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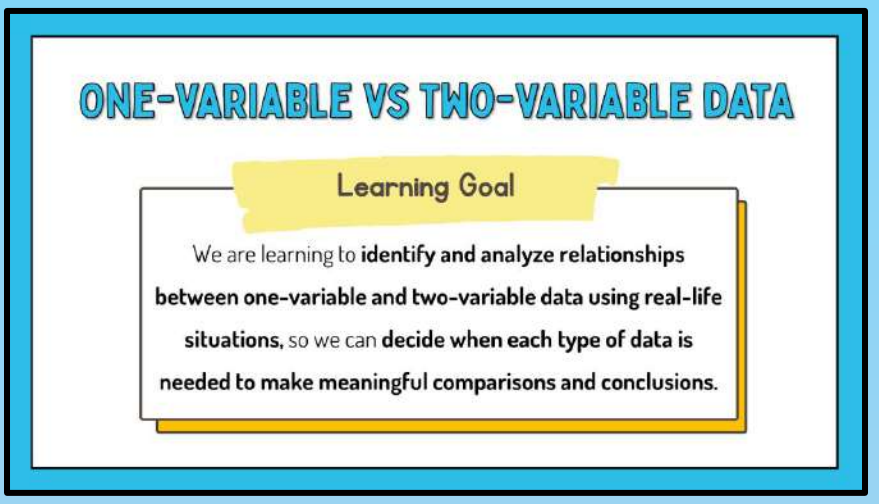
Google Slides Lessons Preview

Ontario Math Curriculum
Data & Probability – Grade 8

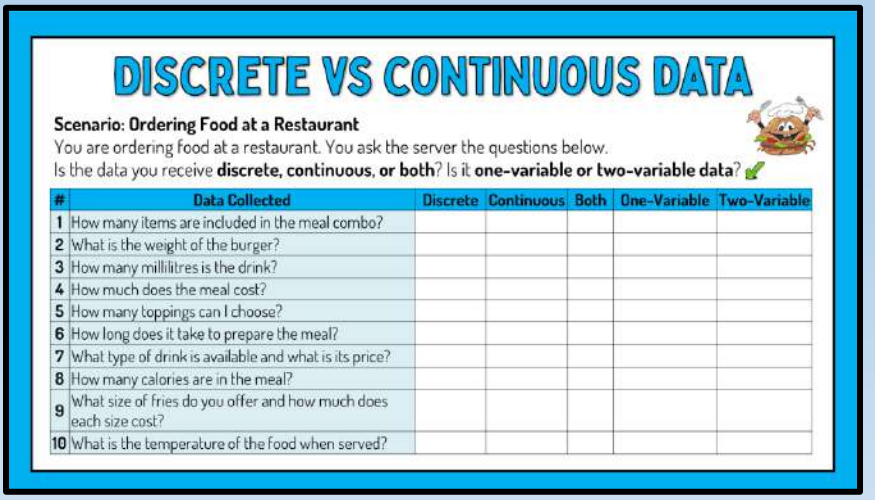
3-Part Lesson Format

Part 1 – Minds On!
- Learning Goals
- Discussion Questions
- Quotes
- And More!

