



Preview – Information



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Google Slides Lessons Preview





Manitoba Math Curriculum Statistics– Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

DATA TYPES

Learning Goal

We are learning to **understand and identify** different types of data (qualitative, quantitative, discrete, and continuous) by **examining their characteristics and examples**, so we can **correctly classify data in different situations**.

QUALITATIVE, DISCRETE OR CONTINUOUS DATA

You are helping organize a school music festival and are collecting information about performers and attendees. Decide whether the data collected is qualitative, discrete, or continuous.

Data Collected	Data Type
1) How many performers are in each band?	Qualitative Data
2) How long is each performance (in minutes)?	Discrete Data
3) What type of music does each band play?	Continuous Data
4) How many songs does each band perform?	
5) What colour are the stage lights?	
6) How many tickets were sold for the event?	
7) What is the age of each performer?	
8) How loud is the music (in decibels)?	
9) What is the name of each band?	
10) How many instruments are used in each performance?	



Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

PRIMARY VS SECONDARY DATA

Read each situation and determine if it is primary or secondary data. ✓

Situation	Primary	Secondary
1) You design a survey to find out how many hours students spend on homework each week.		
2) You use a government website to find the average temperature in your city last year.		
3) You count how many cars pass your school in 10 minutes.		
4) You read a news article about the most popular social media apps among teens.		
5) You measure how long it takes your classmates to run 100 metres.		
6) You collect data from a sports website about a basketball player's scoring average.		
7) You record how many students bring lunch from home each day for a week.		
8) You use a handbook to find the population of different provinces in Canada.		
9) You interview students about their favourite type of music.		
10) You look up the nutritional information of snacks from a company's website.		



Manitoba Math Curriculum Statistics– Grade 8

MODE



Find the mode for the data sets below.

24, 8, 20, 12, 24, 16	36, 42, 39, 36, 45, 36	21, 28, 16, 40, 55
Mode	Mode	Mode
690, 725, 670, 718, 705, 600	72, 85, 91, 75, 78, 85	305, 318, 311, 327, 318, 302
Mode	Mode	Mode
144, 152, 144, 167, 152, 149	210, 225, 218, 238, 225, 210	480, 495, 502, 480, 517, 480
Mode 4.38	Mode	Mode

INTERPRETING HISTOGRAM

A school counsellor surveyed Grade 8 students to find out how many hours of screen time they have on a typical school day.

Grade 8 Students' Daily Screen Time (Hours)



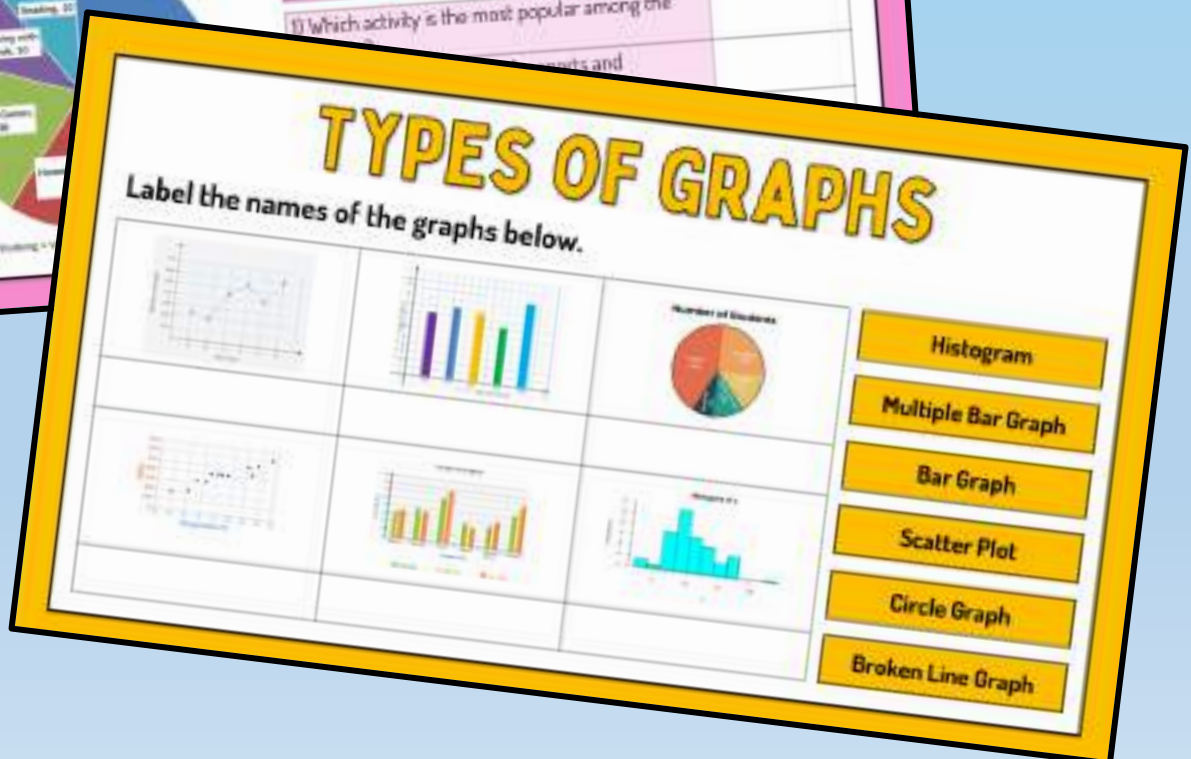
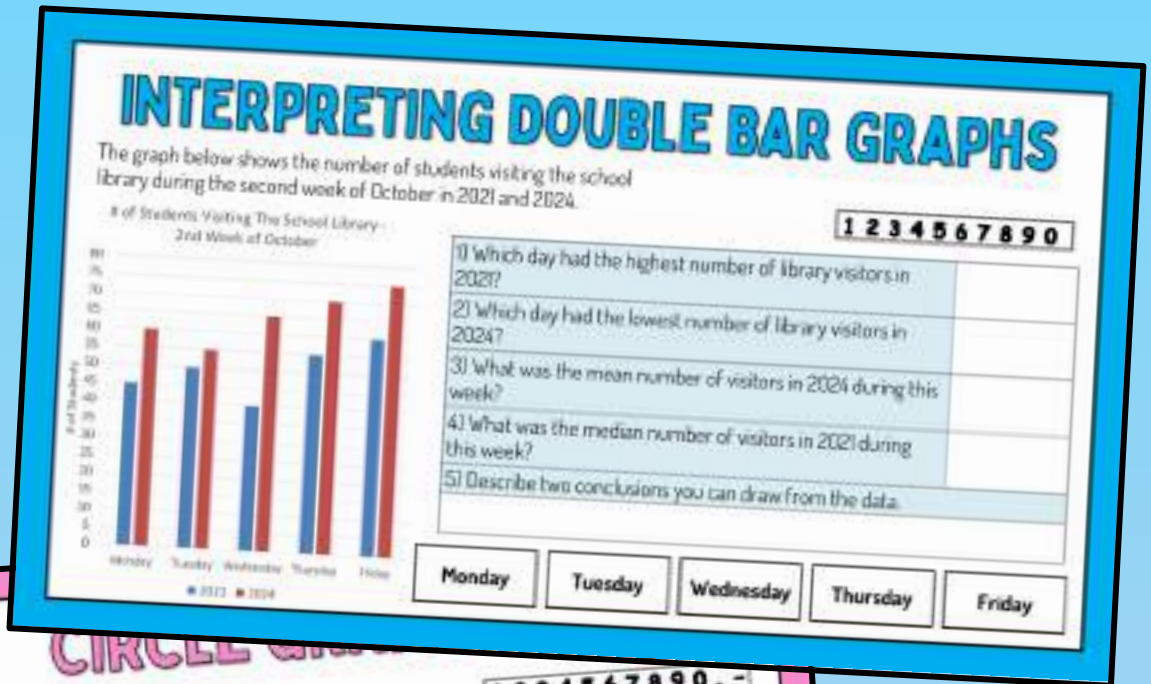
Fill in the frequency table and answer the questions.

Screen Time (Hours)	Frequency
0-1	
1-2	
2-3	
3-4	
4-5	
5-6	
6-7	
7-8	

- Which screen time interval is the most common among students?
- How many students spend less than 2 hours on screens each day?
- How many students spend 5 hours or more on screens each day?
- How many students were surveyed in total?
- Describe one pattern or trend you notice in the distribution of screen time.



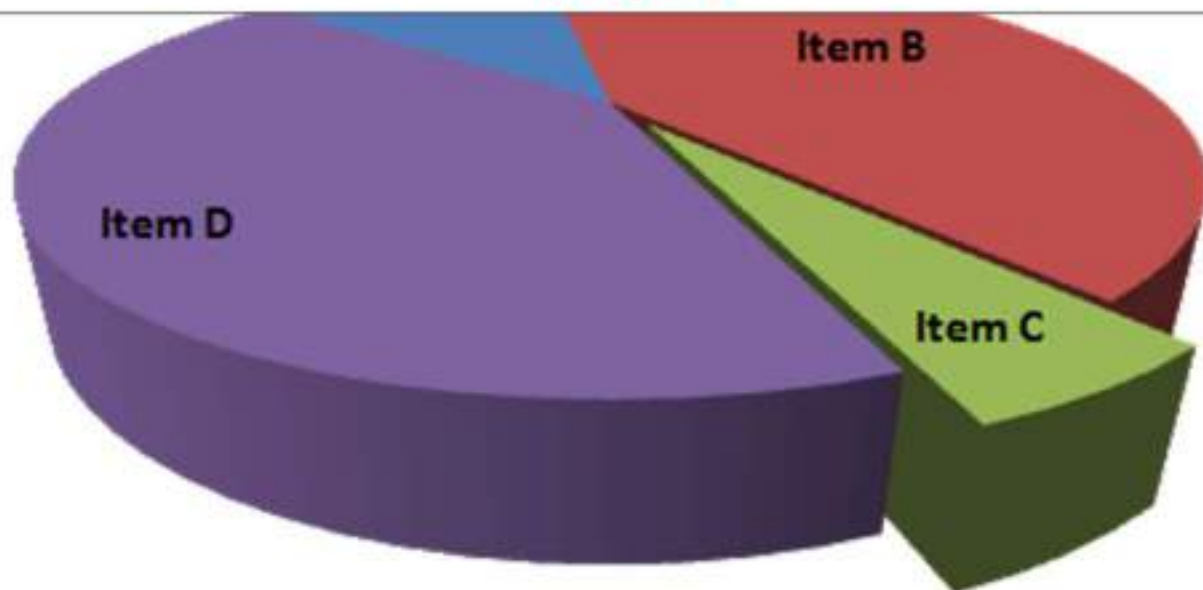
Manitoba Math Curriculum Statistics– Grade 8



Grade 8 Data Analysis

	Curriculum Expectations	Pages That Cover the Expectations
SP.1	Critique ways in which data is presented in circle graphs, line graphs, bar graphs and pictographs.	1-58

Preview of 50 pages from this product that contains 162 pages total.



Data - Qualitative, Discrete, or Continuous?

Part 1**Researching a basketball team**

You are the manager of a basketball team and are researching your next opponent. You decide to collect data based on the questions below. Is the data qualitative, discrete, or continuous?



Data Collected	Qualitative/Discrete/ Continuous
1) How many players are on the team?	
2) How many games are there?	
3) How many points do they score?	
4) What colour are their jerseys?	
5) Which teams have they played before?	
6) How many games have they played?	
7) How old are their players?	
8) How many wins do they have this year?	
9) How many seconds do they take before they shoot?	
10) Which type of defense do they play - zone or man?	
11) How many three pointers do they take a game?	
12) What is the name of their mascot?	

Part 2**Write one example of each type of data**

Type of Data	Example
<u>Qualitative</u>	
<u>Discrete</u>	
<u>Continuous</u>	

MEAN**Mean** = the average in a set of data**Step 1:** Add up the numbers in the data set**Step 2:** Divide the sum by the amount of numbers in the set.**Example:**

Data set: 5, 3, 8, 5

Step 1: $5 + 3 + 8 + 5 = 21$ **Step 2:** $21 \div 4 = 6$ **Part 1** Find the mean for each data set below

	Data	Total – Add Numbers	Mean
1)	16, 19, 2		
2)	41, 48, 58, 5		
3)	121, 105, 129, 117		
4)	5.2, 6.8, 4.3, 7.7		
5)	12.5, 14.8, 15.7, 9		
6)	-5, -7, -9, -3		
7)	-22, -31, -28, -26		
8)	-78, -95, -141, -62		
9)	7, -8, 4, -11		
10)	3.8, -4.2, 2, -1.6		

Part 2 Answer the word problems below

1) Emma is trying to figure out her handicap in golf. A handicap is your average score. She golfed 10 times this year and had the following scores. What is her handicap?

-4, -8, 5, 4, -2, -5, 0, 7, -3, -4

2) Hudson recorded his screen time in minutes for the last 5 days. What was his average screen time for the last 5 days in minutes and hours?

147, 168, 262, 241, 197

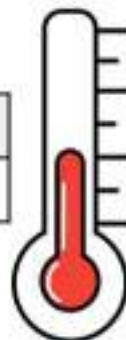
Finding Missing Data Point Using Mean

Questions

Answer the word problems below

1) The average temperature last week was -5°C . The temperatures for each day of the week have been represented in the table below. The table is missing the temperature for Friday. Calculate the missing temperature.

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Temp		-7	-4	-8		3	-4



2) Gas prices for the last 10 days were an average of \$1.34 per litre. The prices for each day are listed below, but day 3 is missing. Calculate the missing value for day 3.

Day	1	2	3	4	5	6	7	8	9	10
Price	1.31	1.45		1.36	1.27	1.37		1.37	1.24	1.22



3) A diver plunged an average of -6.8m in her 8 dives last week. The depth of her dives are recorded in the table below, but her last dive is missing. Calculate the depth of her last dive.

Dive	1	2	3	4	5	6	7	8
Depth	-5.7	-4.2	-8.6	-7.4	-2.2	-6.7	-7.2	



Outliers in Data Sets

An **outlier** in a data set are values that are significantly different from other measures. They may mean that something has gone wrong in the data collection, or they may represent a valid measure that needs further explanation.

Part 1

Circle any outliers in the data sets below

1) 25, 33, 28, 30, 3, 29, 36, 34, 71	4) -4, -8, -6, -21, -9, -7, 12, -5
2) 148, 157, 79, 294, 147	5) -9.4, -29.6, -8.7, -7.9, -10.1, -9.6
3) 15.2, 16.5, 11.4, 21.7	6) 1.1, 0.5, -0.4, -1.5, 13, -0.8, -24.2, 1.3

Part 2

Answer the questions below

1) Owen practiced his sprint races according to the stopwatch that automatically record his times on a computer. His times were: 49.5, 52.3, 138.1, 51.7, 49.8, 52.2.

- Which of his scores was an outlier?
- What might have caused the outlier?



2) Tony looked at how many steps he took last week. The number of steps he took over the last 7 days are recorded below:

11243, 13178, 9135, 20891, 12487, 14567, 3878

- Which of the values are outliers?
- Explain why he may have an outlier of 3878 steps?
- Why might Tony have an outlier of 20891 steps?



3) Chris owns a pizza shop. His profits for the last 7 days are listed below.

\$142, \$165, \$152, \$177, \$843, \$0, \$162

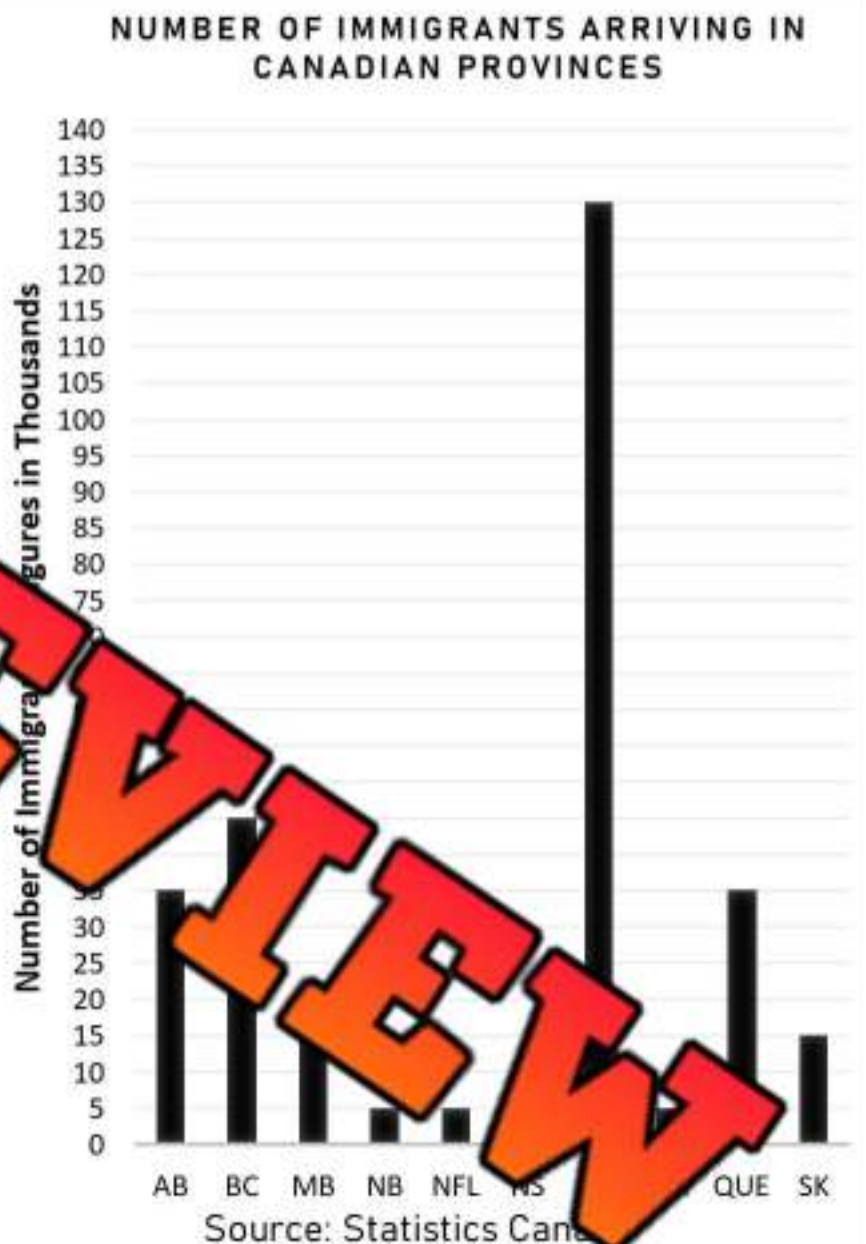
- Which of the values are outliers?
- Explain what could have led to Chris earning \$0 profits on day 6?
- Explain what could have led to Chris earning \$843 on day 5?



Vertical Bar Graph - Immigration

Canada is a popular place for people from other countries to move to. The number of immigrants who moved to Canadian provinces is represented in the bar graph. Fill in the frequency table below.

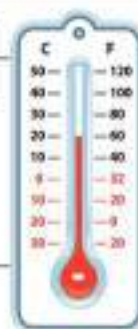
Frequency Table	
AB	
BC	
MB	
NB	
NFL	
NS	
ON	
PEI	
QUE	
SK	
Mean of Canada	
Mode of Canada	
Median of Canada	



- How many more immigrants moved to Ontario than New Brunswick?
- Did more immigrants move to Ontario than all the other provinces combined?
- Is the data quantitative or qualitative?
- Was the data collected from a primary or secondary source?
- In your opinion, what is one reason why more people immigrate to Ontario?

Interpreting a Double Bar Graph

The temperature in degrees Celsius for the 3rd week of May has been represented in the double bar graph below.



Temperatures in Degrees Celsius – 3rd Week of May



a) Which day was warmest in 2000 during this week?

b) Which day was the coldest in 2015 during this week?

c) What was the mean temperature in 2015 during this week?

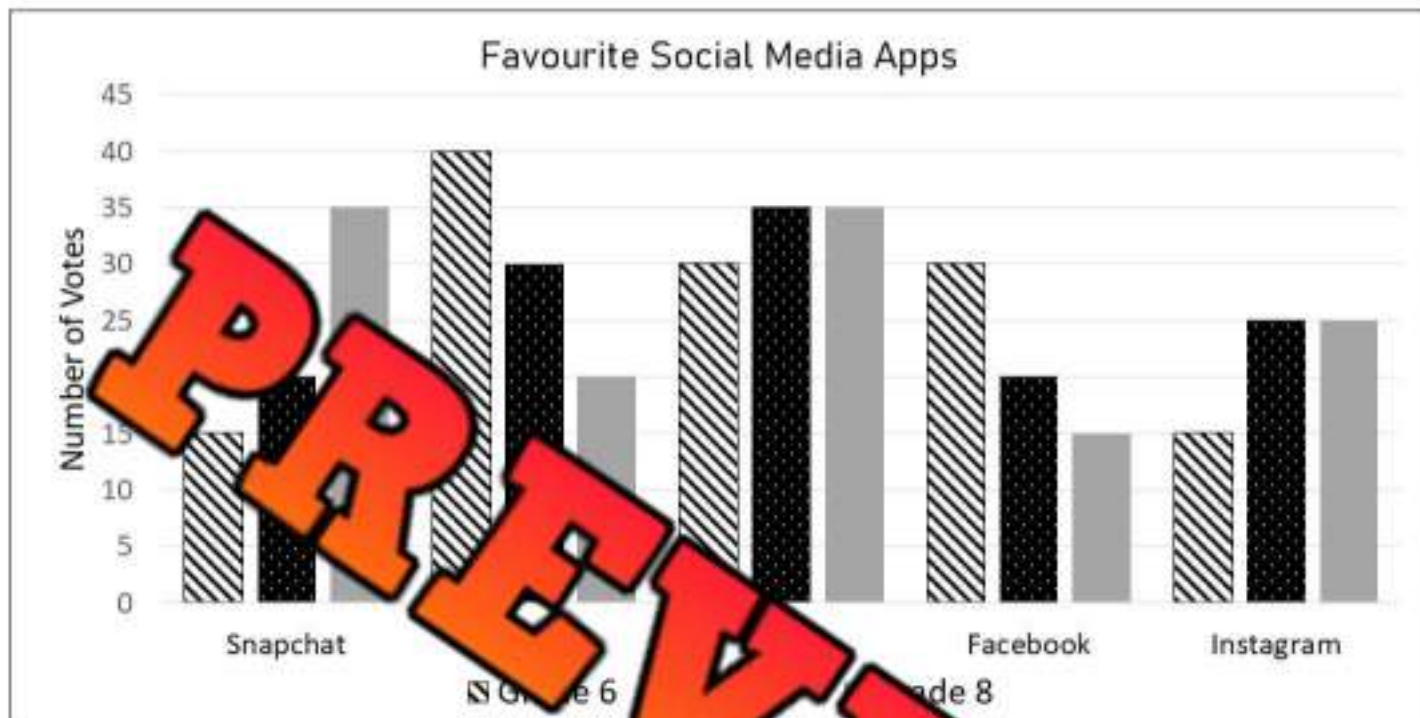
d) What was the median temperature in 2000 during this week?

e) What conclusions can you draw from the data?

f) What could be the cause of the trend you noticed in the graph?

Multiple-Bar Graph - Favourite Social Media

The students in grade 6, 7, and 8s were asked which social media app was their favourite. The results have been sorted by grade in the multiple-bar graph below.



Part 1

Fill in the frequency table by reading the multiple bar graph above

	6		8	
	#	%	#	%
Snapchat	15/130	12		
YouTube				
Tik Tok				
Facebook	30/130	23		
Instagram				
Total	/130			

Part 2

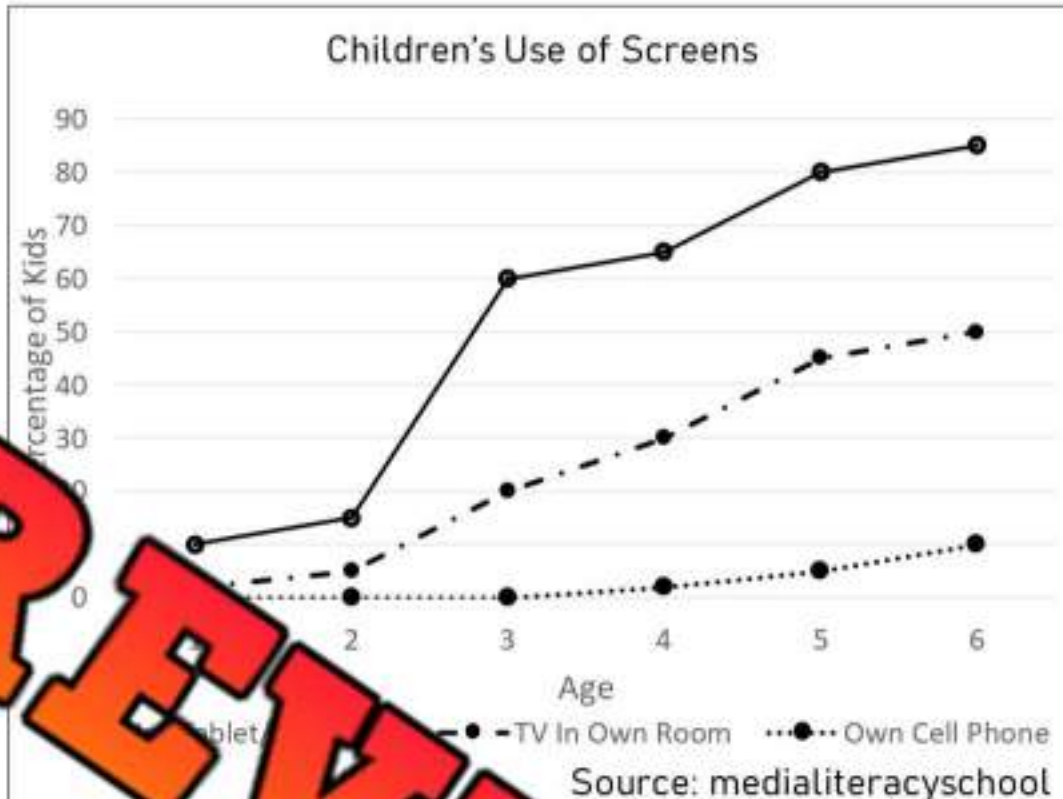
Answer the questions below

a) How many students in each grade were surveyed?

b) Which social media was the most popular? How many votes did it get?

Interpreting a Broken-Line Graph

Children are using screens younger and younger. The multiple-line graph represents the percentage of children who either use a tablet/computer, have a TV in their own room, or own a cell phone.



Questions

Answer the questions below.

- 1) What percentage of 5-year-olds use a tablet/computer?
- 2) What percentage of 6-year-olds own a cell phone?
- 3) Is there a relationship between the two variables – age and percentage using screens?

- 4) At what age do most children start using a tablet/computer? Why do you think that is?

- 5) What do you think about this data? Is it good that children are using screens? Explain.

Collecting Quantitative Continuous Data

Quantitative continuous data is data that is collected through measuring. We don't use categories, instead we use numbers.

Examples – height of someone over time, or time it took to run a lap.



Data Collection

Collect data by measuring or researching your question of interest

Question of interest

Use the following to organize your data.

Interpreting The Data

- 1) Was your data collected from a primary or secondary source?
- 2) Fill in the table below by calculating the measures of central tendency.

Mean	Median

- 3) What conclusions can you draw from your data? What did you learn?

- 4) What surprised you about the data you collected? Include at least 1 surprise.

Name: _____

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Curriculum Connection
SP.1

Creating a Broken-Line Graph

Use the data you collected to plot your graph. Remember the following labels:

☐

X axis label

☐

Y axis label

☐

Title

☐

Scale

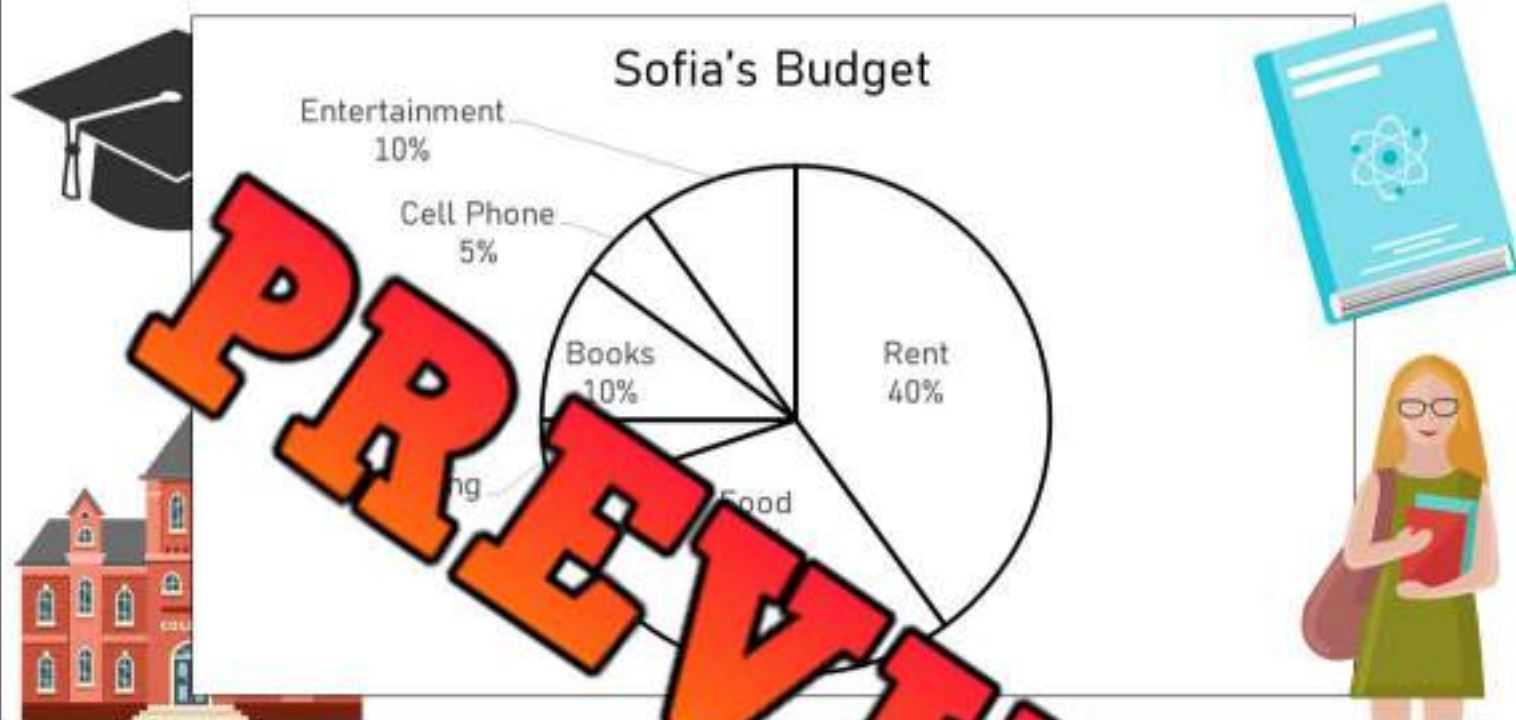
☐

Categories



Circle Graph - Budget

Sofia is heading to college soon. She has \$1000 to spend in total on the things she needs. She created a circle graph to better understand where her money is going.



Part 1

Fill in the frequency table leading to circle graph

	Rent	Food	Clothing	Books	Cell Phone	Entertainment
%						
\$ Spent						

Part 2

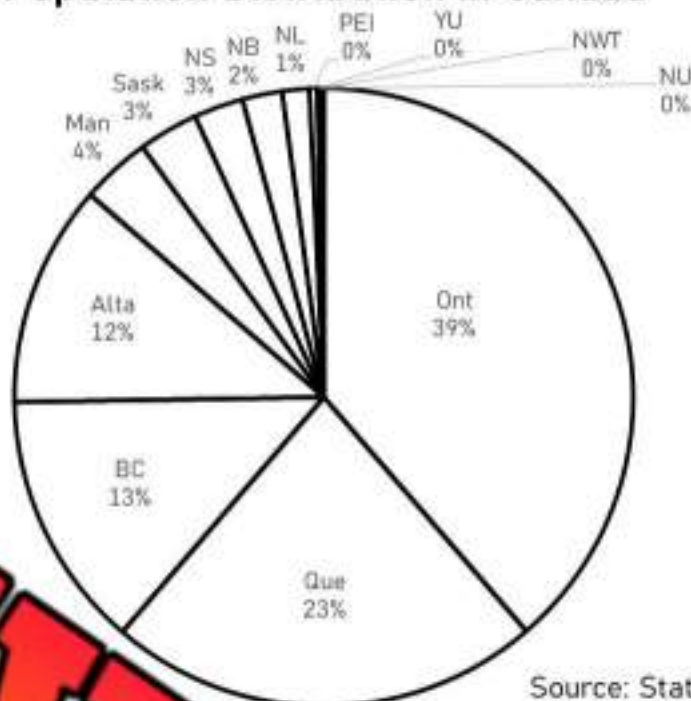
Answer the questions below

- 1) What will Sofia spend most of her money on?
- 2) Which two expenses will account for 70% of her money?
- 3) How much money will she spend on everything except rent?
- 4) What percentage do all 6 expenses add up to?
- 5) What are your thoughts on her budget? How might your budget be the same or different?

Circle Graph - Population Distribution

The population of each province and territory in Canada has been displayed in the circle graph.

Population Distribution in Canada



Part 1

Fill in the frequency table by reading the circle graph

Province	AB	BC	MB	NB	NFL	NS	PEI	SK	NWT	YU	NU
Population Distribution %											

Part 2

Answer the questions below

- 1) What percentage of Canadians live in Ontario and Quebec?
- 2) Do half of Canadians live in Ontario and Alberta?
- 3) Do half of Canadians live in Alberta, BC, and Quebec?
- 4) Martin thinks that more than 4 of 5 Canadians live in 4 provinces in Canada. Is he correct? Explain.

- 5) Why do you think not many Canadians live in the territories? Explain.

Drawing a Circle Graph - Global Emissions

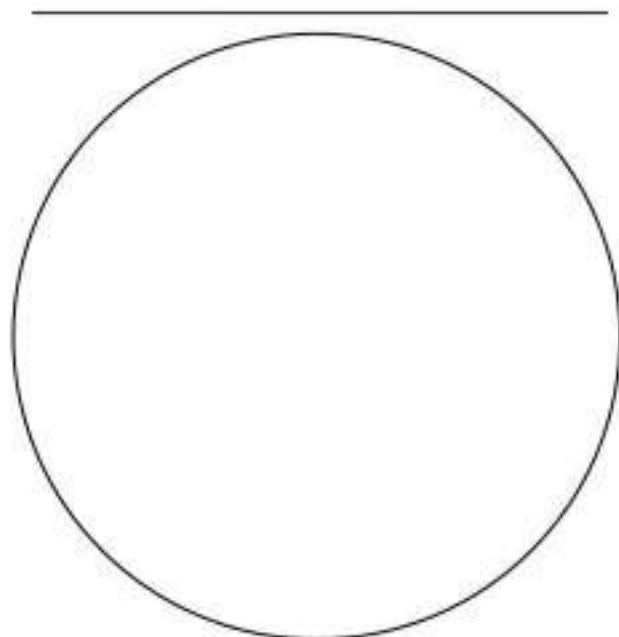
According to the World Resources Institute, Canada accounts for approximately 2% of global greenhouse emissions. The emissions each country produces are listed in the table below.



Part 1 Fill in the table below to determine the angle measurements for the circle graph

	Relative Frequency (as a percentage)	Fraction	Decimal	Angle Measure
China	30	30/100	0.30	$0.30 \times 360 = 108^\circ$
US	15	15/100	0.15	$0.15 \times 360 = 54^\circ$
EU				
Russia	5			
India	5			
Japan				
Brazil	2			
Canada	2			
Others	29			

Part 2 Use a protractor to draw the circle graph



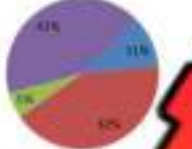
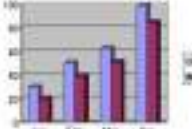
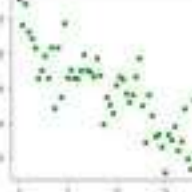
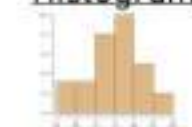
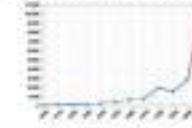
1) How many times more emissions does China produce than Canada?

2) Why do graphs sometimes use an "other" category?

3) Why do you think China produces so many emissions?

Types of Graphs - Information

There are many different types of graphs. Each graph has features that make it better for certain data sets. Read about the different graphs below and when we use each one.

Types of Graph	Explanation	When We Use Them
Circle Graph 	- A graph that is made by dividing a circle into sections that represent parts of a whole. - Each part adds up to 100%.	- When we are displaying the relative frequency of variables - Used with one set of data - Show how categories represent part of a whole data set for one variable
Bar Graph 	- A graph that plots data using bars or columns	- When we want to compare categories between different groups - Used to display 1 data set/1 variable - Used with discrete data
Line Plot 	- A graph that plots data as points on a horizontal axis (check x's) above a vertical line - The dots are connected by a line	- Used to show the frequency of data - Quick and simple way to organize data with smaller values - Used to display data with 1 variable
Multiple-Bar Graph 	- A graph that shows the relationship between different sets of data - The bars are presented beside each other for clear comparisons	- Used to display the relationship between two sets of data for example - gender for different age groups youth - Used to display data with 1 variable - Used to display discrete data
Scatter Plot 	- A graph that displays data points for two continuous variables - Both the y and x axis represent a different variable	- When we have two sets of data - Often used to display data represented in a table of values - Used to show the relationship between two variables
Histogram 	- A graph similar to a bar-graph that shows frequencies for different intervals	- Used when the x-axis uses numbers (intervals). For example - age ranges - Display data with 1 variable
Broken-Line Graph 	- A graph that displays data as points that are connected with a line	- Used to track changes over periods of time - Used with continuous data

Types of Graphs - Questions

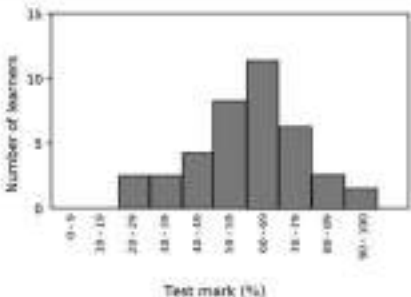
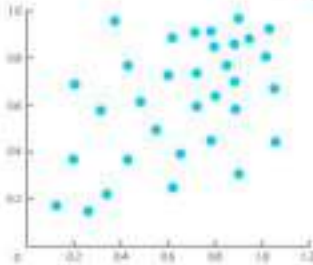
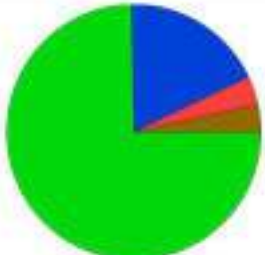
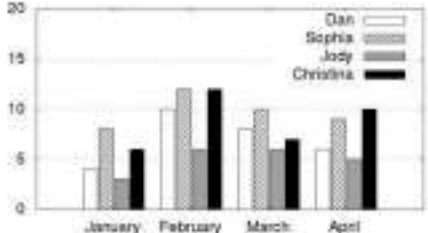
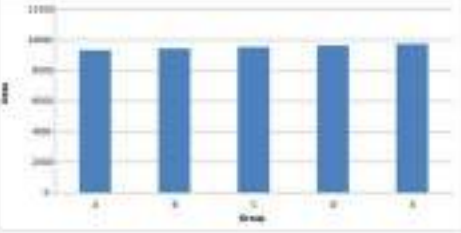
Part 1

Circle the graph you would use to represent the data

Description	Graph A	Graph B
1) You want a simple graph that displays one data set visually	Multiple Bar Graph	Bar Graph
2) You want to show the relationship between two variables	Histogram	Scatter Plot
3) You want a graph that has smaller values	Line Plot	Bar Graph
4) You want to display results of data from grade 7s and grade 8s	Bar Graph	Multiple Bar Graph
5) You want to show continuous data	Broken-Line Graph	Circle Graph
6) You have categories of data and want to represent each category as parts of a whole	Broken Line Graph	Circle Graph
7) You are displaying how many goals were scored in intervals of 1-5, 6-10, 11-15, 16-20	Broken-Line Graph	Histogram

Part 2

Label the names of the graphs

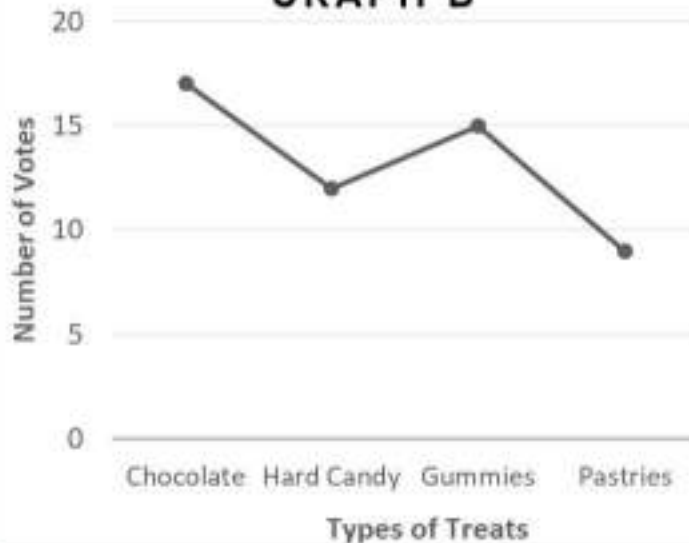
 Number of learners Test mark (%)		
1)	2)	3)
		
4)	5)	6)

Displaying Data Using Different Graphs

FAVOURITE TREATS - GRAPH A



FAVOURITE TREATS - GRAPH B



Questions

Answer the questions below

a) Which graph displays the data more accurately? Explain your choice.

