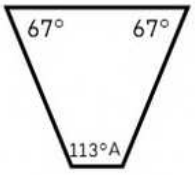
A =

3)



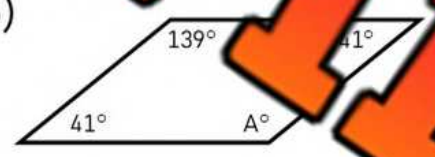
A =

4)



A =

5)



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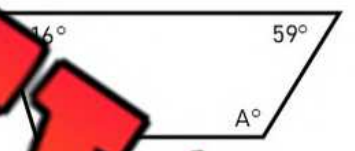
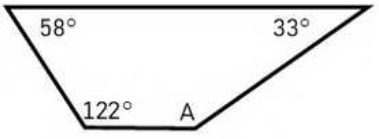


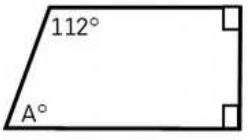
A =

7)



A =

8)



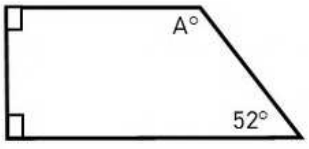
A =

9)



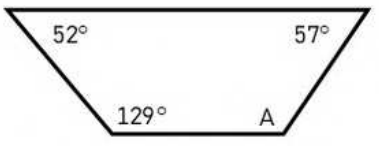
A =

10)



A =

11)



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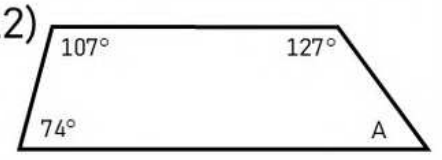
12)



A =

PREVIEW

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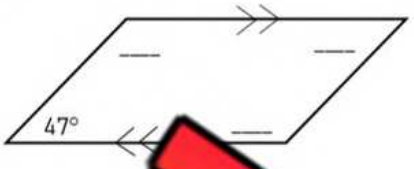
Name: _____ 145

Curriculum Connection
E2.2

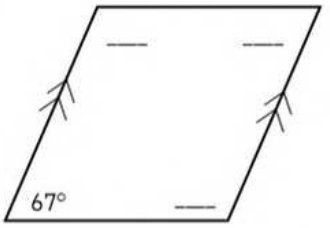
Interior Angles - Quadrilaterals

Instructions Find the values of the unknown angle measurements. No protractors!

1)



2)



3)



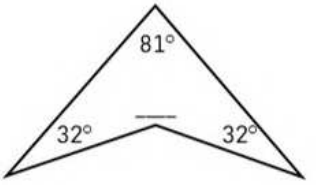
4)



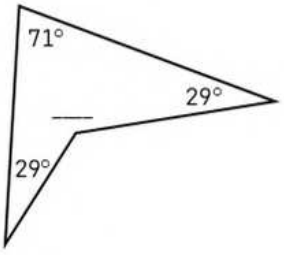
5)



6)



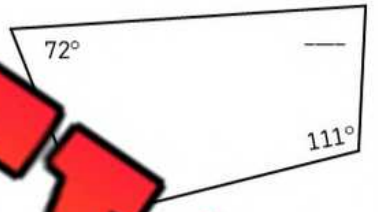
7)



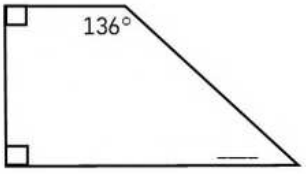
8)



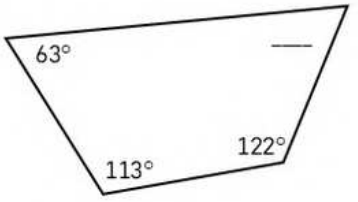
9)



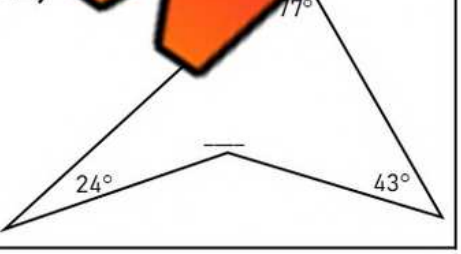
10)



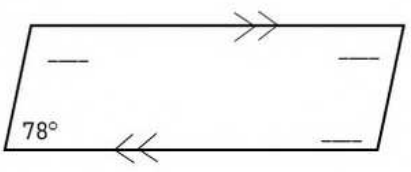
11)



12)



13)



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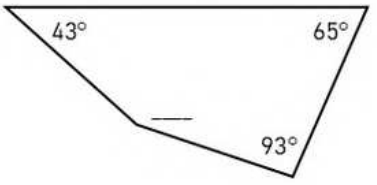
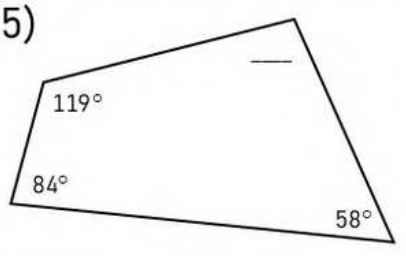


15)



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Curriculum Connection
E2.2

Interior Angles - Polygons

We can determine the sum of interior angles for any polygon by using the following formula: $(n - 2) \times 180$ (n equals the number of sides on the polygon)

Substitute the number of sides the polygon has for the variable n.
For example - A triangle has 3 sides: (3 - 2) x 180 = 180°

Questions | Fill in the table below

#	Po... of Sides	Sum of Interior Angles	Regular Polygon Angle of Each Vertex
1)	3	(n – 2) x 180 (3 – 2) x 180° 180 = 180°	$\frac{180}{3} = 60°$
2)	4		
3)	5		
4)	6		
5)	7		
6)	8		
7)	9		
8)	10		
9)	20		
10)	30		
11)	48		

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Curriculum Connection
E2.2

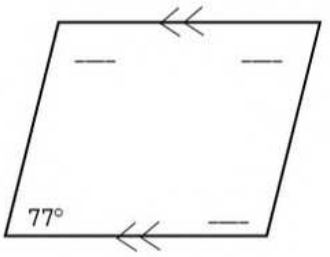
Interior Angles - Polygons

Questions Find the value of the unknown angle using the measurements provided

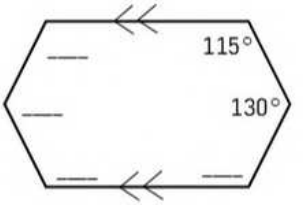
1)



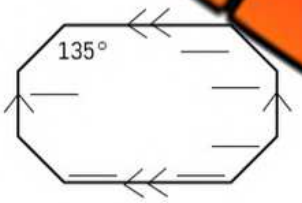
2)



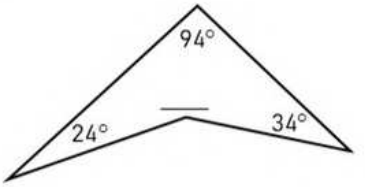
3)



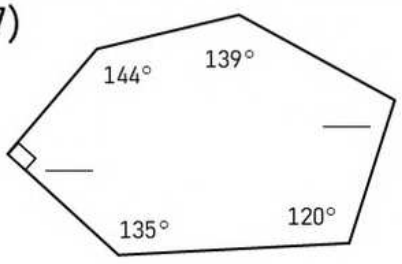
4)



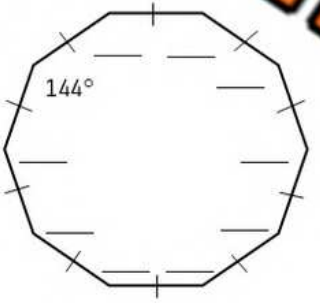
6)

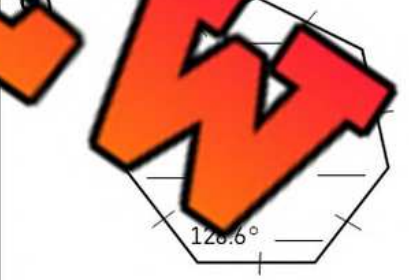


7)

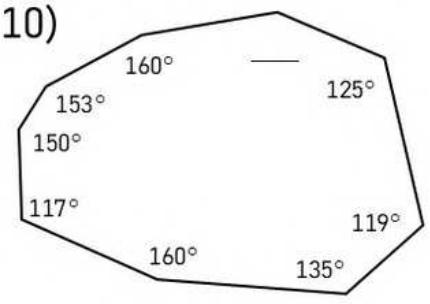


8)

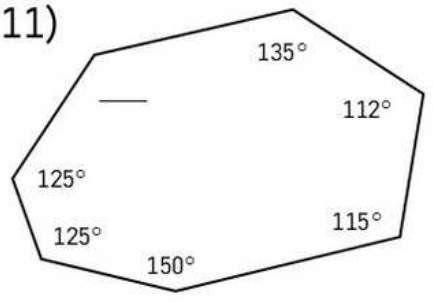




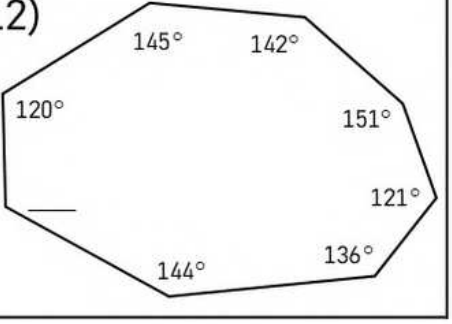
10)



11)



12)



PREVIEW

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Curriculum Connection
E2.2

Unit Quiz – Metric System and Lines/Angles

Part 1 Fill in the tables below

Tg	Gg
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Gm	Mm
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

µm	nm
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

ng	pg
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

PREVIEW

Part 2 Put the units in order from lea greate

1)	7mm	70 000µm	0nm

2)	350 000kg	3Tg	0µg

Part 3 Convert the units of measurement below

1) 500 000g	_____Mg	2) 60µm	_____mm
3) 2 000 000Mg	_____Tg	4) 3.1nL	_____pL
5) 60 000 000pL	_____µL	6) 82m	_____mm

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Part 4 Write the complementary angle for each angle below

#	Angle	Complementary
1	37°	
2	63°	
3	84°	

#	Angle	Complementary
4	46°	
5	72°	
6	55°	

Part 5 e the supplementary angle for each angle below

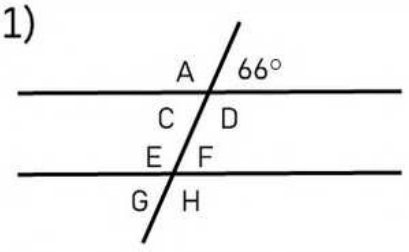
#	ngle	lementary
1	123	
2	144°	
3	157°	

#	Angle	Supplementary
4	82°	
5	171°	
6	106°	

PREVIEW

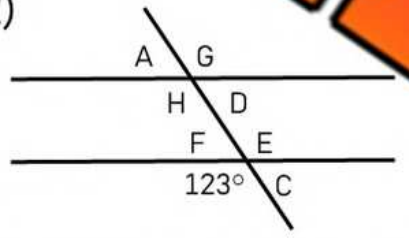
Part 6 Find the values of the unknown a meas ents

1)



A = ___, H = ___, G = ___

2)