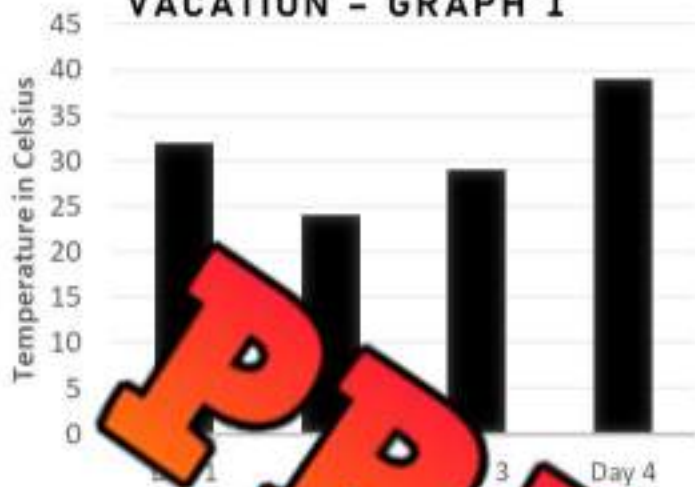
b) Should a line graph be used with discrete data? Explain why or why not.

c) Which scale do you find easier to read? Explain which scale you would have chosen.

d) What information is missing from these graphs?

Displaying Data Using Different Graphs

TEMPERATURE ON VACATION - GRAPH 1



TEMPERATURE ON VACATION - GRAPH 2



Questions

Answer the questions below

a) Which graph displays the data more clearly? Explain your choice.

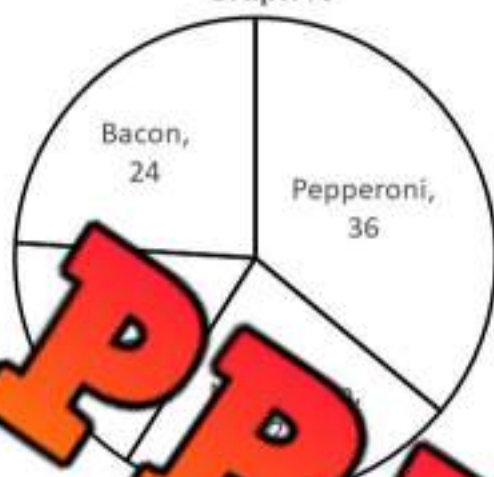
b) Should a bar graph be used with continuous data? Explain your answer.

c) Which scale do you find easier to read? Explain which scale you would have chosen.

d) At the end of day 1, can we infer the temperature began to cool? Explain how the line graph supports this inference.

Displaying Data Using Different Graphs

Last 100 Pizza Toppings Ordered –
Graph A



LAST 100 PIZZA TOPPINGS
ORDERED – GRAPH B



Questions

Answer the questions below

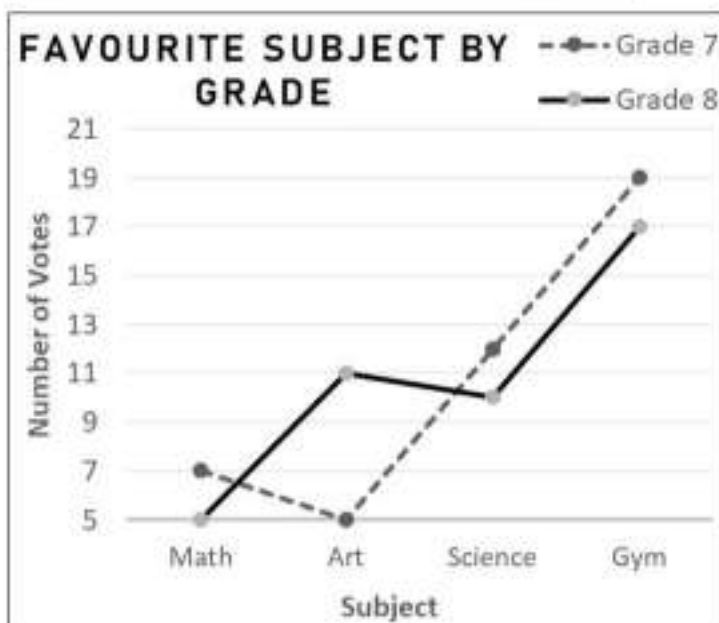
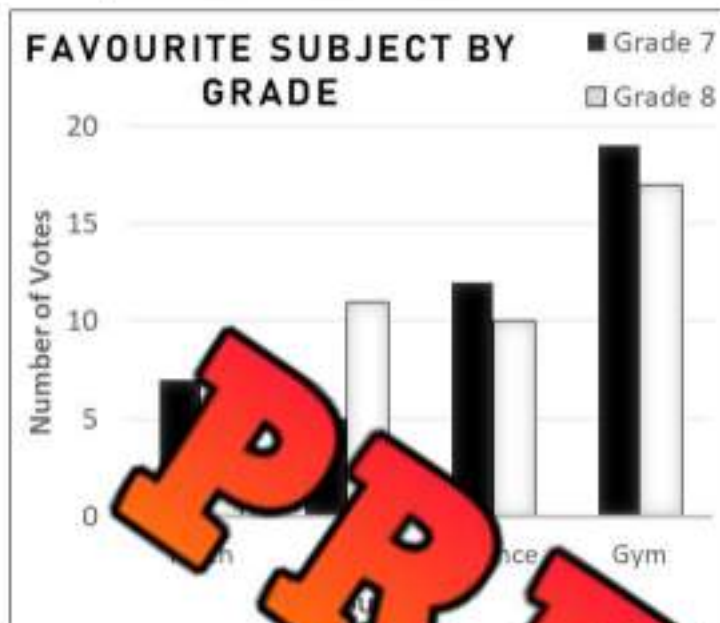
a) Which graph displays the data more clearly? Explain your choice.

b) If we think of the results as a ratio, we could say 36 out of 100 (36%) of orders were pepperoni. Which graph shows a ratio of one topping compared to all toppings? Explain.

c) Which graph is easier to read? Which one would you choose to display this data? Explain.

d) What is another example of data that would be best displayed as a circle graph?
Ex. Percentage of people who drive, walk, bus or bike to work.

Displaying Data Using Different Graphs



Questions

a) Which graph displays the data more clearly? Explain your choice.

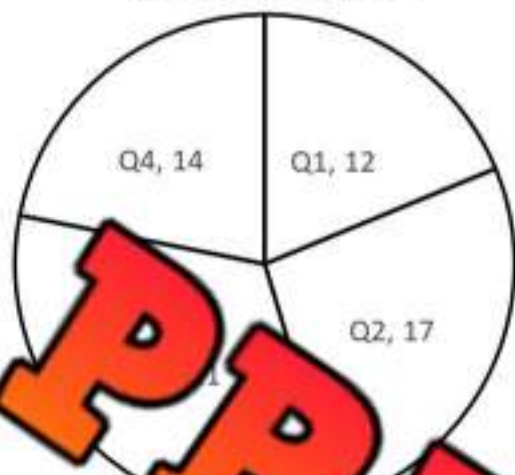
b) Is the data continuous or discrete? Explain how you know.

c) Which scale makes the data easier to understand? Explain.

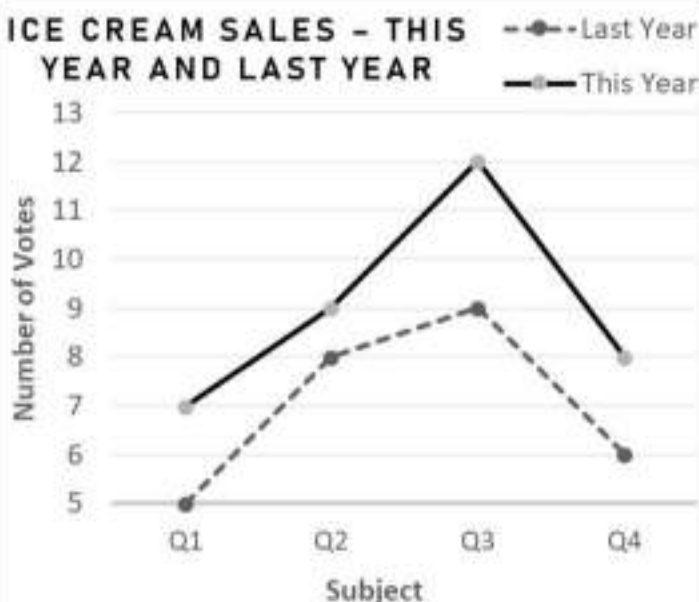
d) Which graph is easier to read? Which one would you choose to display this data? Explain.

Displaying Data Using Different Graphs

ICE CREAM SALES – LAST TWO
YEARS COMBINED



ICE CREAM SALES – THIS
YEAR AND LAST YEAR



Questions

Answer the questions below

a) Both of these graphs display the same data. Which gives us more information about the ice cream sales? Explain.

b) When is it a good option to use a double-line graph?

c) Provide an example of a data set that you would use a double line graph to represent.

d) Is the data continuous or discrete? Explain how you know.

Misleading Graphs

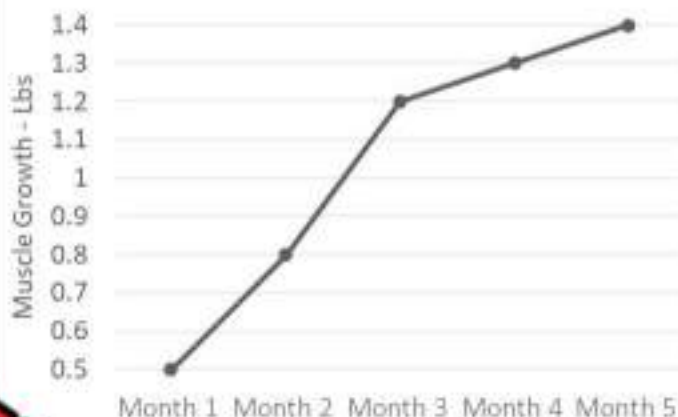


A supplement company that sells muscle-growth pills wants to share data they collected about the results of their pills. The users of their pills have gained muscle, which is what they want to show off. Their marketing team created 2 graphs. Which graph should they choose?

Muscle Growth – Graph A



Muscle Growth – Graph B



Questions

What do you notice about these graphs?

a) Which graph would you use to show customers your growth pills work really fast?

b) How are the graphs different? Do they have the same data?

c) How much muscle was gained in the 5 months?

d) Does graph B make it seem like the users gained muscle quicker? Explain how they made it look this way.

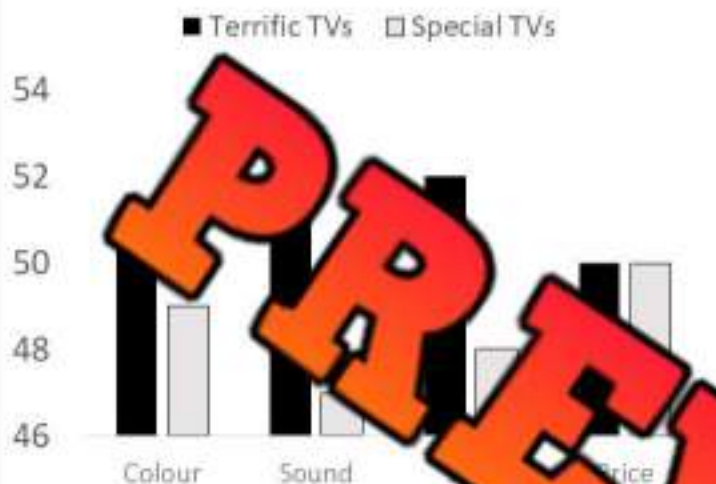
e) Why is it important to read a graph carefully?



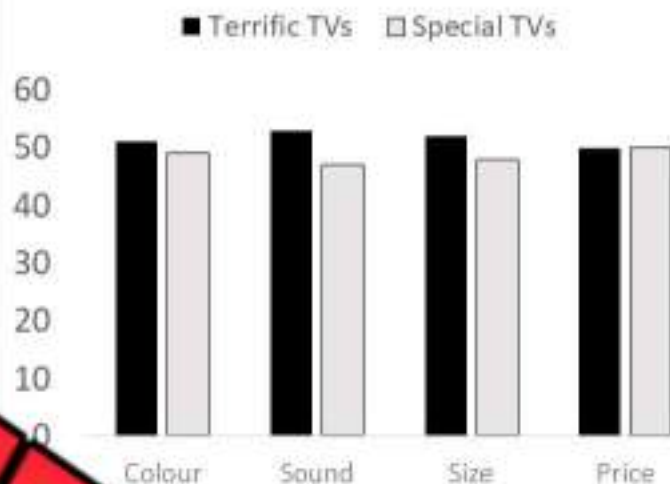
Misleading Graph - Multiple-Bar Graph

Terrific TVs sells televisions. Their biggest competition is a company named, Special TVs. Terrific TVs completed a study that compared the two brands. The results are below.

Best TV – Customer Votes – Graph A



Best TV – Customer Votes – Graph B



Questions

What do you notice about the graphs?

a) Which graph would you use if you were Terrific TVs? Why?

b) How many more votes in total did Terrific TVs get over Special TVs?

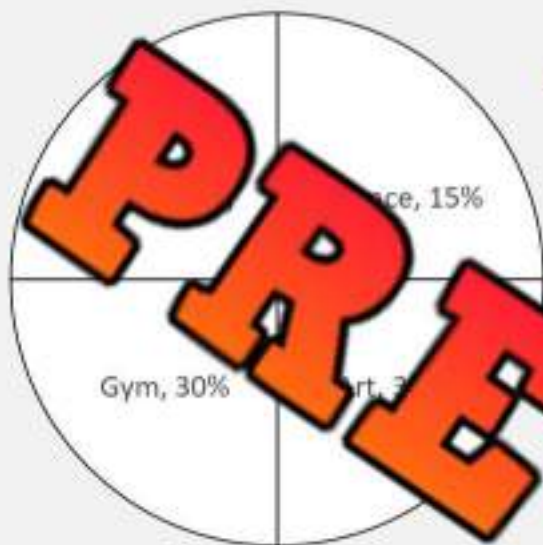
c) Is Terrific TVs a lot better than Special TVs? Explain.

d) Do you think it is fair that businesses create misleading graphs like this one? Explain.

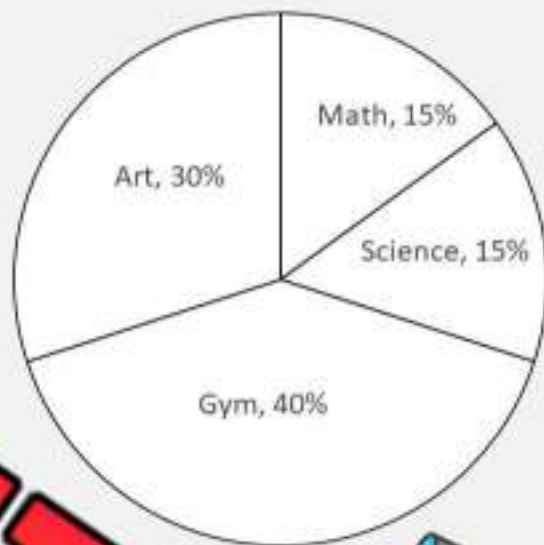
Misleading Graph - Circle Graph

A Science and Technology school is trying to advertise that Science is a popular subject for students. A study that surveyed 100 students asking what their favourite subject was completed. The results have been displayed in 2 graphs below.

Graph A - Most Popular Subjects



Graph B - Most Popular Subjects



Questions

What do you notice about the two graphs?

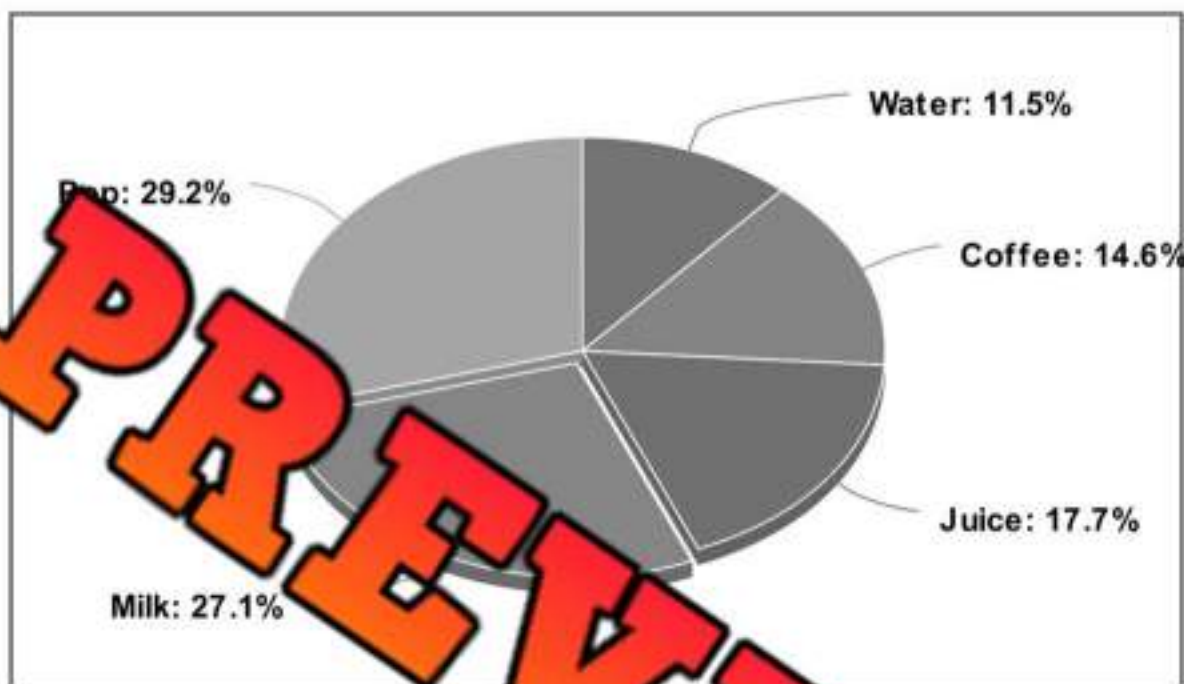
a) Which of the two graphs is misleading? Explain why.

b) Which graph would you use if you were the science and technology school? Explain.

c) Do you think people would fall for this misleading graph? Explain your opinion.

Misleading Graph - Circle Graph

The dairy industry performed a study to find out which beverage was the most popular. They asked 100 people aged 8-64. The results are below.



Questions

Answer the questions below.

a) Why is this circle graph misleading?

b) Why is it important to look at who completed a study before you trust their data?

c) Can you trust all data? What kinds of things can businesses do to create data that is misleading?

Misleading Pictograph - Favourite Drink

The grade 11 students at Jasper High School were asked what their favourite drink was. The results have been displayed in the pictograph below.

Favourite Drinks - Grade 11 Students



Questions

What do you notice about the pictograph above?

a) What do you notice or wonder about the graph above? List at least 2 things.

b) Why is the graph misleading? Explain at least 2 misleading parts.

c) Approximately how many times larger is the soda can than the water? Think volume instead of just height. How does this affect our understanding of the data?

Creating a Misleading Graph

Part 1

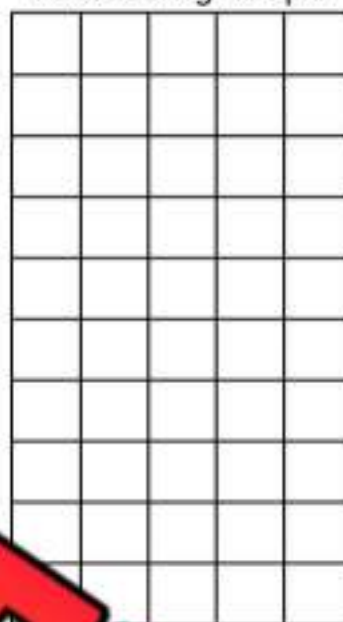
Draw two graphs – one that is misleading and one that is honest

Imagine you are selling donuts as a business. Draw an honest graph and a misleading graph that you could use to show your customers that donuts are the most popular dessert.

Honest Graph



Misleading Graph



Desserts	# of votes
Cookies	24
Ice Cream	26
Donuts	25
Cake	23
Pie	22

Part 2

What do you notice about the two graphs?

a) How did you make the graphs different?

b) Why is it important that we understand how to read graphs carefully?

Unit Test - Data Analysis

Part 1 Read the description of the data and circle if it is discrete or continuous

1) Temperature changes over a month long time period	Discrete	Continuous
2) How many siblings each student has in class	Discrete	Continuous
3) How tall a tree grows over a one year time period	Discrete	Continuous
4) The weight of different hockey skates	Discrete	Continuous
5) The number of students in a class	Discrete	Continuous

Part 2 Circle the graph you would use to represent the data

	Description	Graph A	Graph B
1)	You want to display data that shows how each part to the whole group	Line Graph	Circle Graph
2)	You have data with age intervals. This means your data has numbers on the x and y axis	Line Graph	Histogram
3)	You want a simple graph that displays your data visually	Line Graph	Bar Graph
4)	You want to graph continuous data	Line Graph	Bar Graph
5)	You are displaying two sets of data from men and women	Bar Graph	Circle Graph

Part 3 Fill in the table below by explaining the graph and when we use them

Types of Graph	Explanation	When We Use Them
Line Graph		

Grade 8
STATISTICS AND PROBABILITY
(Chance and Uncertainty)

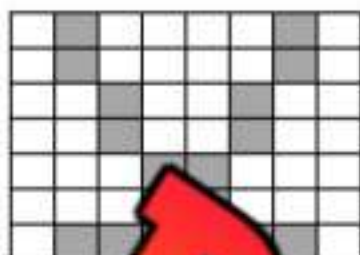
	Curriculum Expectations	Pages That Cover the Expectations
SP.2	Solve problems involving the probability of independent events	60 - 87

Independent Events - Darts

Questions

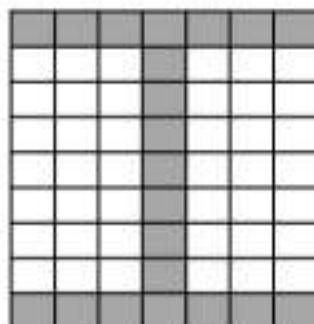
What is the probability of hitting the target if you had **two** throws?

1)



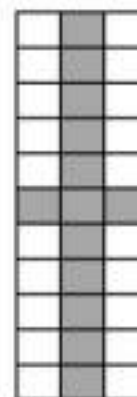
Fraction	
Decimal	
Percent	

2)



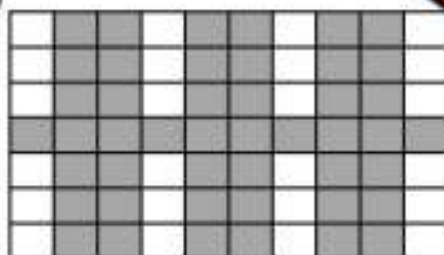
Fraction	
Decimal	
Percent	

3)



Fraction	
Decimal	
Percent	

4)

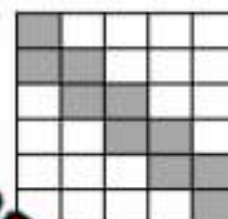


Fraction	
Decimal	
Percent	

6)

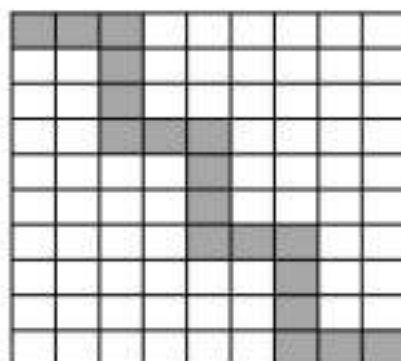


Fraction	
Decimal	
Percent	



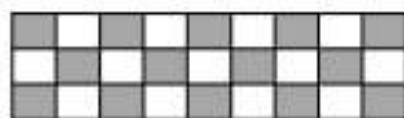
Fraction	
Decimal	
Percent	

7)



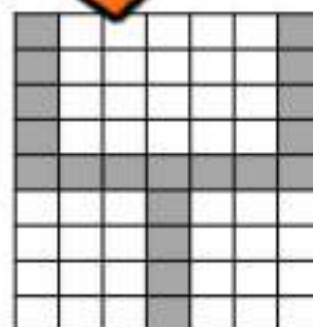
Fraction	
Decimal	
Percent	

8)



Fraction	
Decimal	
Percent	

9)



Fraction	
Decimal	
Percent	

Independent Events - Rolling a Dice

Rolling a Dice

A dice has 6 sides. Each side has a number of dots between 1 and 6. When you roll a dice, you have an unlikely chance of rolling a certain number.



Questions

What is the probability of...

1) Rolling a 1?

Fraction	Decimal	Percent

2) Rolling a 5 or 6?

Fraction	Decimal	Percent

3) Rolling an odd number?

Fraction	Decimal	Percent

4) Rolling two six-sided dice and getting a 5?

Fraction	Decimal	Percent

5) Rolling two six-sided dice and getting a 1, 2, or 3?

Fraction	Decimal	Percent

6) Rolling two six-sided dice and getting an even number?

Fraction	Decimal	Percent

7) Rolling two six-sided dice and getting a 6?

Fraction	Decimal	Percent

Calculating Probability - Venn Diagram

At a wedding reception, the guests had 2 options for dinner – steak or vegetarian. Of the 50 guests at the reception, 30 are having steak, 20 are having vegetarian and 6 hungry guests are having both.

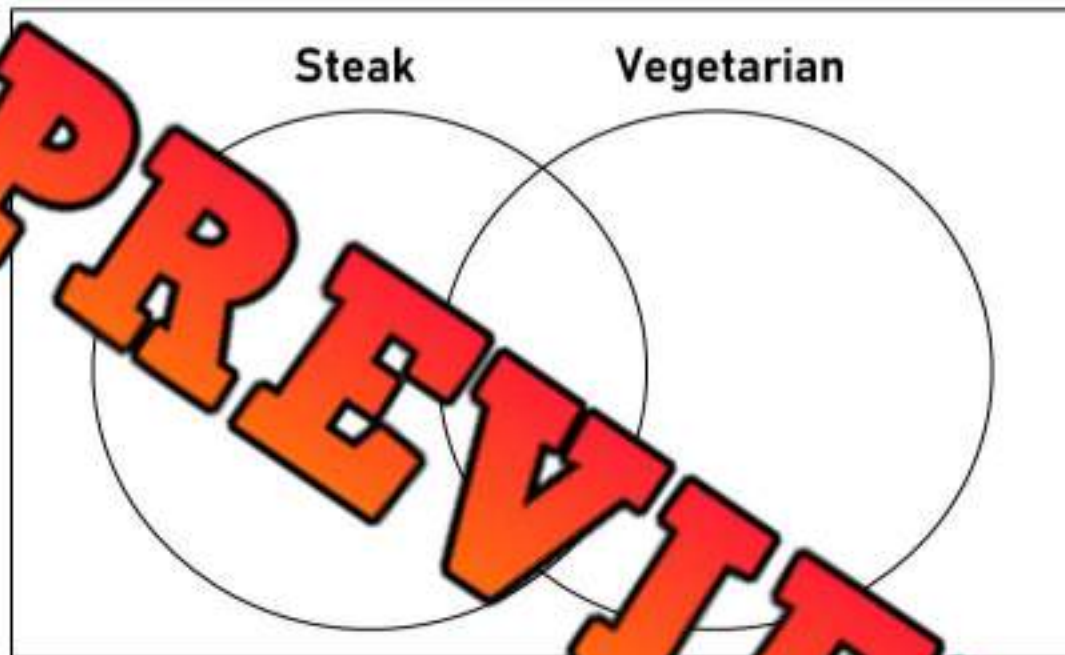
Part 1

Fill in the Venn diagram with the data above



Steak

Vegetarian



Part 2

Answer the questions below

Questions – What is the probability that a randomly selected guest...		Fraction	Percent
1)	ordered steak		
2)	ordered vegetarian		
3)	ordered steak or vegetarian but not both		
4)	ordered steak and vegetarian		
5)	didn't order a meal		
6)	ordered steak but not vegetarian		
7)	ordered vegetarian but not steak		

Calculating Probability - Venn Diagram

Part 1

Fill in the Venn diagram with the data in the table

20 students were surveyed about their hair

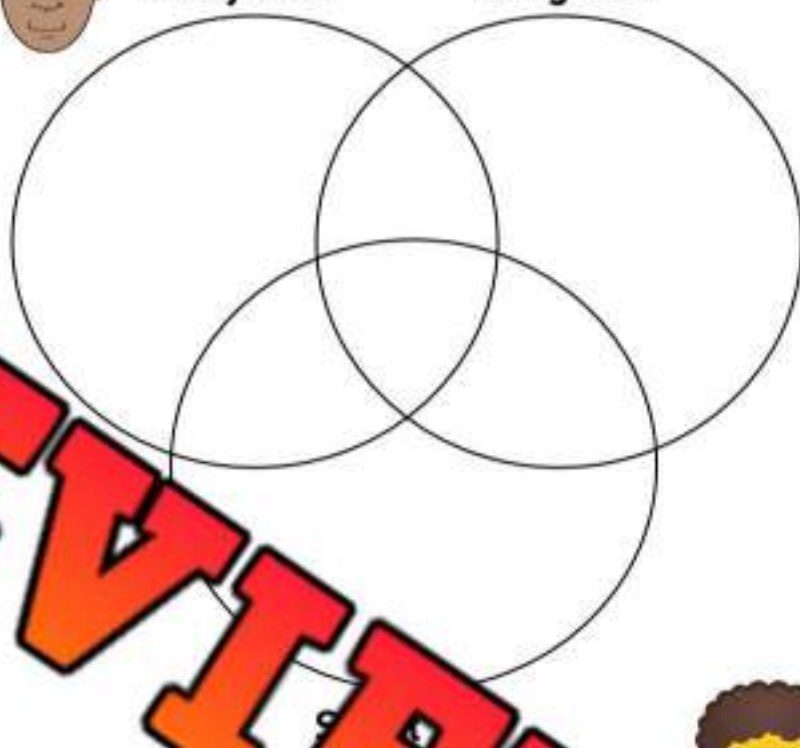
Curly	Long	Short
Elle	Elle	Logan
Henry		Henry
Luna		Arter
Sofia	Lily	
Nova	Luna	Nova
Riley	Nova	Riley
Julian	Julian	
Nora	Nora	David
	Elena	Ben
	Owen	Eddie
	Violet	



Curly Hair



Long Hair



Part 2

Answer the questions below



What is the probability that a randomly selected student...		Fraction	Percent
1)	has curly hair		
2)	has long hair		
3)	has short hair		
4)	does not have curly hair		
5)	has curly short hair		
6)	has curly long hair		
7)	has short hair that isn't curly		
8)	has long hair that isn't curly		

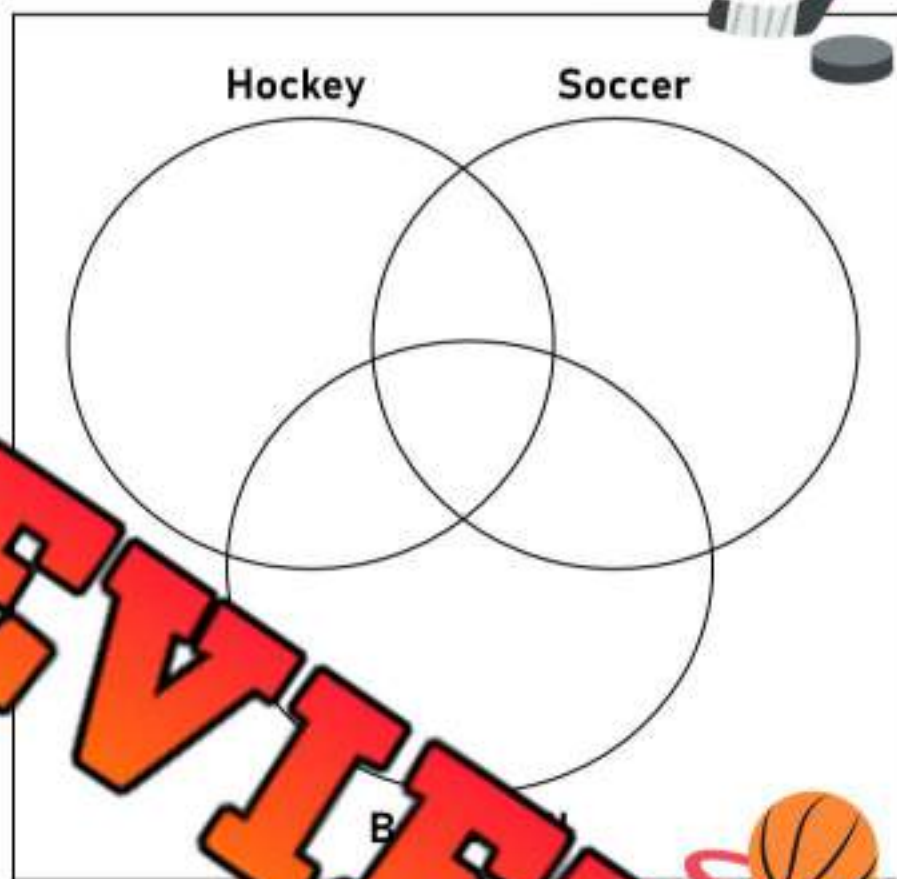
Calculating Probability - Venn Diagram

Part 1

Fill in the Venn diagram with the data in the table

100 people were surveyed about which sports they play

- 33 play basketball
- 45 play soccer
- 41 play hockey
- 15 play hockey and soccer
- 8 play both basketball and hockey
- 9 play both soccer and basketball
- 6 play all three sports



Part 2

Answer the questions below

What is the probability that a randomly selected person...		Fraction	Decimal	Percent
1)	plays hockey			
2)	plays just hockey and not soccer or basketball			
3)	plays soccer			
4)	plays basketball and soccer but not hockey			
5)	plays basketball			
6)	plays all three sports			
7)	doesn't play hockey, soccer, nor basketball			
8)	plays hockey and soccer but not basketball			

Calculating Probability - Venn Diagram

Questions

Answer the questions below using Venn diagrams

1) In a class of 24 students:

- 12 play the guitar
- 13 play the piano
- 5 play both the guitar and the piano



What is the probability that a randomly selected student...		Percent
a)	plays the piano	
b)	plays just the guitar and not the piano	
c)	plays neither the guitar nor the piano	

2) In a company there were 80 workers

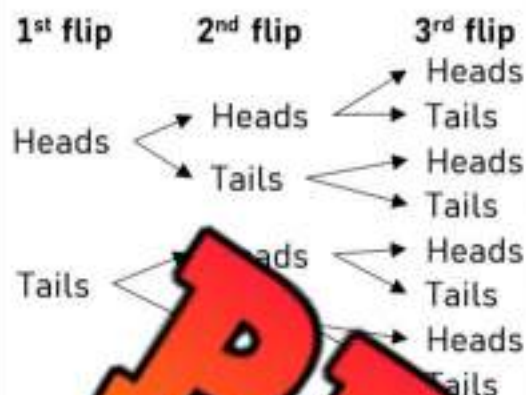
- 50 workers like coffee
- 41 workers like tea
- 20 workers like both coffee and tea



What is the probability that a randomly selected worker...		Percent
a)	likes coffee and tea	
b)	likes just tea and not coffee	
c)	likes neither coffee nor tea	

Theoretical Probability of Two Events - Tree Diagrams

A tree diagram is used to show the probability of an outcome happening when we have more than one event



Combinations
HHH
HHT
HTH
HTT
THH
THT
TTH
TTT



If you flip a coin three times, you could have 8 different combinations of outcomes.

HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

This means you have a $\frac{1}{8}$ probability of flipping three heads or tails in a row.

Questions Draw a tree diagram to show how many different combinations you could have

Rebecca was allowed to choose one drink and one candy at a Halloween party. The types of drinks and candy are listed

		Combinations
_____	→	_____
_____	→	_____
_____	→	_____
_____	→	_____

Candy

- Chocolate
- Gummies



Drinks



1) How many combinations could Rebecca have? _____

2) What is the probability she will choose...	Fraction	Decimal	Percent
a) Chocolate with soda:			
b) Chocolate with juice:			
c) Gummies with soda:			
d) Gummies with juice:			

Tree Diagrams - Independent Events

Questions Draw a tree diagram to show how many different combinations you could have

An ice cream shop sells different cones, ice cream, and toppings. Their menu is listed below.



Cones	Ice Cream	Toppings
Sugar Cone (S)	Vanilla (V)	Butterscotch (B)
Waffle Cone (W)	Chocolate (C)	Fudge (F)



PREVIEW

		Combinations
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	
_____	→ _____	

1) How many combinations of ice cream could you have? _____

2) What is the probability of a customer ordering a...

	Fraction	Percent
a) sugar cone with vanilla ice cream and fudge		
b) sugar cone with chocolate ice cream and butterscotch		
c) waffle cone with chocolate or vanilla and fudge		
d) waffle or sugar cone with vanilla ice cream and fudge or butterscotch		
e) sugar cone with chocolate and fudge or butterscotch		
f) sugar or waffle cone with vanilla or chocolate ice cream and butterscotch or fudge toppings		

Tree Diagrams - Independent Events

Questions

Draw a tree diagram to help you find the probability of different combinations

Georgia is creating an avatar for a video game she is playing. She can choose the characters hair style, hair colour and accessories.



Hair Style	Accessories	Hair Colour
Curly	Necklace	Brown
Spiky	Bracelet	Blond
Long		Red
		Purple

PREVIEW

1) How many combinations could you use to create your avatar? _____

2) What is the probability of a choosing...

Fraction

Decimal

Percent

a) curly red hair with a necklace

b) curly purple, brown or blond hair with a bracelet

c) spiky or long brown hair with a necklace or bracelet

d) long brown, blond, red, or purple hair with a necklace

e) spiky, curly, or long hair that is brown, blond or purple with a bracelet

Drawing Tree Diagrams

Questions

Draw a tree diagram to help you find the probability of different combinations

You are having a surprise dessert at a party you are having. Your parents said it is either cookies or brownies. They also told you the options for the treats and icing. What is the probability of them choosing a specific combination of baked good, treat, and icing.



Baked Goods	Treats	Icing
Cookies (C)	Chocolate Chips (CC)	Vanilla (V)
Brownies (B)	Smarties (S)	Chocolate (CH)
	Raisins (R)	Caramel (CA)

PREVIEW

1) How many combinations of food could you have? _____

2) What is the probability of your parents choosing...