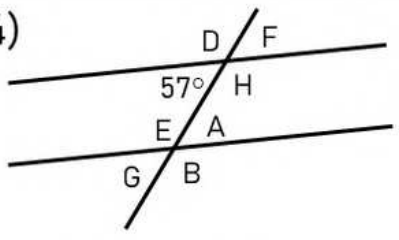


A = ___, E = ___, D = ___



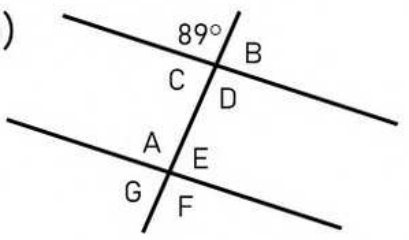
E = ___, B = ___, D = ___

4)



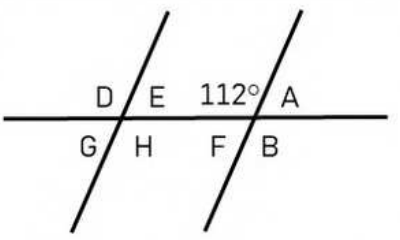
A = ___, H = ___, G = ___

5)



A = ___, F = ___, G = ___

6)



A = ___, H = ___, G = ___

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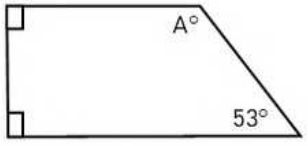
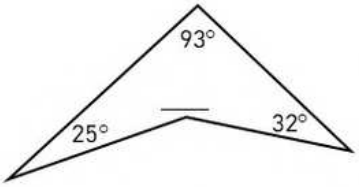
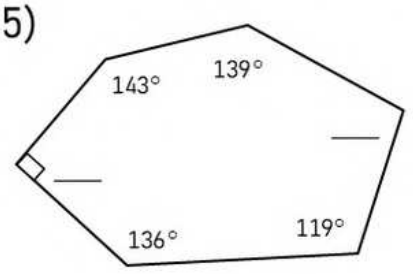
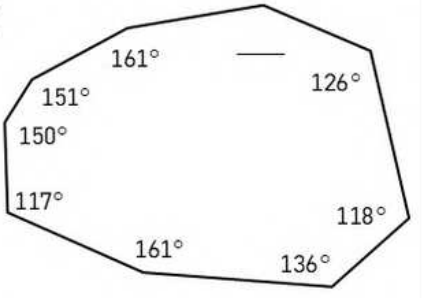
Part 7 Fill in the table below

#	Polygon - # of Sides	Sum of Interior Angles	Regular Polygon Angle of Each Vertex
1)	5		
2)	7		
3)			
4)			
5)	20		
6)	30		

PREVIEW

Part 8 Find the values of the unknow[illegible]

1) 	2) 	
A =	A =	A =

4) 	5) 	6) 

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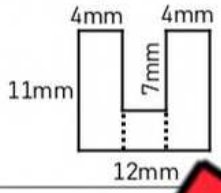
Curriculum Connection
E2.3

Area of Composite Polygons

Find the area of the polygons below by splitting them into separate shapes.

Example



Area = area of rectangle 1 + area of rectangle 2 + area of rectangle 3

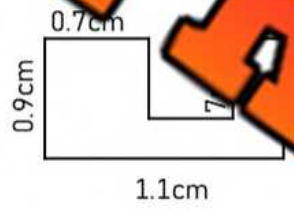
Rectangle 1:	Rectangle 2:	Rectangle 3:
A = 11 x 4	A = 4 x 4	A = 4 x 11
A = 44 mm²	A = 16mm²	A = 44mm²

Area = 44 + 44 + 16
A = 104mm²

Instructio Find the area of the composite polygons below

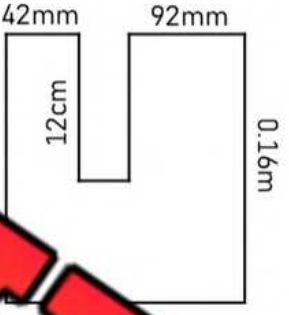
PREVIEW

1)



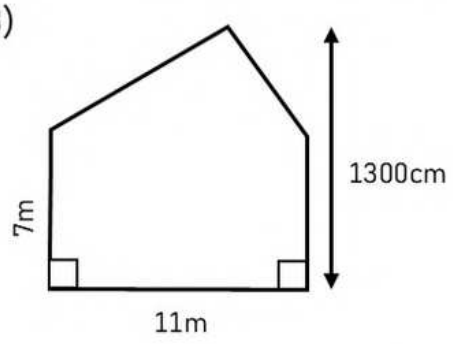
Area = _____

2)



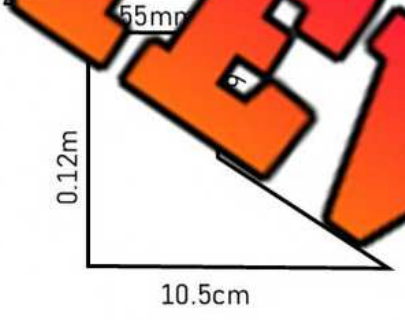
Area = _____

3)



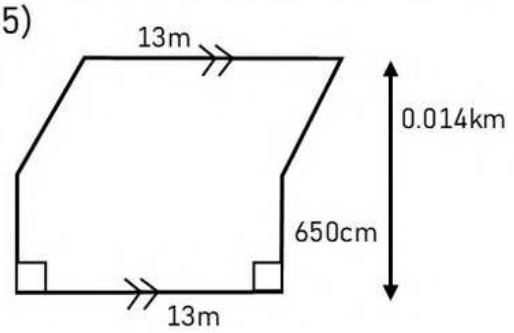
Area = _____

4)



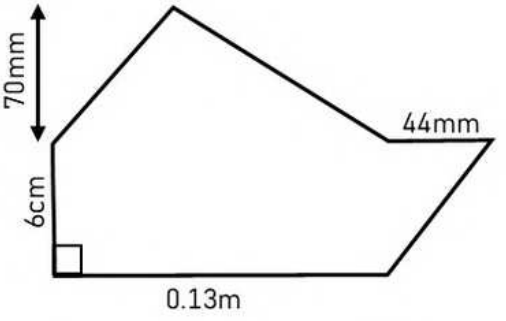
Area = _____

5)



Area = _____

6)



Area = _____

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Curriculum Connection
E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

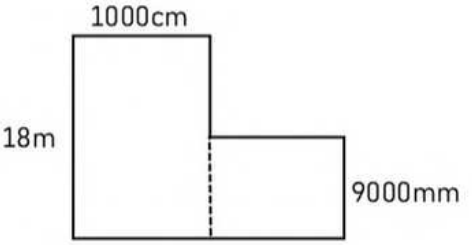
Find the area of composite shape



Area = _____

Name: _____

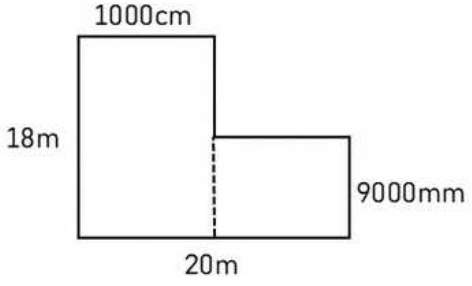
Find the area of composite shape



Area = _____

Name: _____

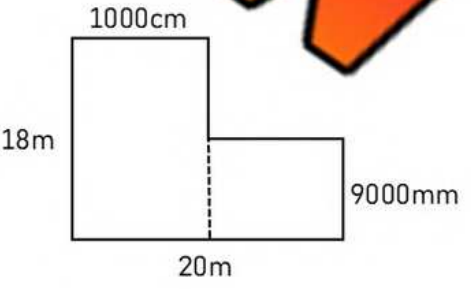
Find the area of composite shape



Area = _____

Name: _____

Find the area of composite shape



Area = _____

PREVIEW

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Name: _____ 155

Curriculum Connection
E2.3

Calculating Radius and Diameter

Calculating Radius Formula

$r = \frac{d}{2}$ or $r = d \div 2$

Calculating Diameter Formula

$d = 2r$ or $d = r \times 2$

Instruction Find the radius and diameter of each circle below

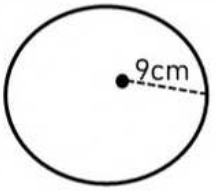
PREVIEW

1)

Radius = _____

Diameter = _____

2)



Radius = _____

Diameter = _____

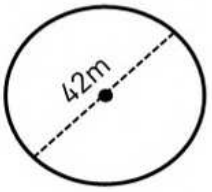
3)



Radius = _____

Diameter = _____

4)



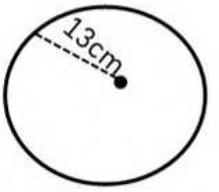
Radius = _____

Diameter = _____

Radius = _____

Diameter = _____

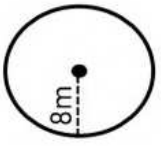
6)



Radius = _____

Diameter = _____

7)



Radius = _____

Diameter = _____

8)



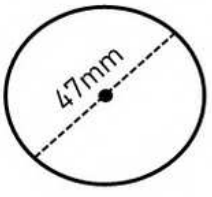
Radius = _____

Diameter = _____

Radius = _____

Diameter = _____

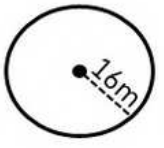
10)



Radius = _____

Diameter = _____

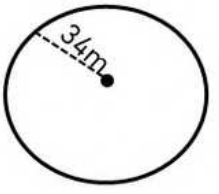
11)



Radius = _____

Diameter = _____

12)



Radius = _____

Diameter = _____

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Name: _____ 157

Curriculum Connection
E2.3

Calculating Circumference

Calculating Circumference (Diameter)
$c = \pi d$ or $c = \pi \times d$

Calculating Circumference (Radius)
$c = 2\pi r$ or $c = 2 \times \pi \times r$

Part 1 — Fill in the table with the missing information

	Radius	Diameter	Circumference
1)	8cm		
2)			
3)		25m	
4)		48cm	
5)			
6)			
7)	3.8km		
8)	8.5m		
9)			
10)		54.8m	

PREVIEW

Part 2 — Answer the word problems below

1)	Aiden is deciding which pizza to buy. He has two options. Option A: Pizza with a radius of 22cm Option B: Pizza with a circumference of 136cm Which pizza is larger? 	
2)	You need to wrap a label around a can. If the diameter of the can is 11.5cm, what length does the label need to be? 	
3)	Alexa needs to wrap a cake she made with a ribbon. The cake has a radius of 16.25cm. How long does the ribbon need to be? 	