	Fraction	Decimal	Percent
a) Cookies with chocolate chips and vanilla icing			
b) Brownies with raisins and caramel icing			
c) Cookies or brownies with smarties and vanilla icing			
d) Cookies or brownies with raisins or smarties and vanilla or chocolate icing			
e) Cookies with chocolate chips, smarties or raisins and vanilla or caramel icing			

Independent Events - Dice Challenge

Part 1

Find the probability of each sum when two dice are rolled



- 1) What is the probability of you rolling two six-sided dice and getting a sum of the two dice greater than 7?
- 2) What is the probability of you rolling two six-sided dice and getting a sum of the two dice less than 10?
- 3) What is the probability of you rolling two six-sided dice and getting a sum of the two dice less than 7?

+	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

Part 2

Find the probability of each product when two dice are rolled



x	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

- 1) What is the probability of you rolling two six-sided dice and getting a product of the two dice greater than 12?
- 2) What is the probability of you rolling two six-sided dice and getting a product of the two dice less than or equal to 15?
- 3) What is the probability of you rolling two six-sided dice and getting a product of the two dice greater than or equal to 24?

Independent Events - Money Bag

Wow, it's your lucky day! A millionaire walks up to you and gives you 3 chances at pulling out a \$100 bill from a bag of money. Each time you pull money out, you will put it back.

Inside the bag, there is 1 of each Canadian currency denomination (\$0.05, \$0.10, \$0.25, \$1, \$2, \$5, \$10, \$50, \$100).



Question: Find the probability of the following scenarios

	Scenario	Answer – Show Your Work
1)	Selecting a Toonie on your first pull?	
2)	Selecting a \$100 bill on your first pull?	
3)	Selecting a Quarter or a Loonie in your first two pulls?	
4)	Having terrible luck and selecting a Nickel, Dime, and a Quarter in your 3 pulls?	
5)	Selecting a \$20, \$50, or \$100 bill in your 3 pulls	
6)	Selecting a \$100 bill on any of your 3 pulls?	

Independent Events - Prize Box

PRIZE BOX



Question If you return the prize each time you choose, what are the probabilities below?

	Question - Fill in the blank...	Answer - Show Your Work
1)	You get one pick. What is the probability of getting stuck in a phone?	
2)	You get one pick. What is the probability of getting a phone?	
3)	You get two picks. What is the probability of picking a set of headphones and a pencil with your first two picks?	
4)	You get two picks. What is the probability of picking a phone with either of the two picks?	
5)	You get three picks. What is the probability of picking a basketball, set of headphones, or phone in any of the 3 picks?	
6)	You are picking from the prize box fifth. One phone, one hairbrush, and two baseballs are already gone. You get four picks. What is the probability of you picking a phone with any of the four picks?	

Theoretical vs Experimental Probability

Theoretical Probability

What should happen

Example - The theoretical probability of flipping a heads is 1 time out of 2 or $\frac{1}{2}$.

Experiment Probability

What did happen after the event (experiment)

Example - You flipped a coin 10 times and got 7 heads. The experimental probability is $\frac{7}{10}$.

Part 1

Write the theoretical probability of the events happening below

Question	Fraction	Decimal	Percent
1) What is the theoretical probability of flipping a heads?			
2) What is the theoretical probability of flipping a tails?			
3) What is the theoretical probability of flipping a heads if you flipped the coin 10 times?			
4) What is the theoretical probability of flipping a heads and then rolling a dice and getting a 2?			
5) What is the theoretical probability of rolling a dice getting an odd number and then flipping a coin?			

Part 2

Experimental Probability - Flip a coin 20 times and record your results

- 1) How many heads and tails do you think you will flip out of 20?
 Heads: _____ Tails: _____
- 2) Perform the experiment by flipping a coin 20 times. Record how many heads and tails you get

	Tallies	Total
Heads		
Tails		

- 3) Was the theoretical probability and experimental probability the same? Should it be the same? Explain.

Theoretical vs Experimental Probability

Examples of Theoretical and Experimental Probability

Theoretical: You should roll a 3 once every 6 rolls = $\frac{1}{6}$

Experimental: You rolled a 3 twice when you rolled a dice six times = $\frac{2}{6}$



Part 1

Circle if the example is theoretical or experimental

Example	Theoretical	Experimental
1) There is a chance of rain today	Theoretical	Experimental
2) You flip a coin 10 times and got heads 3 times	Theoretical	Experimental
3) You have a $\frac{1}{4}$ chance of drawing a heart from a deck of cards	Theoretical	Experimental
4) A scratch card has a $\frac{1}{5}$ chance of winning a prize	Theoretical	Experimental
5) Your batting average is 0.25, so you get a hit 1 in 4	Theoretical	Experimental
6) You made 4 of 10 three point shots	Theoretical	Experimental
7) Seabiscuit won the race even though he was 1/3	Theoretical	Experimental
8) The Toronto Raptors won 4/7 games	Theoretical	Experimental
9) You have a $\frac{1}{80}$ chance of winning a giveaway on Instagram	Theoretical	Experimental
10) You won a cross-country race with 90 people in it	Theoretical	Experimental

Part 2

Is the example theoretical or experimental? What is the probability?

Example	Theoretical or Experimental	Fraction	Decimal	Percent
1) You should make 8 in 10 free throws				
2) You buy one raffle ticket out of 90 that are sold.				
3) You rolled a dice 10 times and got a 4 4 times.				
4) You pulled 20 cards from a deck of cards and got 5 red ones.				
5) There is a 35% chance of precipitation				

Theoretical vs Experimental Probability - # of Events

The theoretical and experimental probability of an event happening is not guaranteed to be the same. Performing more trials in an experiment will cause the experimental probability to be closer to the theoretical probability.

Example – if you flip a coin 2 times, it is easy to picture getting heads twice in a row. That would mean the experimental probability of getting a heads was 100% or $2/2$. However, if you flipped the coin 100 times, it is almost impossible to get 100 heads in a row.

Part 1 How many times should you get a 1, 2, 3, 4, 5, or 6 when performing the number of rolls below?

	1	2	3	4	5	6
6 rolls						
12 rolls						
60 rolls						
600 rolls						
1200 rolls						

Part 2 Follow the instructions below to complete the experiments

1) Roll the dice 6 times. Tally your results

1	2	3	4	5	6

2) Roll the dice 60 times. Record how many of each number you get.

	1	2	3	4	5	6
Tallies						
Total						

3) Did the experimental probability get closer to the theoretical probability when you rolled the dice more times? Explain why this happens.



Rolling Doubles



Part 1 What is the theoretical probability of rolling doubles when rolling 2 dice

1) Fill in the table to help discover the theoretical probability of rolling doubles when rolling two dice.

Tip: $\frac{\text{favourable outcomes}}{\text{total possible outcomes}}$

2) What is the theoretical probability of rolling doubles? Write as a fraction and percentage.

Second Throw

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2						
3						
4						
5						
6						

First Throw

Part 2 What is the experimental probability of rolling doubles when rolling 2 dice

1) Roll 2 six-sided dice 24 times. Record the results in the table below. Put a tally every time you roll a double.

Number of Rolls	Doubles

2) Was your experimental probability the same as the theoretical probability? Explain.

3) Was your experimental probability the same as the other students in your class? Explain why or why not.

4) If you performed 1000 rolls, do you think your experimental probability would be closer or further from the theoretical probability? Explain.

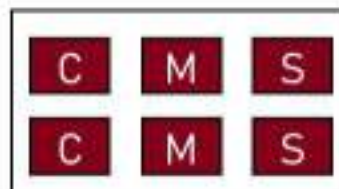
Tree Diagrams - Independent Events

Questions

Draw a tree diagram to help you find the probability of different combinations

There is a box full of different flavoured chocolates:

- 2 coconut (C)
- 2 mint (M)
- 2 salted-caramel (S)



Draw a tree diagram for the following scenario:

You pull one chocolate, and then put it back in the bag before pulling another chocolate

Tree Diagram		Combinations
1 st Draw	2 nd Draw	

1) How many combinations of chocolates could you draw? _____

2) What is the probability of drawing...	Fraction	Decimal	Percent
a) coconut and then mint			
b) mint and then coconut			
c) salted-caramel and then coconut or mint			
d) coconut, mint, or salted caramel and then mint			

Tree Diagram - 4 Events

Questions Draw a tree diagram to help you find the probability of different combinations

Lane flips a coin 4 times. Draw a tree diagram that lists all the possible outcomes she could get as she flips the coins.



PREVIEW

2) How many combinations could Lane get? _____

3) What is the probability that she flips the following...	Fraction	Percent
a) 2 heads and 2 tails		
b) 1 heads and 3 tails		
c) 1 tails and 3 heads		
d) 4 heads		
e) 4 tails		

Tree Diagram - Free Throws

Part 1 Draw a tree diagram to help you find the probability of different combinations

Roger is a 72% free throw shooter. When he goes to the free throw line to shoot two free throws, he has a 72% chance at making the first shot and a 72% chance at making the second shot.

Fill in the blanks on the tree diagram below.

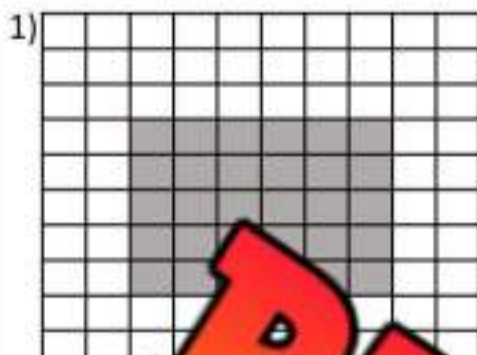


Part 2 Answer the questions below

What is the probability that Roger...	Decimal	Percent
1) makes the first free throw and misses the second		
2) misses the first free throw and makes the second		
3) makes both free throws		
4) misses both free throws		

Unit Quiz - Probability

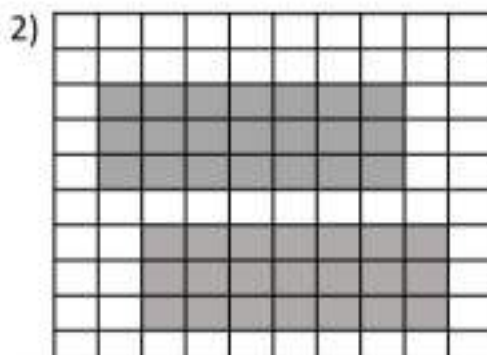
Part 1 Represent the probability of hitting the target using a fraction, decimal and percent



Fraction

Decimal

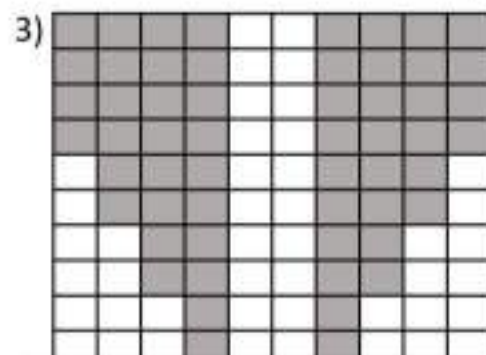
Percent



Fraction

Decimal

Percent

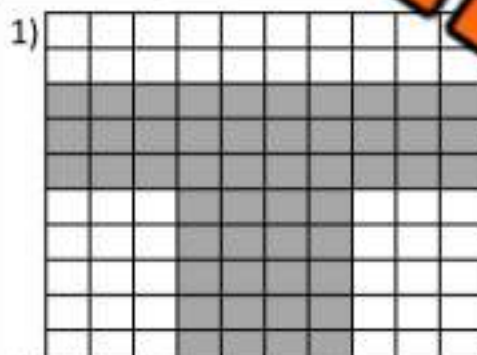


Fraction

Decimal

Percent

Part 2 What is the probability of hitting the target if you get 2 throws?



Fraction

Decimal

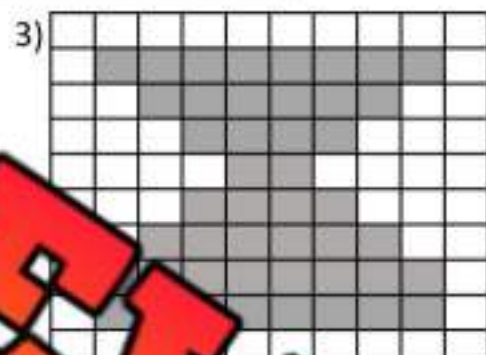
Percent



Fraction

Decimal

Percent



Fraction

Decimal

Percent

Part 3 What is the probability of...

1) Rolling a 1?

Fraction

Decimal

Percent

2) Rolling a 5 or 6?

Fraction

Decimal

Percent

3) Rolling an odd number?

Fraction

Decimal

Percent



Google Slides Lessons Preview





Manitoba Math Curriculum Patterns & Relations – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

LEARNING GOAL

We are learning to analyze and describe increasing patterns using addition and multiplication to understand how numbers grow, change, and relate to each other.

Increasing Decimal Pattern Rules - Tenths

Fill in the boxes and blanks to complete the patterns by figuring out the pattern rules.

#	PATTERN	RULE
1)	7.8, 8.3, 8.8	Start at _____, then add _____ each time.
2)	22.9, 23.2, 23.5	Start at _____, then add _____ each time.
3)	41.0, 41.7, 42.4	Start at _____, then add _____ each time.
4)	53.5, 54.6, 55.7	Start at _____, then add _____ each time.
5)	79.8, 82.1, 84.4	Start at _____, then add _____ each time.

Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Exit Cards - Increasing Patterns

✓ Decide if the statements below are True or False. ✗

Pattern: 1, 2, 4, 8, 16, _____ Pattern Rule: Start at 1, multiply by 2 each time. True/False Statements: a) The 6th number is 32. b) The pattern adds 2 each time. c) The 7th number is 64.	Pattern Rule: Start at 147.53, add 1.08 each time. Next numbers: 148.61, 149.69, 150.77 True/False Statements: a) The pattern will land on 155.09 b) The 5th number is 152.85. c) The pattern multiplies by 1.08 each time.
--	--



Manitoba Math Curriculum Patterns & Relations – Grade 8

Recursive vs Functional Relationships

Complete the table by deciding whether Tavish is describing the recursive relationship or the functional relationship.

	Pattern	Tavish's Description	Recursive or Functional										
1)	<table border="1"> <tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>y</td><td>9</td><td>15</td><td>21</td><td>27</td></tr> </table>	x	1	2	3	4	y	9	15	21	27	The pattern goes up by 6 each time.	
x	1	2	3	4									
y	9	15	21	27									
2)	<table border="1"> <tr><td>x</td><td>2</td><td>4</td><td>6</td><td>8</td></tr> <tr><td>y</td><td>14</td><td>28</td><td>42</td><td>56</td></tr> </table>	x	2	4	6	8	y	14	28	42	56	The term number is multiplied by 7.	
x	2	4	6	8									
y	14	28	42	56									
3)	<table border="1"> <tr><td>x</td><td>3</td><td>6</td><td>9</td><td>12</td></tr> <tr><td>y</td><td>13</td><td>22</td><td>31</td><td>40</td></tr> </table>	x	3	6	9	12	y	13	22	31	40	The term number is multiplied by 3 and then 4 is added.	
x	3	6	9	12									
y	13	22	31	40									
4)	<table border="1"> <tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>y</td><td>12</td><td>21</td><td>30</td><td>39</td></tr> </table>	x	1	2	3	4	y	12	21	30	39	The pattern goes up by 9 each time.	
x	1	2	3	4									
y	12	21	30	39									
5)	<table border="1"> <tr><td>x</td><td>5</td><td>10</td><td>15</td><td>20</td></tr> <tr><td>y</td><td>18</td><td>33</td><td>48</td><td>63</td></tr> </table>	x	5	10	15	20	y	18	33	48	63	$3x + 3$	
x	5	10	15	20									
y	18	33	48	63									

Rule: add 12

In	Out
279	
	561

Rule: multiply 5

In	Out
13	
	225

Rule: subtract 23

In	Out
649	
	737

Rule: divide 9

In	Out
81	
	15

Fill in the tables and answer the questions.

1) Ronan rents a delivery van and pays a set rate for every 10 km he drives.

KM Driven (x)	0	10	20	30	40	50
Cost (y)	\$4.00	\$6.50	\$9.00	\$11.50	\$14.00	\$16.50

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much would it cost to drive 100 km?

c) How much would it cost to drive 250 km?





Manitoba Math Curriculum Patterns & Relations – Grade 8

Decreasing Decimal Pattern Rules - Hundredths

Fill in the blanks to complete the decreasing patterns below.

1)	8.61	8.57	8.53	8.49				
2)	89.43	89.30	89.17					
3)	164.78	163.53	162.28					
4)	503.04	497.70	492.36					

Linear and Non-Linear

Look at the graphs closely. Answer the questions below.

5.58

1) How are the lines the same?

2) How are the lines different?

3) What could these three lines represent?

played on the graph is linear or not.

1)		Linear	Non-Linear
2)		Linear	Non-Linear



Workbook Preview



Grade 8
PATTERNS AND RELATIONS
Patterns

	Curriculum Expectations	Pages That Cover the Expectations
PR.1	Graph and analyze two-variable linear relations.	3 - 55

Preview of 50 pages from this product that contains 216 pages total.

Recursive vs Functional Relationships

A **recursive relationship** describes the pattern between successive numbers in one of the rows/columns of a table of values. A **functional relationship** is a general rule to describe the relationship between two columns/rows of numbers in a table of values. We look across the table instead of beside.

Part 1

Is Hanna describing the recursive or functional relationship?

	Pattern					Hanna's Description	Recursive or Functional
1)	x	1	2	3	4	The pattern goes up by 5 each time.	
	y	7	12	17	22		
2)	x	5	15	25	35	The y variable goes up by 50 each time	
	y	50	100	150	200		
3)	x	1	2	3	4	The x variable is multiplied by 7 and 1 is added	
	y	8	15	22	29		
4)	x	1	2	3	4		
	y	5	14	23	32		
5)	x	1	2	3	4	Start at 17, add 6 each time	
	y	17	23	29	35		

Part 2

Provide a recursive and functional description of the patterns

	Pattern					Recursive	
1)	x	1	2	3	4	Functional	
	y	4	11	18	25		
	Pattern					Recursive	
2)	x	1	2	3	4	Functional	
	y	20	45	70	95		

Using Algebraic Expressions

In the expression $6y + 5$, the 6 is the **numerical coefficient** of the variable and the 5 is the **constant term**. The **variable** is the y , which can represent any number.

Part 1

Use the algebraic expressions to fill in the tables

Term Number	Term Value
1	
2	
3	
4	
5	
8	

1) $5x + 2$

Term Number	Term Value
1	
2	
3	
4	
5	
8	

2) $3x - 4$

Term Number	Term Value
1	
2	
3	
4	
5	
11	

3) $t + 9$

Term Number	Term Value
1	
2	
3	
4	
5	
11	

4) $4n - 3$

Term Number	Term Value
1	
2	
4	
5	
10	
20	

5) $20 \div x + 8$

Term Number	Term Value
1	
2	
3	
4	
5	
11	

6) $7x - 6$

Part 2

Write 4 algebraic expressions using:

variable = n constant term = 12 numerical coefficient = 4

1	
2	

3	
4	

Matchstick Growing Patterns

Questions

How many matchsticks are in each figure? Draw the next two figures

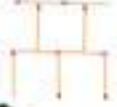
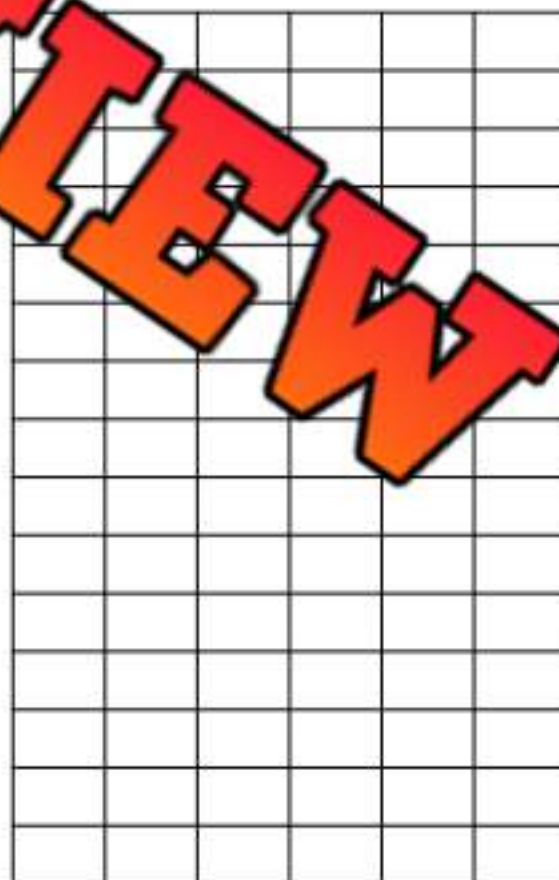
<u>F-1</u>	<u>F-2</u>	<u>F-3</u>	<u>F-4</u>	<u>F-5</u>
				

Figure	2	3	4	5	10	20
Number of Matchsticks						

Questions

- 1) Write an expression that represents the functional relationship.
- 2) How many matchsticks will the 7th term have?
- 3) How many matchsticks will the 10th term have?
- 4) What figure would use 201 matchsticks?

Matchsticks



1 2 3 4 5

Figure Number

Matchstick Shrinking Patterns

Questions

How many matchsticks are in each figure? Draw the next two figures

<u>F-1</u>	<u>F-2</u>	<u>F-3</u>	<u>F-4</u>	<u>F-5</u>
				

Figure Number	2	3	4	5
Number of Matchsticks				

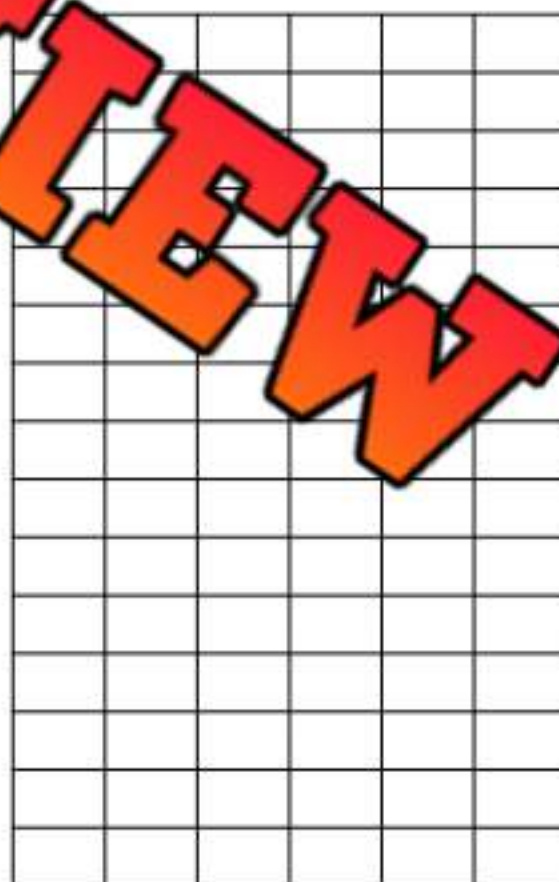
Questions

1) How many matchsticks will the 7th term have?

2) Is there a linear relationship between the two variables (term number and number of matchsticks)? Explain.

3) How many matchsticks in total would you need to make 8 figures?

Matchsticks



1 2 3 4 5

Figure Number

Two-Variable Linear Relationships



Questions

Answer the questions below

1) At an ice cream shop, you pay for the cone and then more money for every scoop you add.

Scoops (x)	0	1	2	3	4	5
Cost (y)	\$2.00	\$2.50	\$3.00	\$3.50	\$4.00	\$4.50

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much does the cone cost?

c) How much would it cost for 6 scoops of ice cream on a cone?

2) It costs \$15 for admission to a museum. Once inside, you pay for each additional ride you go on.

Rides (x)	0	1	2	3	4	5
Total Cost (y)	\$15.00	\$17.50	\$20.00	\$22.50	\$25.00	\$27.50

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much would it cost to go on 50 rides?

3) Roger rents a truck and pays a set rate for every 10km he drives.

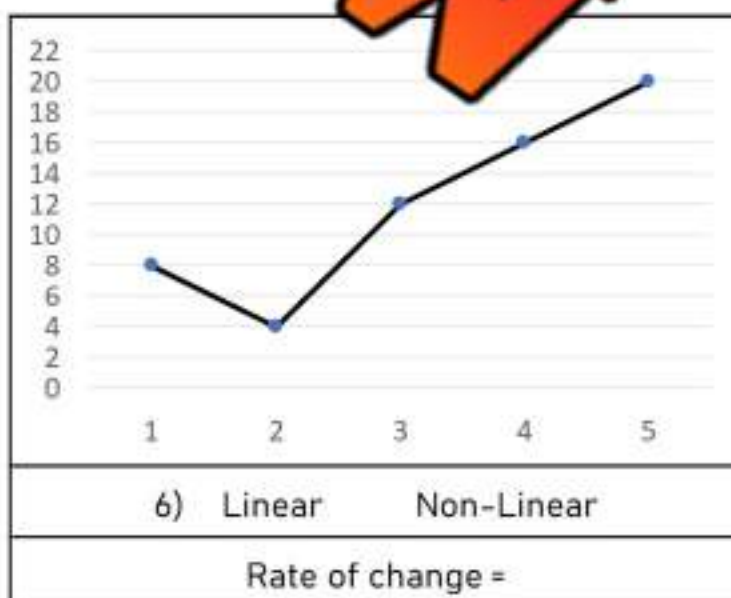
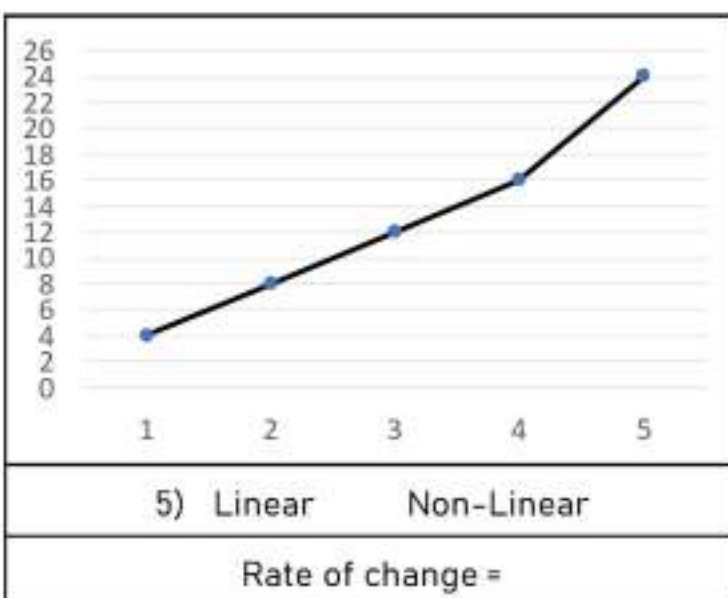
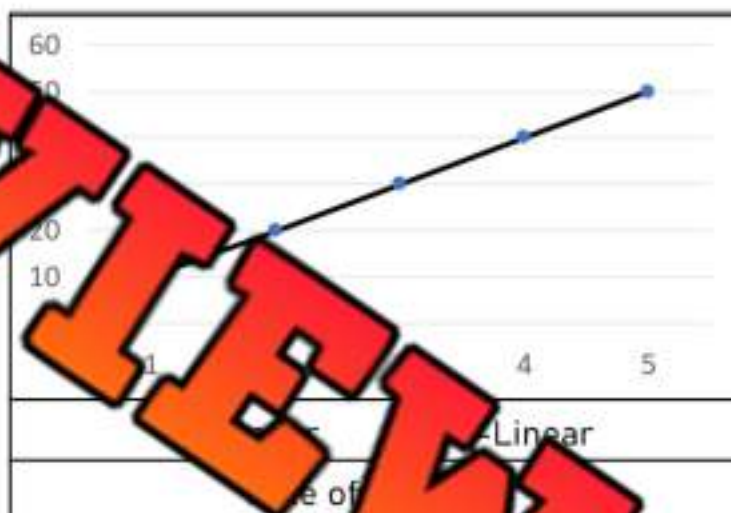
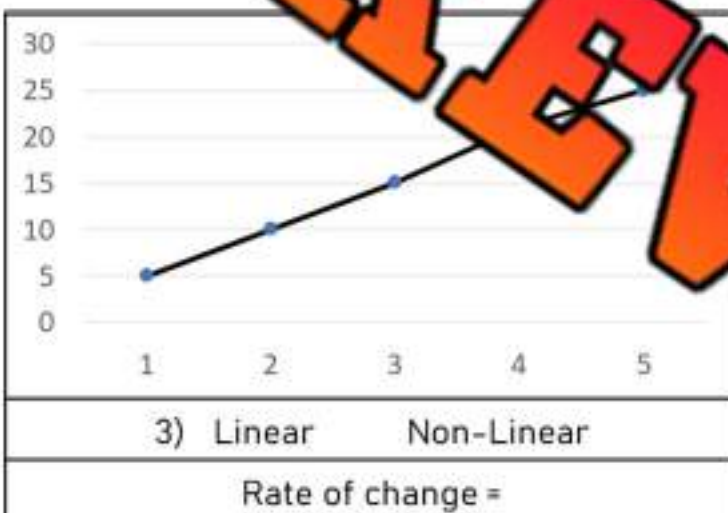
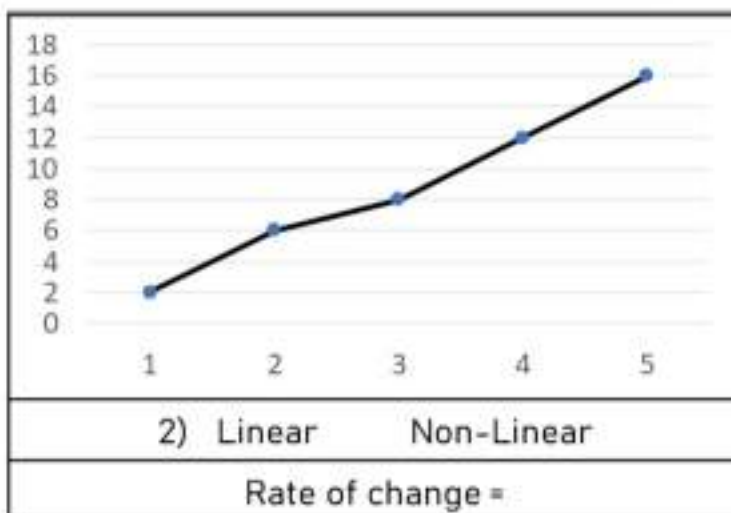
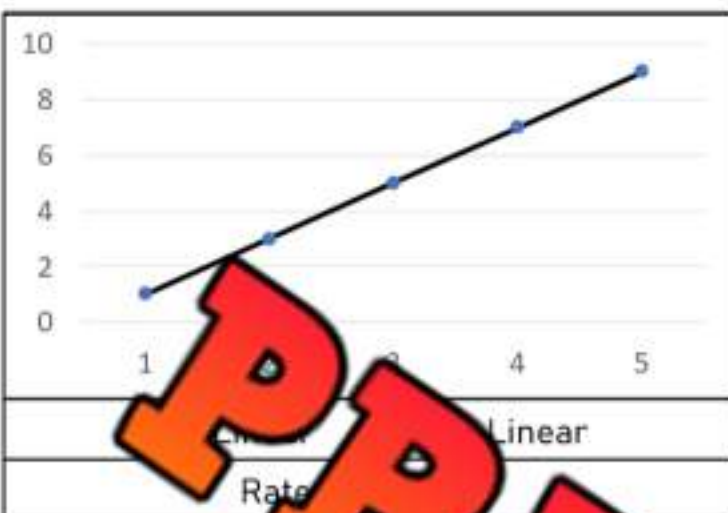
KM Driven (x)	0	10	20	30	40	50	60	70	80
Cost (y)	\$50	\$55	\$60	\$65	\$70	\$75	\$80	\$85	\$90

a) What is the functional relationship between the two variables (algebraic expression)?

c) How much would it cost to drive 250km?

Increasing Linear Patterns - Yes or No?**Questions**

Circle if the pattern displayed on the graph is linear or non-linear



Increasing Linear Patterns - Yes or No?

Questions

Circle if the pattern is linear or not based on the table of values

1)

Term Number (x)	Term Value (y)
1	5
2	9
3	13
4	17
5	21
Linear	Non-Linear

2)

Term Number (x)	Term Value (y)
1	37
2	44
3	51
4	57
5	64
Linear	Non-Linear

3)

Term Number (x)	Term Value (y)
1	88
2	96
3	104
4	112
5	120
Linear	Non-Linear

4)

Term Number (x)	Term Value (y)
1	2.5
2	4.5
3	6.5
4	8.5
5	10.5
Linear	Non-Linear

5)

Term Number (x)	Term Value (y)
1	4
2	10
3	16
4	17.5
5	21.5
Linear	Non-Linear

6)

Term Number (x)	Term Value (y)
1	200
2	275
3	350
4	425
5	500
Linear	Non-Linear

7)

Term Number (x)	Term Value (y)
1	44.0
2	47.5
3	50.5
4	54.0
5	57.5
Linear	Non-Linear

8)

Term Number (x)	Term Value (y)
1	140
2	280
3	420
4	580
5	720
Linear	Non-Linear

9)

Term Number (x)	Term Value (y)
1	112.1
2	112.3
3	112.5
4	112.7
5	112.9
Linear	Non-Linear

Pattern Rule - Input/Output Tables - Integers**Questions**

Fill in the input/output tables below

1)

In n	Out $n + (-5)$
1	
2	
3	
4	
5	

2)

In n	Out $2n + (-3)$
1	
2	
3	
4	
5	

3)

In n	Out $n + 9$
-1	
-2	
-3	
-4	
-5	

4)

In x	Out $x + (-3)$
-2	
-4	
-6	
-8	
-10	

In
 x Out
 $x + (-6)$

In x	Out $x + (-6)$
4	
6	
8	
10	

6)

In x	Out $x + 13$
-1	
-3	

7)

In p	Out $2p + (-12)$
20	
40	
60	
80	
100	

8)

In p	Out $p + (-15)$
-3	
-6	
-9	
-12	
-15	

9)

In p	Out $p + (-12)$
-3	
-1	
2	
4	
6	

Linear Equations - Table of Values

A **linear equation** is an equation that is written for two different variables. The variables have a relationship where they increase or decrease at the same rate. This means when the variables are plotted on a graph, the line will be straight.

It is helpful to use a table of values to represent the values of both variables. This allows us to see the relationship between the variables. We can find any missing value by using an equation that represents the relationship between the variables. A related pair of x and y values is called an ordered pair.

Practice Fill in the tables using the equation below

x	y
1	
2	14
3	20
4	
5	
6	

$$1) y = 6x + 2$$

x	y
	-2
	1
3	4
4	
5	
9	11

$$2) y = 3x - 5$$

x	y
1	
2	
3	
4	
5	
11	

$$3) y = -2x + 4$$

x	y
1	
2	
3	
4	
5	
9	

$$4) y = 4x - 7$$

x	y
1	
2	
3	
4	
5	
10	

$$5) y = -3x - 4$$

x	y
1	
2	
3	
4	
5	
11	

$$6) y = 5x - (-8)$$

Linear Equations - Table of Values

Practice

Write the equation that represents the relation between x and y

x	y
1	2
2	9
3	16
4	23
5	30
6	37

x	y
1	-7
2	-11
3	-15
4	-19
5	
9	

x	y
1	-3
2	0
3	3
4	6
5	
11	

1) _____

3) _____

x	y
1	5
2	0
3	-5
4	-10
5	
9	

x	y
1	17
2	14
3	11
4	8
5	
10	

x	y
1	-7
2	-18
3	-29
4	-40
5	
10	

4) _____

5) _____

6) _____

Practice

Read the problem and represent it in the table of values

An ice cream shop sells cones for \$3 and toppings for \$2 each. An equation for this relation is $y = 2x + 3$ where the 3 dollars is constant, and the x represents how many toppings are chosen.

a) Fill in the table of values

b) Fill in the ordered pairs below - Remember (x, y)

(1, __) (2, __) (3, __) (8, __) (12, __) (20, __)

x	y
1	
2	
3	
4	
5	

Linear Equations - Table of Values

Practice

Make a table of values for each relation

1) $y = 3x + 2$

2) $y = 5x - 6$

3) $y = -2x + 3$

4) $y = 4x - 2$

5) $y = 6x + 6$

6) $y = -7x - 8$

Challenge

Can you determine the equation using the ordered pairs?

These ordered pairs are in the same linear relation: $(-2, -4)$, $(0, 4)$, $(2, 12)$, $(4, 20)$

a) What is the equation that represents the values in the ordered pairs?

b) Fill in the missing value in the ordered pairs

 $(1, \underline{\quad})$, $(3, \underline{\quad})$, $(8, \underline{\quad})$, $(-4, \underline{\quad})$, $(-8, \underline{\quad})$, $(\underline{\quad}, 56)$, $(\underline{\quad}, -56)$

c) Fill in the table of values for the linear relation

x	-6	-3	0	5	7	12	15	20
y								

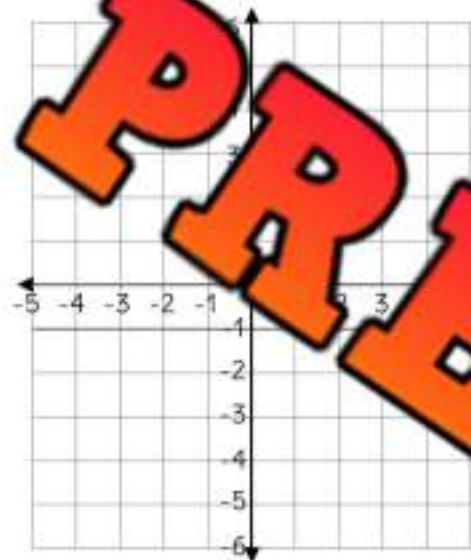
Linear Equations - Graphing 2 Variables

Questions

Fill in the table of values and then graph the results using ordered pairs

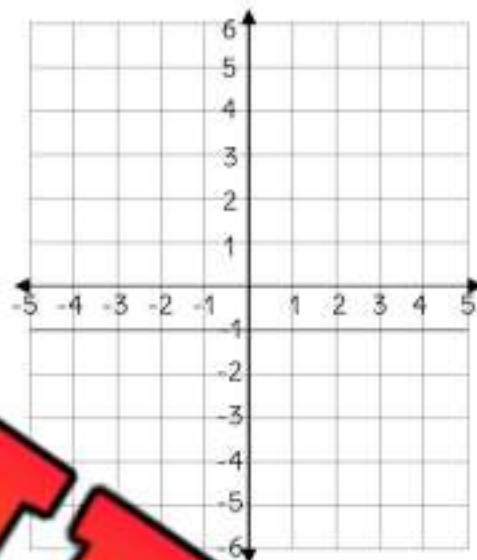
1) $y = 2x - 2$

x	0	1	2	3	4
y					



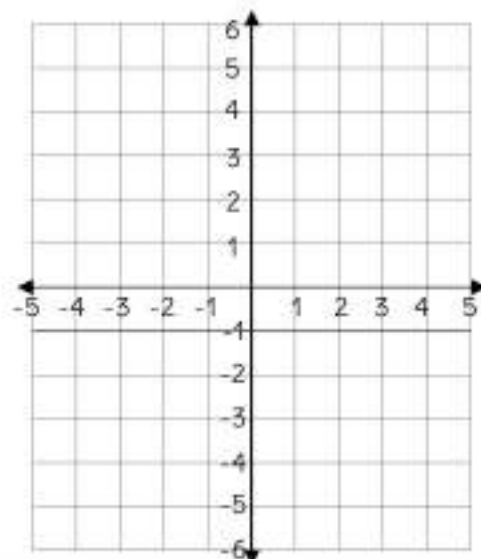
2) $y = 3x - 6$

x	0	1	2	3	4
y					

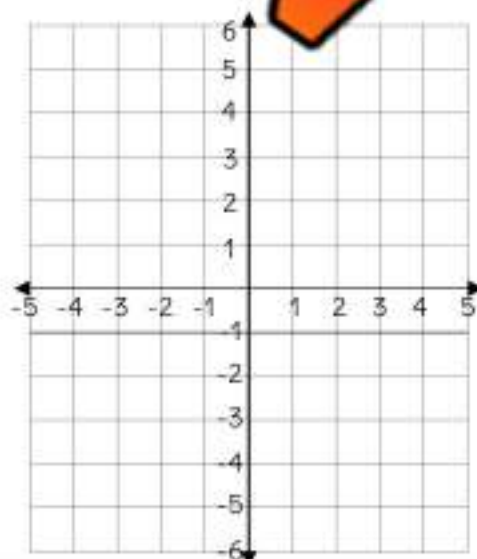


3) $y = -x + 2$

x	0	1	2	3	4
y					



x	0	1	2	3	4
y					



Two-Variable Linear Relationship - Scientist**Challenge**

Answer the word problem below



Mrs. Ferrety teaches a grade 8 class. She invited a scientist to join her class to do some experiments with them. The scientist charges \$40 for the materials they use for the experiments, plus an additional \$3 per student who is in the class.

- a) Fill in the table of values below using the linear equation: $y = 3x + 40$

- b) Graph the values

Question

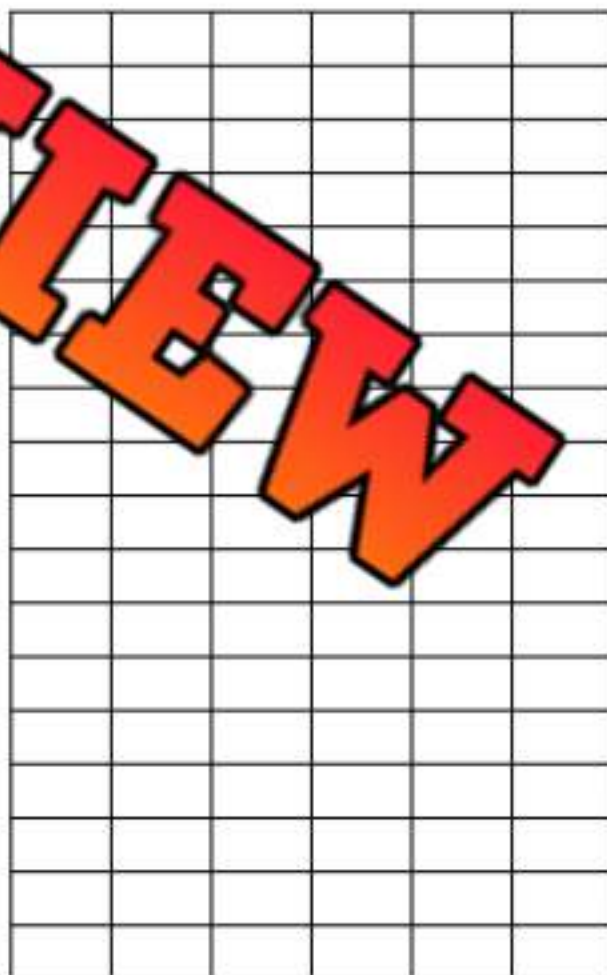
- a) Fill in the missing values in the ordered pairs below

(25, _____), (50, _____), (100, _____)

(_____, 67), (_____, 85), (_____, 106)

- b) If 28 students are in the class, how much will the scientist earn for their presentation?

- c) If the scientist earned \$136, how many students were in the class?



Two-Variable Linear Relationship - Working

Word Problems

Investigate the relationship between the two-variables

Stephanie earns \$15 for every hour she works. She received a starting bonus of \$50 before even working an hour.



- 1) Fill in the table of values to represent the linear relationship between hours worked and money earned.

- ## 2) Graph table

3) Questions

- a) Write the linear equation that represents this situation.
-
- b) Stephanie is scheduled to work 35 hours this week. How much will she earn with her bonus?
-
- c) Fill in the missing values in the ordered pairs below
- (10, _____), (42, _____), (75, _____)
- (_____, 320), (_____, 1055), (_____, 3050)
-
- d) Stephanie earned \$1580 in her first month of work, including her bonus. How many hours did she work?

VIEW

Two-Variable Linear Relationship - Moving Day**Challenge**

Answer the word problem below



Aiden's family is moving. They rented a moving truck for \$50 a day. They are charged an additional \$0.50 for every 1km they drive.

1) Fill in the table of values below

2) Graph the table

3) Questions

a) Write the linear equation that represents this problem

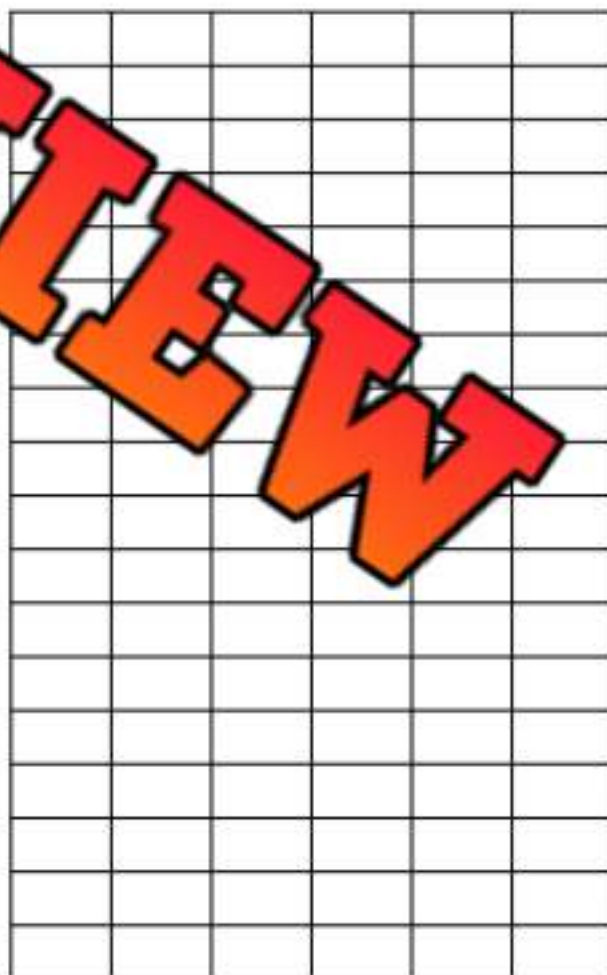
b) If Aiden's family drove 330km in one day, how much would they need to pay?

c) Fill in the missing values in the ordered pairs below

(15, _____), (75, _____), (135, _____)

(_____, 130), (_____, 240), (_____, 500)

d) Aiden's family owes \$660 to the moving company. How far did they drive?



Linear Equations - Graphing 2 Variables

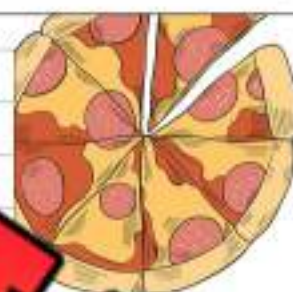
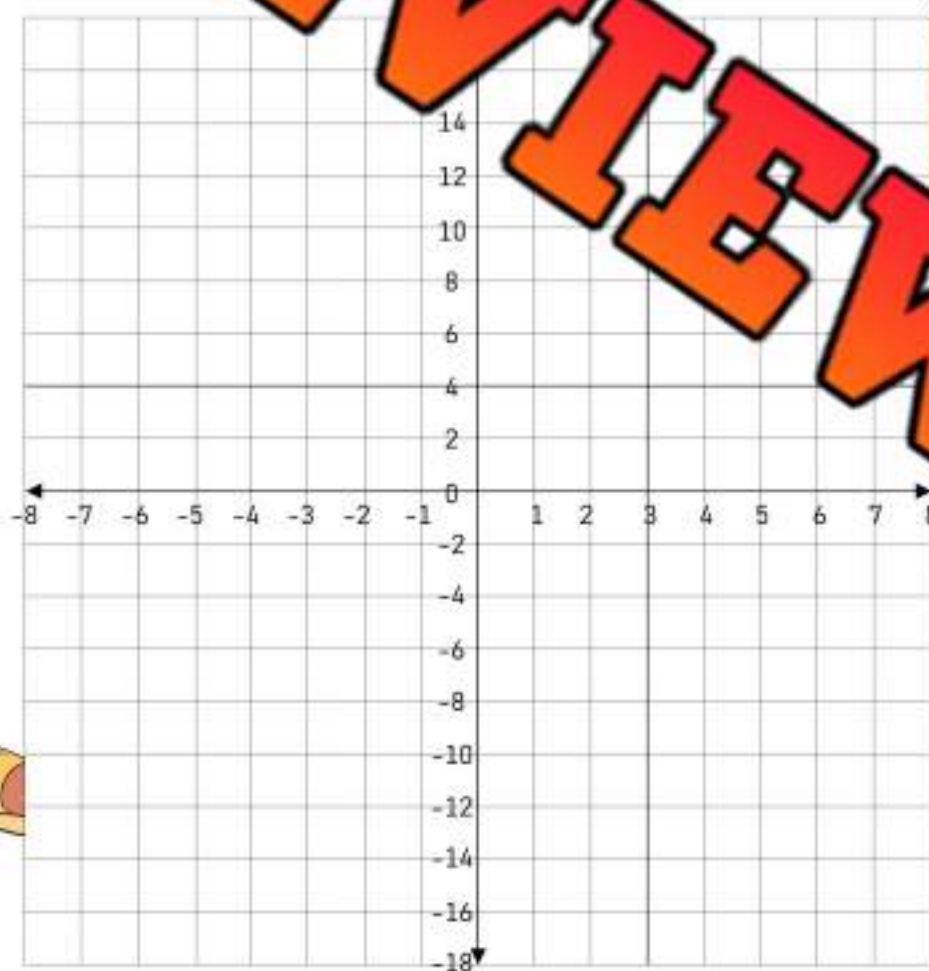
Questions Fill in the table of values and then graph the results using ordered pairs

Matt is hosting a pizza party. He will buy 2 slices for each person coming and 4 extra slices in case someone shows up unexpectedly. He determined an equation that will help him decide how many slices to buy: $y = 2x + 4$

a) Fill in the table of values using the equation above.

x	1	2	3	4	5	6
y						

b) Represent the results using the graph. Connect the dots using a line. Is the relation linear or not linear.



Linear Equations - Graphing 2 Variables

Questions Fill in the table of values and then graph the results using ordered pairs

Hadley sells her homemade scarfs at a flea market. It costs her \$10 to rent a table but she makes \$5 each hour she is there. She uses the following equation to represent her earnings: $y = 5x - 10$

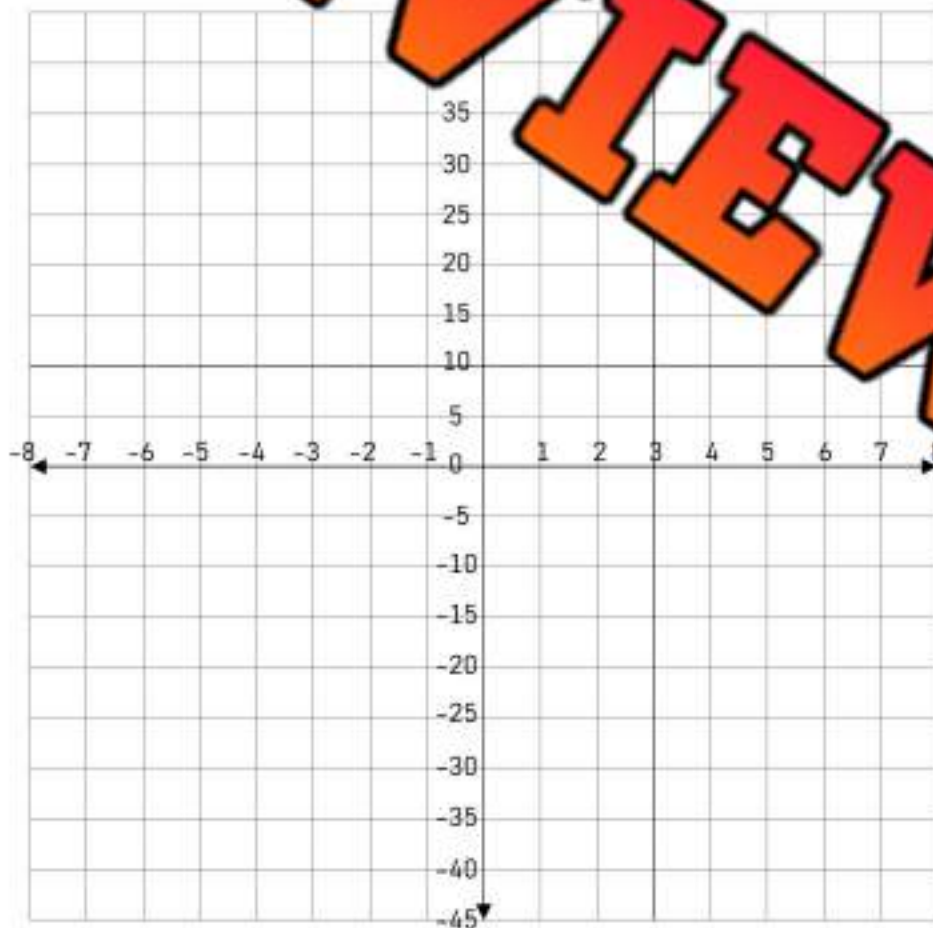
a) Fill in the table of values using the equation above.

x	1	2	3	4	5	6	7	8
y								

b) Represent the results using the graph. Connect the dots using a line.

c) Fill in the missing values in the ordered pairs below

(10, ____), (20, ____), (____, 80), (____, 100), (____, 150)



Graphing Linear Equations - Exercise

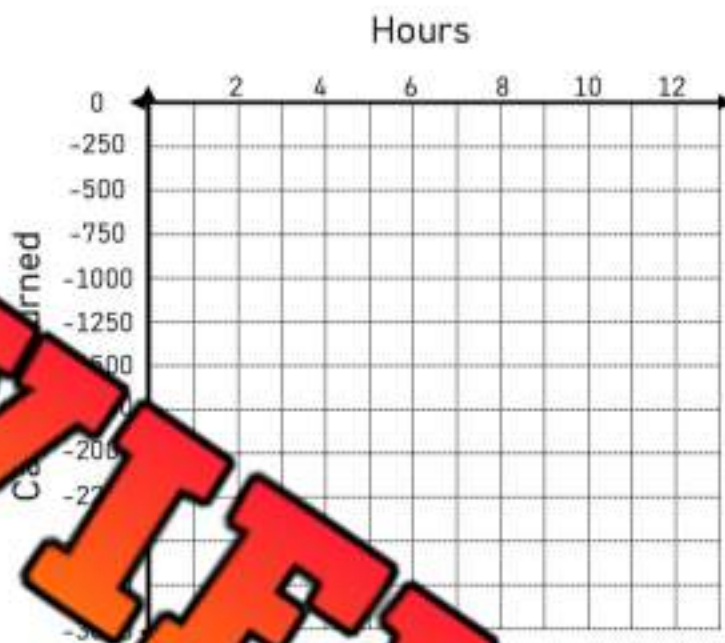


Questions

Answer the questions below

For every 1-hour Logan exercises, he burns 250 calories. Use negative integers to fill in the table of values that tracks Logan's calorie burn.

1-Hour	2-Hours	3-Hours	4-Hours	5-Hours	6-Hours	7-Hours



- a) If Logan exercises for 1 hour a week, how many calories would he burn?

- b) Write the linear equation that represents the situation. Use multiplication and a negative integer.

- c) If Logan has already burned 750 calories this week, how many more hours will he need to exercise to burn 2250 calories? Write an equation that represents the situation.

- d) Describe the relationship between the two variables.

- e) Fill in the missing values in the ordered pairs below

(14, _____), (20, _____), (32, _____)

(_____, -4250), (_____, -6500), (_____, -9750)

Graphing Linear Equations - Advertising

Questions

Answer the questions below



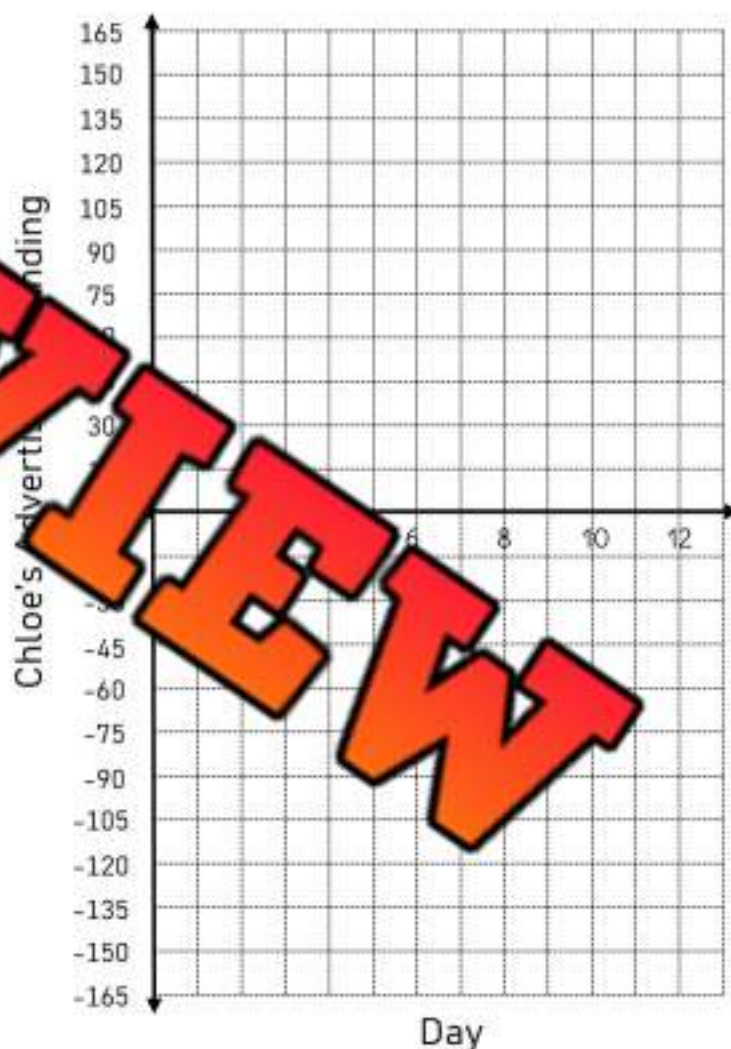
Chloe has an advertising budget of \$150. She decides to spend \$15 a day. Use negative integers to fill in the table of values that tracks her advertising spending. Display the table of values as a graph as well.

1) After _____ days, how much of the all budget will Chloe have left? _____

2) Write the linear equation that represents the situation. Use multiplication and a negative integer.

3) Chloe has discovered that she earns \$20 a day from people buying her products after seeing her advertisements. Use the numbers/operations below to write a new linear equation that represents the situation.

y x -15 20 $+$ $=$



4) Matthew answered the question above using this equation: $y = x(-15) + 20$ but he isn't getting the correct answer. How could he move one bracket to get the correct answer? Why was he wrong before?

Algebra Quiz - Patterning

Part 1

How many matchsticks are in each term. Sketch the next 3 terms

F-1	F-2	F-3	F-4	F-5	F-6			
								
What is the functional relationship?			Expression:					
			2	3	4	5	6	20
# of Matchsticks								

Part 2

In the table below and answer the questions

- 1) Cole's pay for today is represented in the table below

Hours Worked	0	1	2	3	4	5	6	7	8
Money Earned (\$)	0	27	54	81					

- a) Is the relationship between the variables linear? ☐ Yes ☐ No
- b) What is the functional relationship between variables?

- 2) It costs \$30 for admission to an amusement park. Once inside you can go on as many rides as you want. Each additional ride you go on costs \$1.50.

Rides	0	1	2	3	4	5
Total Cost	\$30.00	\$31.50	\$33.00	\$34.50	\$36.00	\$37.50

- a) What is the functional relationship between the two variables (algebraic expression)?
- b) If you graphed the table of values, would the line be straight or curved? Explain.
- c) How much would it cost if you went on 25 rides?

Grade 8

PATTERNS AND RELATIONS

Variables and Equations

	Curriculum Expectations	Pages That Cover the Expectations
PR.2	Model and solve problems concretely, pictorially and algebraically using linear equations of the form: • $ax = b$ • $x/a = b$ • $ax + b = c$ • $x/a + b = c$ • $a(x + b) = c$ where a, b and c are integers.	57 - 108

Distributive Property - Addition

The distributive property is used to make difficult problems simpler. It means that when we multiply a number by the sum of two or more addends, we get the same result as multiplying each addend separately by the number.

You can use the distributive property of multiplication to rewrite expressions that have a number outside of a parenthesis.

Example 1

$$7(5 + 3)$$

5	3
35	21

Example 2

$$4(y + 8)$$

y	8
4y	32

Evaluate Fill in models to represent the distributive property of the expressions

1) $9(4 + 6)$

2) $6(3 + n)$

3) $8(7 + 3)$

4) $3(5 + 2)$

5) $6(f + 11)$

6) $-3(5 + 7)$

Expand

Evaluate the expressions below

1) $9(t + 7)$

2) $-2(8 + 12)$

3) $-6(x + 3)$

4) $8(y + 4)$

5) $5(-11 + n)$

6) $-4(-12 + k)$

Writing Algebraic Expressions

Using algebraic expressions helps us understand mathematical situations. We can use a variable to replace a changing number, like how many \$10 tickets are sold to a game – $t \times 10$

Part 1

Write each algebraic expression in words.
Use the words, "a number" in place of the variable

1) $9 - t$

Nine subtract a number

2) $n +$

3) $6 + b$

4) $12r$

5) $\frac{y}{8} + 5$

6) $9 - t + 21$

7) $\frac{21}{y} + 13$

8) $(8b) - (4x)$

$\frac{y}{3}$

$\frac{-x}{3}$

Part 2

Write an algebraic expression for each statement

1) Twelve times a number subtract eight

2) Divide a number by seven and multiply it by a different number

3) A number is subtracted by fourteen divided by five

4) Triple a number subtracted by double a different number

5) Divide eighty by a number, then multiply by four

Evaluating Expressions - Food Truck

Walker works at a food truck selling burgers, hot dogs, fries, and pogos. He uses algebraic expressions to determine the cost of his customer's orders.



Menu	
Burger (b)	\$4.50
Hot Dog (h)	\$2.75
Fries (f)	\$3.25
Pogo (p)	\$3.50

Solve the algebraic expression and then evaluate using the menu prices

Customer Order	Expression	Answer
1) 2 burgers, 1 fry	$2 \times b + f$ $4.50 + 3.25$	
2) 4 hot dogs, 2 pogos		
3) 5 fries, 2 pogos		
4) 3 burgers, 2 fries, 2 pogos		
5) 3 fries, 5 burgers, 4 hot dogs		
6) 10 burgers, 10 fries		
7) 5 hot dogs, 7 fries, 3 pogos		
8) 4 burgers, 9 hot dogs		

Evaluating Algebraic Expressions - (x ÷)**Part 1**Evaluate for $x = -3$. Use brackets to separate the numbers

1) $7x$	2) $6x$	3) $4x - 5$	4) $12x + 7$
5) $17x +$	6) $15x - 10$	7) $8x - x$	8) $13x + 6 - x$

Part 2Evaluate the following expressions for $y = -8$

1) $\frac{y}{2}$	2) $\frac{56}{y}$	4) $\frac{y}{2} + 5$
5) $\frac{48}{y} + 7$	6) $\frac{88}{y} + y$	7) $\frac{y}{y} \times y$

Challenge!

Use three -5s and any operation or brackets to write an expression with the values provided

	Your Expressions	Value
1)		-125
2)		-5
3)		0
4)		50

	Your Expressions	Value
5)		5
6)		-10
7)		20
8)		-6

Representing Situations - Division

Part 1

Solve the expressions below using $n = 6$ and $y = 3$

	Expression	Answer
1)	$(7 + 11) \div y$	
2)	$\frac{(n + 3)}{y}$	
3)		
4)	$\frac{12y}{y}$	

	Expression	Answer
5)	$\frac{(n + y + 6)}{y}$	
6)	$8 + \frac{(5n - 6)}{y}$	
7)	$\frac{n}{y}$	
8)	$\frac{(11 + 4)}{y}$	

Part 2

Write an expression for each situation. Use a variable in brackets to represent the situations

- 1) Gianna and her friends saved money to make a bracelet. They divided the earnings up equally amongst her (f) friends.

a) Write an expression that represents the situation.

- b) If Gianna worked with 2 other friends, how much would each friend get?

- 2) Zoey made 3 trays of cookies with 12 cookies on each tray. She split the cookies up equally between (n) number of friends.

a) Write an expression that represents the situation.

- b) If Zoey split the cookies with 8 friends, how much would each friend get?

- 3) Mrs. Hubert has 8 packs of pencil crayons that have 12 crayons inside each pack. She divides the pencil crayons into (g) number of groups.

a) Write an expression that represents the situation.

- b) If Mrs. Hubert gave 6 crayons to each group, how many groups did she give to?



Writing Equations

An equation is a statement that two expressions are equal. An expression has no equal sign, whereas an equation has an equal sign. When we can solve the answer to an expression, it becomes an equation because we add an equal sign.

Expression

Eight more than a number

$$8 + n$$

$$n$$

Equation

Eight more than a number is 14

$$8 + n = 14$$

$$n = 6$$

Part 1 Write equations for each sentence

		Equation	Answer
1)	Eleven less than a number is 10		
2)	Sixty-two more than a number is 100		
3)	Eight times a number minus 3 is 19		
4)	Twenty-eight divided by a number is four		
5)	A number plus sixteen divided by two is 10		
6)	Nine times a number plus forty is 76		

Part 2 Write a sentence in words for each equation

Equation	Sentence	Value of n
1) $6n = 24$		
2) $11 + n - 8 = 12$		
3) $7 + \frac{32}{n} = 15$		
4) $9n - 9 = 45$		

Are They Equal? + -

Are the equations equal? Put a slash through the equal sign for any equations that are not equal.

$8 + 4 = 12$

$23 - (-7) \neq 16$

$42 + (-15) = 27$

Part 1

Put a slash through the equal sign ($\neq$) if it is not balanced

$1) 12 + (-10) = 2$

$2) 13 + (-18) = -5$

$3) (-21) + 13 = -8$

$4) 35 - (-10) = 45$

$5) 45 - (-17) = 26$

$6) (-22) - 11 = -11$

$7) 53 - (-15) = 68$

$8) 71 - (-18) = 54$

$9) (-48) + (-12) = 60$

$10) (-67) - (-9) = -58$

$11) 38 - (-144) = 182$

$12) 212 - (-12) = -224$

Part 2

Fill in the missing number to balance the equation

$1) \square + (-12) = -19$

$2) \square - 14 = 23$

$3) \square - 7 = -26$

$4) 42 + (-14) = \square$

$5) (-62) - \square = (-75)$

$6) \square + (-32) = -61$

$7) 71 + \square = 63$

$8) 83 + (-19) = \square$

$9) (-37) - \square = -89$

$10) 109 + \square = 101$

$11) 121 - (-14) = \square$

$12) 100 + \square = -172$

Addition Equations - Golf Tournament - Challenge

Zack hosted a 4-round golf tournament. He has the results and needs to find out who won the tournament. The leaderboard is below but is missing numbers.

**Directions**

Fill in the leaderboard

Player	Round 1	Round 2	Round 3	Round 4	Final Score
Richard	-4	-6	4	-5	
Chloe		-2	5		-5
Dominic		-4		9	-6
Kayden			-1	-5	
Silas	5	9	9		-1
Lillian	5	8	7		9
Brooklyn	-4	-2			-5
Natalie		7	2	-6	-4
Andrew	-5	4	1		
Santiago		-3	-8	-4	-22

Results

Who won the golf tournament?

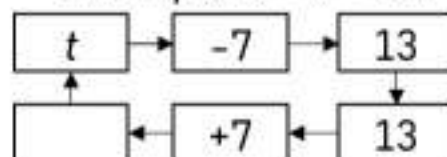
1) Who won the golf tournament?	
2) The entry fee for the tournament was \$75. All the money went to the prize (p). Write an equation that determines the value for (p).	
3) More golfers joined the tournament. The prize ended up being \$1125. Write an equation that determines how many golfers (g) participated in the tournament.	

Adding and Subtracting Equations - Flow Chart

Steps to fill in a flow chart:

- 1) Write the variable in the first box
- 2) Write the second value in the second box
- 3) Write the answer in the third box
- 4) We are working in reverse now. Write the answer in the first box
- 5) We do the opposite to the next box as we did with the second box
- 6) Fill in the last box to find the value of the variable, which it points to

Example: $t - 7 = 13$



Directions: Fill in the blank in the flow chart

1) $t - 4 = 9$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	6) $t - 13 = 5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
2) $r - 6 = -8$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	7) $r - 4 = -4$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
3) $c + 9 = 5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	8) $c - 11 = 17$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
4) $b + 11 = -2$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	9) $b + 6 = -11$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
5) $p - 8 = -5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	10) $p + 16 = -9$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.

Finding the Value of a Variable

When we multiply a number by a variable, we do not need to use the multiplication sign. It is known that any variable next to a number means the operation we are using is multiplication.

Example: $7n = 14$ means $7 \times n = 14$

We can figure out the unknown number by balancing the equation - $n = 2$.

Part 1

Find out the value of the variable

1) $3n$ $n =$	2) $(-4n) = 16$ $n =$	3) $(-9s) = 54$ $s =$
4) $7 \times (-4)$ $p =$	5) $\frac{77}{n} = -11$ $n =$	6) $\frac{-28}{k} = -7$ $k =$
7) $(-3n) = (-18)$ $n =$	8) $4n =$ $n =$	9) $\frac{n}{8} = -9$ $n =$
10) $\frac{-40}{5} = n$ $n =$	11) $(-8) = (-t)$ $t =$	12) $\frac{p}{15} = -5$ $p =$
13) $(-8n) = 96$ $n =$	14) $\frac{110}{n} = -11$ $n =$	15) $7d$ $d =$

Part 2

Calculate the area of a circle and a triangle using the formula below

The formula for calculating the area of a circle is: $A = \pi r^2$ $\pi \approx 3.14$

Calculate the area in the questions below using the values for radius and pi

	Radius	Area - Circle
1)	$r = 9\text{cm}$	$A =$
2)	$r = 6\text{cm}$	$A =$

	Radius	Area - Circle
3)	$r = 12\text{cm}$	$A =$
4)	$r = 7\text{cm}$	$A =$

	Radius	Area - Circle
5)	$r = 13\text{cm}$	$A =$
6)	$r = 11\text{cm}$	$A =$

The formula for calculating the area of a triangle is: $A = \frac{(b)(h)}{2}$

	b	h	Area - Triangle
1)	6	2	$A =$
2)	9	6	$A =$

	b	h	Area - Triangle
3)	8	4	$A =$
4)	7	5	$A =$

	b	h	Area - Triangle
5)	3	4	$A =$
6)	8	6	$A =$

Writing Multiplication Equations - Gas Station

Tyler works at a gas station. He sells fuel by the litre, chips, drinks, and chocolate bars.

Fuel (f)	Chips (c)	Drinks (d)	Chocolate Bars (b)
\$1.33/L 	\$1.75 	\$1.25 	\$1.99 

Questions

Complete the table below. The first one is done for you

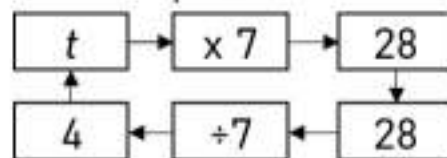
#	Fuel (f)	Chips (c)	Drinks (d)	Chocolate Bars (b)	Equation	Answer
1	20	2	0	0	$t = 20f + 2c$	$t = 20 \times 1.33 + 2 \times 1.75$ $t = 26.6 + 3.50$ $t = \$30.1$
2	50	0	3	2		
3	0	2	1	0		
4	60	1	2	2		
5	0	2	0	0		
6	0	1	1	0		
7	25	2	1	2		
8	70	0	1	3		

Multiplying Equations - Flow Chart

Steps to fill in a flow chart:

- 1) Write the variable in the first box
- 2) Write the second value in the second box
- 3) Write the answer in the third box
- 4) We are working in reverse now. Write the answer in the first box
- 5) We do the opposite to the next box as we did with the second box
- 6) Fill in the first box to find the value of the variable, which it points to

Example: $7t = 28$



Directions: Fill in the blank in the flow chart

1) $7t = 28$	 	6) $-12t = (-84)$	→ → ↑ ← ←
2) $3r = 15$	→ → ↑ ← ←	7) $11s = 55$	→ → ↑ ← ←
3) $-9c = 36$	→ → ↑ ← ←	8) $-7c = 63$	→ → ↑ ← ←
4) $-6b = -42$	→ → ↑ ← ←	9) $-12b = (-132)$	→ → ↑ ← ←
5) $8p = -72$	→ → ↑ ← ←	10) $-9n = 63$	→ → ↑ ← ←

Writing Division Equations - Investments

An investment club is a group of investors who pool their money to make investments. Each member of the group helps study new investment opportunities. When an investment earns money, they split the earnings. When an investment loses money, they split the losses.



Questions

Use a formula to find out the balance for each person in the club

#	Investment (i)	# of People in the Club (n)	Formula	Answer
1		8	$\frac{i}{n} = t$	$\frac{-400}{8} = -50$
2	\$600 gain	10		
3	\$800 loss			
4	\$1200 loss	8		
5	\$ 750 gain	5		
6	\$5000 gain	20		
7	\$2500 loss	25		
8	\$3600 loss	24		
9	\$12500 gain	5		
10	\$8000 gain	40		
11	\$6800 loss	17		
12	\$25000 loss	20		
13	\$84000 gain	16		

Evaluating Equations**Questions**

Evaluate the equations below

1)

$$x = 9 + 14 - 5$$

2)

$$x = 7 \times 4 - 11$$

3)

$$x = 3 + 10 - 5$$

4)

$$x = 25 - 4 \times 3$$

5)

$$x = 6 + 5 - 5 \times 3$$

6)

$$x = 14 + 3 - 23$$

7)

$$x = 8 \times 5 \div (-2)$$

8)

$$x = (2 - 5) \times 3$$

9)

$$x = 24 \div 6 \times (-5)$$

10)

$$x = 61 - 6 + (-15)$$

Evaluating Equations - Isolating the Variable

Steps to isolate a variable:

1. Add or subtract the same amount from both sides so that the variable is by itself
2. If the number that is with the variable is positive, you will subtract the same number from both sides.
3. If it is negative, you will add the number to both sides.
4. Leave your answer with the variable on the left (examples 2/3)

Example 1

$$x - 14 = 1$$

Example 2

$$\begin{aligned}15 &= x + 9 \\15 - 9 &= x + 9 - 9 \\6 &= x \\x &= 6\end{aligned}$$

Example 3

$$\begin{aligned}-34 &= 6x - 4 \\-34 + 4 &= 6x - 4 \\-30 &= 6x \\-30 &= 6x \\-5 &= x \\x &= -5\end{aligned}$$

Questions: Evaluate equations below

1)

$$x - 5 = 15$$

2)

$$x + 17 = 31$$

3)

$$x + 12 = 25$$

4)

$$x - 31 = 1$$

5)

$$9 = x + 13$$

6)

$$24 = x - 15$$

7)

$$x + 32 = 25$$

8)

$$48 = x + 56$$

Representing Problems with Linear Equations ($ax = b$)**Questions**Represent the problems with linear equations ($ax = b$) and solve for x

1)

Gianna drove 110km per hour for many hours to get to her cottage that is 770km away. How many hours did she drive for?

Linear equation:

 $x =$

2)

Scarlett drinks 9 full bottles of water each day. She drinks a total of 4500mL of water each day. How many mL are in her bottle?

Linear equation:

 $x =$ 

3)

Avery ran 7 laps around her neighbourhood. She ended up running 4200m in total. What is the distance of one lap around her neighbourhood?

Linear equation:

 $x =$

4)

Mason just finished a video game he had bought. He played it everyday for 10 days. He played for a total of 1250 minutes. How many minutes did he play each day?

Linear equation:

 $x =$ 

5)

Levi finished recording 6 songs with his band. It took them 174 minutes to record all 6 songs. On average, how many minutes did it take them to record each song?

Linear equation:

 $x =$

6)

Owen types 32 words per minute. He typed an essay that was 256 words long. How many minutes did it take him to type the essay?

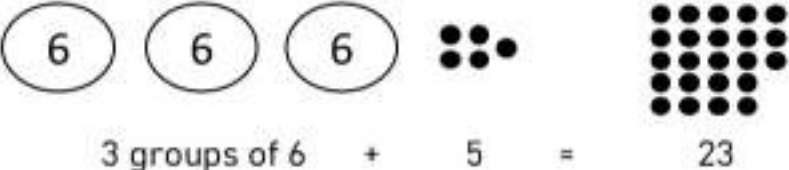
Linear equation:

 $x =$ 

Representing Linear Equations ($ax + b = c$)

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation
Ex)	$3x + 5 = 23$ $x = 6$	 3 groups of 6 + 5 = 23
1)		
2)	$8x + 9 = 49$ $x =$	
3)	$5x + 8 = 43$ $x =$	
4)	$7x + 8 = 50$ $x =$	
5)	$2x + 12 = 42$ $x =$	
6)	$4x + 22 = 66$ $x =$	
7)	$8x + 15 = 79$ $x =$	

Representing Problems with Linear Equations ($ax + b = c$)**Questions** Represent the problems with linear equations ($ax + b = c$) and solve for x

1)

Dylan went to an arcade. He had to pay for each game he played. He ended up playing 8 games. He also had to pay \$12 to enter the arcade. In total, it cost him \$36 at the arcade. How much does each game cost?

Linear equation:

 $x =$ 

2)

For babysitting, Ashley gets a flat fee of \$10, plus \$4 per hour. Ashley earned \$46 babysitting yesterday. How long did she babysit for?

Linear equation:

 $x =$ 

3)

Riley has \$30 saved to buy a new coat. She is able to save \$7 a week from her allowance. How many weeks will it be until she has the \$128 she needs for her new coat?

Linear equation:

 $x =$ 

Solving Linear Equations ($ax=b$, $ax+b=c$)**Questions**Solve the linear equations below by determining the value of x

1) $8x = 56$

$x =$

2) $6x + 8 = 50$

$x =$

3) $9x + 11 = 83$

$x =$

4) $12x = 48$

$x =$

5) $4x + 17 = 45$

$x =$

6) $8x + 15 = 71$

$x =$

7) $11x = 55$

$x =$

8) $12x + 94 = 126$

$x =$

9) $9x = 108$

$x =$

10) $15x + 40 = 115$

$x =$

11) $7x + 31 = 94$

$x =$

12) $12x + 12 = 110$

13) $16x = 96$

$x =$

14) $11x + 60 = 115$

$x =$

15) $12x + 42 = 126$

$x =$

16) $25x + 70 = 245$

$x =$

17) $14x + 25 = 123$

$x =$

18) $100x = 1200$

$x =$

Representing Problems with Linear Equations ($x/a = b$)**Questions**Represent the problems with linear equations ($\frac{x}{a} = b$) and solve for x

1)

Mya is having a party with 95 guests. She is serving soda to drink. She bought enough soda for each guest to have 3. How many sodas did she buy?

Linear equation:

 $x =$

2)

Paid some money today cutting grass in her neighbourhood. She charges \$_____ she cuts and she cut 7 yards. How much money did she earn

Linear equation:

 $x =$ 

3)

Neill collected candy from trick-or-treating for Halloween. He divided his candy equally between himself and his 3 other brothers. Each person got 24 candies. How many candies did he collect?

Linear equation:

 $x =$

4)

Amelia is in a running challenge. She will complete a challenge that she needs to run over 6 days. Each day she will run 12km. How many km does she need to run for the challenge?

Linear equation:

 $x =$ 

5)

Connor is one of the best 3-point shooters around. Each week, he takes a certain amount of 3-point shots during practice. He practices 6 days a week and takes 85 shots per session. How many shots in total does he take for the week?

Linear equation:

 $x =$

6)

Hani has to do a bunch of push-ups for a fitness challenge. He divides the pushups into 8 sets of 25. How many total pushups does he need to do for the challenge?