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E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Fill in the table with the missing information. (c = πd & c = 2πd)

	Radius	Diameter	Circumference
1)	13m		
2)		39m	
3)	11m		
4)		77m	

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Name: _____

1) Fill in the table with the missing information. (c = πd & c = 2πd)

	Radius	Diameter	Circumference
1)	13m		
2)		39m	
3)	11m		
4)		77m	

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Name: _____

1) Fill in the table with the missing information. (c = πd & c = 2πd)

	Radius	Diameter	Circumference
1)	13m		
2)		39m	
3)	11m		
4)		77m	

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

PREVIEW

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Name: _____ 159

Curriculum Connection
E2.3

Area of a Circle - Radius

The area of a circle is the part inside the circle. We can calculate the area of a circle by using its radius. For most calculations, we can use 3.14 for pi. The formula is pi x radius^2. We can write this as $a = \pi r^2$

Calculating Area Using Radius



$a = \pi r^2$
$a = \pi \times 8 \times 8$
$a = 200.96m^2$

Practice Calculate the area of the circles using the radius

PREVIEW

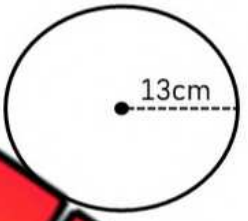
1)



Radius = _____

Area = _____

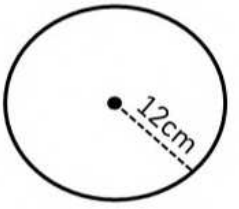
2)



Radius = _____

Area = _____

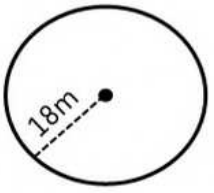
3)



Radius = _____

Area = _____

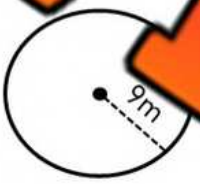
4)



Radius = _____

Area = _____

5)



Radius = _____

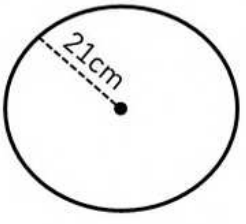
Area = _____



Radius = _____

Area = _____

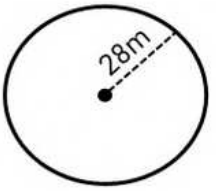
7)



Radius = _____

Area = _____

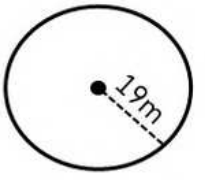
8)



Radius = _____

Area = _____

9)



Radius = _____

Area = _____

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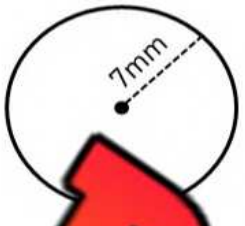
Name: _____ 161

Curriculum Connection
E2.3

Circles – Mixed Review

Practice | Fill in the blanks below

1)



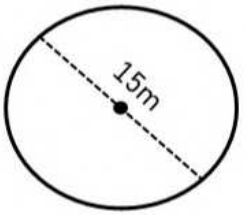
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

2)



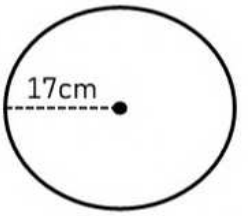
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

3)



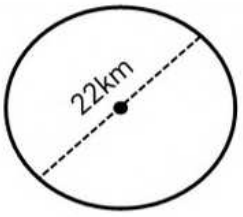
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

4)



Radius = _____

Diameter = _____

Circumference = _____

Area = _____

5)



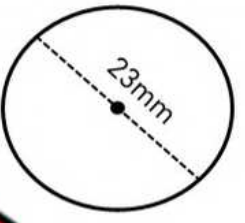
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

6)



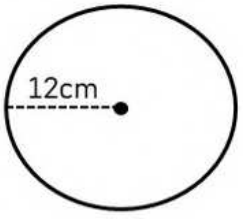
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

7)



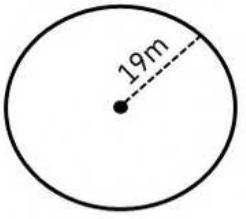
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

8)



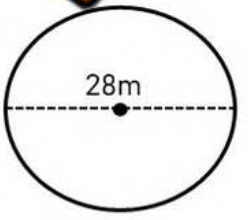
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

9)



Radius = _____

Diameter = _____

Circumference = _____

Area = _____

PREVIEW

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Name: _____ 162

Curriculum Connection
E2.3

Math Race: Circumference, Radius, Diameter, and Area

Objective

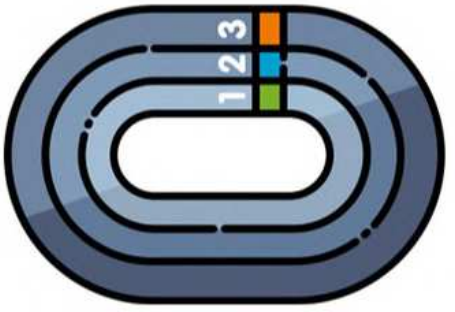
What are we learning about?

Students will practice calculating the circumference, radius, diameter, and area of circles by quickly answering related questions in a competitive and engaging game format. They will learn how to estimate these values using pi = 3.

Materials

What you will need for the activity.

- L[illegible] circumference, radius, di[illegible]r, and [illegible]cles.
- Optional: Tim[illegible]atch
- Chairs arr[illegible]ircle



PREVIEW

Instructions

How y[illegible]mplet[illegible]ctivity

1. Setup: Arrange chairs in a cir[illegible]le, w[illegible]stud[illegible]ted in a chair. One student stands behind a seated student to [illegible]he gam[illegible]
2. Explain the Game: Explain to the students t[illegible]y will [illegible]ipating in a race around the circle by answering questions a[illegible]ircu[illegible]n[illegible]a[illegible]s, diameter, and area. The goal is to move around the entire circle[illegible]n to th[illegible]ginal position. Students should use mental math and esti[illegible]pi = [illegible]
3. Start the Game: The teacher reads out a question (e.g., "W[illegible]at is[illegible]n[illegible]e of a circle with a radius of 3 cm?")
4. Answering the Question: The standing student and the seated studen[illegible]ront of them compete to answer the question first. The student who answers correctly first moves to stand behind the next seated student, while the other student remains seated.
5. Continue the Race: The teacher continues reading out questions, and the process repeats. The standing student continues to move around the circle, answering questions at each stop.
6. Winning the Game: The first student to make it around the entire circle and return to their original position wins the race.
7. Review: After the game, review some of the questions and answers with the class to reinforce the concepts and ensure understanding.

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Name: _____ 164

Curriculum Connection
E2.3

Questions | Use the questions below for the game

A cylindrical can has a circumference of 30 cm at its base. What is the can's diameter?	10 cm
A round placemat has a radius of 12 cm. What is the circumference of the placemat?	72 cm
The area of a circular fountain is 27 square metres. What is the diameter of the fountain?	6 metres
A round pl ound has a circumference of 48 metres. What is the radius of the playgr	8 metres
The area yground is 300 square metres. What is the radius of the p	10 metres
The area a circ ce is 12 square metres. What is the radius of the clock?	2 metres
A round wall cloc diam What is the circumference of the clock?	90 cm
A circular pizza pan has a nce What is the radius of the pan?	10 cm
A circular garden plot has a radius of 4 What ircumference of the plot in centimetres?	240 cm
A round clock's face has a diameter of 16 cm. W he ar ock's face?	192 cm²
The area of a circular trampoline is 75 square metres. amp diameter.	10 etres
A cylindrical water tank has a circumference of 150 cm at its base. radius of the base?	cm
A round hot tub has a radius of 3 metres. What is the area of the hot tub square centimetres?	2,700 cm²
The diameter of a circular sticker is 9 cm. Calculate the circumference of the sticker.	27 cm
A circular track has a circumference of 60 metres. What is the radius of the track?	10 metres
The area of a round park bench is 300 square centimetres. Find the radius of the bench.	10 cm
A circular plate has a circumference of 30 cm. What is the plate's diameter?	10 cm
A round fountain has a diameter of 12 metres. Calculate the area of the fountain in square metres.	108 m²

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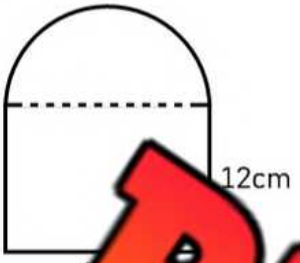
Name: _____ 170

Curriculum Connection
E2.3

Perimeter of Composite Shapes

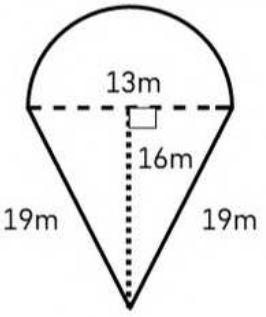
Questions Find the perimeter of each composite shape

1)



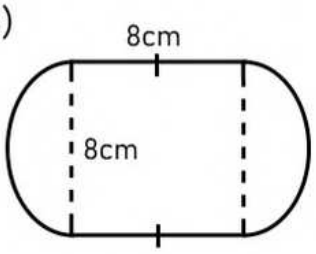
Perimeter: _____

2)

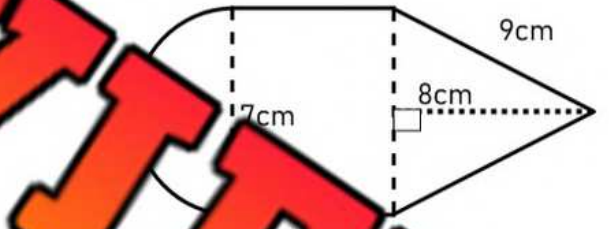


Perimeter: _____

3)

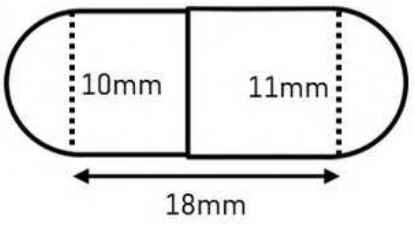


Perimeter: _____



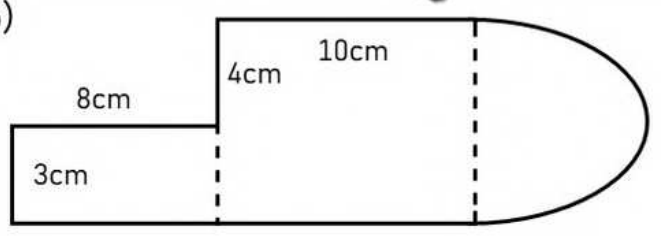
Perimeter: _____

5)



Perimeter: _____

6)



Perimeter: _____

PREVIEW

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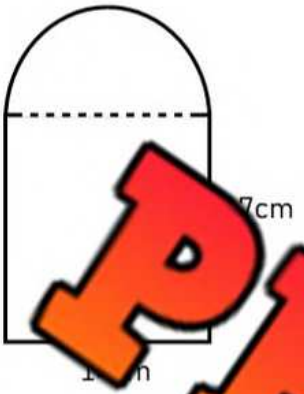
Name: _____ 172

Curriculum Connection
E2.3

Area of Composite Shapes

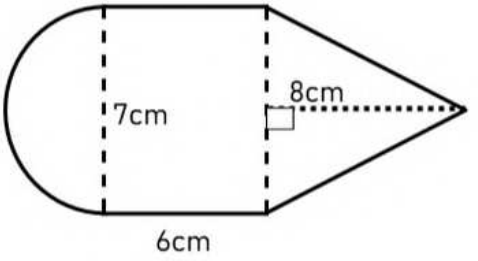
Questions Find the area of each composite shape

1)



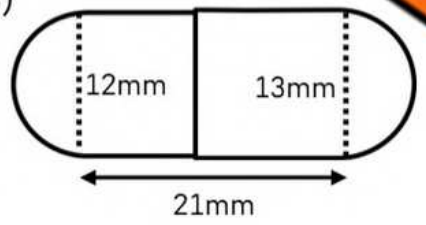
Area: _____

2)



Area: _____

3)