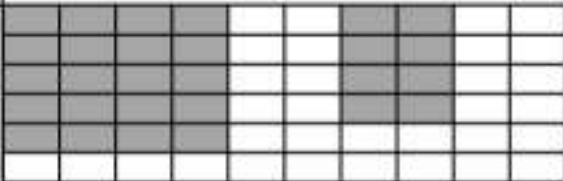
Linear equation:

 $x =$ 

Representing Linear Equations ($x/a + b = c$)

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation	Verification
Ex)	$\frac{x}{4} + 8 = 13$ $x = 20$	 20 divided by 4 + 8 = 13	$\frac{20}{4} + 8 = 13 \checkmark$
1)	$\frac{x}{6} + 8 = 13$ $x =$		
2)	$\frac{x}{5} + 10 = 13$ $x =$		
3)	$\frac{x}{8} + 5 = 9$ $x =$		
4)	$\frac{x}{7} + 15 = 17$ $x =$		
5)	$\frac{x}{6} + 14 = 18$ $x =$		
6)	$\frac{x}{4} + 12 = 19$ $x =$		

Solving Linear Equations ($x/a=b$, $x/a+b=c$)**Questions**Solve the linear equations below by determining the value of x .

1) $\frac{x}{6} = 7$

 $x =$

2) $\frac{x}{6} + 5 = 13$

 $x =$

3) $\frac{x}{3} = 8$

 $x =$

4) $\frac{x}{6} = 2$

 $x =$

5) $\frac{x}{4} = 9$

 $x =$

6) $\frac{x}{8} + 4 = 12$

 $x =$

7) $\frac{x}{11} + 13 = 21$

 $x =$

9) $\frac{x}{12} + 8 = 13$

 $x =$

10) $\frac{x}{7} = 7$

 $x =$

11) $\frac{x}{15} + 5 = 9$

 $x =$

13) $\frac{x}{10} + 27 = 40$

 $x =$

14) $\frac{x}{8} = 7$

 $x =$

15) $\frac{x}{8} + 11 = 20$

 $x =$

16) $\frac{x}{3} + 15 = 26$

 $x =$

17) $\frac{x}{5} + 22 = 42$

 $x =$

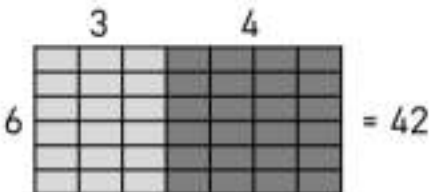
18) $\frac{x}{12} = 7$

 $x =$

Representing Linear Equations - $a(x + b) = c$

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation	Verification
Ex)	$6(x + 4) = 42$ $x = 3$		$6(3 + 4) =$ $6 \times 7 = 42$ ✓
1)	$(x + 5) =$ $x =$		
2)	$4(x + 3) = 36$ $x =$		
3)	$2(x + 6) = 22$ $x =$		
4)	$7(x + 4) = 77$ $x =$		
5)	$8(x + 5) = 72$ $x =$		
6)	$6(x + 3) = 48$ $x =$		

Representing Linear Equations - $a(x + b) = c$ **Questions** Represent the problems with linear equations $a(x + b) = c$ and solve for x

1)

3 students were comparing what they had in their lunch today. All 3 students had the same number of pieces of fruit. They had 6 strawberries each and some raspberries as well. In total, the 3 students had 42 pieces of fruit. How many raspberries did each student have?

Linear equation:

 $x =$ 

2)

A uniform consists of a jersey and a pair of shorts. The jersey costs \$22. A team ordered 15 uniforms and paid a total of \$585. How much did each pair of shorts cost?

Linear equation:

 $x =$ 

3)

Ralph ordered 7 slices of pizza and 7 drinks for him and his friends. The pizza slices were \$4 each. Ralph paid \$49 in total. How much did each drink cost?

Linear equation:

 $x =$ 

Solving Linear Equations - $a(x + b) = c$ **Questions**Solve the linear equations below by determining the value of x

1) $8(x + 4) = 56$

 $x =$

2) $6(x + 7) = 66$

 $x =$

3) $4(x + 5) = 32$

 $x =$

4) $x =$

5) $11(x + 9) = 121$

 $x =$

6) $12(x + 6) = 96$

 $x =$

7) $6(x + 3) = 88$

 $x =$

8) $5(x + 10) = 100$

 $x =$

9) $4(x + 6) = 52$

 $x =$

10) $7(x + 11) = 105$

 $x =$

11) $4(x + 12) = 100$

 $x =$

12) $6(x + 8) = 90$

13) $11(x + 7) = 110$

 $x =$

14) $50(x + 5) = 450$

 $x =$

15) $20(x + 4) = 220$

 $x =$

16) $6(x + 6) = 150$

 $x =$

17) $15(x + 11) = 225$

 $x =$

18) $25(x + 3) = 375$

 $x =$

Representing Problems with Linear Equations

Questions

Represent the problems with linear equations

1)

A plumber charges \$35 for a service call plus an additional hourly rate. The plumber just earned \$195 for a 4-hour call. How much does the plumber earn per hour?

Linear equation: _____

 $x =$ _____

2)

Jody works this week for 9 hours at each job. She is a hair-dresser and works as a cashier as well. As a cashier, she earns \$15 an hour. For the week, Jody made \$333. How much does Jody earn as a hair-dresser per hour?

Linear equation: _____

 $x =$ _____

3)

A group of 9 friends earned some money by performing in a band. Rachel is the singer, and she went home with \$60. She had \$210 when she went home and now she has \$210. How much did the band earn?

Linear equation: _____

 $x =$ _____

4)

Jace performed 15 sets of pullups. At the end of the 15 sets, he had done 150 pullups. How many pullups did he do each set?

Linear equation: _____

 $x =$ _____

5)

An athlete earns millions of dollars per season. They signed a 1-time signing bonus of \$500,000 and played 6 seasons. In total, they earned \$18,500,000. How much do they earn per season?

Linear equation: _____

 $x =$ _____

Unit Test - Variables and Equations**Part 1**Evaluate the following expressions for $x = 5$ and $p = -7$

1) $(x) + (p) - 11$	2) $17 + x + (p)$	3) $(19 - x) - (p)$	4) $x + (26 + p)$
5) $54 \div (p)$	6) $22 + 8x - (p + 5)$	7) $12 - \frac{7x}{p} + 5p$	8) $9x + (2p - x)$

Part 2Put a star in the box if the equation is not balanced ($\neq$) if it is not balanced

1) $(-9) + 7 = 2$	2) $1 + (-8) =$	3) $(-21) + 13 = -8$
4) $\frac{50}{10} = -10$	5) $\frac{36}{-9} =$	6) $\frac{48}{-8} = 6$

Part 3

Simplify the equations below. Make sure the variable is on one side.

1) $x = 9 + 14 - 5$	2) $x = 24 \div 6$
3) $48 = x + 56$	4) $x + (3 \times 4) = 60 \div (-10)$



Google Slides Lessons Preview





Manitoba Math Curriculum Number Unit – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

Learning Goal

We are learning to multiply and divide whole numbers by other whole numbers so we can accurately solve problems involving measurements, money, and real-world situations.

Discussion Questions

- 1) If you had 4 bags with 25 marbles in each, how could you quickly figure out the total without counting one by one?
- 2) If you double a number and then double it again, what operation are you really doing?
- 3) If 5 friends split a \$100 bill evenly, will everyone get a whole number amount? How do you know?

Area Model Multiplication – 3 x 1 Digits

Use the area model to solve the multiplication problems below.

1) $236 \times 2 =$ _____ 	2) $617 \times 5 =$ _____ 	3) $568 \times 4 =$ _____
4) $627 \times 8 =$ _____ 	5) $765 \times 7 =$ _____ 	6) $903 \times 9 =$ _____

Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Multiplication – Word Problem

- 1) A student reads 35 pages of a novel each day for 24 days. How many pages has the student read by the end of that time?
- 2) A theatre sells 248 tickets for each show. If they run 12 shows in a month, how many tickets do they sell in total?



Manitoba Math Curriculum

Number Unit – Grade 8

Area of a Square – Square Root

When we calculate the area of a square, we use a square number to determine the area.
 Example: If the area of a square is 9, its side length is $\sqrt{9}$ or 3.

What is the area? Write the side lengths as square roots and units.

#	Question	Area	Side Length
1)			$\sqrt{\quad}$ units
2)			$\sqrt{\quad}$ units
3)			$\sqrt{\quad}$ units
4)			$\sqrt{\quad}$ units

	Number 1	Sign	Number 2
1	2 ²		$\sqrt{16}$
2	$\sqrt{81}$		12
3	$\sqrt{49}$		3 ²
4	8 ²		$\sqrt{121}$
5	$\sqrt{225}$		18

#	Number 1	Sign	Number 2
6	12 ²		$\sqrt{169}$
7	$\sqrt{196}$		15
8	$\sqrt{400}$		21 ²
9	18 ²		$\sqrt{361}$
10	$\sqrt{576}$		23

Fill in the blanks:

$\sqrt{48}$

$\sqrt{48} = \frac{\quad}{\quad}$ or $\frac{\quad}{\quad}$

$\sqrt{117}$

$\sqrt{117} = \frac{\quad}{\quad}$ or $\frac{\quad}{\quad}$



Manitoba Math Curriculum

Number Unit – Grade 8

Fractions, Decimals, and Percents

What fraction, decimal, and percent of the area is shaded in?

$+$ $-$ $\div$ $\times$

Fraction: Decimal: Percent:	Fraction: Decimal: Percent:	Fraction: Decimal: Percent:	Fraction: Decimal: Percent:
Fraction: Decimal: Percent:	Fraction: Decimal: Percent:	Fraction: Decimal: Percent:	Fraction: Decimal: Percent:

Ratio

A ratio shows the relationship between two amounts.

Example:

The ratio of chips to juices can be written in 3 ways:

Words: 1 to 4 Ratio: 1:4 Fraction: $\frac{1}{4}$

Write the ratio for the questions below.

	Words	Ratio	Fraction
1) Cellphones to telephones 			
2) Coffee to croissants 			
3) Eggs to bread slices 			

		4 to 12	3:5	$\frac{8}{24}$
2)	7:14	14:28	1:3	$\frac{3}{7}$
3)	$\frac{5}{8}$	2 to 3	$\frac{10}{16}$	6:9
4)	6 to 4	$\frac{12}{8}$	3:2	18 to 16
5)	9:15	$\frac{6}{10}$	12:18	18 to 30
				21:40



Workbook Preview



Grade 8

Number

	Curriculum Expectations	Pages That Cover the Expectations
N.1	Demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers)	1 - 25
N.2	Determine the approximate square root of numbers that are not perfect squares (limited to whole	26 - 38
N.	Preview of 50 pages from this product that contains 339 pages total.	
N.		
N.		
N.5	Solve problems that involve rates, ratios and proportional reasoning.	66 - 81
N.6	Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically.	82 - 129
N.7	Demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically.	130 - 156
N.8	Solve problems involving positive rational numbers.	157 - 169

Perfect Squares - Square Numbers

A **perfect square** is any number that is a product of two identical numbers. In other words, when we multiply two of the same numbers together, the answer is a perfect square. Perfect squares are also referred to as square numbers.

Examples - 9 is a perfect square (3×3)

4 is a perfect square (2×2)

Part 1

Solve by determining the perfect square

		Perfect Square
1)	$1 \times 1 =$	
2)	$2 \times 2 =$	
3)	$3 \times 3 =$	
4)	$4 \times 4 =$	
5)	$5 \times 5 =$	
6)	$6 \times 6 =$	

	Question	Perfect Square
7)	$7 \times 7 =$	
8)	$8 \times 8 =$	
9)	$9 \times 9 =$	
10)	$10 \times 10 =$	
11)	$11 \times 11 =$	
12)	$12 \times 12 =$	

Part 2

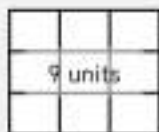
Solve the word problem below

- Richard built a square deck. One of the side lengths is 9m. What is the area of the deck?
- The area of a square tile is 121cm^2 . What are the side lengths?

Area of a Square - Square Root

When we calculate the area of a square, we use a square number to determine the area.

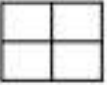
Example:



If the area of a square is 9, its side length is $\sqrt{9}$ or 3.

Part 1

What is the area? Write the side lengths as square roots and units

	Question	Area	Side Length		Question	Area	Side Length
1)			____ units	4)			____ units
2)			____ units	5)			____ units
3)			____ units	6)			____ units

Part 2

Fill in the table

	Area	Side Length (Units)	Side Length
1)			$\sqrt{64}$
2)		7	$\sqrt{\quad}$
3)	144		$\sqrt{\quad}$
4)		11	$\sqrt{\quad}$

Part 3

Is the number a perfect square?

	Area	Yes/No
1)	12	
2)	81	
3)	42	
4)	100	

Perfect Squares - Exponents

When we multiply a number by itself, we can use an exponent. An **exponent** refers to the number of times a number is multiplied by itself. When we represent a perfect square, we can use an exponent to the power of 2, meaning the number multiplied by itself. A power of 1 is the number itself.



Example - 16 is a perfect square (4×4) or 4^2

Part 1 Solve by determining the perfect square

	Perfect Square
1)	1^2
2)	2^2
3)	3^2
4)	4^2
5)	5^2
6)	6^2

	Question	Perfect Square
7)	7^2	
8	8^2	
	9^2	
10)	10^2	
	11^2	
12)	12^2	

Part 2 Find out the area of the squares below

When we calculate the area of a square, we are multiplying the length by the width or base times height. Since a square has the same side lengths, the formula is: s^2

	Question	Area
1)	 6cm	
2)	11cm 	

	Question	Area
3)	 7mm	
4)	9m 	

Square Roots

A **square root** is a number that can be multiplied by itself to give the original number. A square root is the opposite a perfect square. Instead of multiplying a number by itself, we take the answer and find out what number was used.

Each positive number has two possible square roots – one positive and one negative

Example The square roots of 49 are +7 and -7 because $(+7)(+7)$ and $(-7)(-7)=49$

Part 1 Provide the positive and negative square root

	Question	Positive Square Root	Negative Square Root
1)	$\sqrt{36}$		
2)	$\sqrt{4}$		
3)	$\sqrt{9}$		
4)	$\sqrt{16}$		
5)	$\sqrt{121}$		
6)	$\sqrt{144}$		

	Question	Square Root
		(+) (-)
7)	$\sqrt{49}$	
	$\sqrt{25}$	
9)	$\sqrt{81}$	
	$\sqrt{64}$	
11)	$\sqrt{100}$	
12)	$\sqrt{64}$	

Part 2 Provide the square root based on the symbol used

The symbol $\sqrt{\quad}$ means positive square root and the symbol $\pm\sqrt{\quad}$ means provide both the positive and negative square roots.

	Question	Answer(s)
1)	$\pm\sqrt{81}$	
2)	$\sqrt{49}$	
3)	$\pm\sqrt{9}$	

	Question	Answer(s)
4)	$\pm\sqrt{36}$	
5)	$\sqrt{100}$	
6)	$\pm\sqrt{64}$	

Comparing Square Roots & Perfect Squares

Part 1

Which number is larger? Use $<$ $>$ or $=$ to compare the numbers

1)	3^2		$\sqrt{100}$
2)	$\sqrt{36}$		6
3)	4^2		5^2
4)	2^2		9
5)	$\sqrt{36}$		8
6)	$\sqrt{121}$		11^2
7)	$\sqrt{25}$		-6
8)	50		7^2
9)	4^2		$\sqrt{144}$
10)	2		$\sqrt{4}$

Part 2

Order from least to greatest

1) $\sqrt{4}$, 4, $\sqrt{16}$, -16, $\sqrt{9}$, $\sqrt{81}$	3) $\sqrt{144}$, 2, 49, 17
2) $\sqrt{64}$, $\sqrt{36}$, -3, 9, $\sqrt{121}$	4) $\sqrt{4}$, 16, $\sqrt{64}$, 9, $\sqrt{9}$

Part 3

Challenge: find the square root for each number

1) $\sqrt{289}$		5) $\sqrt{400}$	
2) $\sqrt{225}$		6) $\sqrt{324}$	
3) $\sqrt{169}$		7) $\sqrt{256}$	
4) $\sqrt{361}$		8) $\sqrt{625}$	

Perfect Squares - Word Problems

Word Problems

Answer the word problems below

1) Which whole numbers between 100 and 150 are perfect squares?

2) Which whole numbers between 150 and 200 are perfect squares?

3) I am a square number. The sum of my digits is 7. What square numbers might I be?

4) What three square numbers have a sum that is a square number?

5) Archer is planning to make a square garden this year. He needs to have an area less than 50m^2 .

a) What is the largest area the garden could be?

b) What is the side length of the garden?

c) How many metres of fencing will be needed?

d) If one metre of fencing costs Archer \$2.50, how much would the entire fence cost him?



PREVIEW

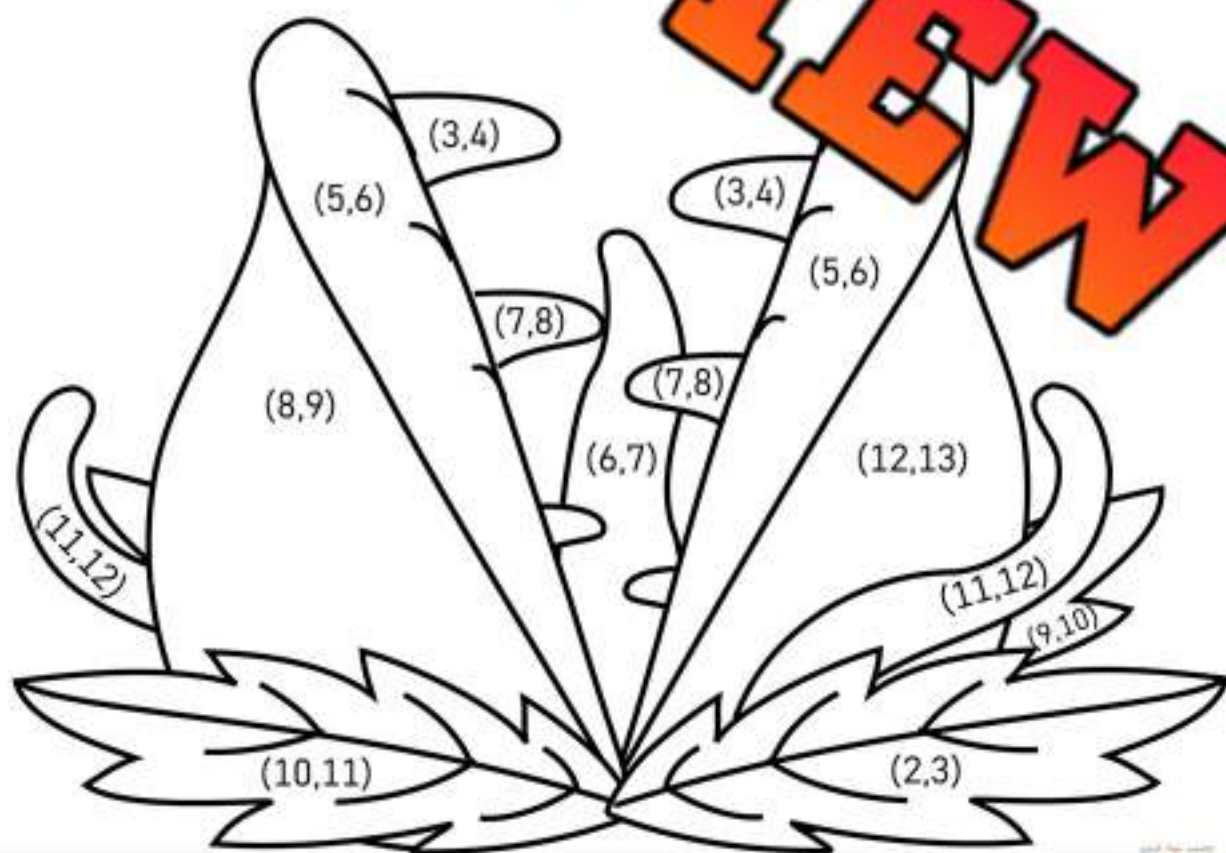


Estimating Square Roots - Colouring

Practice

Find the two square roots between the irrational numbers and colour the picture with the matching colour

	Irrational Number	Square Root 1	Square Root 2	Colour
1)	$\sqrt{32}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Light Green
2)	$\sqrt{11}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Yellow
3)	$\sqrt{47}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Purple
4)	$\sqrt{58}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Green
5)	$\sqrt{10}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Light Green
6)	$\sqrt{14}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Dark Green
7)	$\sqrt{50}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Yellow
8)	$\sqrt{8}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Dark Green
9)	$\sqrt{152}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Green
10)	$\sqrt{89}$	$\sqrt{\quad}$	$\sqrt{\quad}$	Dark Green



Estimating Square Roots - Riddle

Practice

Find the lower and higher perfect squares and write the corresponding letter above the numbers below

	Non-Perfect Square	Lower Perfect Square	Higher Perfect Square
B	$\sqrt{11}$		
Z	$\sqrt{10}$		
S	$\sqrt{10}$		
R	$\sqrt{55}$		
A	$\sqrt{2}$		
A	$\sqrt{6}$		
A	$\sqrt{77}$		
D	$\sqrt{125}$		
E	$\sqrt{18}$		

What's black and white and blue

(64,81)

(81,100)

(4,9)

(121,144)

(36,49)

(16,25)

(9,16)

(49,64)

(1,4)

Square Roots - Area

Part 1

Assume the side lengths and area below are of squares. Fill in the table

	Side Length	Area
1)		81cm
2)		
3)		
4)		144cm
5)	10m	

	Side Length	Area
6)		4m
7)	11cm	
8)	4km	
9)		9m
10)		36km

Part 2

Find the side length of the squares below. You will need to estimate one square

1)	A = 49 side length =	A = 54 side length =	A = 6 side length =	A = 56 side length =	A = 45 side length =	A = 49 side length =
2)	A = 9 side length =	A = 15 side length =	A = 16 side length =	A = 81 side length =	A = 89 side length =	A = 100 side length =
3)	A = 64 side length =	A = 66 side length =	A = 81 side length =	A = 16 side length =	A = 20 side length =	A = 25 side length =

Estimating Square Roots

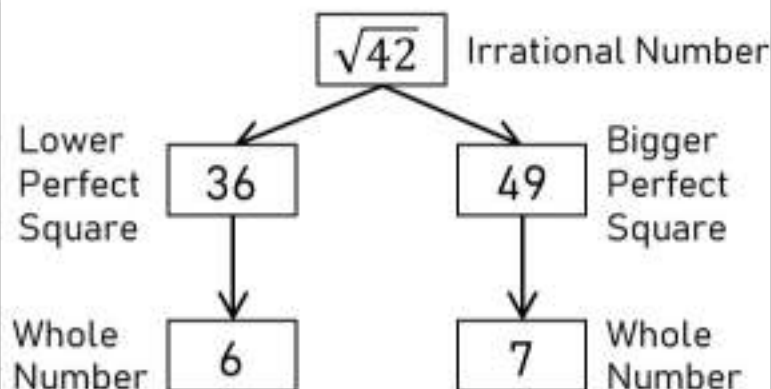
Step 1: Find the two perfect squares above and below the irrational number.

Step 2: Use the following formula to find the decimal number that will go with the whole number. Simplify the fraction.

Irrational # Lower Perfect Square
Bigger Lower P.S.

Step 3: Use the decimal number using the lower perfect square to find the simplified fraction from above.

Step 4: Change the fraction to a decimal (rounded to the nearest hundredth).



$$\frac{42 - 36}{49 - 36} = \frac{6}{13}$$

$$= 6 \frac{6}{13} \text{ or } 6.46$$

Practice

Fill in the blanks by following the steps above

$\sqrt{19}$

□

↓

□

□

↓

□

□ - □ = □

□ - □ = □

$\sqrt{19}$ □ $\frac{\square}{\square} = \square$

□ - □ = □

□ - □ = □

$\sqrt{19}$ □ $\frac{\square}{\square} = \square$

$\sqrt{68}$

□

↓

□

□

↓

□

□ - □ = □

□ - □ = □

$\sqrt{68}$ □ $\frac{\square}{\square} = \square$

□ - □ = □

□ - □ = □

$\sqrt{68}$ □ $\frac{\square}{\square} = \square$

$\sqrt{28}$

□

↓

□

□

↓

□

□ - □ = □

□ - □ = □

$\sqrt{28}$ □ $\frac{\square}{\square} = \square$

□ - □ = □

□ - □ = □

$\sqrt{28}$ □ $\frac{\square}{\square} = \square$

$\sqrt{57}$

□

↓

□

□

↓

□

□ - □ = □

□ - □ = □

$\sqrt{57}$ □ $\frac{\square}{\square} = \square$

□ - □ = □

□ - □ = □

$\sqrt{57}$ □ $\frac{\square}{\square} = \square$

Comparing Square Roots & Perfect Squares

Part 1

Which number is larger? Use < > or = to compare the numbers

1)	3^2		$\sqrt{110}$
2)	$\sqrt{100}$		10
3)	$\sqrt{5}$		8
4)	7		$\sqrt{5}$
5)	$\sqrt{29}$		2^2
6)	$\sqrt{45}$		7
7)	$\sqrt{7}$		3
8)	$\sqrt{14}$		3
9)	12		$\sqrt{138}$
10)	11		$\sqrt{127}$

Part 2

Order from least to greatest

1) $\sqrt{8}$, 2, $\sqrt{10}$, 3, $\sqrt{5}$	3) $\sqrt{82}$, 9, 8, 7
2) $\sqrt{32}$, $\sqrt{41}$, -11, 6, $\sqrt{35}$	4) $\sqrt{140}$, 12, $\sqrt{147}$, 11, 123

Part 3

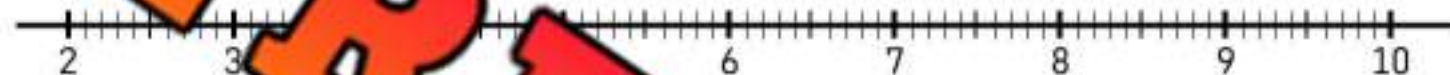
Circle which numbers are imperfect squares

1) 25, 4, 12, 24, 36, 50, 100, 68, 56, 64, 88, 96, 1, 6, 20
2) 16, 10, 28, 35, 9, 0, 81, 144, 110, 108, 121, 64, 62, 18

Square Roots - Number Line

Part 1 Place each square root on the number line to show its approximate value

1) $\sqrt{38}$	2) $\sqrt{10}$	3) $\sqrt{28}$
4) $\sqrt{42}$	5) $\sqrt{65}$	6) $\sqrt{87}$



7) $\sqrt{62}$	8) $\sqrt{100}$	9) $\sqrt{132}$
10) $\sqrt{141}$	11) $\sqrt{90}$	12) $\sqrt{22}$



Part 2 Which value is larger? Use < > or = to compare the values

1)	5		$\sqrt{21}$	4)	8.5		$\sqrt{66}$	7)	7.5		$\sqrt{52}$
2)	3		$\sqrt{14}$	5)	9.5		$\sqrt{95}$	8)	12.5		$\sqrt{145}$
3)	6		$\sqrt{31}$	6)	7.5		$\sqrt{60}$	9)	11.5		$\sqrt{142}$

Square Roots - Word Problems

Word Problems

Answer the word problems below

1) Jade painted a beautiful square painting. She would like to frame it, so she needs the dimensions of the sides. The area of the painting is 5m^2 . What are the side lengths? Round to the nearest two decimal places.



2) Weston is creating a fence around his square yard. The area of his yard is 140m^2 .

a) What are the side lengths? Round to the nearest hundredth?



b) The fencing comes in metre lengths. How many metres should he buy?



3) Livia made a rectangular painting for her friend. The area is 126cm^2 . Livia's friend loves it but needs a square painting to fit the space. If Livia recreates a square painting with the same area, what should the side lengths be?



4) An estimate for a square root is 8.49. Is the whole number (square) closer to 64 or 81? Explain.



Fractions, Decimals, Percents - Word Problems**Questions**

Answer the word problems below

1) Kylie bakes cakes and sells them. It costs her \$5 to make a cake. She sells the cake for \$18. What percentage is the selling price in comparison to the cost price?



2) Gavin earned \$10 an hour. He received a raise from his boss and is now earning \$60 an hour. What percentage does Gavin earn now in relation to what he earned before?



3) Maeve did well on her test. She got all of the 20 questions correct and answered 3 bonus questions correctly. What was her mark as a fraction and percentage?

Fraction	Percentage



4) Elliott ran a 10km race last week. The winner finished in 35 minutes. It took Elliot 45 minutes. What percentage of the winner's time did Elliott take in relation to the winner's time?



5) Calvin sold a baseball card for \$88. He bought it for \$20. How much did Calvin sell it for in relation to what he paid as a percentage?



6) Luke hit the golf ball 200 yards. Scott drove the golf ball 300 yards right after. Write how much further Scott hit the ball than Luke as a fraction, decimal, and percent.

Fraction	Decimal	Percent



Test - Squares, Multiplication/Division, and Percent**Part 1**

Provide the positive and negative square root

	Question	Square Root	
		(+)	(-)
1)	$\sqrt{36}$		
2)	$\sqrt{1}$		
3)			

	Question	Square Root	
		(+)	(-)
4)	$\sqrt{121}$		
5)	$\sqrt{25}$		
6)	$\sqrt{64}$		

Part 2

Write the number in the box. Use < > or = to compare the number

1)	5^2		$\sqrt{100}$	2)	$\sqrt{121}$		11^2
2)	$\sqrt{64}$		7	3)	7^2		-6
3)	$\sqrt{49}$		2^2	4)	-5^2		5^2

Part 3

Order from least to greatest

1) $\sqrt{49}$, 49, $\sqrt{16}$, -16, $\sqrt{9}$, $\sqrt{81}$	3) $\sqrt{16}$, 16, $\sqrt{64}$, -1, $\sqrt{100}$
2) $\sqrt{144}$, $\sqrt{36}$, -6, 6, $\sqrt{121}$	4) $\sqrt{9}$, 4, $\sqrt{81}$, 10, $\sqrt{4}$

Ratio In 3 Ways

A **ratio** shows the relationship between two amounts.

Example



The ratio of apples to bananas can be written in 3 ways:

Words: 1 to 7

Ratio: 1:7

Fraction: $\frac{1}{7}$

Question Write the ratios for the questions below

1) Cookies to cups



Words: _____

Ratio: _____

Fraction: _____

2) Tomatoes to onions



Words: _____

Ratio: _____

Fraction: _____

3) Pizzas to drinks



Words: _____

Ratio: _____

Fraction: _____

4) Burgers to fries



Words: _____

Ratio: _____

Fraction: _____

5) Pineapples to strawberries



Words: _____

Ratio: _____

Fraction: _____

6) Bread to jam



Words: _____

Ratio: _____

Fraction: _____

Ratios - Word Problems

Questions

Answer the word problems below

1) There are 27 students in a grade 8 class. The ratio of boys to girls is 5:4.

a) Write the ratio in words and as a fraction.

b) How many boys are in the class?

c) How many girls are in the class?



2) A car dealership has 100 vehicles. The ratio of cars to vans to trucks is - 10:4:6.

a) How many cars do they have?

b) How many vans do they have?

c) How many trucks do they have?



3) A banquet hall has 15 tables. The ratio of tables to chairs is 15:90.

a) How many chairs are there at each table?

b) The banquet hall bought 12 more tables. How many more chairs will they need?



Proportional vs Non-Proportional Relationships

A **proportional relationship** is when two variables change at the same rate.

Example – 1 cookie per 1 student ($1/1$) is proportional to 10 cookies per 10 students ($10/10$). Both variables (cookie and student), were multiplied by the same number – 10.

A **non-proportional relationship** is when two variables do not change at the same rate.

Example – \$100 per 1 month ($1/100$) is different than \$500 per 7 months ($500/7$)

Question: Are the relationships proportional or non-proportional?

1) $\frac{9}{2}$ and $\frac{18}{6}$	2) $\frac{2}{6}$ and $\frac{5}{15}$
Proportional Non-Proportional	Proportional Non-Proportional
3) $\frac{14}{5}$ and $\frac{98}{35}$	4) $\frac{3}{2}$ and $\frac{75}{125}$
Proportional Non-Proportional	Proportional Non-Proportional
5) $\frac{5}{8}$ and $\frac{45}{64}$	6) $\frac{4}{3}$ and $\frac{12}{9}$
Proportional Non-Proportional	Proportional Non-Proportional
7) $\frac{12}{7}$ and $\frac{84}{56}$	8) $\frac{7}{3}$ and $\frac{210}{90}$
Proportional Non-Proportional	Proportional Non-Proportional
9) $\frac{60}{7}$ and $\frac{300}{35}$	10) $\frac{8}{17}$ and $\frac{56}{102}$
Proportional Non-Proportional	Proportional Non-Proportional
11) $\frac{9}{22}$ and $\frac{54}{132}$	12) $\frac{15}{35}$ and $\frac{120}{245}$
Proportional Non-Proportional	Proportional Non-Proportional

Proportional vs Non-Proportional Relationships

When representing variables, we can use a table to determine if the relationship is proportional or non-proportional.

Example – Erica earned a pay cheque each week from her employer. Her earnings go up \$250 each week, which makes the relationship between weeks and earnings proportional.

Weeks (x)	1	2	3	4	5	6
Earnings (y)	250	500	750	1000	1250	1500

Question: Are the relationships proportional or non-proportional?

1)

(x)	1	2	3	4
(y)	75	150	225	300

Proportional Non-Proportional

2)

(x)	5	10	15	20
(y)	50	100	150	200

Proportional Non-Proportional

3)

(x)	3	6	9	12
(y)	15	30	45	60

Proportional Non-Proportional

4)

(x)	8	12	16	20
(y)	72	114	136	136

Proportional Non-Proportional

5)

(x)	10	20	30	40
(y)	70	140	210	280

Proportional Non-Proportional

6)

(x)	7	14	21	100
(y)	200	400	600	1200

Proportional Non-Proportional

7)

(x)	20	40	60	80
(y)	5	10	15	20

Proportional Non-Proportional

8)

(x)	7	14	21	28
(y)	21	42	64	86

Proportional Non-Proportional

9)

(x)	1	11	21	31
(y)	10	110	210	310

Proportional Non-Proportional

10)

(x)	5	15	25	35
(y)	150	450	750	1050

Proportional Non-Proportional

Proportional Relationship - Graph

When a proportional relationship is represented on a graph, the result is a straight line. This is called a linear graph.

Example:

Kim drove from Kingston to Toronto. She kept track of her distance every hour.



Hours	Distance (km)
1	100
2	200
3	300
4	400

Question: Look at the table of values based on the graph. Is the relationship proportional?

1)

(x)	(y)
1	
2	
3	
4	

Proportional

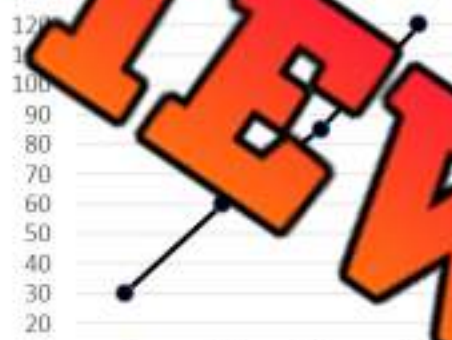


Non-Proportional

2)

(x)	(y)
5	
10	
15	
20	

Proportional



Non-Proportional

3)

(x)	(y)
15	
30	
45	
60	

Proportional



Non-Proportional

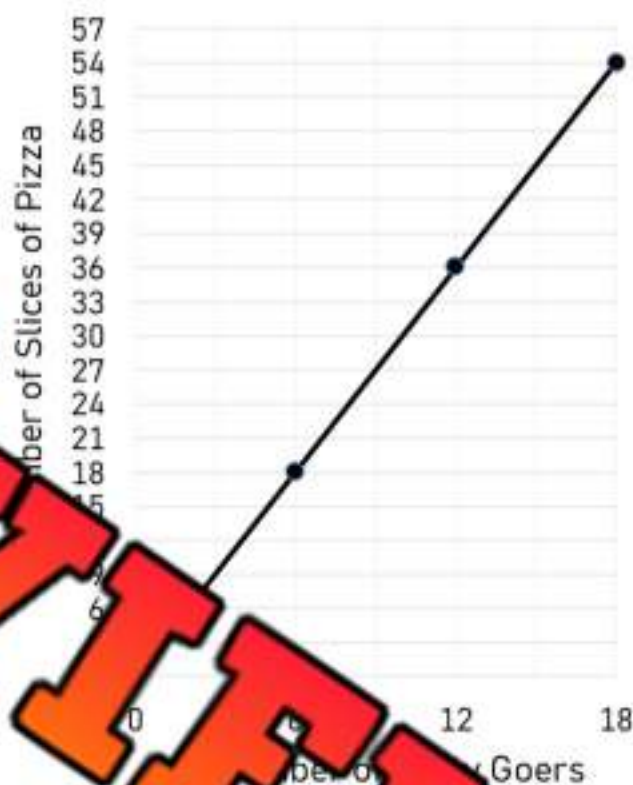
Proportional Relationship - Pizza Party

Questions

Solve the problem below

Reagan is buying pizza for a pizza party. She wants to have 3 slices of pizza for each person coming to the party. The graph below represents the relationship between the number of slices of pizza and the number of party goers.

Pizza Slices



- 1) Is the graph proportional or non-proportional?
- 2) What is the unit rate? (number of slices per person)
- 3) How many pizza slices would she need for 9 people?
- 4) Reagan bought 63 slices of pizza. How many people is she expecting?
- 5) Use the graph to determine how many pizza slices she would need for 13 people?
- 6) Use the graph to determine how many slices she would need for 17 people?
- 7) If Reagan bought 147 slices of pizza, how many people was she expecting?

Proportional Relationship - Bank Account

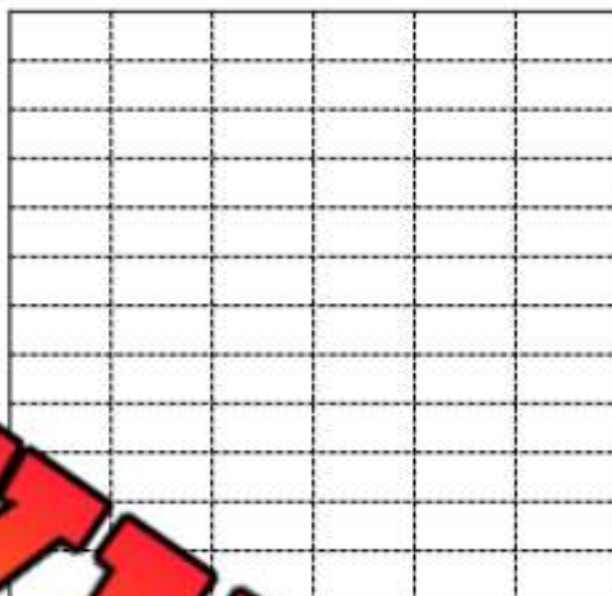
Questions

Draw a line graph and fill in the table to represent the situation

Ruby's parents deposit \$10 into her bank account each week. Fill in the table and draw a line graph to show the relationship between her total savings and what week it is.



Week	Saving



1) Is the relationship between week and savings proportional or non-proportional?

2) How much did Ruby save after 5 weeks?

3) What is the unit rate? (savings per week)

4) How much does she have saved after 3.5 weeks?

5) After 10 weeks, how much would Ruby have saved?

6) After 22 weeks, Ruby saved all her money and then spent \$63. How much does she have now?

Proportional Relationship - Earnings

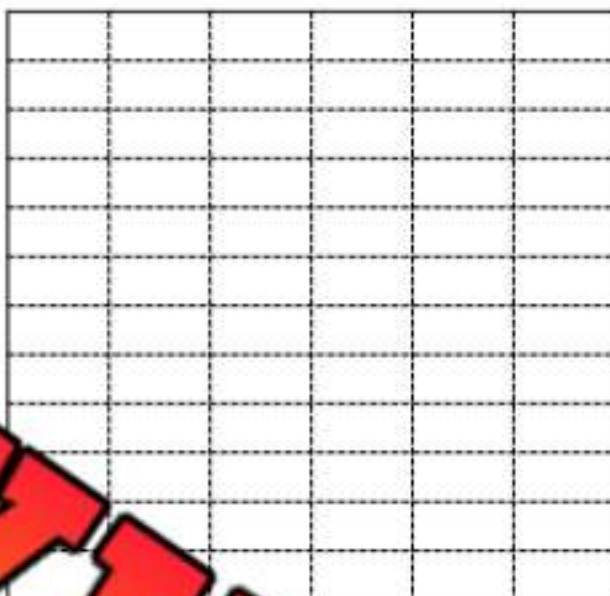
Questions

Draw a line graph and fill in the table to represent the situation

Daniel earns \$350 a week from his job. Fill in his earnings over a 10-week period and graph his earnings.