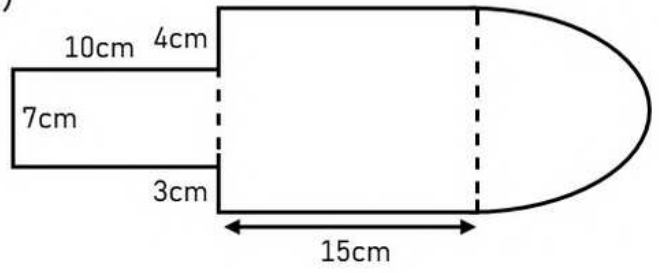


Area: _____



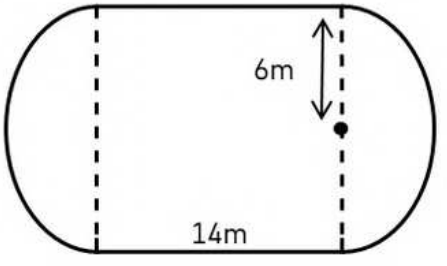
Area: _____

5)



Area: _____

6)



Area: _____

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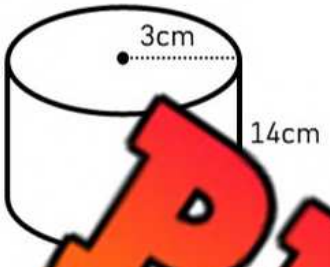
Name: _____ 175

Curriculum Connection
E2.3

Surface Area - Cylinders

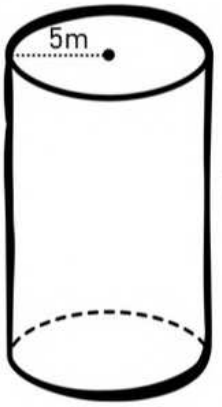
Questions Solve the questions below

1)



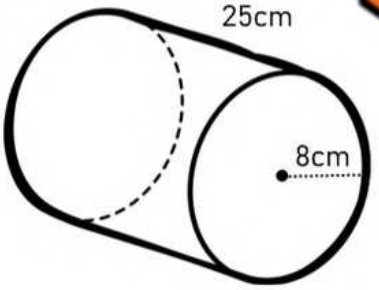
Surface Area: _____

2)



Surface Area: _____

3)

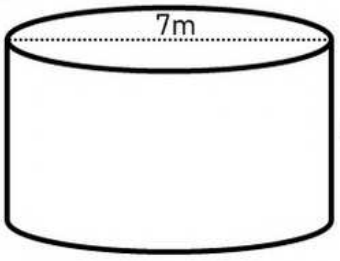


Surface Area: _____



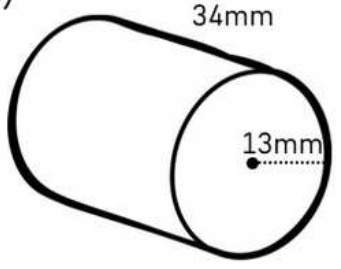
Surface Area: _____

5)



Surface Area: _____

6)



Surface Area: _____

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Name: _____ 176

Curriculum Connection
E2.3

Surface Area - Cylinders

Instruction Solve the questions below



1) A can of soup has a diameter of 9cm and a height of 19cm. What is the surface area of the can?

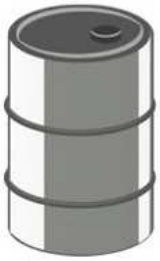


2) A can of tuna has a radius of 7.5cm and a height of 42mm. What is the surface area of the can?



3) A battery is composed of two cylinders. The main battery cylinder has a radius of 7mm. The height of the main cylinder is 8cm. The smaller cylinder on top of the battery has a diameter of 8mm and a height of 4mm.

What is the total surface area of the battery?



4) A barrel has a diameter of 74cm and a height of 1.62m. What is the surface area of the barrel?

PREVIEW

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Curriculum Connection
E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Solve the questions below



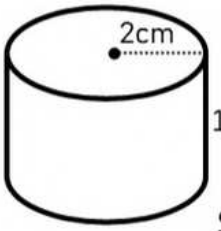
Surface Area: _____

2) A soda can is modeled as a cylinder with a radius of 6 cm and a height of 15 cm. Draw its net and calculate the surface area of the can.

_____

Name: _____

1) Solve the questions below



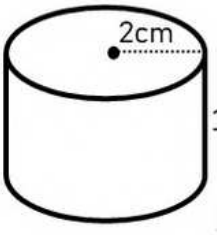
Surface Area: _____

2) A soda can is modeled as a cylinder with a radius of 6 cm and a height of 15 cm. Draw its net and calculate the surface area of the can.

_____

Name: _____

1) Solve the questions below



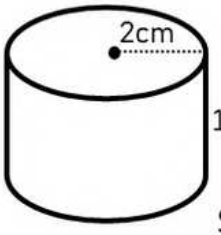
Surface Area: _____

2) A soda can is modeled as a cylinder with a radius of 6 cm and a height of 15 cm. Draw its net and calculate the surface area of the can.

_____

Name: _____

1) Solve the questions below



Surface Area: _____

2) A soda can is modeled as a cylinder with a radius of 6 cm and a height of 15 cm. Draw its net and calculate the surface area of the can.

_____

PREVIEW

Name: _____ 178

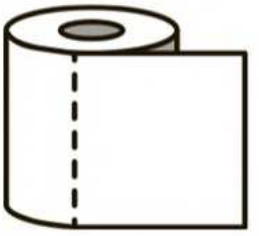
Curriculum Connection
E2.3

Surfaces Area Using Nets - Cylinders

Instruction Solve the questions below

1) A toilet paper roll is 16cm tall with a radius of 6cm. The inside cylinder is a hole. It has a diameter of 3cm.

What is th urface area of the toilet paper roll. Remember to account for the hole.



PREVIEW

2) A wheel of brie chees tall. is 9cm long. What is the surface area of the full wheel of che



3) A pot has no lid on top. The pot is 14cm tall and has a radius of 10cm. What is the surface area of the pot?



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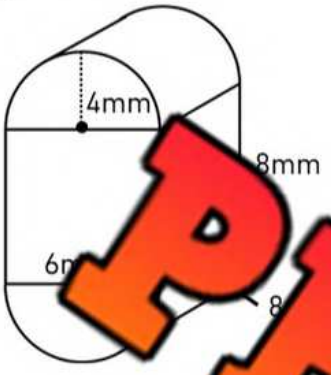
Name: _____ 180

Curriculum Connection
E2.3

Surface Area – 3D Composite Objects

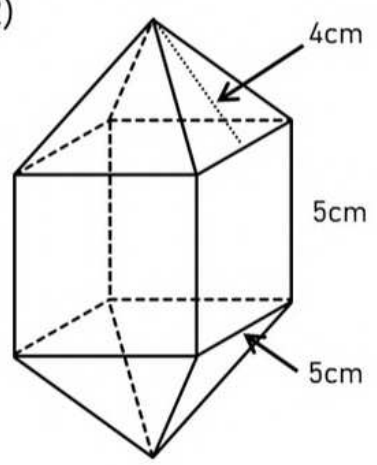
Questions Find the surface area of the 3D composite objects

1)



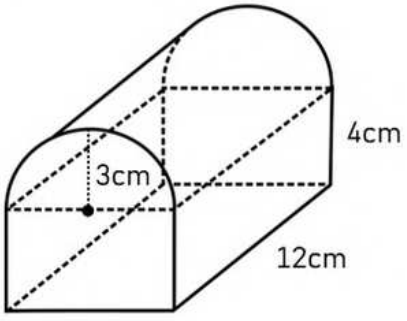
Surface Area: _____

2)

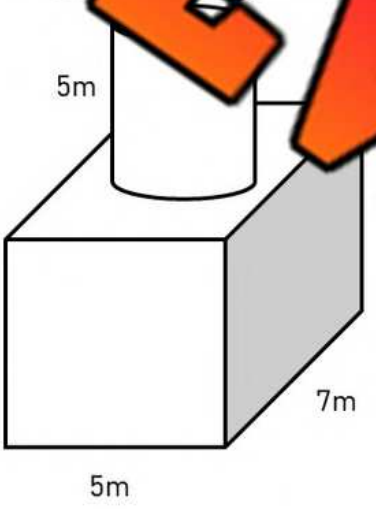


Surface Area: _____

3)



Surface Area: _____



Surface Area: _____

PREVIEW

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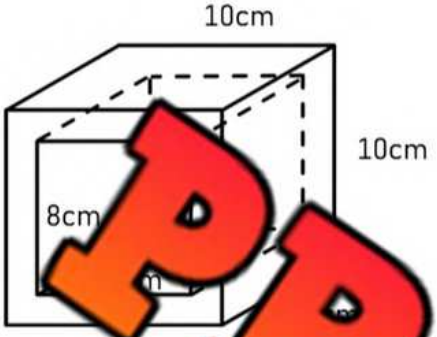
Name: _____ 182

Curriculum Connection
E2.3

Surface Area – 3D Composite Objects

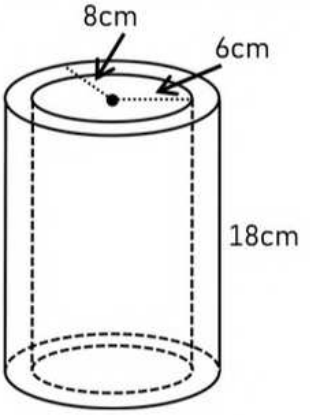
Questions Find the surface area of the 3D objects below. Note the holes!

1)



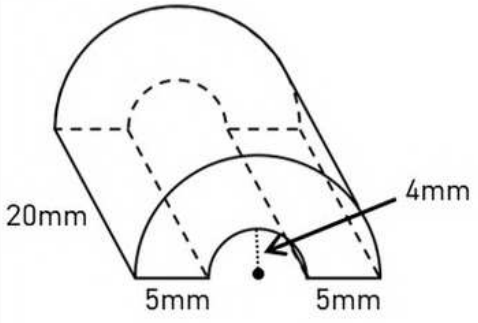
Surface Area: _____

2)



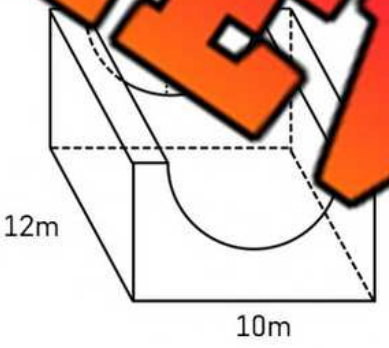
Surface Area: _____

3)



Surface Area: _____

4)



Surface Area: _____

PREVIEW

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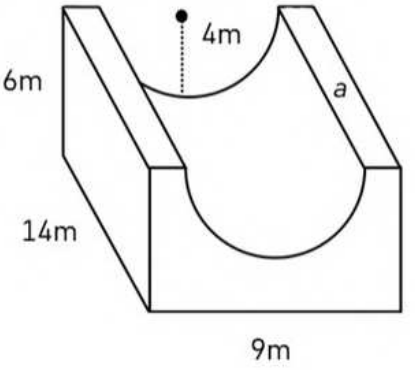
Name: _____ 183

Curriculum Connection
E2.3

Surface Area – Word Problems

Questions | Answer the word problems below

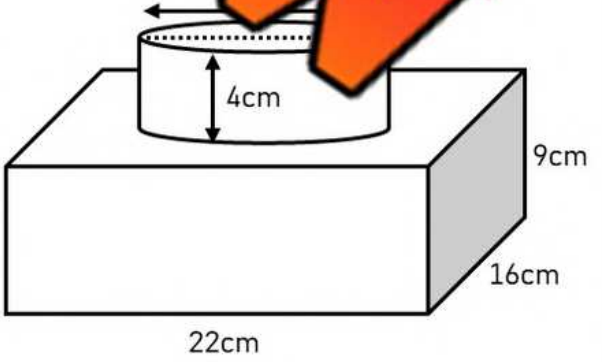
1) A half-pipe skateboard ramp has been built with the dimensions below.



a) What is the surface area of the half-pipe?

b) When a skateb… how much room is there for them to land on the top of t… pe? W… the dimensions of the area that is labelled with an *a*?