Total Savings	
2	
6	
8	
10	



1) Is the relationship between weeks and savings proportional or non-proportional?

2) How much did Daniel earn after 5 weeks?

3) What is the unit rate? (earnings per week)

4) How much does he earn after 3.5 weeks?

5) After 20 weeks, how much would Daniel have earned?

6) After 25 weeks, Daniel saved all his money and then spent \$2100. How much does he have now?

Proportional Reasoning - Quiz

Part 1

Write the ratios for the questions below

1) Ratio of 41 balls to 67 strikes.	Words: _____ Ratio: _____ Fraction: _____	3) Ratio of 27 cars to 12 trucks.	Words: _____ Ratio: _____ Fraction: _____
2) Ratio of green to red balls.	Words: _____ Ratio: _____ Fraction: _____	4) Ratio of 25 students to 1 teacher.	Words: _____ Ratio: _____ Fraction: _____

Part 2

Circle two ratios for each of the questions below

1) 3 to 9	$\frac{1}{3}$	2:5	9:27	$\frac{10}{33}$
2) 4:16	1:3	1 to 4	5	12:48
3) $\frac{5}{20}$	2:8	6:40	7:28	3:10

Part 3

Answer the word problems below

- 1) There are 35 students in a grade 8 class. The ratio of girls to boys is 3:2.
- Write the ratio in words and as a fraction.
 - How many boys are in the class?
 - How many girls are in the class?

Repeated Addition & Multiplying Fractions

Part 1

Add and multiply the fractions below

Addition Version	Multiplication Version
1) $\frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} = \frac{20}{7}$ or $2\frac{6}{7}$	$5 \times \frac{4}{7} = \frac{20}{7}$ or $2\frac{6}{7}$
2) $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} =$	
3) $\frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5} =$	
4) $\frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} =$	
5) $\frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} =$	
6) $\frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} =$	
7) $\frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} =$	

Part 2

Answer the word problems below using an addition and multiplication sentence

- 1) Jerry made 5 pizzas. Each of the pizzas have $\frac{2}{7}$ cups of cheese. How much cheese do all 5 pizzas have in total?

Addition Sentence	Multiplication Sentence

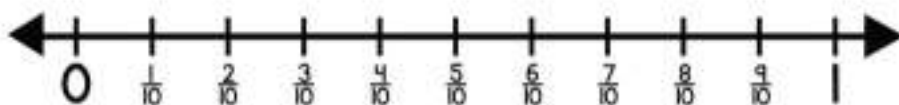
- 2) Helen buys 9 bags of chips. Each bag is $\frac{4}{9}$ of a kg. How many kilograms are all 9 bags combined?

Addition Sentence	Multiplication Sentence

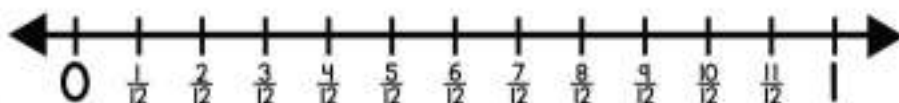
Multiply Whole Numbers by Fractions - Number Line**Questions**

Use the number line by skip counting to find the answer

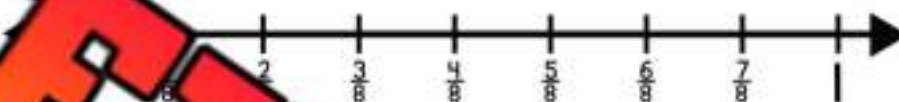
1) $8 \times \frac{1}{10} =$



2) $10 \times \frac{1}{12} =$



3) $7 \times \frac{1}{8} =$



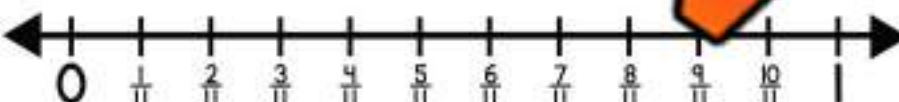
4) $5 \times \frac{1}{6} =$



5) $4 \times \frac{1}{5} =$



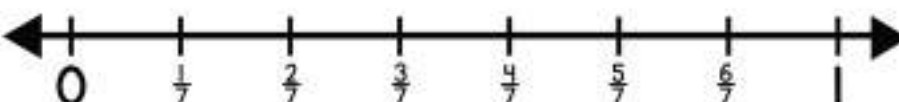
6) $7 \times \frac{1}{11} =$



7) $8 \times \frac{1}{9} =$



8) $6 \times \frac{1}{7} =$



Multiplying Fractions - Area Models

We can represent two fractions using the same area model. Doing so will allow us to determine the product when we multiply two fractions together.

$$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12}$$



Example

Step 1: Divide the area model into thirds horizontally to represent $\frac{2}{3}$

Step 2: Draw diagonal lines that fill in two-thirds of the area model

Step 3: Divide the area model into fourths vertically to represent $\frac{1}{4}$

Step 4: Shade one-fourth of the area model

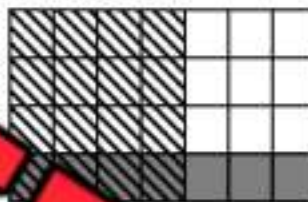
Step 5: Determine how many squares overlap compared to the total number of squares

Questions: Use the area model to find the product. Steps 1-4 have been done for you

1)



$$\frac{3}{5} \times \frac{2}{4} = \underline{\hspace{2cm}}$$



$$= \underline{\hspace{2cm}}$$

3)



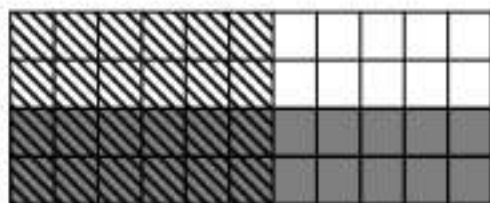
$$\frac{6}{7} \times \frac{3}{4} = \underline{\hspace{2cm}}$$

4)



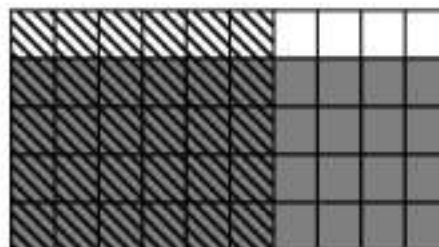
$$\frac{5}{9} \times \frac{3}{5} = \underline{\hspace{2cm}}$$

5)



$$\frac{6}{11} \times \frac{2}{4} = \underline{\hspace{2cm}}$$

6)



$$\frac{4}{6} \times \frac{3}{5} = \underline{\hspace{2cm}}$$

Multiplying Fractions - Area Models

The area models below have been divided to represent the fractions.

Directions:

- 1) Use diagonal lines to represent the first fraction
- 2) Shade in the area model to represent the second fraction
- 3) Write the answer

Question

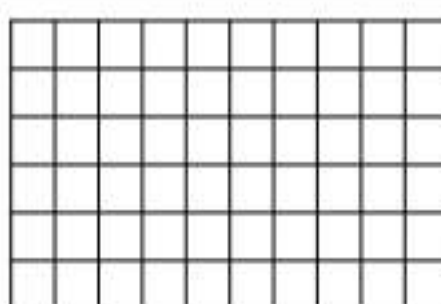
Find the product using the area models below

1)



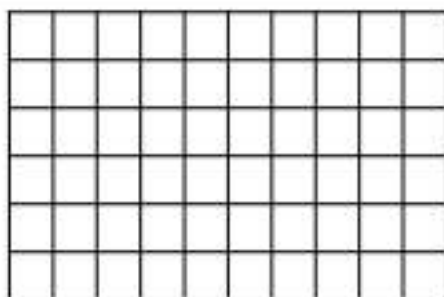
$$\frac{7}{9} \times \frac{5}{6} = \underline{\hspace{2cm}}$$

2)



$$\frac{3}{10} \times \frac{4}{6} = \underline{\hspace{2cm}}$$

3)



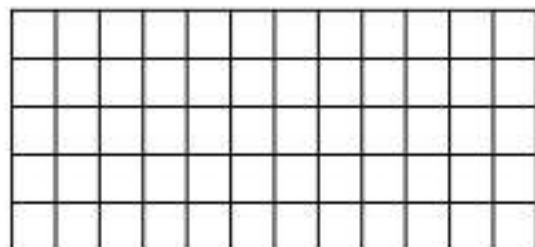
$$\frac{4}{10} \times \frac{4}{6} = \underline{\hspace{2cm}}$$

4)



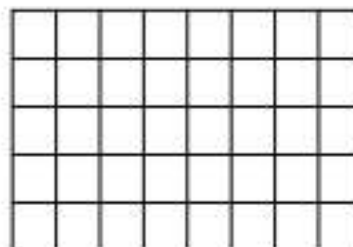
$$\frac{6}{14} \times \frac{3}{5} = \underline{\hspace{2cm}}$$

5)



$$\frac{8}{12} \times \frac{4}{5} = \underline{\hspace{2cm}}$$

6)



$$\frac{5}{8} \times \frac{2}{5} = \underline{\hspace{2cm}}$$

Multiplying Fractions - Word Problems

Questions

Find the products of the fractions below

1) Axel and Jasmine raced for 5 minutes. In the 5 minutes, Axel ran $\frac{4}{5}$ of a kilometre. Jasmine ran $\frac{2}{3}$ times as far as Axel. How far did Jasmine run?



2) Faith and Ember had sandwiches. Faith ate $\frac{3}{4}$ of her sandwich. Ember wasn't that hungry, so she ate $\frac{1}{3}$ as much as Faith ate. How much of her sandwich did Ember eat?



3) Laura completed $\frac{8}{11}$ of a marathon in the same time that Adalyn finished $\frac{2}{3}$ times as much of the race that Laura finished. How much of the marathon did Adalyn finish?



4) Atlas and Evie volunteered one day. Atlas spent $\frac{3}{4}$ of the 8-hour workday volunteering. Evie volunteered $\frac{1}{3}$ the amount of time that Atlas volunteered.

- a) What fraction of the workday did Evie volunteer?
- b) How much time did Atlas volunteer?
- c) How much time did Evie volunteer?



Multiplying Mixed Fractions

How to multiply mixed fractions

- 1) Convert the mixed fractions to improper fractions
- 2) Multiply the improper fractions
- 3) Convert the improper fraction back to a mixed fraction
- 4) Simplify if necessary

$$2\frac{2}{3} \times 2\frac{2}{4} = \frac{8}{3} \times \frac{10}{4} = \frac{80}{12} \text{ or } 6\frac{8}{12} \text{ or } 6\frac{2}{3}$$

Part 1 Find the products of the fractions below. Simplify the fractions.

1) $3\frac{2}{3} \times 2\frac{2}{4} =$

2) $4\frac{2}{5} \times 7\frac{5}{6} =$

3) $5\frac{1}{2} \times 6\frac{3}{7} =$

4) $9\frac{2}{4} \times 4\frac{7}{9} =$

5) $10\frac{5}{7} \times 7\frac{2}{3} =$

6) $1\frac{2}{5} \times 3\frac{7}{9} =$

7) $12\frac{3}{5} \times 5\frac{2}{3} =$

8) $8\frac{2}{9} \times 3\frac{7}{9} =$

Part 2 Answer the word problems

- 1) Hadley ran $3\frac{4}{5}$ km. Freya ran $2\frac{2}{3}$ km times further. How far did Freya run?



- 2) Parker made tomato and chicken noodle soup. He made $2\frac{3}{4}$ kg of tomato soup and $4\frac{4}{5}$ times more chicken noodle soup. How much chicken noodle soup did he make?



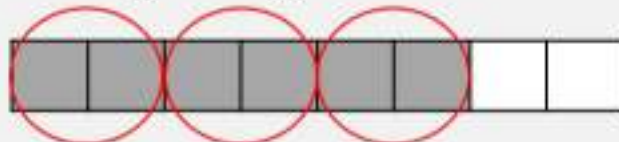
Dividing Fractions Using Models

Dividing Fractions

When we divide a fraction by its unit fraction, we should think, "how many counts of the unit are in the fraction (i.e., how many two-eighths are in six-eighths?)

Solution - We can see that there are 3 two eighths in six eighths.

$$\frac{6}{8} \div \frac{2}{8} = 3$$



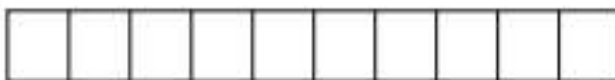
Questions _____ in the fraction bar. How many times does the divisor fit into the dividend

1)



$$\frac{4}{8} \div \frac{2}{8} = \underline{\quad}$$

2)



$$\frac{9}{10} \div \frac{3}{10} = \underline{\quad}$$

3)



$$\frac{4}{8} \div \frac{1}{8} = \underline{\quad}$$

4)



$$\frac{6}{10} \div \frac{2}{10} = \underline{\quad}$$

5)



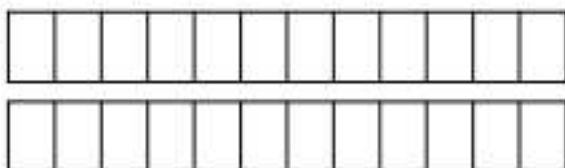
$$\frac{8}{10} \div \frac{2}{10} = \underline{\quad}$$

6)



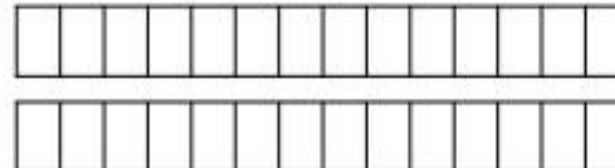
$$\frac{16}{20} \div \frac{4}{20} = \underline{\quad}$$

7)



$$\frac{24}{24} \div \frac{4}{24} = \underline{\quad}$$

8)



$$\frac{21}{28} \div \frac{3}{28} = \underline{\quad}$$

Dividing Fractions Using Models

Dividing Fractions

We can use a bar model to compare fractions to make it easier to divide.

$$\frac{3}{4} \div \frac{1}{8} = 6$$



Solution – We can see that $1/8$ fits into $3/4$ six times.

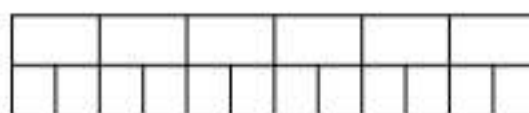
Questions Shade in the fraction bars. How many times does the divisor fit into the dividend

1)



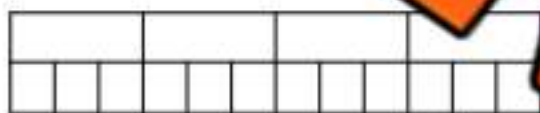
$$\frac{3}{5} \div \frac{1}{10} = \underline{\quad}$$

2)



$$\frac{5}{6} \div \frac{1}{12} = \underline{\quad}$$

3)



$$\frac{2}{4} \div \frac{1}{12} = \underline{\quad}$$

6)



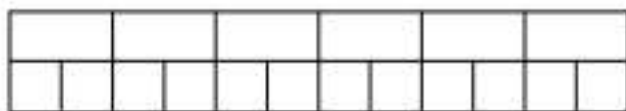
$$\frac{1}{3} \div \frac{1}{9} = \underline{\quad}$$

5)



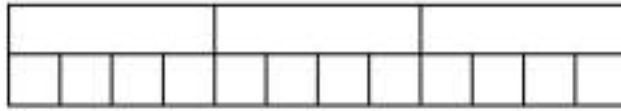
$$\frac{3}{4} \div \frac{1}{8} = \underline{\quad}$$

7)



$$\frac{5}{6} \div \frac{1}{12} = \underline{\quad}$$

8)



$$\frac{1}{3} \div \frac{1}{12} = \underline{\quad}$$

Dividing Fractions - Word Problems

Questions

Find the answers of the fractions below

1) Howard can run a kilometre in $\frac{2}{8}$ of an hour. How many kilometres can he run in $\frac{3}{4}$ of an hour?



2) Jayce bought a submarine sandwich that is $\frac{9}{10}$ of a metre long. He wants to cut it into smaller sandwiches that are $\frac{3}{30}$ of a metre long. How many sandwiches will he have?



3) Hugh has a goal of exercising $\frac{12}{4}$ hours a day. He has done several runs today. His runs take him $\frac{4}{6}$ of an hour. How many runs does Hugh have to go on?



4) Zara loves to read. She can read a book in $\frac{2}{7}$ of an hour. If she only had $\frac{10}{12}$ of an hour to read, how many books could she read?



Dividing Mixed Fractions

How to divide mixed fractions

- 1) Convert the mixed fractions to improper fractions
- 2) Use the Keep, Switch, Flip (K,S,F) method to change the question to multiplication
- 3) Convert the answer back to a mixed fraction and simplify if necessary

Question	Improper	K, S, F	Answer	Simplified
$4\frac{2}{3} \div 3\frac{1}{5}$	$\frac{14}{3} \div \frac{16}{5}$	$\frac{14}{3} \times \frac{5}{16} = \frac{70}{48}$	$1\frac{32}{48}$	$1\frac{2}{3}$

Part 1 Find the answers of the fractions below. Simplify the fractions.

Question	Improper	K, S, F	Answer	Simplified
1) $6\frac{3}{7} \div 2\frac{2}{5}$				
2) $5\frac{4}{6} \div 4\frac{1}{3}$				
3) $8\frac{5}{6} \div 3\frac{3}{4}$				
4) $7\frac{4}{5} \div 4\frac{1}{6}$				
5) $6\frac{1}{4} \div 3\frac{2}{5}$				
6) $8\frac{3}{9} \div 2\frac{5}{7}$				

Part 2

Answer the word problem

Jasper ordered $5\frac{4}{5}$ loads of mulch to fill gardens around his property. Each garden requires $1\frac{2}{3}$ loads of mulch. How many gardens can he fill with mulch?



Unit Test - Fractions

Part 1

Convert the mixed numbers to improper fractions

1) $7\frac{2}{4} =$

2) $4\frac{1}{5} =$

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

Part 2

Convert the improper fractions to mixed numbers

1) $\frac{27}{4} =$

2) $\frac{26}{7} =$

3) $\frac{34}{6} =$

Part 3

Add and subtract the fractions below using the models

1) $\frac{6}{8} + \frac{4}{8} = \underline{\hspace{2cm}}$

2) $\frac{3}{8} + \frac{3}{8} = \underline{\hspace{2cm}}$

3) $\frac{8}{9} - \frac{5}{9} = \underline{\hspace{2cm}}$

4) $\frac{10}{11} - \frac{7}{11} = \underline{\hspace{2cm}}$

Multiplying Integers - Number Line

Follow these steps to use a number line for solving multiplication questions involving integers.

Multiplier

$$-5 \times -4 = 20$$

Multiplicand

Product

- 1) The dog always starts at 0
- 2) The multiplier tells us how many steps the dog will take.
- 3) The multiplicand tells us to walk forwards or backwards. For a positive number, walk forwards. For a negative number, walk backwards.
- 4) The multiplier also tells us how many jumps to take.

Ex. $(-5) \times (-4)$

Take 5 steps, with 4 jumps
Walking backwards to 20 = 20



Questions

Use the number lines to solve the questions

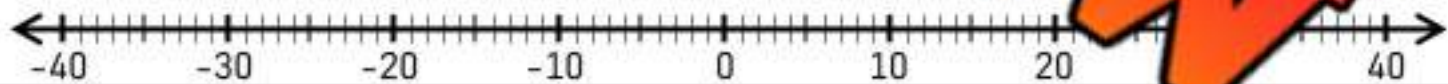
1) $(-5) \times (-7) =$



2) $8 \times (-4) =$



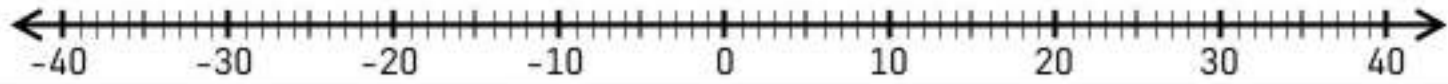
3) $(-7) \times 3 =$



4) $(-9) \times (-4) =$



5) $5 \times (-8) =$



6) $(-20) \times (-2) =$



Multiplying Integers

Adding Integers Rules

- $(+) \times (+) = (+)$ Multiplying 2 positive integers will give a positive answer
 $(-) \times (-) = (+)$ Multiplying 2 negative integers will give a positive answer
 $(+) \times (-) = (-)$ Multiplying integers with different signs will give a negative answer
 $(-) \times (+) = (-)$ Multiplying integers with different signs will give a negative answer

Part 1 Use the rules above to answer the 1-step equations below

1) $5 \times (-2) = \square$	6) $(-5) \times (-5) = \square$	11) $(-8) \times (-12) = \square$
2) $(-7) \times 7 = \square$	7) $4 \times (-5) = \square$	12) $13 \times (-9) = \square$
3) $(-8) \times (-3) = \square$	8) $(-12) \times (-1) = \square$	13) $(-16) \times 8 = \square$
4) $12 \times 8 = \square$	9) $(-13) \times (-11) = \square$	$(-13) \times (-13) = \square$
5) $(-11) \times 12 = \square$	10) $20 \times 7 = \square$	$15 \times 0 = \square$

Part 2 Simplify the multi-step expressions and use the rules

Ex) $2 \times (-3) \times (-8)$ $= (-6) \times (-8)$ $= 48$	3) $5 \times 10 \times (-10) \times (-1)$
1) $(7) \times (-3) \times 2$	4) $6 \times (-2) \times (-4) \times 2$
2) $(-4) \times (-6) \times (-3)$	5) $(-9) \times 3 \times (-2) \times 10$

Multiplication Squares

Part 1

Fill in the squares by multiplying the integers

1)

x	5	-8
-3		
-7		

2)

x	2	-9
-8		
-6		

3)

x	7	-1
-9		
-3		

4)

x	-3	-7	-10
-8			
6			

6)

x	12	-6
-4		
9		

7)

x	-15	-13
-3		
-5		

8)

x	-6	1	23	-56
-4				
7				

Part 2

Fill in the squares by multiplying the integers

1)

x	6	-5	2
-4			
-7			
3			

2)

x	10	-11	12
-3			
-7			
-9			

3)

x	-5	15	-25
-2			
-4			
6			

Name: _____

145

Integer Multiplication Chart

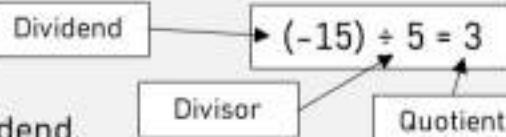
Directions

Fill in the chart by multiplying the integers

x	-5	-4	-3	-2	-1	2	3	4	5
5									
4									
3									
2									
1									
0									
-1									
-2									
-3									
-4									
-5									

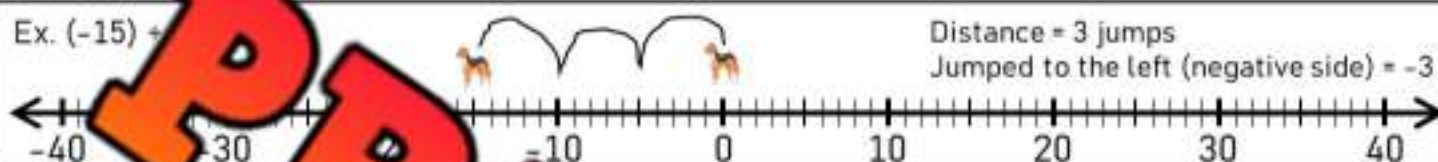
Dividing Integers - Number Line

Follow these steps to use a number line for solving division questions involving integers.



- 1) The dog always starts at 0
- 2) The dog jumps by the divisor until it reaches the dividend.
- 3) Your answer is how many jumps it takes
- 4) The answer is negative if the dog faces the negative side and positive if it faces the positive side.

Ex. $(-15) \div 5 =$



Questions Use the number lines to solve the questions

1) $(-25) \div (-5) =$



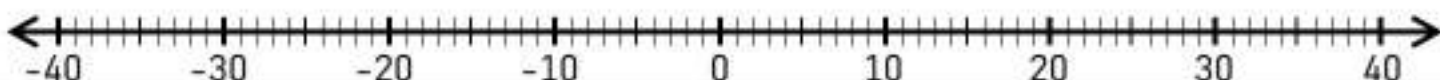
2) $12 \div (-4) =$



3) $(-32) \div 4 =$



4) $(-18) \div (-6) =$



5) $24 \div (-8) =$



6) $(-36) \div (-3) =$



Dividing Integers

Dividing Integers Rules – Same as Multiplication!

- $\oplus \div \oplus = \oplus$ Dividing 2 positive integers will give a positive answer
 $\ominus \div \ominus = \oplus$ Dividing 2 negative integers will give a positive answer
 $\oplus \div \ominus = \ominus$ Dividing integers with different signs will give a negative answer
 $\ominus \div \oplus = \ominus$ Dividing integers with different signs will give a negative answer

Part 1 Use the rules above to answer the 1-step equations below

1) $15 \div (-3) =$	6) $(-60) \div (-12) =$
2) $(-49) \div 7 =$	$72 \div (-8) =$
3) $(-66) \div (-6) =$	$110 \div 11 =$
4) $32 \div 4 =$	9) $(-120) \div (-5) =$
5) $(-81) \div 9 =$	10) $28 \div (-4) =$

Part 2 Simplify the multi-step expressions and use the rules above

Ex) $28 \div (-7) \div (-2)$ $= (-4) \div (-2)$ $= 2$	3) $50 \div 5 \div (-2)$
1) $(36) \div (-3) \div 6$	4) $48 \div (-4) \div (-3) \div 2$
2) $(-72) \div (-8) \div (-3)$	5) $(-112) \div 2 \div (-2) \div 4$

Division Squares

Part 1

Fill in the squares by multiplying the integers

1)

÷	5	-3
-15		
-30		

2)

÷	-6	3
18		
-12		

3)

÷	7	-2
28		
-56		

4)

÷	12	
-48		
36		

5)

÷	-4	-8
56		
-32		

6)

÷	-2	-12
-60		
96		

7)

÷	5	15
-75		
-105		

8)

÷	-22	11
-88		
66		

9)

÷	3	-9
45		
-18		

Part 2

Fill in the squares by multiplying the integers

1)

÷	2	-6	-10
-60			
90			
-180			

2)

÷	-3	-6	9
18			
-54			
90			

3)

÷	-5	15	-25
-75			
-150			
225			

Input/Output Tables - Integers

Directions

Fill in the input/output tables by following the rules

1)

Input	Output
-11	
-7	
3	
12	
Multiply by 4	

2)

Input	Output
-48	
-26	
-12	
22	
56	
Divide by 2	

3)

Input	Output
-12	
-9	
-6	
0	
11	
Multiply by -8	

4)

Input	Output
-84	
-66	
36	
96	
114	
Divide by -6	

5)

Input	Output
-1	
-9	
13	
15	
Multiply by -4	

6)

Input	Output
-90	
-75	
-60	
40	
Divide by -5	

7)

Input	Output
-13	
-11	
8	
12	
14	
Multiply by -12	

8)

Input	Output
-250	
-140	
90	
170	
330	
Divide by -10	

9)

Input	Output
-7000	
-6200	
-800	
4200	
10000	
Multiply by -100	

Integers Quiz

Part 1

Solve the questions below

1) $9 + (-5) =$

2) $11 + (-9) =$

3) $(-15) + 6 =$

4) $(-13) +$

5) $(-31) + 19 =$

6) $(-43) + 15 =$

Part 2

Solve the questions below

1) $11 + (-4) + 4$

2) $10 + 2 + (-17)$

3) $25 + (-18) + 13$

4) $(-1) + (-2) + 3$

Part 3

Answer the word problems below. Write the equation for each problem.

- 1) You take 17 steps forwards, 15 steps backwards, another 25 steps forwards, and another 19 steps forwards. How many steps have you taken?



- 2) A submarine starts at sea level and dives 17m down before coming up 11m. It makes another plunge down 43m and then rises 27m. How many meters is it below sea level?



Rational vs Irrational Numbers

A **rational number** can be written as a ratio of two integers (a simple fraction). If a decimal number has a repeating or terminating decimal, it is a rational number.

Examples

5 can be written as $5/1$

$\sqrt{16}$ can be written as 4 ($4/1$)

$0.333\ldots$ can be written as $1/3$

An **irrational number** cannot be written as a ratio of two integers. Another clue is that the decimal goes on forever without repeating.

Examples

π (Pi)

$\sqrt{2} = 1.414213562373095\ldots$

$\sqrt{10} = 3.162277660168379\ldots$

Part 1 Is _____ a rational or irrational number?

	Question	Answer
1)	$\sqrt{18}$	
2)	9	
3)	$\frac{5}{8}$	
4)	$\sqrt{16}$	
5)	$2.\overline{3}$	
6)	$\sqrt{24}$	

	Question	Rational/Irrational
	$\sqrt{49}$	
8)	25	
	$\sqrt{16}$	
10)	$\frac{1}{2}$	
11)	$\frac{2}{6}$	
12)	$\sqrt{72}$	

Part 2 Write at least 10 rational and irrational numbers below

Rational Numbers

Irrational Numbers

Representing Integers as Fractions

Integers are rational numbers that can be represented as fractions. We can represent positive and negative whole numbers as fractions by putting the integer on top of the number 1.

For example: $-5 = \frac{-5}{1}$ and $+9 = \frac{9}{1}$

Part 1

Fill in the tables below

	Fraction
1)	
2)	-4
3)	
4)	9
5)	$\frac{2}{1}$

	Integer	Fraction
6)	-7	
7)		$\frac{-6}{1}$
8)	5	
		$\frac{3}{1}$
10)	-10	

Part 2

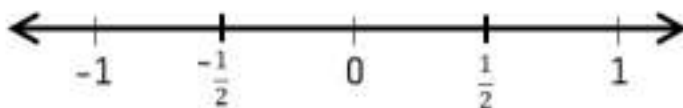
Word problems

- Sienna pays \$60 each month for her phone bill. Represent how much she spends a year as an integer and as a fraction.
- Reagan is filling up her pool with water. Each hour, 100 litres is poured into the pool. Represent how many litres of water poured into the pool after 24 hours as an integer and a fraction.
- A submarine plunged 64m below sea level. It plunged another 49m before coming back up. Represent how many metres below sea level the submarine was as an integer and a fraction.



Proper Fractions - Number Line

A **proper fraction** has a numerator (top number) smaller than the denominator (bottom number). When we place a proper fraction on a number line, it will always fall between 0 and 1.



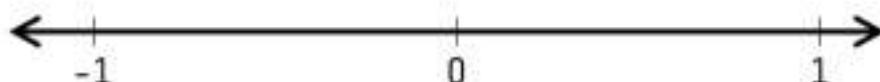
Example - Plotting $\frac{1}{2}$ and $-\frac{1}{2}$ on a number line

- 1) The denominator tells us how many equal parts are between 0 and 1
- 2) The numerator tells us how many parts starting from zero we move to plot our fraction
- 3) $\frac{1}{2}$ corresponds with $-\frac{1}{2}$, which means the same steps will work for both

Practice

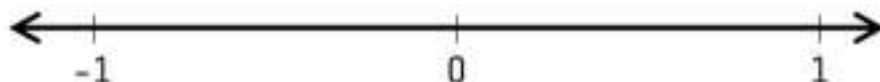
Plot the rational numbers on the number lines below

1) $\frac{1}{3}$, $-\frac{1}{3}$, $\frac{2}{3}$, $-\frac{2}{3}$



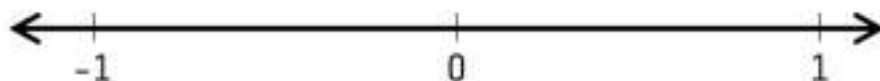
Put in order from least to greatest: _____

2) $\frac{1}{4}$, $-\frac{1}{4}$, $\frac{3}{4}$, $-\frac{3}{4}$



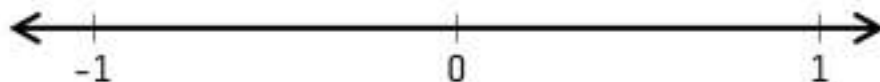
Put in order from least to greatest: _____

3) $\frac{1}{5}$, $-\frac{1}{5}$, $\frac{4}{5}$, $-\frac{4}{5}$



Put in order from least to greatest: _____

4) $\frac{4}{6}$, $-\frac{1}{6}$, $\frac{2}{6}$, $-\frac{5}{6}$



Put in order from least to greatest: _____

Comparing Rational Numbers - Fractions/Integers**Part 1**Use the $<$, $>$, $=$ to compare the integers below

1) $\frac{6}{8}$ $\frac{5}{4}$

5) $\frac{3}{6}$ $\frac{-5}{10}$

9) $\frac{6}{2}$ $\frac{9}{4}$

2) $\frac{3}{4}$ $\frac{-2}{1}$

6) $\frac{9}{1}$ $\frac{8}{1}$

10) $\frac{2}{10}$ $\frac{10}{2}$

3) $\frac{5}{9}$

7) $\frac{-5}{6}$ $\frac{-5}{4}$

11) $\frac{-6}{1}$ $\frac{-5}{1}$

4) $\frac{-4}{2}$

8) $\frac{4}{4}$

12) $\frac{-15}{3}$ $\frac{-10}{5}$

Part 2

Arrange the fractions in order from least to greatest

1) $\frac{6}{2}$, -5 , $\frac{-12}{2}$, $\frac{16}{4}$, 2 , $\frac{-4}{2}$, -7

2) $\frac{9}{2}$, -4 , $\frac{-11}{2}$, $\frac{15}{5}$, 4 , $\frac{-5}{1}$, -6

4) $\frac{14}{3}$, 4 , $\frac{-15}{4}$, $\frac{20}{4}$, -3 , $\frac{-20}{10}$, 8

5) $\frac{11}{3}$, 2 , $\frac{18}{2}$, $\frac{-21}{7}$, 8 , $\frac{-49}{7}$, -8

Unit Test - Rational Numbers

Part 1

Is the number a rational or irrational number?

	Question	Rational/Irrational
1)	$\sqrt{24}$	
2)		
3)		

	Question	Rational/Irrational
4)	$\sqrt{49}$	
5)	$0.\bar{3}$	
6)	$\sqrt{10}$	

Part 2

Place the decimal numbers, fractions and integers on the number line

1) $\frac{12}{4}$, 2.25, $\frac{6}{3}$, $\frac{8}{2}$, -1.5



2) $\frac{1}{2}$, 0.75, $\frac{6}{2}$, $\frac{1}{10}$, -1.5, $\frac{8}{4}$, 0.25

**Part 3**Use the $<$, $>$, $=$ to compare the rational numbers below

1) $\frac{6}{8}$ $\frac{5}{4}$

2) $\frac{5}{9}$ $\frac{10}{18}$

3) $\frac{6}{2}$ $\frac{9}{4}$

4) $\frac{3}{4}$ $\frac{2}{1}$

5) $\frac{9}{1}$ $\frac{8}{1}$

6) $\frac{15}{3}$ $\frac{10}{5}$



Google Slides Lessons Preview





Manitoba Math Curriculum Shape & Space – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

Learning Goal

We are learning to describe and use the Pythagorean relationship with different geometric models so we can solve problems to find missing side lengths in right triangles.

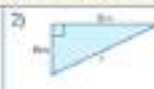


Pythagorean Theorem – Missing Side

Find the value of the missing side. Record your answer as a square root. Drag the numbers and labels to answer.

$\sqrt{\quad} =$ 1 2 3 4 5 6 7 8 9 0

1) 
 $a^2 + b^2 = c^2$
 $12^2 + 6^2 = c^2$
 $144 + 36 = c^2$
 $\sqrt{180} = c$
 $c = \sqrt{180}$



Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Consolidation – Multiple-Choice Questions

Drag the checkmark to answer the following multiple-choice questions about the topic: 

1) In a right triangle, the side opposite the right angle is called:

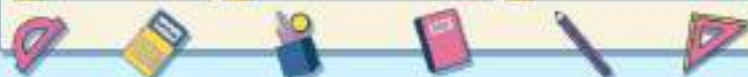
- a) The adjacent side
- b) The base
- c) The altitude
- d) The hypotenuse

2) Which geometric model BEST demonstrates the Pythagorean relationship?

- a) Three circles whose areas add up
- b) Three squares built on the sides of a right triangle
- c) A rectangle divided into two triangles
- d) A hexagon inside a circle

3) Which of the following sets of side lengths forms a right triangle?

- a) 7 cm, 24 cm, 25 cm
- b) 6 cm, 8 cm, 15 cm
- c) 5 cm, 12 cm, 20 cm
- d) 8 cm, 9 cm, 16 cm





Manitoba Math Curriculum

Shape & Space – Grade 8

Area of Composite Polygons

Find the area of each composite polygon below. Drag the numbers to complete the equations.

cm	mm	m	1	2	3	4	5	6	7	8	9	0
Area = _____												
Area = _____												
Area = _____												
Area = _____												
Area = _____												
Area = _____												

Find the surface area of the 3D objects below.

Surface area = _____	Surface area = _____	3) Rectangular Prism Surface area = _____
4) Rectangular Prism Surface area = _____	5) Cube Surface area = _____	6) Triangular Prism Surface area = _____

Find the surface area of the 3D objects below.

1) Surface area = _____	2) Surface area = _____	3) Surface area = _____
4) Surface area = _____	5) Surface area = _____	6) Surface area = _____



Manitoba Math Curriculum

Shape & Space – Grade 8

Circumferences Word Problems

1) Nathan is planning to buy a new rug. The rug is circular with a diameter of 3.2 m. What is the circumference of the rug?

2) Liam wraps a rope tightly around a tree trunk. If the rope makes exactly one full loop and the rope length is 314 cm, what is the diameter of the tree trunk?

Fill in the blanks.

1)  Area: _____ Perimeter: _____

2)  Area: _____ Perimeter: _____

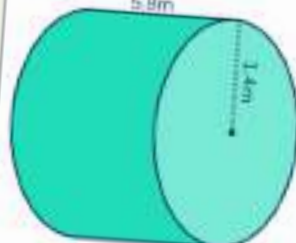
3)  Area: _____ Perimeter: _____

4)  Area: _____ Perimeter: _____

5)  Area: _____ Perimeter: _____

6)  Area: _____ Perimeter: _____

1)  Area of the Base= _____ Volume: _____

2)  Area of the Base= _____ Volume: _____

3)  Area of the Base= _____ Volume: _____

Grade 8
SHAPE AND SPACE
Measurement

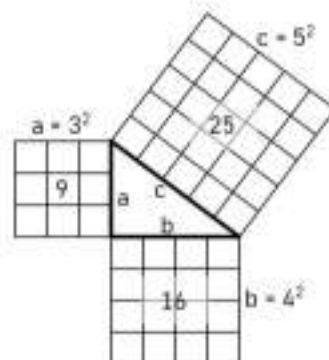
	Curriculum Expectations	Pages That Cover the Expectations
SS.1	Develop and apply the Pythagorean theorem to solve problems.	3 – 17
Preview of 50 pages from this product that contains 195 pages total.		
SS.3	• right rectangular prisms • right triangular prisms • right cylinders to solve problems.	38 – 62
SS.4	Develop and apply formulas for determining the volume of right prisms and right cylinders.	63 – 74

Pythagorean Theorem - Intro

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**.

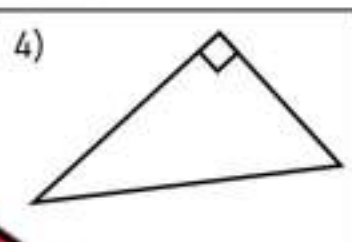
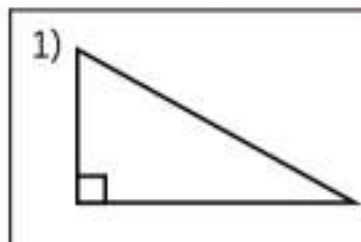
The formula for calculating the length of the hypotenuse is: $a^2 + b^2 = c^2$

- 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 square on 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 (9 + 16). This means the length of side c must be $\sqrt{25}$ or 5.