2) Courtney made a two-layer cake using a recta… m and …inder. Instead of using icing between the two-layers, she w… saw… jam to hold them together. Courtney will cover the outside of the ca… ith … t the bottom).



a) What is the area that will be covered by jam (two surfaces)?

b) What is the area that will be covered in vanilla icing?

PREVIEW

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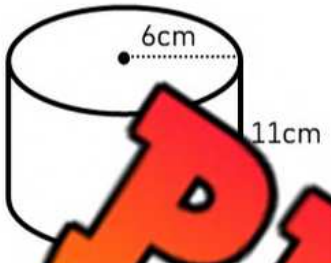
Name: _____ 186

Curriculum Connection
E2.3

Volume - Cylinders

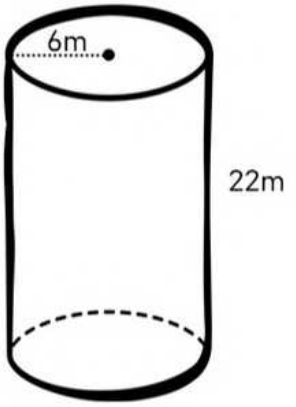
Questions Solve the questions below

1)



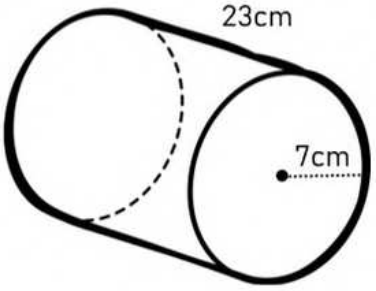
Area of the Base: _____ Volume: _____

2)



Area of the Base: _____ Volume: _____

3)

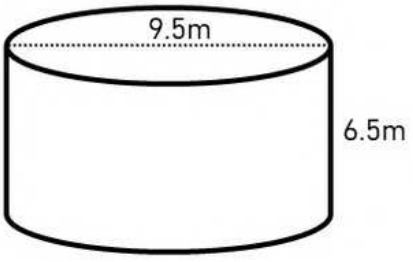


Area of the Base: _____ Volume: _____



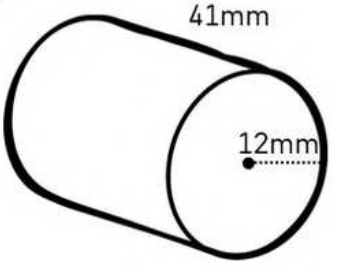
Area of the Base: _____ Volume: _____

5)



Area of the Base: _____ Volume: _____

6)



Area of the Base: _____ Volume: _____

PREVIEW

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Name: _____ 187

Curriculum Connection
E2.3

Volume of Cylinders

Part 1 Fill in the blanks to investigate the area of the base and the volume

	Radius	Area of Base	Height	Volume
1)	9 mm		13 mm	
2)	mm		15 mm	
3)			10 cm	
4)			6 km	
5)	9		8 cm	
6)	13 cm		11 cm	
7)	6 m		12 m	
8)	9 m		m	

PREVIEW

Part 2 Answer the questions below

1)	The radius of a swimming pool is 4.1 metres. The height of the pool is 1.3 metres. What is the volume of the swimming pool? 
2)	A can's base has an area of 37 cm^2. The volume of the can is 407cm^3. What is the height of the can? 
3)	A bucket has a height of 9cm. The bucket's base has an area of 22cm^2. a) What is the volume of the bucket? b) If 1cm^3 of volume has the capacity to hold 1mL of water, how many mL can the bucket hold? 

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Curriculum Connection
E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Fill in the blanks to investigate the area of the base, height, and the volume.

	Radius	Area of Base	Height	Volume
1)	[illegible]m		10cm	
2)	[illegible]		15cm	
[illegible]	[illegible]		20cm	392.5cm^3
[illegible]	7cm	[illegible]154cm^2		924cm^3

2) A cylindrica[illegible]er [illegible]has [illegible]area of 200 cm² and a height of 2 meters.

a) What is the [illegible]of the [illegible]in cubic centimeters (cm³)?

b) If 1 liter of water is equ[illegible]0 c[illegible]o[illegible]y liters of water can the tank hold?

Name: _____

1) Fill in the blanks to investigate the area of the base, he[illegible]th[illegible]e.

	Radius	Area of Base	Height	
1)	6cm		10cm	
2)	4cm		15cm	
3)	2.5cm		20cm	392.5cm^3
4)	7cm	154cm^2		924cm^3

2) A cylindrical water tank has a base area of 200 cm² and a height of 2 meters.

a) What is the volume of the water tank in cubic centimeters (cm³)?

b) If 1 liter of water is equal to 1,000 cm³, how many liters of water can the tank hold?

PREVIEW

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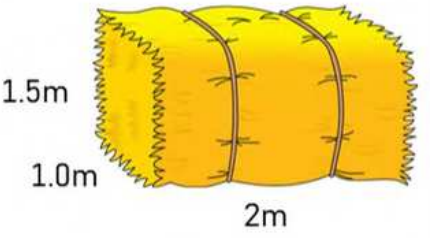
Name: _____ 190

Curriculum Connection
E2.3

Volume of Cylinders

Instruction Answer the questions below

1) There are two types of hay bales – one that is in the shape of a cylinder and one that is in the shape of a rectangular prism. The cylinder-shaped hay bale is 300cm tall and 150cm long. The rectangular-shaped hay bale has the following dimensions: 1.5m by 1.0m by 2.0m.



a) Which shape of hay bale contains more hay?



b) Joel thinks that a cylinder-shaped hay bale out of 3 rectangular-shaped bales. Is he right? Explain.

2) You are planning to make candles to sell. What would the dimensions of the candles be?

a) Draw a picture of one of the candles and label the dimensions.

b) What is the volume of the candle?

c) For every $10cm^3$, it costs you 30 cents. How much would the candle cost you in total?

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Curriculum Connection
E2.3

Activity: "Cylinder Volume Toss Challenge"

Objective

What are we learning about?

Students will reinforce their understanding of finding the volume of cylinders through a fun, team-based activity that involves answering volume problems and shooting a paper ball into a bin.

Materials

What you will need for the activity.

- I ms
- R ng she h team
- Paper balls (n)
- Bins or ba per tea
- Desks (one pe)



Instructions

How you ity

1. Arrange the classroom so that the nough ultiple teams to work simultaneously. Place a desk about 6 feet awa m a asket.
2. Place a stack of index cards with area pro on ea s
3. Provide each team with a recording sheet and a p
4. Divide the students into teams of about five membe
5. Each team stands in a line behind their respective desk.
6. The first student in line flips over an index card and solves the to the volume of a cylinder on the recording sheet.
7. Once the answer is recorded, the student attempts to shoot the paper all into the bin.
8. If the student makes the shot, they place a tally mark on the team's tally sheet for a point. If they miss, no tally is given.
9. The student then goes to the end of the line, and the next student steps up to the desk to repeat the process.
10. The activity continues until all index cards have been solved.
11. Once all index cards are completed, the teacher collects the recording sheets and reviews the answers with the class.
12. For each incorrect answer, the team loses one point.
13. The team with the highest number of points after deductions is declared the winner.

PREVIEW

Name: _____ 192

Curriculum Connection
E2.3

Index Cards | Cut out the cards below

A water tank has a radius of 2 m and a height of 4 m. What is the volume of the tank?

A cylindrical candle has a radius of 3 cm and a height of 8 cm. What is the volume of the candle?

A cylindrical [illegible] of 6 cm and a [illegible] its volum[illegible]

A cylindrical barrel has a diameter of 2 m and a height of 5 m. Find the volume of the barrel.

A can of paint has a diameter of 10 cm and a height of 20 cm. Calculate the volume of the can.

A gas ta[illegible] vo[illegible] of 5000 cm³ and a rad[illegible] of [illegible] height of t[illegible]

The volume of a cylinder is 1000 cm³ and the height is 10 cm. Find the radius of the base.

A cylindrical container has a radius of 7 cm and a height of 15 cm. What is its volume?

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Name: _____ 194

Curriculum Connection
E2.3

Index Cards | Cut out the cards below

A cylindrical pipe has a radius of 4 cm and a height of 10 cm. What is the volume of the pipe?

A cylindrical water tank has a radius of 3 m and a height of 8 m. What is the volume of the tank?

A large silo [illegible] and a height of [illegible] volume of [illegible]

A container has a base area of 100 cm² and a height of 25 cm. Find the volume of the container.

A cylindrical vase has a radius of 6 cm and a height of 15 cm. What is the volume of the vase?

A soda [illegible] and a height [illegible] volume [illegible]

The volume of a cylindrical drum is 2000 cm³ and the radius is 5 cm. Find the height of the drum.

A cylinder has a volume of 1200 cm³ and a height of 10 cm. What is the radius of its base?

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Name: _____ 195

Curriculum Connection
E2.3

Cylinder Volume Toss Challenge

Answers Record your answers below

Question	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Question	Answer
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

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Tally Chart Record your makes in the tally chart below

Tallies – Made Shots	Total

Wrong Answers	Final Score

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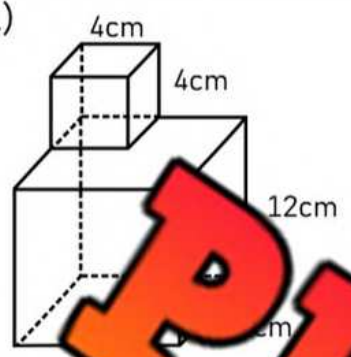
Name: _____ 196

Curriculum Connection
E2.3

Volume – 3D Composite Objects

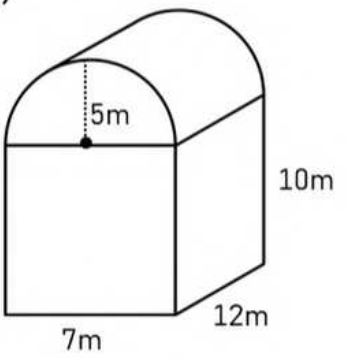
Questions Find the volume of the 3D objects

1)



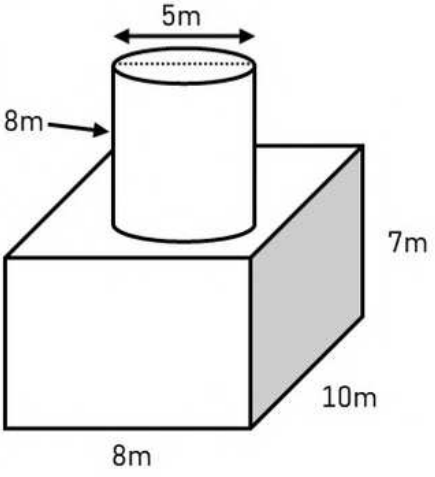
Volume: _____

2)

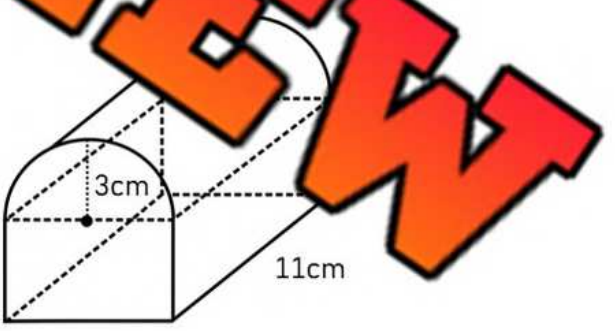


Volu _____

3)



Volume: _____



Volume: _____

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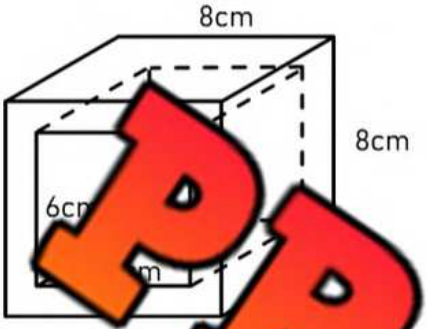
Name: _____ 197

Curriculum Connection
E2.3

Volume – 3D Composite Objects

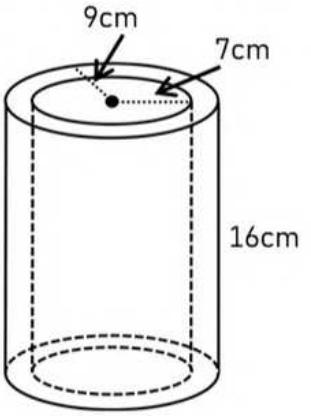
Questions Find the volume of the 3D objects that have holes in them

1)



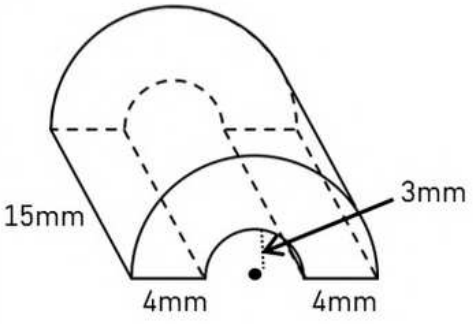
Volume: _____

2)



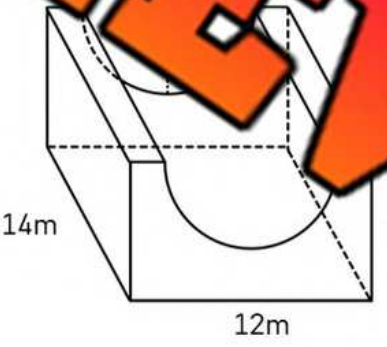
Volume: _____

3)



Volume: _____

4)



Volume: _____

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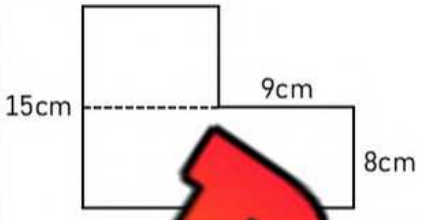
Name: _____ 199

Unit Test – Surface Area and Volume

Part 1 Find the area and perimeter of each composite shape

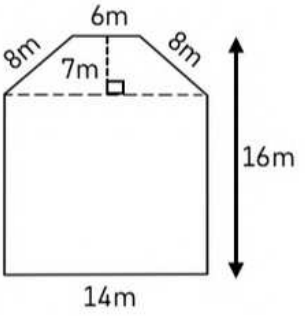
1)



Perimeter: _____

Area: _____

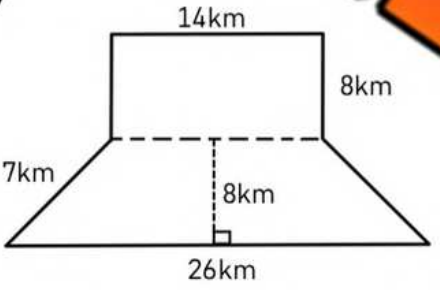
2)



Perimeter: _____

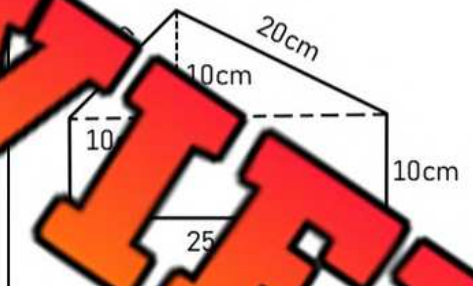
Area: _____

3)



Perimeter: _____

Area: _____



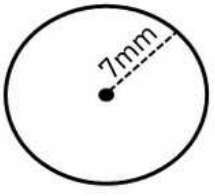
Perimeter: _____

Area: _____

PREVIEW

Part 2 Fill in the blanks below

1)



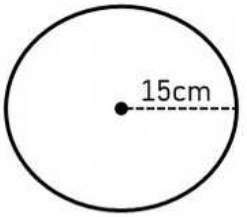
Radius = _____

Diameter = _____

Circumference = _____

Area = _____

2)



Radius = _____

Diameter = _____

Circumference = _____

Area = _____

3)



Radius = _____

Diameter = _____

Circumference = _____

Area = _____

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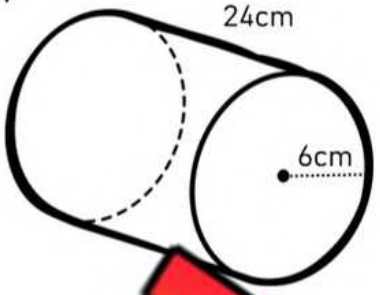
Part 6 Find the volume and surface area of the 3D objects below

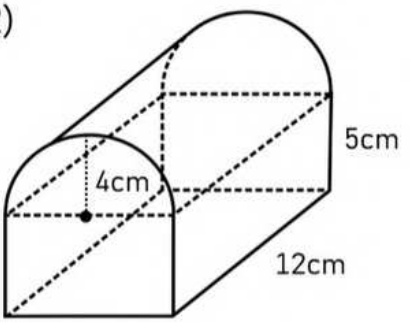
1)



Volume: _____

Surface Area: _____

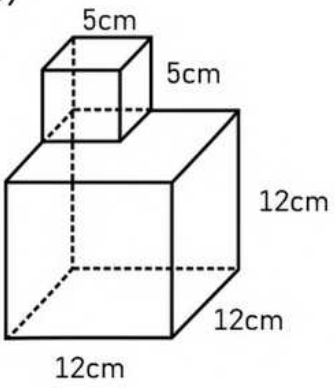
2)



Volume: _____

Surface Area: _____

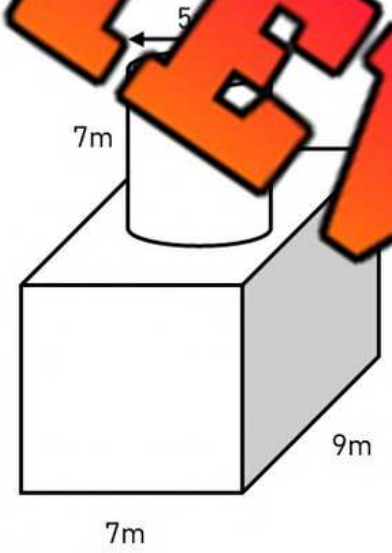
3)



Volume: _____

Surface Area: _____

4)



Volume: _____

Surface Area: _____

PREVIEW

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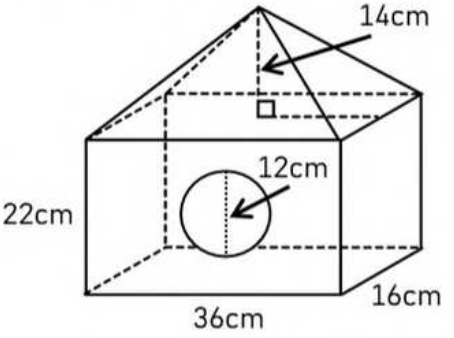
Part 7 Answer the word problems below

1) Josh is building a wooden birdhouse. The dimensions of the birdhouse have been displayed on his diagram below.

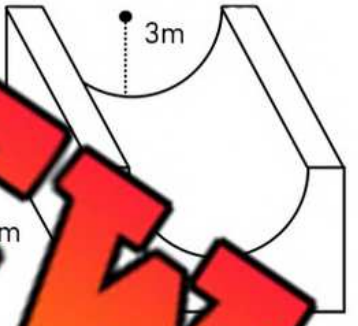
What is the surface area of the birdhouse with the hole?



PREVIEW

2) A half-pipe skateboard ... be ... th the dimensions below.

a) What is the surface area of the h... e?



b) How much space does the half-pipe occupy?

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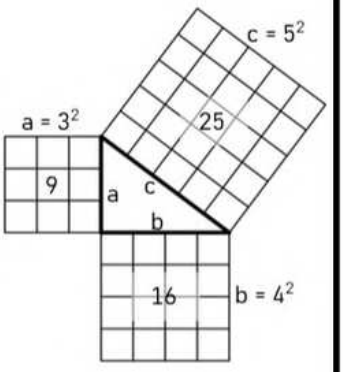
Curriculum Connection
E2.4

Intro – Pythagorean Theorem

The properties of a right triangle can be used to find an unknown side length. The longest side of a right triangle is always opposite the 90° angle and is called the **hypotenuse.**

The formula for calculating the length of the hypotenuse is: $a^2 + b^2 = c^2$

- If side a is 3 units long, then a square on this side has an area of 3^2 or 9.
- If side b is 4 units long, then a square on this side has an area of 4^2 or 16.
- If the area of side c is equal to the combined areas of the squares on sides a and b, then the square on side c must have an area of 25 square units (9 + 16). This means the length of side c must be $\sqrt{25}$.



PREVIEW

Part 1 — Label the triangles: a, b, and c

1)

2)

4)

Part 2 — Evaluate

	Question	Answer
1)	3^2	
2)	8^2	
3)	10^2	
4)	$\sqrt{36}$	

	Question	Answer
5)	$\sqrt{144}$	
6)	$\sqrt{16}$	
7)	7^2	
8)	$\sqrt{81}$	

Part 3 — Label the triangles: a, b, c and fill in the blanks to find their values

1)

$a^2 + b^2 = c^2$

___ + ___ = ___

Hypotenuse = _____

2)

$a^2 + b^2 = c^2$

___ + ___ = ___

Hypotenuse = _____

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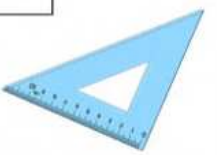
Curriculum Connection
E2.4

Pythagorean Theorem – Word Problems



Instructions Answer the questions below

1)	In a right-angled triangle, the lengths of the two shorter sides are 3 cm and 4 cm. What is the length of the hypotenuse?
2)	ht tria e leg that measures 8 meters and another leg that measur Wh the length of the hypotenuse?
3)	A building is 30 meters tall, and r is le ainst the top of the building. If the base of the ladder is 25 metres away fro bui how long is the ladder?
4)	A rectangular billboard is 15 meters tall and 20 meters wide. dia ole runs from the bottom corner to the top corner. How long is the pole?
5)	A rectangular garden is 12 meters long and 8 meters wide. If a diagonal path is drawn across the garden, what is the length of the path?