Part 1

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



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

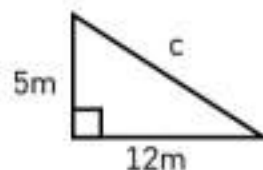
Label the triangles: a , b , c and fill in the blanks to find their values

1)
 $a^2 + b^2 = c^2$
 $9 + 16 = 25$
 Hypotenuse = 5

2)
 $a^2 + b^2 = c^2$
 $25 + 144 = 169$
 Hypotenuse = 13

Pythagorean Theorem - Missing Side

The most common use of the Pythagorean Theorem is to find the value of a side on a right-triangle. We do this by applying our understanding of simplifying algebraic equations. To find the value of the hypotenuse, simply plug the values into the equation.

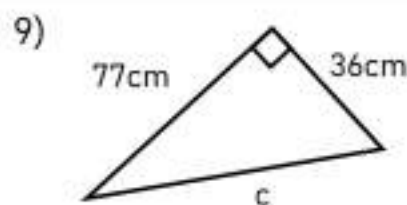
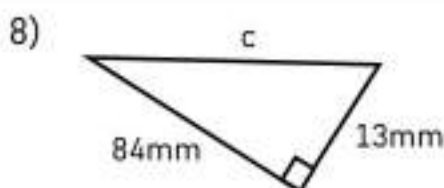
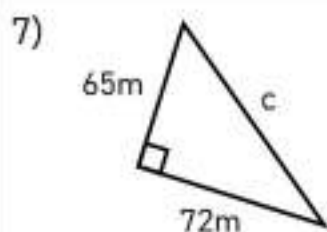
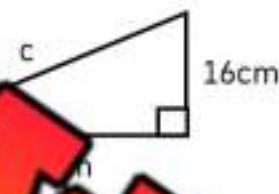
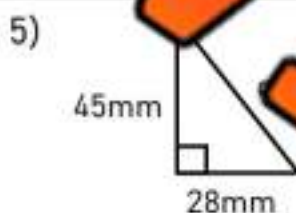
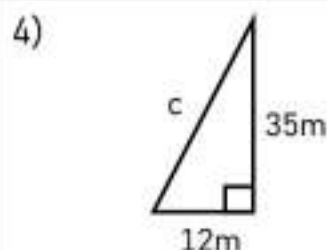
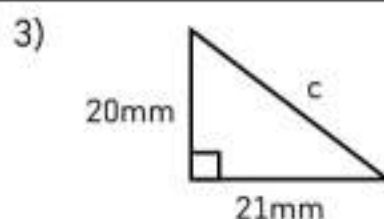
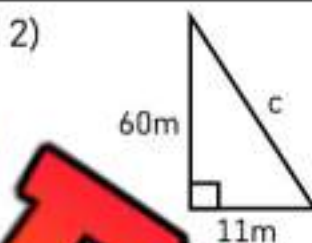


Solution

$$\begin{aligned}a^2 + b^2 &= c^2 \\5^2 + 12^2 &= c^2 \\25 + 144 &= c^2 \\\sqrt{169} &= \sqrt{c^2} \\13 &= c\end{aligned}$$

Question

Find the value of the hypotenuse



Pythagorean Theorem - Word Problems

Questions

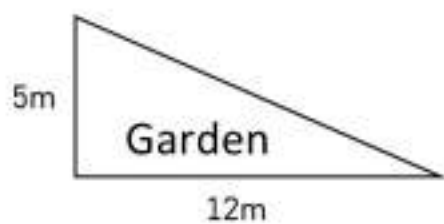
Answer the word problems below

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

- 2) Lily walked 4 km south and 3 km east. Calculate how far Lily is away from her starting point.

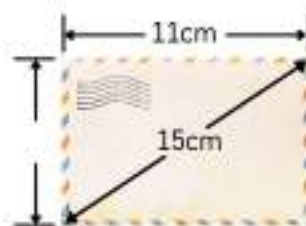


- 3) Julian built a triangular garden with the dimensions below. If he wanted to put a fence around his garden, how long would the fence need to be?



- 4) Ivy's house is a rectangular shape that is 15m wide by 9m high. Calculate the diagonal of her house (from corner to corner)?

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



Pythagorean Theorem - Word Problems

Questions

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 high is the top of the ladder off the ground?



- 2) Howard has a huge ladder to reach a very tall bookshelf. He needs to climb 9m to find the books. He wants the top of the ladder to be at the height of the book he wants. How far away from the bookshelf did he put the ladder?



- 3) A pirate is on a treasure hunting mission. 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?

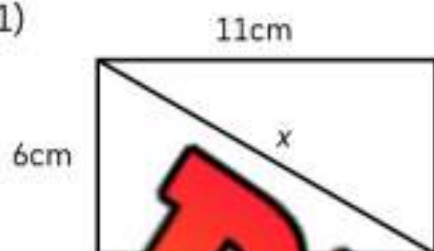


Pythagorean Theorem - Missing Side

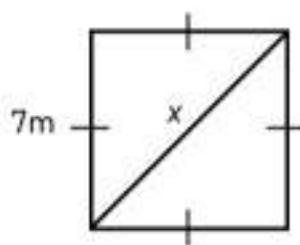
QuestionsFind the value of x .

Round the answer to the nearest tenth or leave as a square root

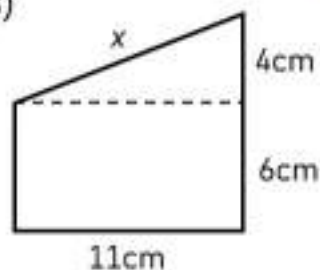
1)



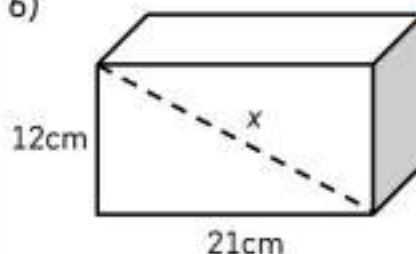
2)



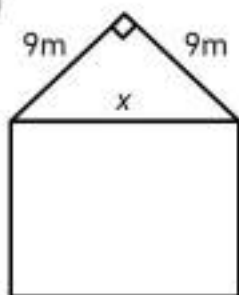
3)



6)



5)



Pythagorean Theorem - Word Problems

Questions

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 point A to point B, you need to walk around the pond. To avoid the pond, you walk 40m east. To the nearest metre, how many metres would you have saved if you could have walked through the pond?



- 3) A baseball diamond is a square with sides of 30m. What is the distance between first base and third base?

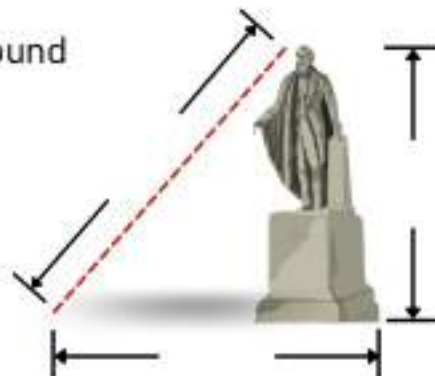
- 4) The local fire department has been called to a burning building. They need their ladder to reach the 4th floor, which is 22m high. They know that the ladder will need to be at least 12m away from the building. If they brought a 25m ladder, will they reach the fourth floor?

Pythagorean Theorem - Word Problems

Questions

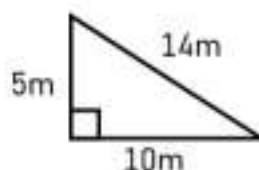
Answer the word problems below

- 1) Steven brings his hang glider 30m to the top of a mountain. He travels southeast 60m before landing on the ground. How far does he need to walk back to the base of the mountain?
- 2) A flagpole is 40m tall and casts a shadow of 6m on the ground away from the base of the pole. What is the distance from the top of the flagpole to the end of the shadow?
- 3) A building casts a shadow on the ground 12m long. The height of the building is 5m. What is the length from the top of the building to the end of the shadow? How tall is the building?
- 4) A statue is 8m tall and it casts a shadow on the ground that is 6m long. What is the length from the top of the statue to the end of the shadow?



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

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 5^2 + 10^2 &= 14^2 \\ 25 + 100 &= 196 \\ 125 &\neq 196 \end{aligned}$$

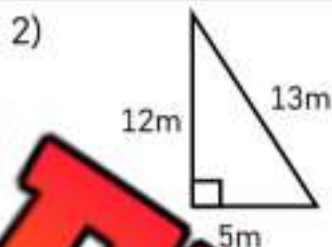
This equation is false, therefore this is not a right triangle

Question

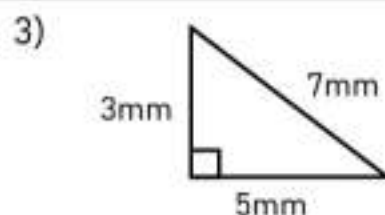
Is the triangle a right triangle?



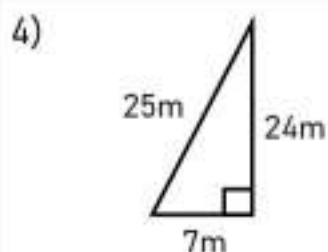
Yes No



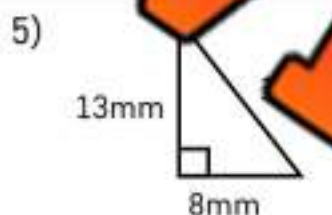
Yes No



Yes No



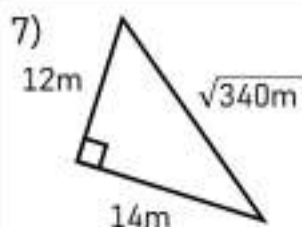
Yes No



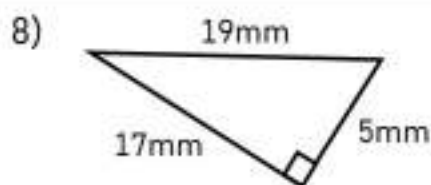
Yes No



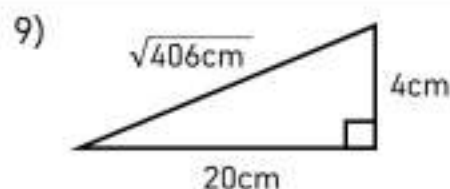
Yes No



Yes No



Yes No

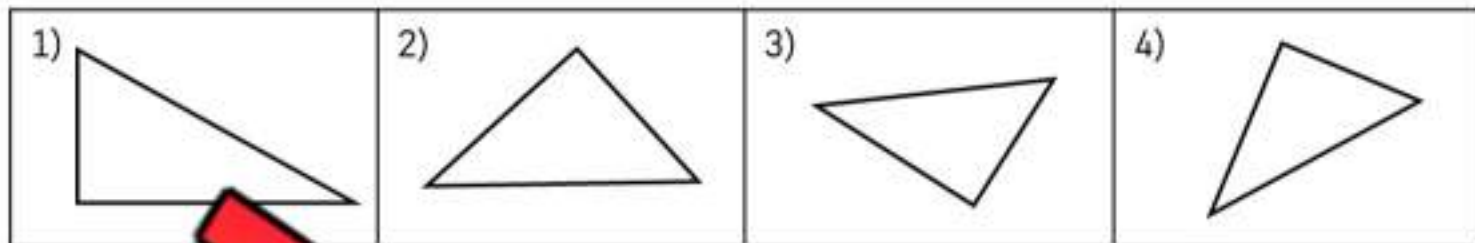


Yes No

Pythagorean Theorem - Quiz

Part 1

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



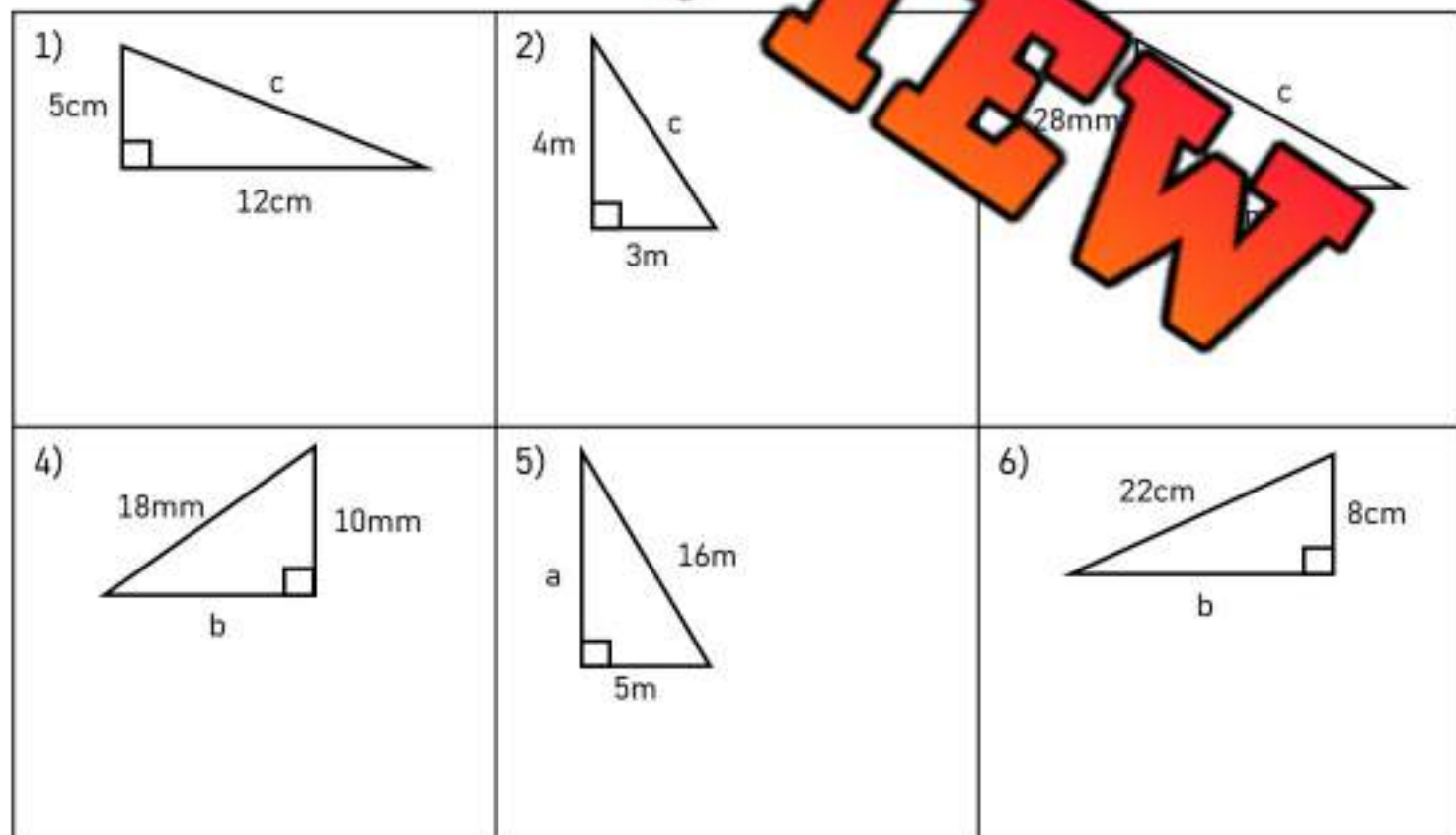
Part 2

	Question	Answer
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 length

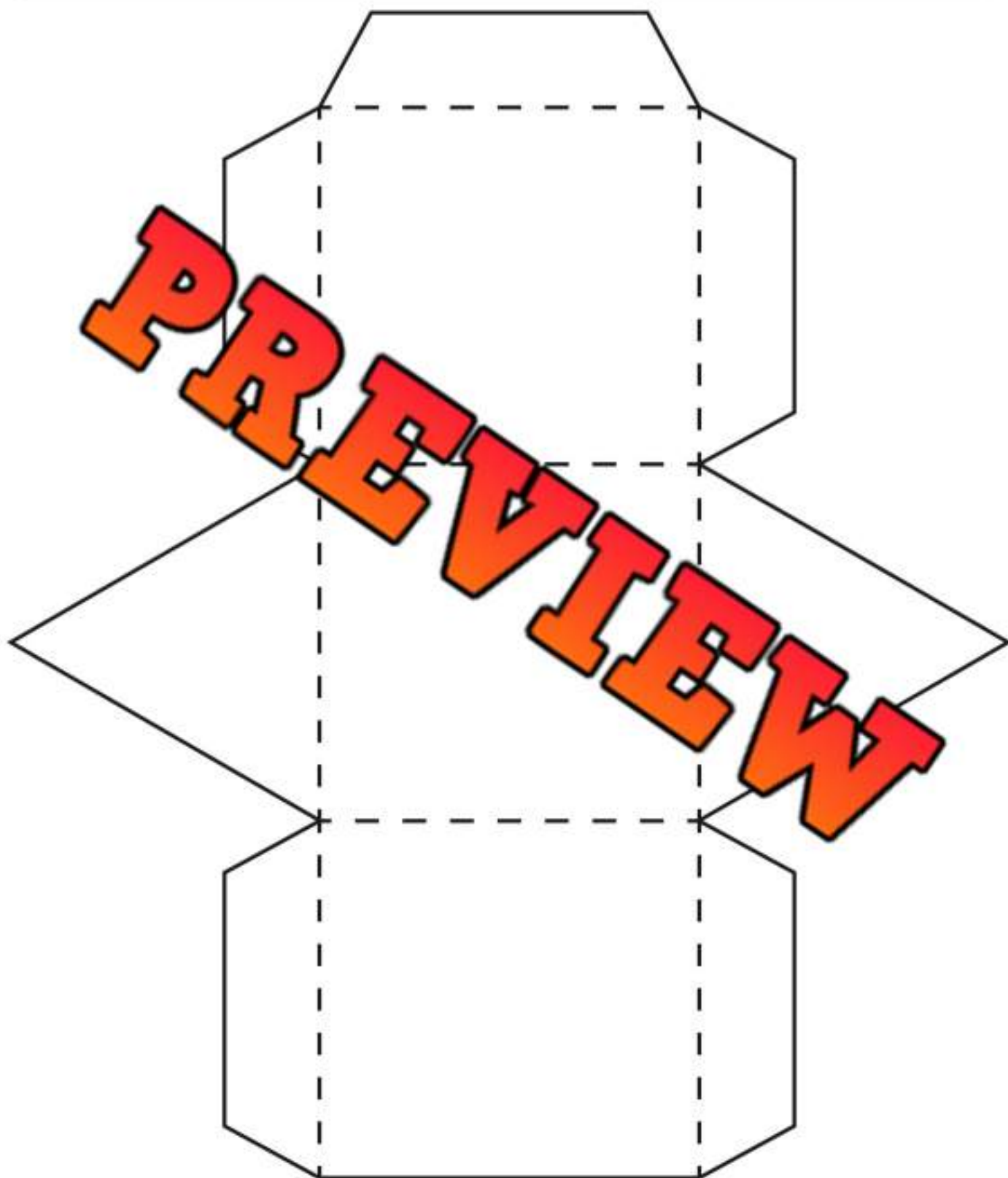


Name: _____

18

Curriculum Connection
SS.2

3D Model - Triangle Based Prism Net

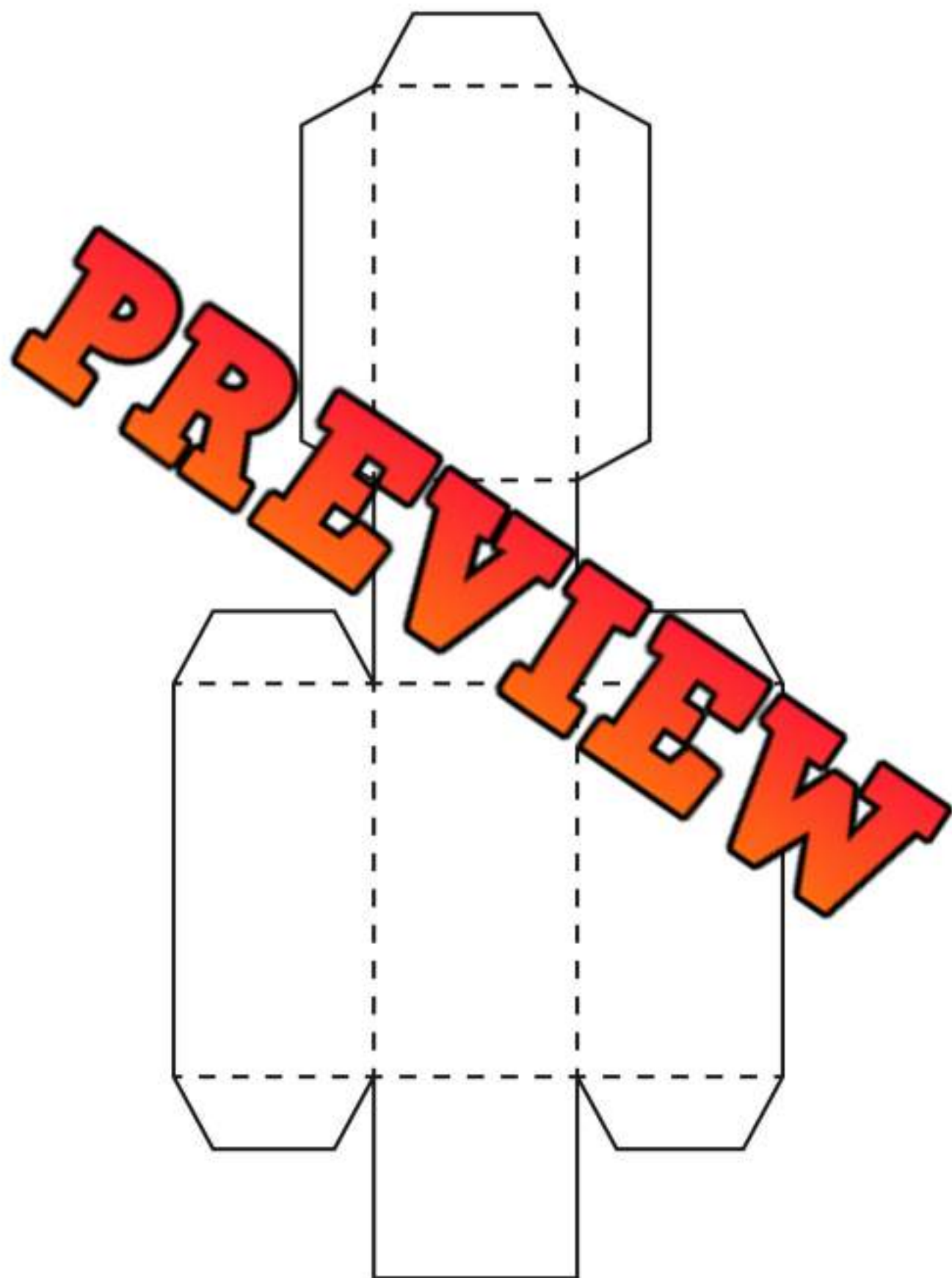


Name: _____

19

Curriculum Connection
SS.2

3D Model - Rectangle Based Prism Net

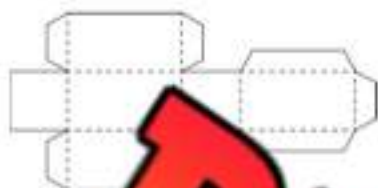


Nets Representing 3D Objects

Questions

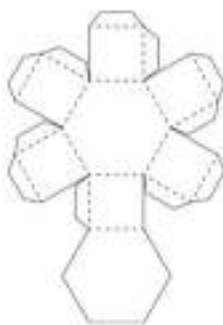
Identify and circle the 3D object formed by each net

1)



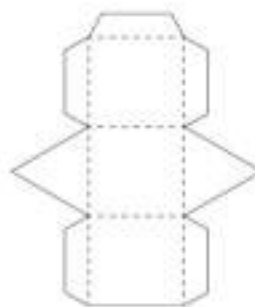
- Rectangular Prism
- Cylinder
- Cube

2)



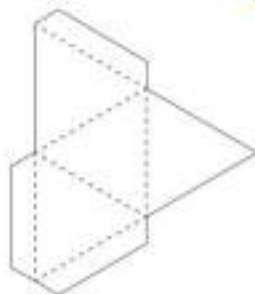
- Rectangular Prism
- Pentagonal Prism
- Triangular Prism

3)



- Rectangular Prism
- Pentagonal Prism
- Triangular Prism

4)



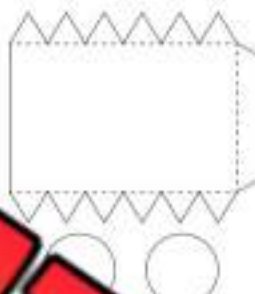
- Rectangular Pyramid
- Pentagonal Pyramid
- Triangular Pyramid

5)



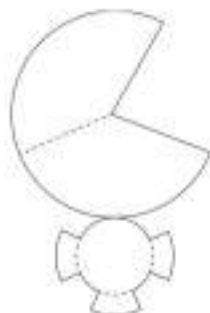
- Rectangular Pyramid
- Square Pyramid
- Triangular Pyramid

6)



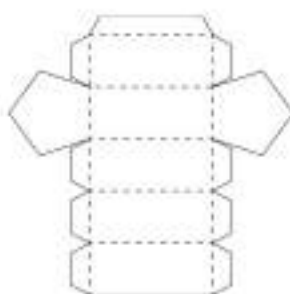
- Rectangular Prism
- Cylinder
- Cube

7)



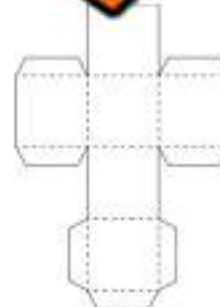
- Rectangular Prism
- Cylinder
- Cone

8)



- Rectangular Prism
- Pentagonal Prism
- Cube

9)



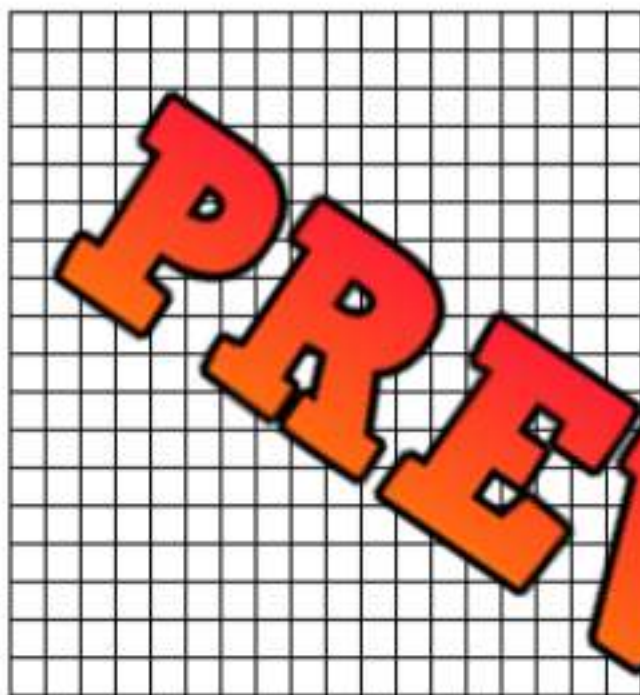
- Rectangular Prism
- Pentagonal Prism
- Cube

Drawing Nets - 3D Objects

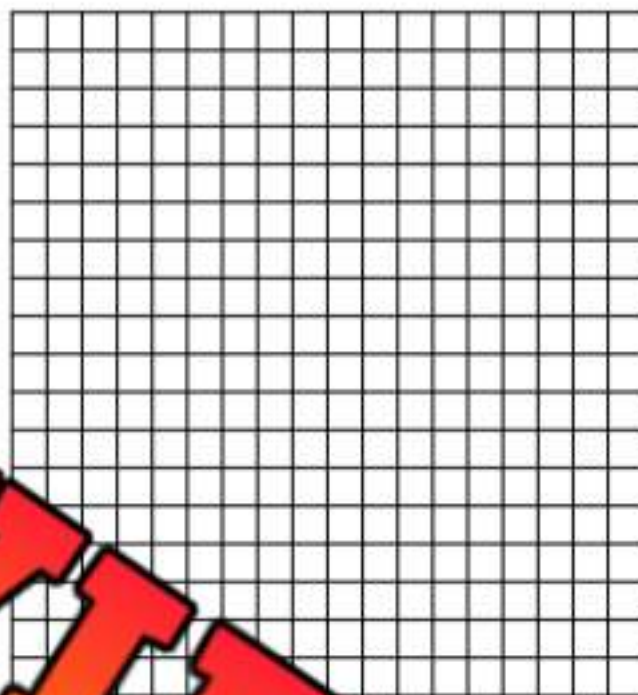
Questions

Draw the 3D objects using the grids below

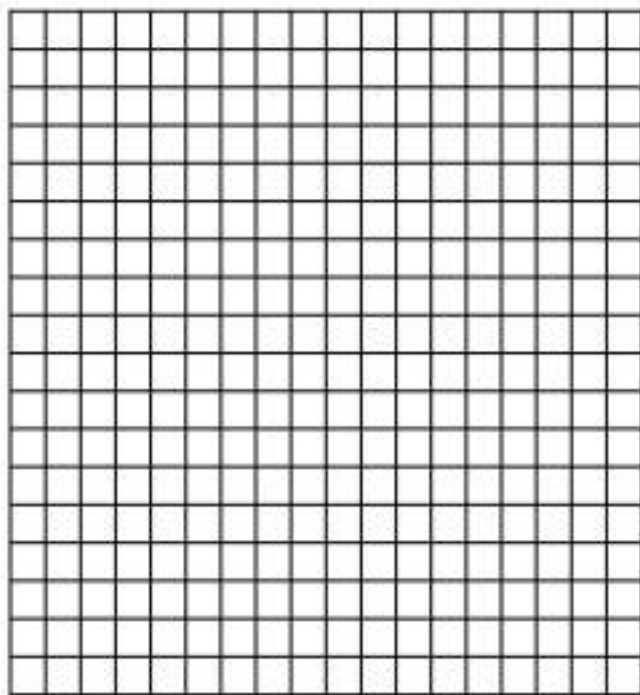
1) Rectangular Prism



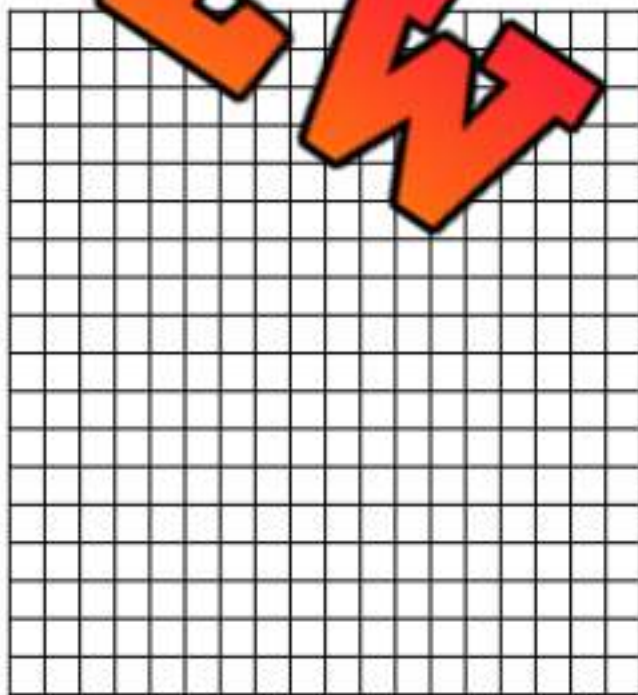
2) Rectangular Prism



3) Triangular Prism



4)

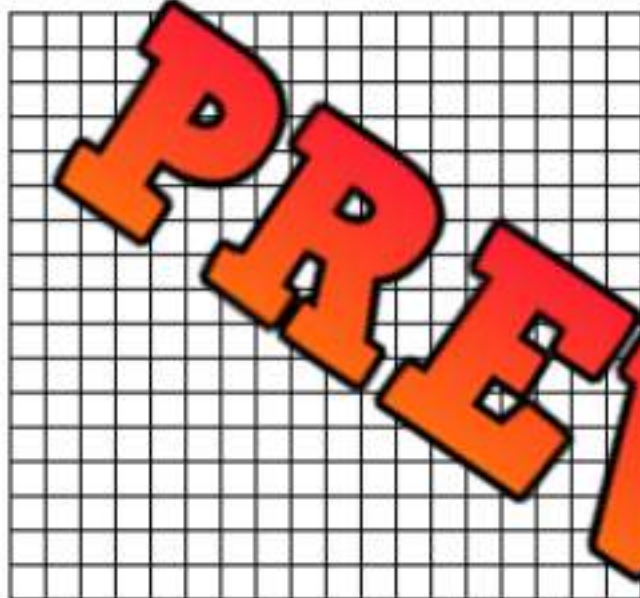
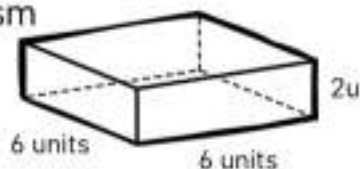


Drawing Nets - 3D Objects

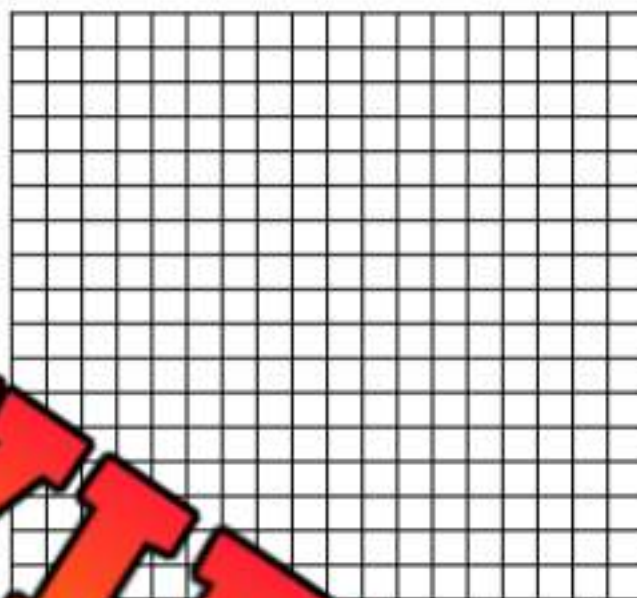
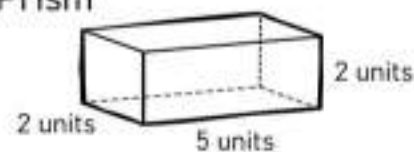
Questions

Draw the nets based on the dimensions provided

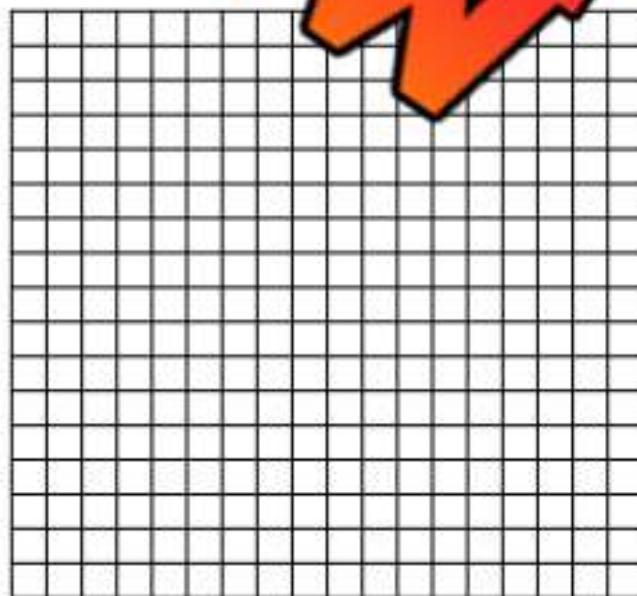
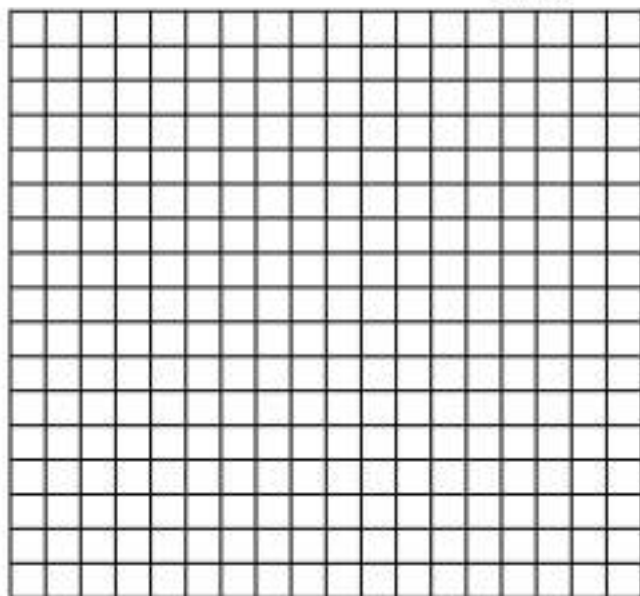
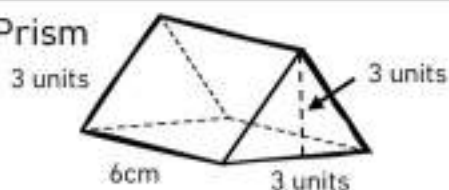
1) Rectangular Prism



2) Rectangular Prism



3) Triangular Prism

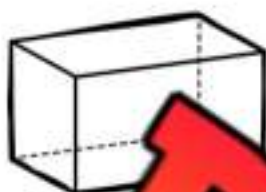


Drawing Nets - 3D Objects

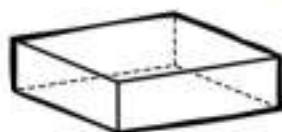
Questions

Draw two different nets of the 3D objects

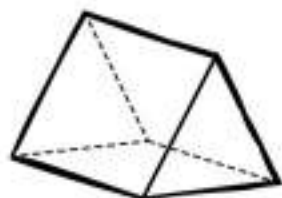
1)



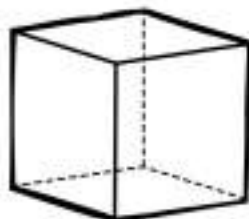
2)



3)



4)



PREVIEW

Surface Area Using Nets - Rectangular Prisms**Questions**

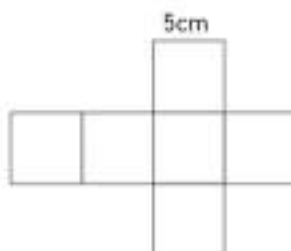
Find the surface area of the 3D objects using the nets below

1)



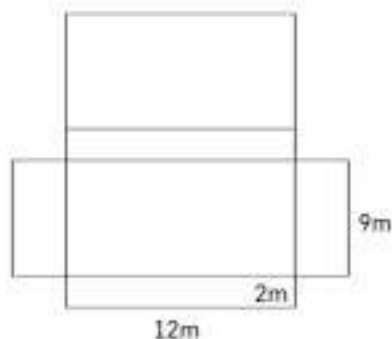
Surface Area: _____

2)

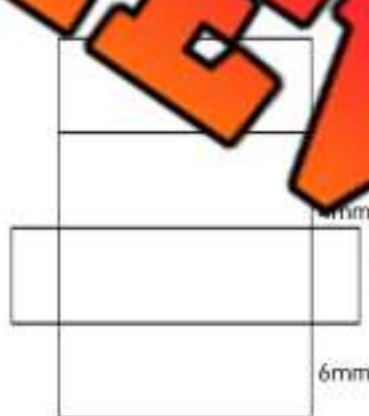


Surface Area: _____

3)



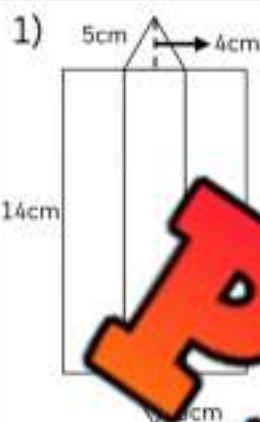
Surface Area: _____



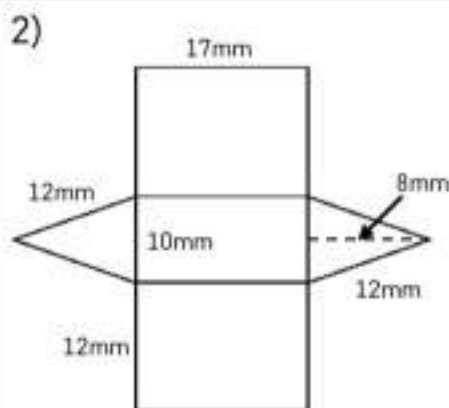
Surface Area: _____

Surface Area Using Nets - Triangular Prisms**Questions**

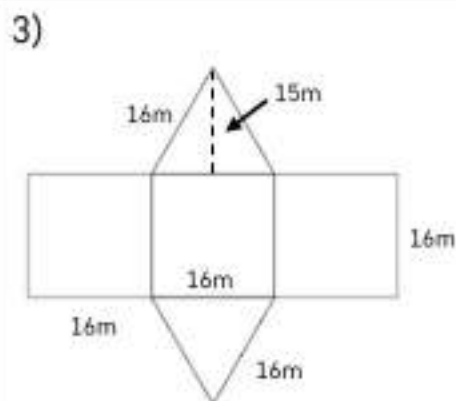
Find the surface area of the 3D objects using the nets below



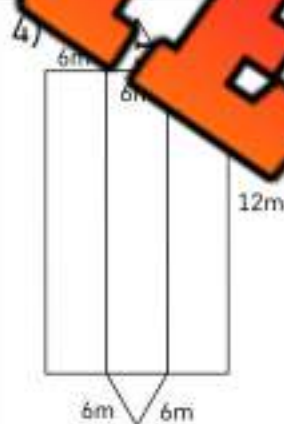
Surface Area: _____



Surface Area: _____



Surface Area: _____



Surface Area: _____

Surface Area Using Nets - Rectangular Prisms**Questions**

Find the surface area of the 3D objects below

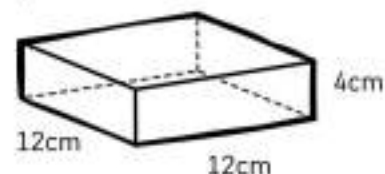
Workspace**Draw the Net**

1)



Surface Area: _____

2)



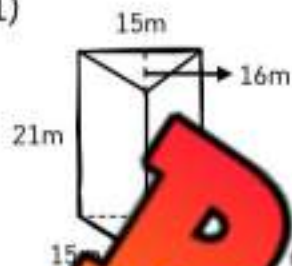
Surface Area: _____

Surface Area Using Nets - Triangular Prisms**Questions**

Find the surface area of the 3D objects below

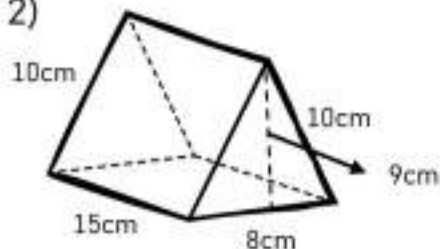
Workspace**Draw the Net**

1)



Surface Area: _____

2)



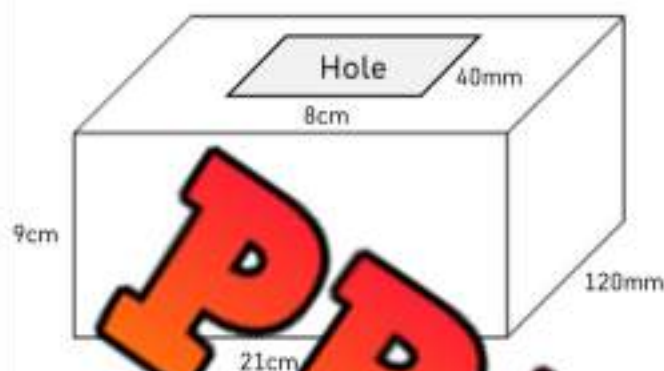
Surface Area: _____

Surface Area - Prism - Word Problems

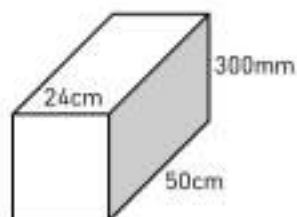
Questions

Solve the word problems below

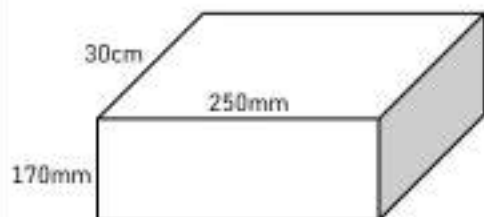
- 1) Find the surface area of the tissue box below.