PREVIEW

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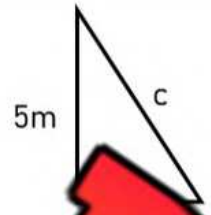
Name: _____ 207

Curriculum Connection
E2.4

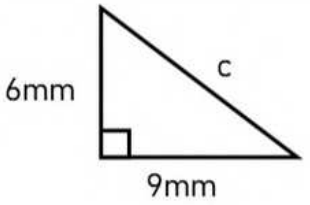
Pythagorean Theorem – Missing Side

Instructions Find the value of the hypotenuse. Round the answer to the nearest tenth

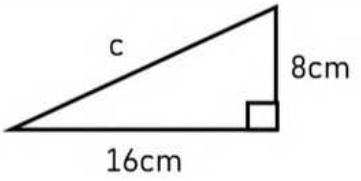
1)



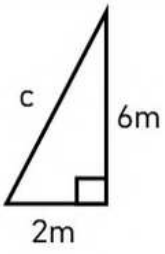
2)



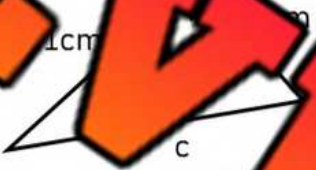
3)



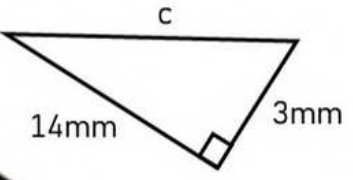
4)



5)



6)



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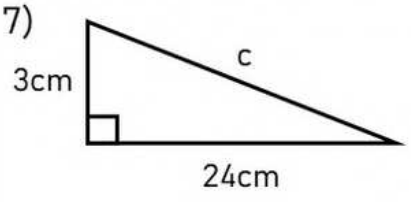
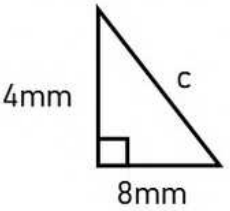
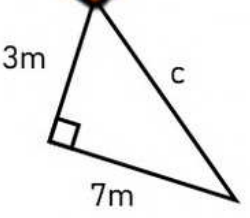


8)



9)



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Curriculum Connection
E2.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

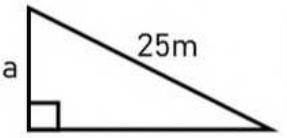
1) Find the value of the missing side.



2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

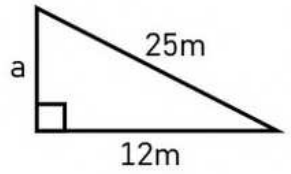
1) Find the value of the missing side.



2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

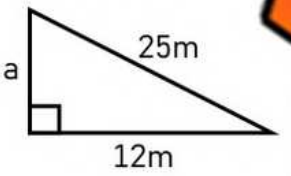
1) Find the value of the missing side.



2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

1) Find the value of the missing side.



2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

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Name: _____ 210

Curriculum Connection
E2.4

Pythagorean Theorem – Word Problems

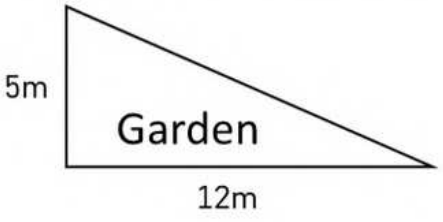
Instructions Answer the word problems below

1) Find the hypotenuse of a right triangle with a base of 10cm and a height of 6cm.

2) Lil[illegible]uth and 3 km east. Calculate how far Lily is away from her [illegible]ng point.

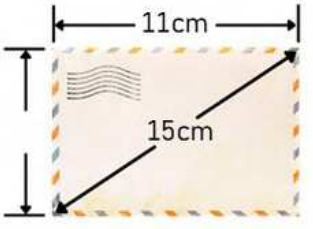


3) Julian built a triangular [illegible]en u[illegible]t[illegible]ensions below. If he wanted to put a fence around his garden, h[illegible]wou[illegible]e fence need to be?



4) Ivy's house is a rectangular shape that is 15m wide by 9m [illegible]g. [illegible]ng is the diagonal of her house (from corner to corner)?

5) An envelope has the dimensions below. What is the height of the envelope?



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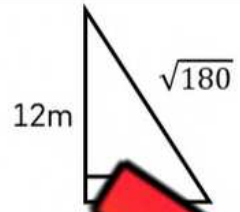
Name: _____ 211

Curriculum Connection
E2.4

Pythagorean Theorem – Missing Side

Instructions Find the value of the missing side. Record your answer as a square root

1)



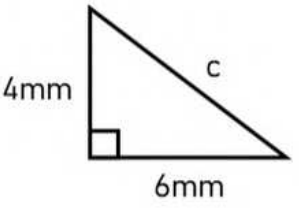
a^2 c^2

14^2 $36 = c^2$

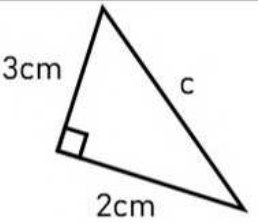
$\sqrt{180} = \sqrt{c^2}$

$c = \sqrt{180}$

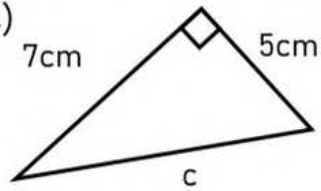
2)



3)



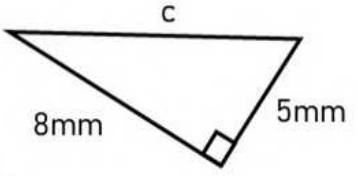
4)



5)



6)



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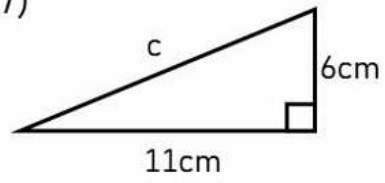

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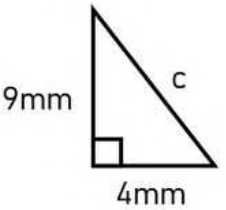

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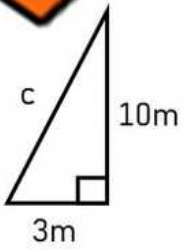

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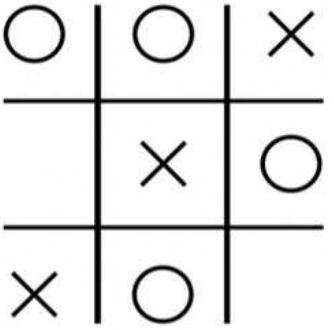
Name: _____ 213

Curriculum Connection
E2.4

Math Tic-Tac-Toe: Pythagorean Challenge

Objective — What are we learning about?

Students will practice using the Pythagorean Theorem to find the missing side of right triangles in a fun, competitive game of tic-tac-toe. This activity will reinforce their problem-solving skills and teamwork.



Materia[illegible] W[illegible] you will need for the activity.

- Whiteboard [illegible]er
- Markers o[illegible] mark[illegible]
- Pre-written Py[illegible]rean [illegible] for each cell of the tic-tac-toe grid)

Instructions — How you w[illegible]ple[illegible]ty

1) **Preparation**: Hand out Tic-Tac-Toe [illegible]ksheets [illegible] of students. Each worksheet should have a large tic-tac-toe [illegible]h a di[illegible] Pythagorean Theorem problem in each cell. One side of [illegible]ht tr[illegible] missing in each problem.

2) **Instructions**:
   - Students will play individually against each other, [illegible] on [illegible] and the other "O."
   - The student playing "X" will go first. They will choose a cell, so[illegible] Pythagorean Theorem problem in that cell, and check their an[illegible] with their partner. If the solution is correct, they place an X in that cell.
   - If the answer is incorrect, they do not place their mark, and it becomes the "O" player's turn. The "O" player will then choose a cell, solve the problem, and check their answer. If correct, they place an O in that cell.
   - The game continues with alternating turns.

3) **Winning the Game**: The first player to get three marks in a row (horizontally, vertically, or diagonally) wins the game.

4) **Discussion**: After the game, students should discuss with their partner the different strategies they used to solve the problems and any challenges they faced during the activity.

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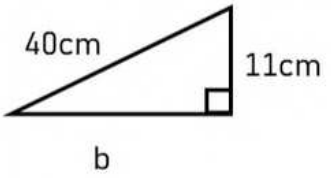
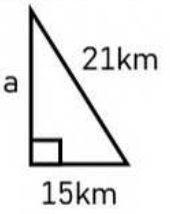
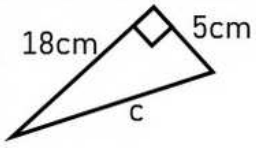
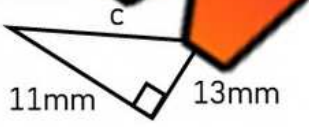
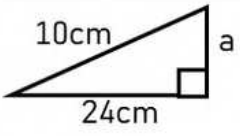
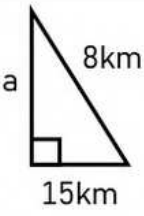
Curriculum Connection
E2.4

Tic-Tac-Toe Use the following tic-tac-toe grids for the game.

Lily walked 5 km south and 12 km east. How far is she from her starting point?		Jacob's rectangular garden measures 18 m by 24 m. Find the diagonal length.
	Lucas paddled his kayak 4 km north and 3 km east. How far is he from his starting point?	
David climbs 12m up a tree and moves 5m to the right on a branch. What is his diagonal distance from the tree base?		The base of a TV screen measures 48cm, and the height is 36cm. Find the diagonal size of the screen.
A rectangular rug is 9 m wide and 12 m long. What is the diagonal length?	Ella's garden is a rectangle measuring 20m by 15m. Find the diagonal length.	
	Daniel cycled 9km west and 12 km north. How far is he from his starting point?	
	Find the hypotenuse: right triangle with legs of 12cm and 16cm.	

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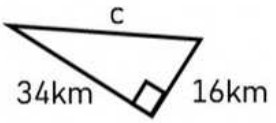
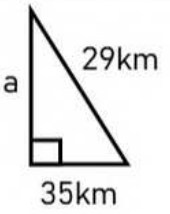
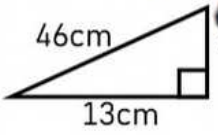
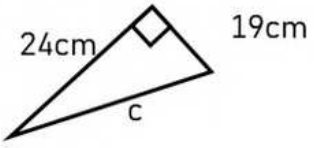
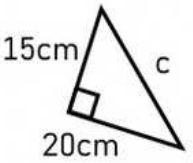
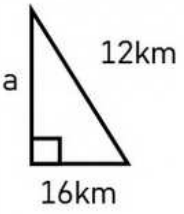
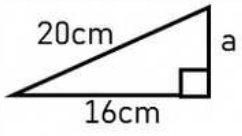
Curriculum Connection
E2.4

Tic-Tac-Toe Use the following tic-tac-toe grids for the game.

Chris's living room measures 5 m by 12 m. Find the diagonal length.	Lisa climbs 3 m up a ladder and moves 4 m sideways on a scaffold. What is her diagonal distance from the ground?	A triangle has legs of 5 cm and 12 cm. What is the hypotenuse?
A rectangular field is 12m wide and 35 long. What the diag length		
	and 60 nd th of t diagonal.	Ava jogged 7 km west and 24 km south. How far is she from her starting point?
		mm m
Nathan walked 3km north and 4km east. Calculate the distance from his starting point.		Hannah hiked 15km east and 20 km south. How far is she from the starting point?
	Mia flew her drone 8m upward and 15 m to the right. Calculate the diagonal distance.	Jamie's rectangular swimming pool measures 20m by 25m. Find the diagonal length.