- 2) Edward is painting his mailbox and needs to find the surface area so he can buy the amount of paint he needs. The mailbox has no door on the front. Find the surface area of the mailbox in the diagram below.



- 3) Kaitlyn needs to wrap her mom's birthday present. She has enough wrapping paper to cover a surface area of 3500cm^2 . Does she have enough paper?



Surface Area - Prism - Word Problems

Questions

Solve the questions below

Lisa is planning to lay bricks on her outdoor fireplace. Her fireplace is a rectangular prism, and she wants to brick all sides, except the bottom.

- a) What is the surface area of the fireplace, excluding the bottom?



- b) What is the surface area of the fireplace (excluding the bottom) in cm?

- c) If the surface area of each brick is 500cm^2 , how many bricks will Lisa need to cover her fireplace (excluding the bottom)?



- d) If each brick costs \$0.79, how much will it cost to cover the fireplace?

Area of a Circle - Diameter

When we know the diameter of a circle, we can divide it by two to get the radius. Once we have the radius, we can use it to calculate the area of a circle using the formula: $a = \pi r^2$

Calculating Area Using Diameter



$$a = \pi r^2$$

$$\text{diameter} = 18, \text{radius} = 9$$

$$a = \pi \times 9 \times 9$$

$$a = 254.34\text{m}^2$$

Practice

Calculate the area of the circles using the radius

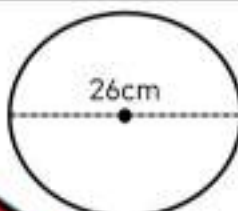
1)

Diameter = _____

Radius = _____

Area = _____

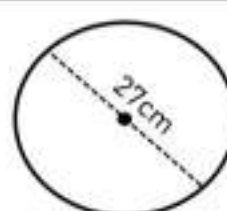
2)



Radius = _____

Area = _____

3)



Diameter = _____

Radius = _____

Area = _____

4)



Diameter = _____

Radius = _____

Area = _____

5)



Diameter = _____

Radius = _____

Area = _____

13cm

Diameter = _____

Radius = _____

Area = _____

Word Problems

Solve the problems below

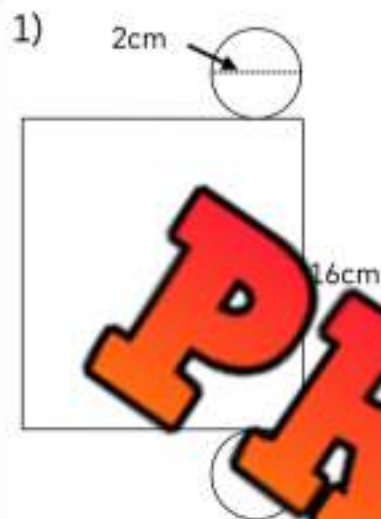


	Questions	Answer
1)	A dinner plate has a diameter of 19cm. What is the area of the plate?	
2)	A circular table is 1.3 metres wide. What is the area of the table in centimetres?	

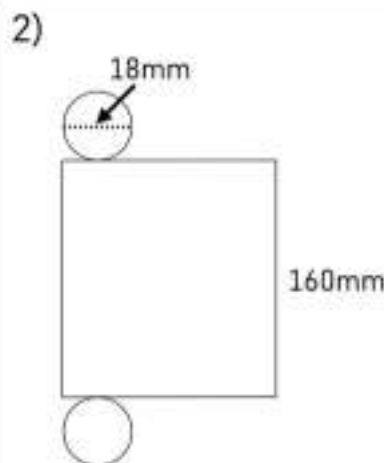
Surface Area Using Nets - Cylinders

Part 1

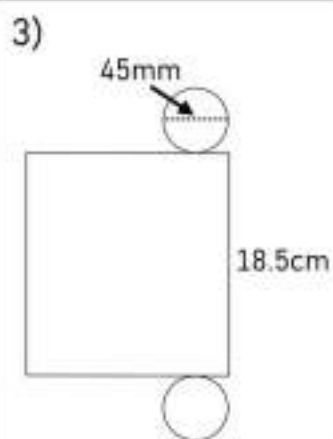
Solve the questions below



Surface Area: _____



Surface Area: _____



Surface Area: _____



Surface Area: _____

Part 2

Solve the question below

A can is 13cm tall. The top of the can has a radius of 3cm. Draw the net of the can and calculate the surface area of the can.

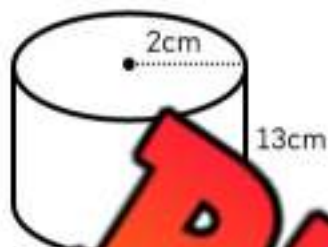


Surface Area - Cylinders

Questions

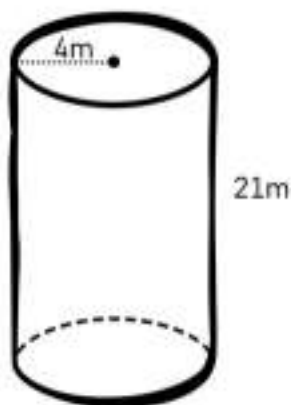
Solve the questions below

1)



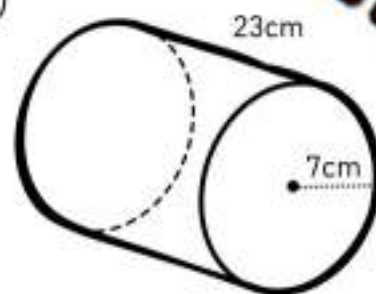
Surface Area: _____

2)



Surface Area: _____

3)



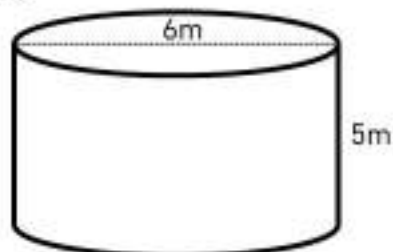
Surface Area: _____

4)



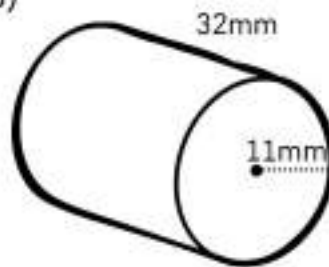
Surface Area: _____

5)



Surface Area: _____

6)



Surface Area: _____

Surface Area - Cylinders

Questions

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 10cm. What is the surface area of the can?



3) A battery is made of two cylinders. The main battery cylinder has a radius of 4cm and a height of 8cm. The smaller cylinder on top of the battery has a diameter of 8cm and a height of 2cm.

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?

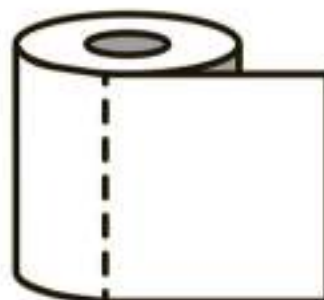
Surface Area Using Nets - Cylinders

Questions

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 the surface area of the toilet paper roll. Remember to account for the hole.



2) A wheel of brie cheese is 14cm tall. The cheese is 9cm long. What is the surface area of the full wheel of cheese?



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?



Calculating Volume Using the Base

Part 1

Fill in the blanks to investigate the area of the base and the height

	Area of Base	Height	Volume
1)	10 cm ²		80 cm ³
2)	13 mm ²	6 mm	
3)		5 cm	75 cm ³
4)		8 mm	96 mm ³
5)		9 m	
6)	16		144 mm ³
7)			132 km ³
8)	15 m ²		210 m ³

Part 2

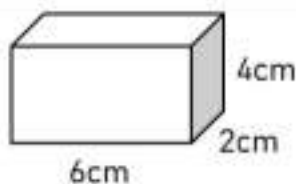
Answer the questions

1)	A box of cereal has a base with a length of 10cm and a width of 9cm. The height of the box is 22cm. What is the volume of the box?	
2)	A juice box is 9cm wide and 5cm long. The height of the juice box is 12cm. What is the volume of the juice box?	
3)	A railway car is 6.5m long and 2.2m wide. The railway car is 3.1m tall. What is the volume of the railway car?	

Calculating Volume of Rectangular Prisms

Rectangular Prism - Calculating Volume

To find the volume of a rectangular prism, multiply the length by the width by the height.



$$\begin{aligned}v &= l \times w \times h \\v &= 6\text{cm} \times 2\text{cm} \times 4\text{cm} \\v &= 48\text{cm}^3\end{aligned}$$

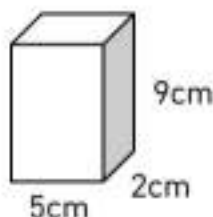
Question

Calculate the volume of the rectangular prisms

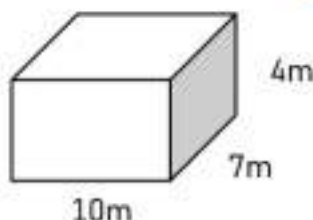
1)



2)



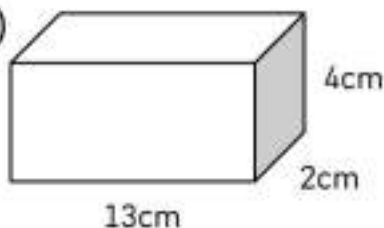
3)



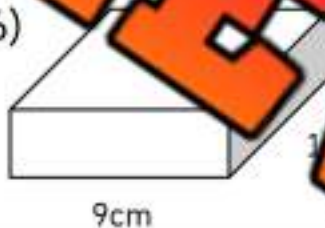
4)



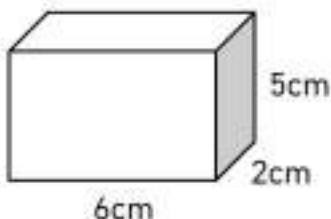
5)



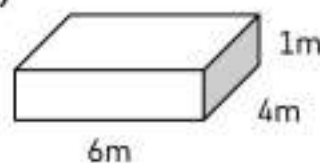
6)



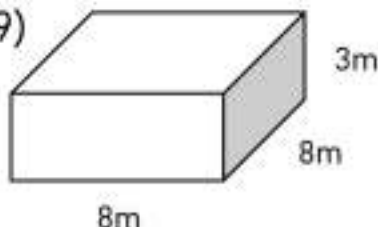
7)



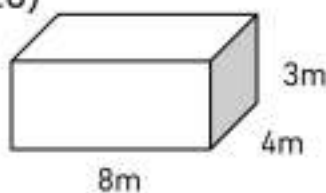
8)



9)



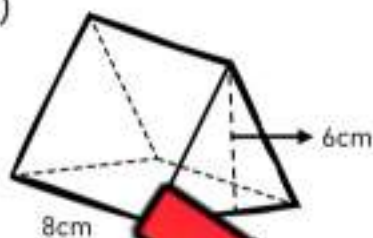
10)



Volume - Triangular Prisms**Questions**

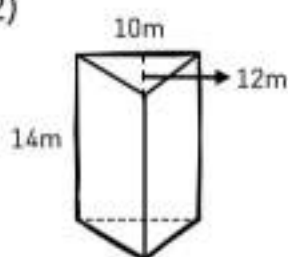
Find the volume of the triangular prisms below

1)



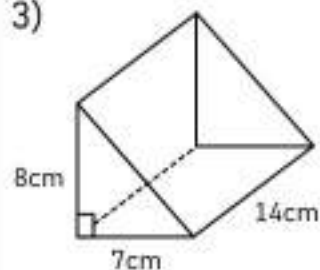
Volume: _____

2)



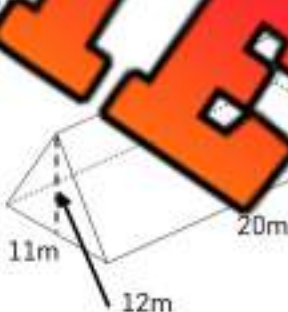
Volume: _____

3)



Volume: _____

4)

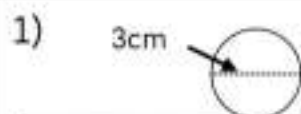


Volume: _____

Volume - Cylinders

Part 1

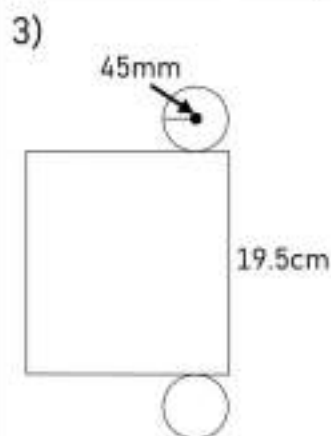
Solve the questions below



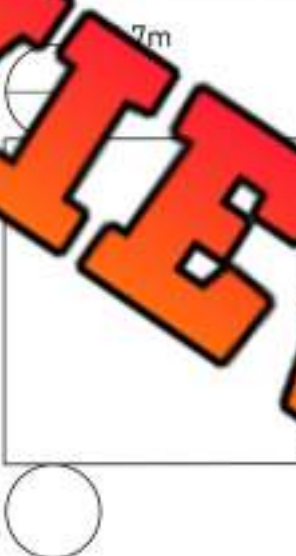
Area of the Base: _____ Volume: _____



Area of the Base: _____ Volume: _____



Area of the Base: _____ Volume: _____



Area of the Base: _____ Volume: _____

Part 2

Solve the question below

A paint can is 54cm tall and has a diameter of 18cm. What is the volume of the paint can?



Volume - Cylinders

Questions

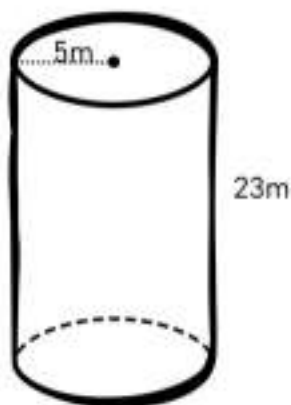
Solve the questions below

1)



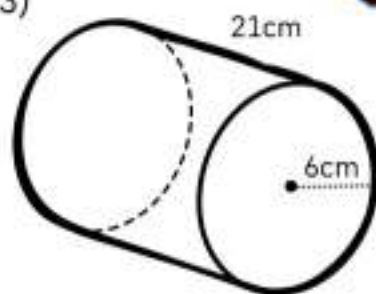
Area of the Base: _____ Volume: _____

2)



Area of the Base: _____ Volume: _____

3)



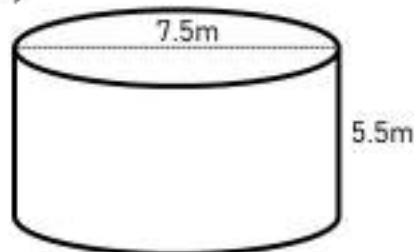
Area of the Base: _____ Volume: _____

4)



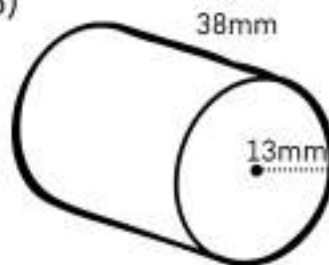
Area of the Base: _____ Volume: _____

5)



Area of the Base: _____ Volume: _____

6)



Area of the Base: _____ Volume: _____

Volume of Cylinders

Part 1

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

	Area of Base	Height	Volume
1)	8 mm^2	7 mm	
2)	15 cm^2	11 cm	
3)	m^2		114 m^3
4)	17 m^2		154 km^3
5)	m^2		119 mm^3
6)	18 m^2	15 m	
7)	22 km^2		
8)	25 mm^2		175 mm^3

Part 2

Answer the questions below

A hot cocoa jar is 12cm tall. There are only 4 cm left of cocoa in the jar. The radius of the jar is 7cm.

- a) What is the volume of cocoa left in the jar?
- b) How much more cocoa would be needed to fill the jar?



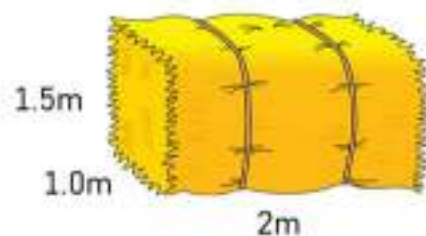
Volume of Cylinders

Questions

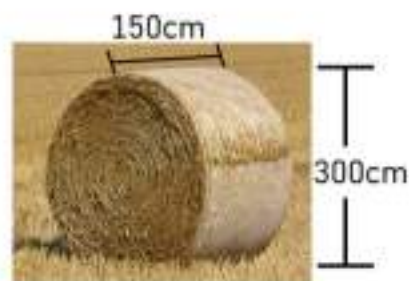
Answer the questions below

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 one of hay bale contains more hay?



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



2) You are planning to make candles to sell. What would your candles be?

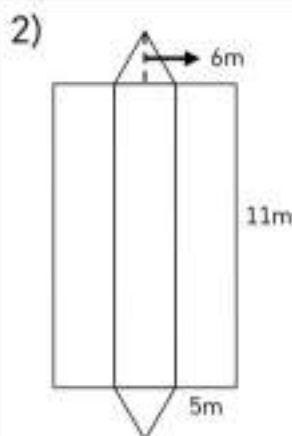
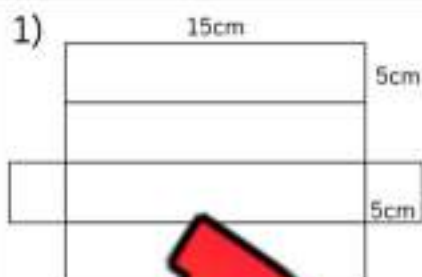
a) Draw a picture of one of the candles and label the dimensions.

b) What is the volume of the candle?

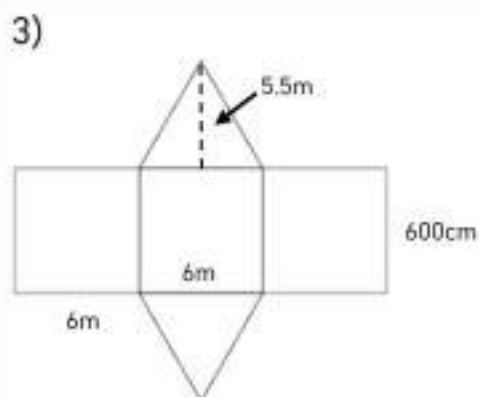
c) For every 10cm^3 , it costs you 30 cents. How much would the candle cost you in total?

Unit Test - Surface Area and Volume**Part 1**

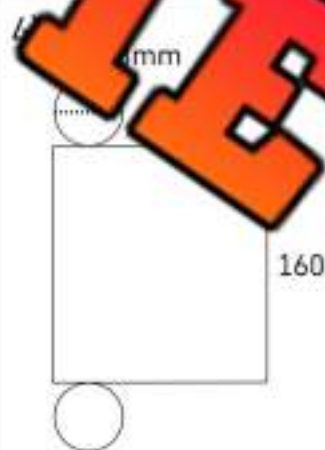
Find the surface area of the 3D objects using the nets below



Surface Area: _____



Surface Area: _____



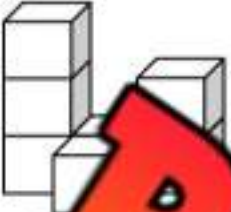
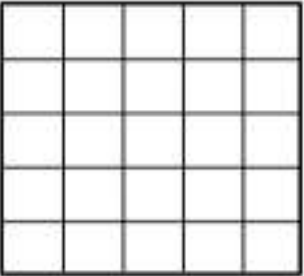
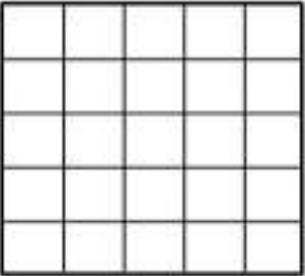
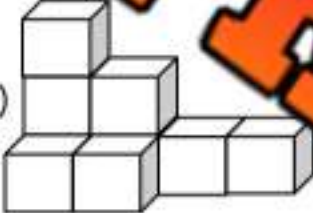
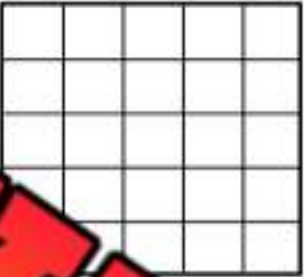
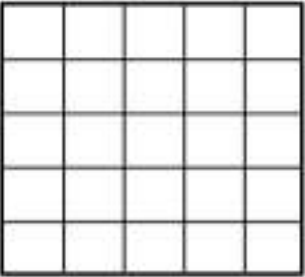
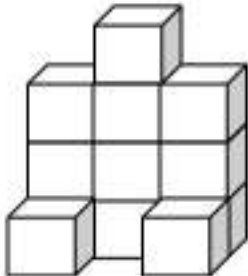
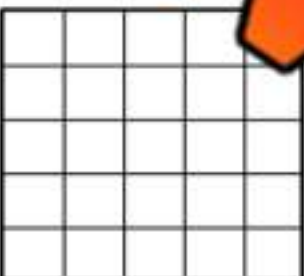
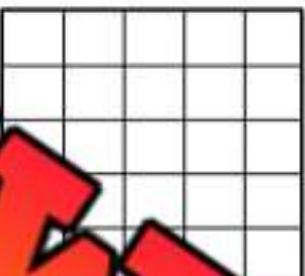
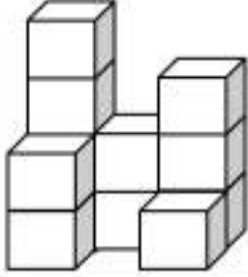
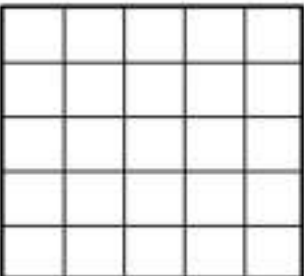
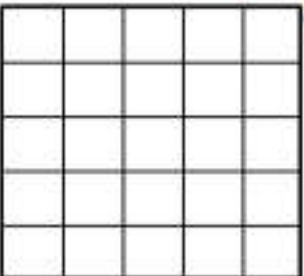
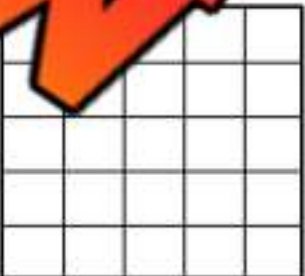
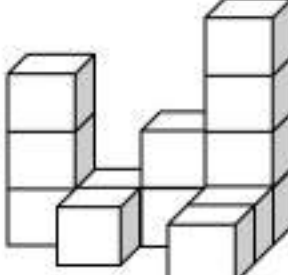
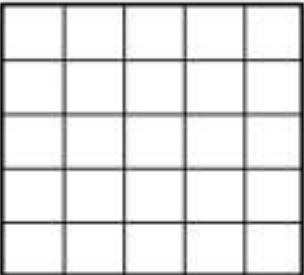
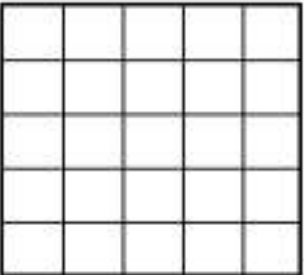
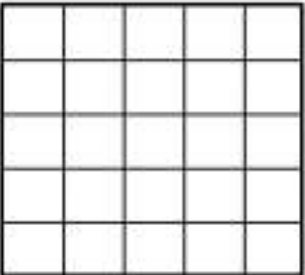
Surface Area: _____

Grade 8
SHAPE AND SPACE
 3-D Objects and 2-D Shapes
 Transformations

	Learning Expectations	Pages That Cover the Expectations
SS.5	Draw and interpret front, top and side views of 3-D objects including rectangular prisms	80 – 90
SS.6	Demonstrate an understanding of tessellations by: - explaining the properties of shapes that tessellate - explaining which tessellating shapes are possible - creating tessellations - identifying tessellations in the environment	

Drawing Top, Front, and Side Views of Objects**Questions**

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

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

Drawing Top, Front, and Side Views of Objects

Questions

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

3) Top View	Front View	Side View

4) Top View	Front View	Side View

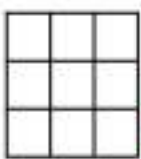
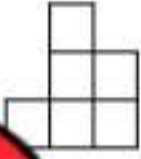
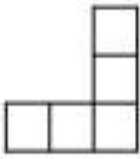
5) Top View	Front View	Side View

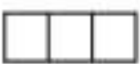
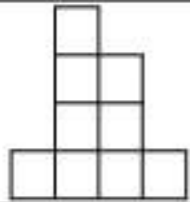
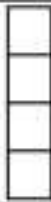
6) Top View	Front View	Side View

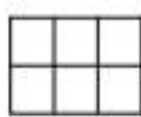
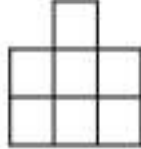
Drawing Top, Front, and Side Views of Objects

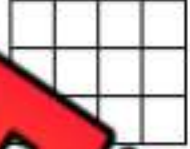
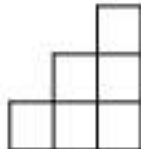
Questions

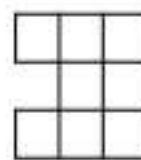
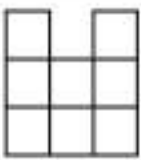
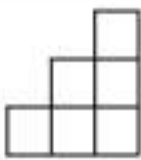
Draw the 3D objects by using the top, front, and side views

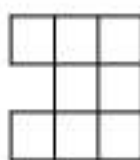
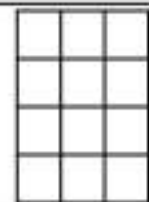
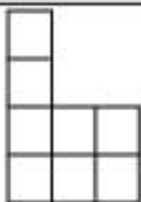
Top View	Front View	Side View
		
1)		

Top View	Front View	Side View
		
2)		

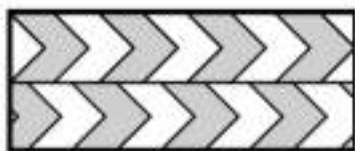
Top View	Front View	Side View
		
3)		

Top View	Front View	Side View
		
4)		

Top View	Front View	Side View
		
5)		

Top View	Front View	Side View
		
6)		

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

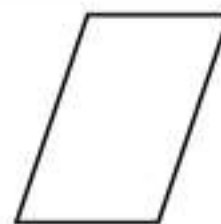
Can the shapes below be used by themselves in a tessellation?



1) Yes No



2) Yes No



3) Yes No



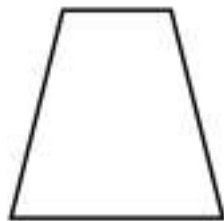
4) Yes No



5) Yes No



6) Yes No



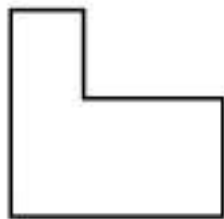
7) Yes No



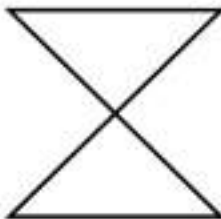
8) Yes No



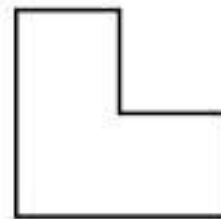
9) Yes No



10) Yes No



11) Yes No



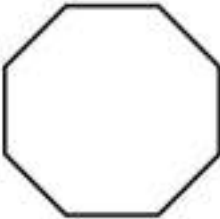
12) Yes No

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 ☐
	
4) Yes ☐ No ☐	5) Yes ☐ No ☐
	
7) Yes ☐ No ☐	8) Yes ☐ No ☐
	9) Yes ☐ No ☐

Part 2

Describe the 3 regular polygons that will tessellate

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

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° .

Questions

Use the information above to fill in the tables

Terms	Definition – What does the term mean?
Regular Polygon	
Interior Angle	
Sum of Interior Angles	

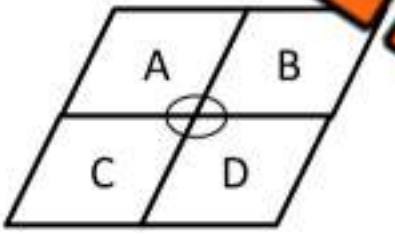
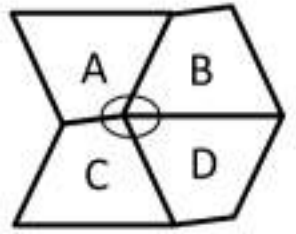
Regular Polygon	Sum of Interior Angles (Number of Triangles x 180°)	Multiple/Factor of 360° Yes/No
1) 		
2) 		
3) 		
4) 		
5) 		
6) 		
7) 		
8) 		

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.

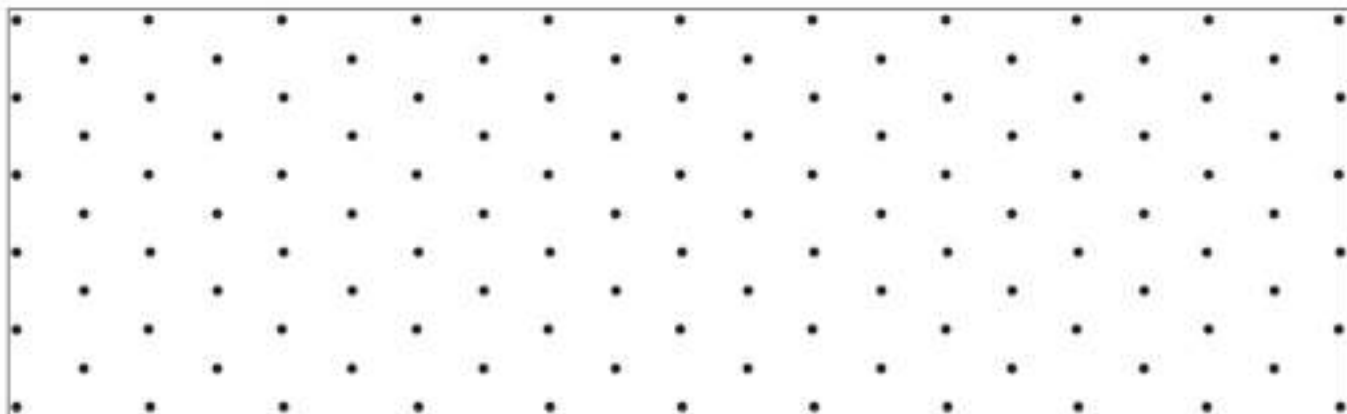
Part 1

Fill in the table below

Tessellation	Sum of the Circled Angles	Describe Transformation
		<u>From Shape A to Shape D</u>
		<u>From Shape A to Shape B</u>
		<u>From Shape A to Shape C</u>

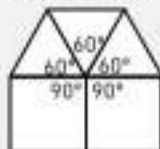
Part 2

Create a tessellation using one or multiple quadrilaterals



Tessellating with Different Polygons

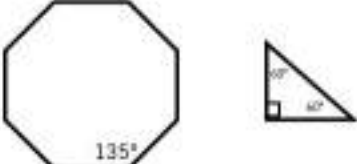
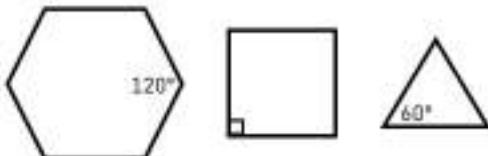
Tessellations with different polygons are often used in artwork. When artists combine polygons, they need to ensure the vertices have interior angles that add to 360° .



Using 2 squares and 3 triangles have central vertices adding to 360° ($60 + 60 + 60 + 90 + 90 = 360^\circ$)

Questions

Can the polygons be combined to create a tessellation? Explain

	Yes/No	Explanation
1) 		
2) 		
3) 		
4) 		
5) 		

Drawing Tessellations - Combining Polygons**Draw**

Draw a tessellation using the combination of polygons below

1) Pentagon and Triangle

2) Square

3) Octagon and
Quadrilateral

4) Octagon and 2 Triangles

5) Hexagon, Quadrilateral,
Triangle**PREVIEW**

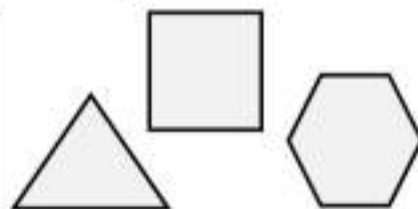
Name: _____

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Curriculum Connection
SS.6

Regular Tessellations

A **regular tessellation** is composed of identically sized and shaped regular polygons. To create a regular tessellation, choose one of the regular polygons and tile them. Add colours afterwards to add to the pattern.



Create

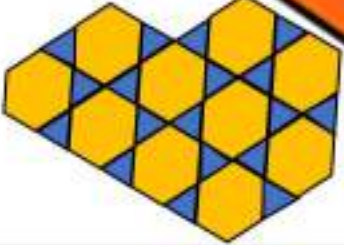
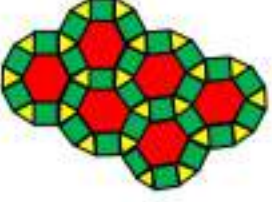
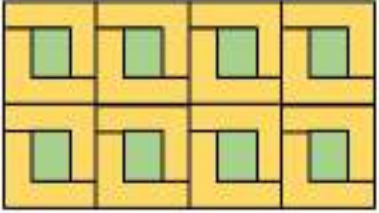
Create a regular tessellation below using regular triangles, squares, or hexagons

PREVIEW

Type 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) 	

Creating Translation Tessellation

Directions

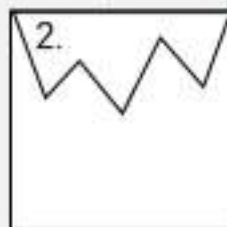
Follow the instructions to create your own translation tessellation

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.

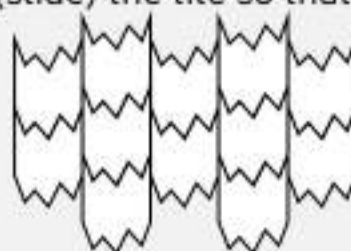
A **translation tessellation** is a tessellation that has been created by the translating (sliding) of a tile.

Instructions

- 1) Take a square piece of strong paper, like cardboard, cardstock or index cards.
- 2) Create a "nibble" by drawing a path from one corner of the square to an adjacent corner. Do not draw a straight line and do not stop halfway.
- 3) Cut along your pencil line so that you have two pieces. The piece that you designed is called the "nibble".
- 4) Translate (slide) the nibble piece to the opposite corner and tape the straight edges together. These two pieces need to fit perfectly with no overlapping.



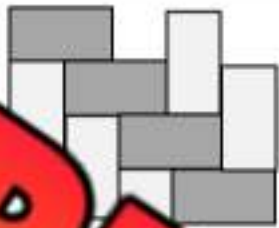
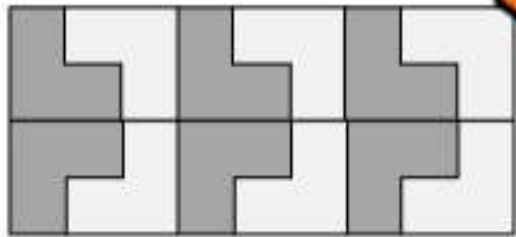
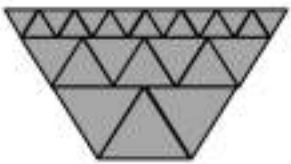
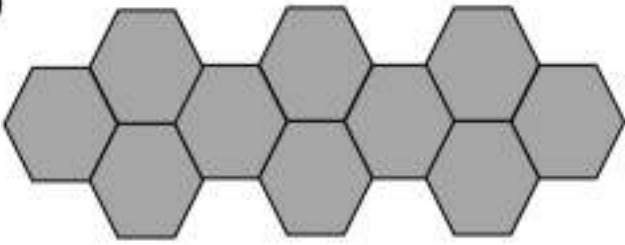
- 5) Place your tile on one of the four corners. To avoid having gaps, have the corner of the paper align with the original square you started with. The first tile you trace can hang off the edge of the paper.
- 6) Since this is a translation tessellation, you will translate (slide) the tile so that it fits together like a puzzle.
- 7) Continue translating the tile until the page is covered.
- 8) Colour your tessellation in a pattern



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) 	

Unit Test - Drawing Shapes and Tessellations

Part 1 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 2 Draw the top, front, and side view of the objects below

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