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Curriculum Connection
E2.4

Pythagorean Theorem – Word Problems

Instruction Answer the word problems below

1) Robert has a 4m ladder that he is using to get as high as possible to hang his Christmas lights. He puts the ladder 2 metres away from the wall.

a) Label the dimensions on the diagram

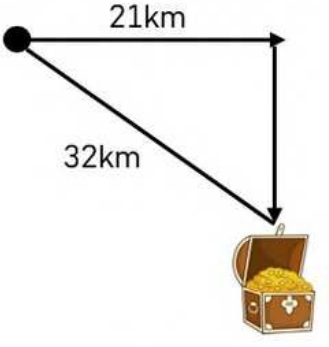
b) How [illegible] the top of the ladder off the ground?



2) Howard has a huge [illegible]er to [illegible]very tall bookshelf. He needs to climb 9m to find the boo[illegible] wa[illegible] the top of the ladder to be at the height of the book he wants [illegible] sho[illegible] put the ladder away from the bookshelf?



3) A pirate is on a treasure hunting missing. His GPS tells him he is 32km away from the treasure. He decides to travel 21km due east. The GPS now tells him that the treasure is due south from where his boat is. How far south does he need to travel to find the treasure?



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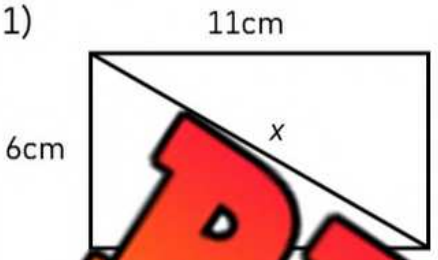
Curriculum Connection
E2.4

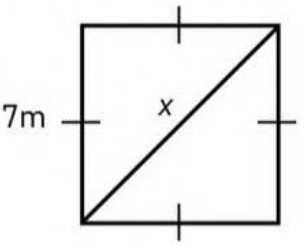
Pythagorean Theorem – Missing Side

Instruction Find the value of x.
Round the answer to the nearest tenth or leave as a square root

1)



2)



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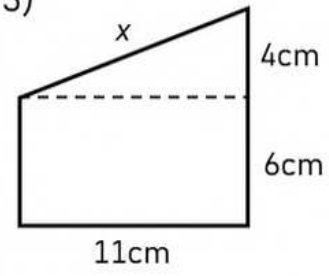



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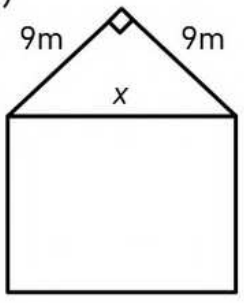
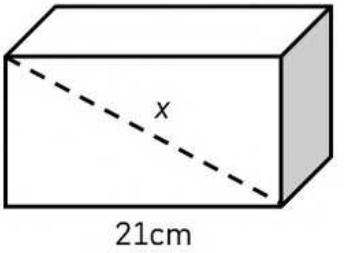


6)



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Curriculum Connection
E2.4

Pythagorean Theorem – Word Problems

Instruction Answer the word problems below

1) TVs are measured diagonally from corner to corner. Jeffrey wants a 150cm TV. He likes the look of one that has a base of 140cm and a height of 54cm. Is the TV 150cm diagonally?



2) To get from [illegible] point [illegible] you need to walk around the pond. To avoid the pond, you walk [illegible] and 44 [illegible] To the nearest metre, how many metres would you have sav[illegible]u cou[illegible]ked through the pond?



3) A baseball diamond is a square with sides of 30m. W[illegible] dis[illegible]ety[illegible]en first base and third base?

4) The local fire department has been called to a burning building. They need their ladder to reach the 4th floor, which is 22m high. They know that the ladder will need to be at least 12m away from the building. If they brought a 25m ladder, will they reach the fourth floor?

PREVIEW

Curriculum Connection
E2.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Real-life Pythagorean theorem problems, Find the value of the missing side.

1) A tree is 20 m tall and casts a shadow 15 m long on the ground. What is the distance from the top of the tree to the end of the shadow?

2) A ramp is used to load equipment onto a truck. The ramp is 2 m high and 4 m long along the ground. What is the length of the ramp itself?

Name: _____

Real-life Pythagorean theorem problems, Find the value of the missing side.

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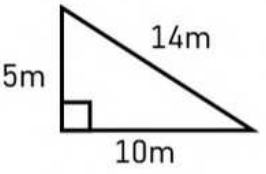
Curriculum Connection
E2.4

Identify Right Triangles – Pythagorean Theorem

We can use the Pythagorean Theorem to find out if a triangle is a right triangle or not. If we have all the measurements of the triangle, we can plug them into the equation. If the equation is true, the triangle is a right triangle and if it is false, it is not.



Solution

$a^2 + b^2 = c^2$

$5^2 + 10^2 = 14^2$

$25 + 100 = 196$

$125 \neq 196$

This equation is false, therefore this is not a right triangle

Questions Is the triangle a right triangle?

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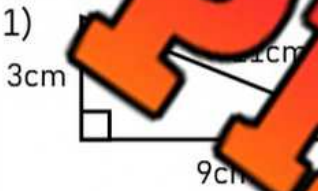
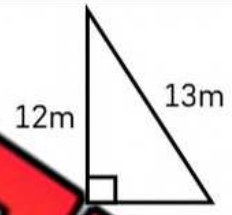
1)



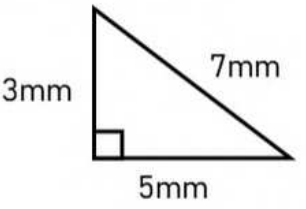
Yes No

2)



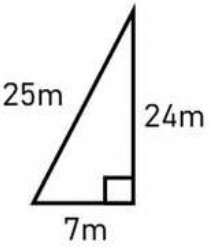
No

3)



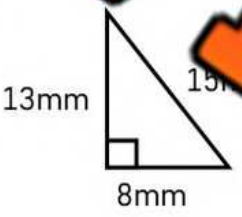
Yes No

4)



Yes No

5)

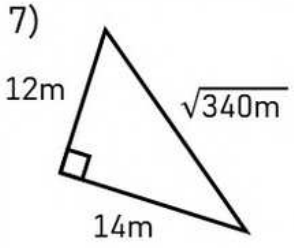


Yes No



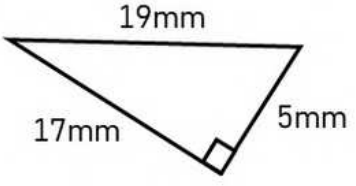
Yes No

7)



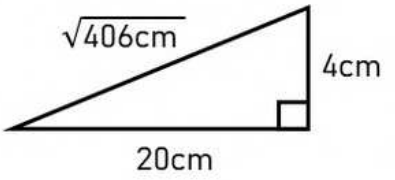
Yes No

8)



Yes No

9)



Yes No

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Curriculum Connection
E2.4

Pythagorean Theorem – Word Problems

Directions Draw and label the triangles and decide if the triangles are right or not

1) In the triangle ABC, the sides AB, BC, and AC measure 7cm, 24cm, and 25cm respectively. Is the triangle a right triangle?

2) In the tri[illegible]e s[illegible]IK, KL, and JL measure 5cm, 12cm, and 14cm respective[illegible] trian[illegible]t triangle?

3) In the triangle PQR, the sides PQ, QR, and [illegible]me[illegible]1[illegible]0mm, and 61mm respectively. Is the triangle a right trian[illegible]

4) In the triangle XYZ, the sides XY, YZ, and XZ measure 20cm, 20cm, and 29cm respectively. Is the triangle a right triangle?

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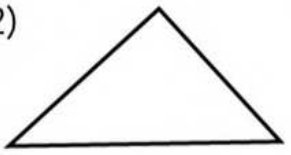
Name: _____ 227

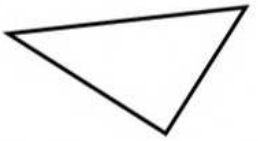
Curriculum Connection
TQ

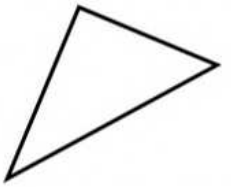
Pythagorean Theorem – Quiz

Part 1 Label the sides of the right triangles: a, b, and c

1) 

2) 

3) 

4) 

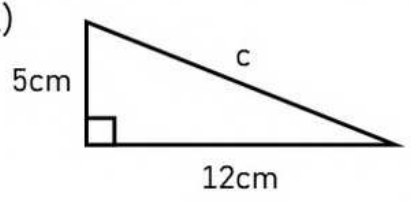
PREVIEW

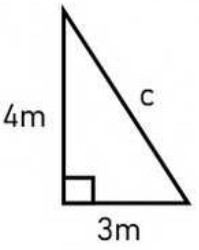
Part 2 Va

	Quest	Ans
1)	7^2	
2)	9^2	
3)	$\sqrt{16}$	

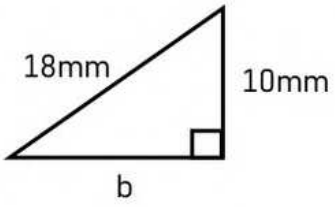
	Question	Answer
4)	$\sqrt{121}$	
5)	$\sqrt{64}$	
	6^2	

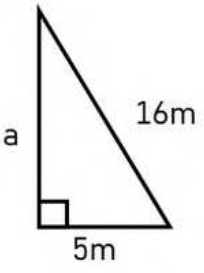
Part 3 Find the value of the missing side l m

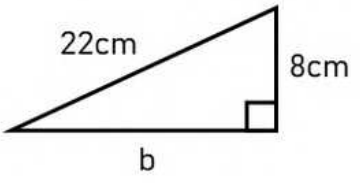
1) 

2) 



4) 

5) 

6) 

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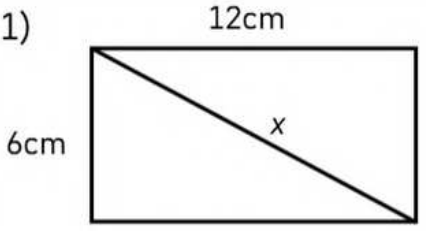
Name: _____ 228

Curriculum Connection
TQ

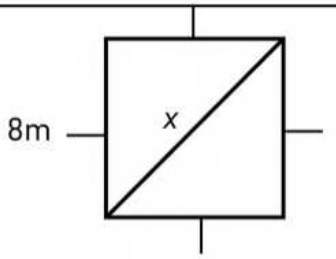
Part 4

Find the value of x.
Round the answer to the nearest tenth or leave as a square root

1)



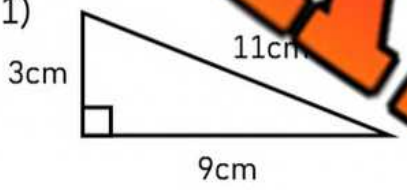
2)



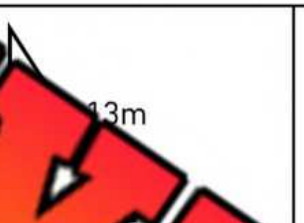
Part 5

...gle a right triangle?

1)

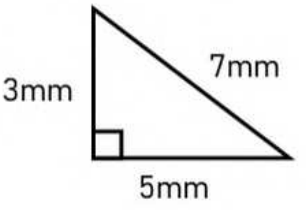


Yes No



Yes No

3)



No

Part 6

Is the triangle a right triangle?

1) A 14m ladder is leaning against a house. The bottom of the ladder is ...es from the house. How high does the ladder reach to the nearest tenth?

2) A building casts a shadow of 10m on the ground. The length from the top of the building to the end of the shadow is 26m. How tall is the building?

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