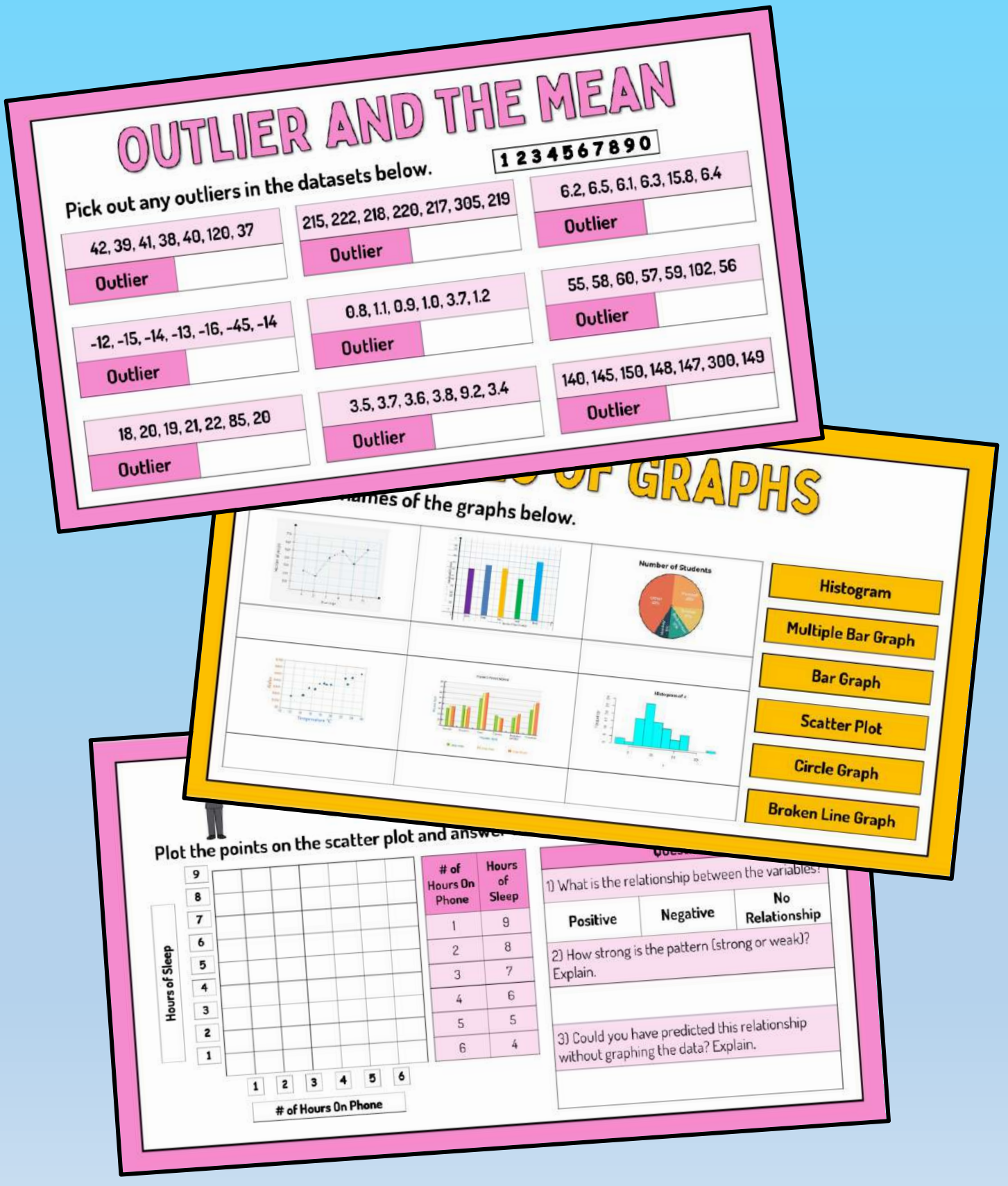


Part 2 – Action!
- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

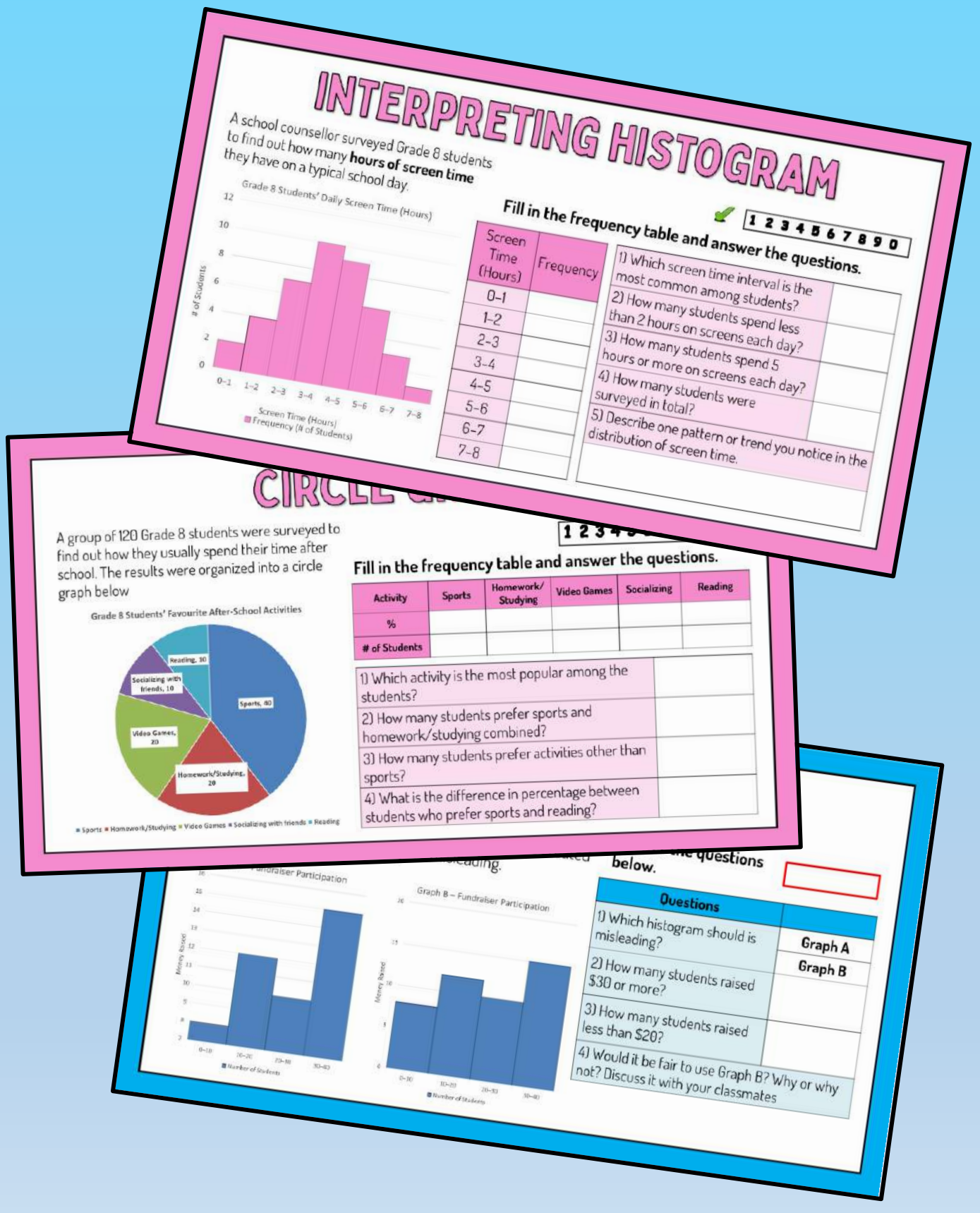
Part 3 – Consolidation!
- Exit Cards
- Quizzes
- Reflection
- And More!



Ontario Math Curriculum
Data & Probability – Grade 8



Ontario Math Curriculum
Data & Probability – Grade 8



Workbook Preview

Grade 8
D1. – Data Literacy

	Curriculum Expectations	Pages That Cover the Expectations
D1.1	identify situations involving one-variable data and situations involving two-variable data, and explain when each type of data is needed	8 – 10, 15,
D1.2	collect continuous data to answer questions of interest involving two variables, and organize the data sets as appropriate in a table of values	5 – 7, 11 – 14, 45, 47, 54, 56, 68, 73, 77, 83, 85
D1.3		8, 55, , 78,
D1.4	create an infographic about a data set, representing the data in appropriate ways, including in tables and scatter plots, and incorporating any other relevant information that helps to tell a story about the data	93 - 98
D1.5	use mathematical language, including the terms "strong", "weak", "none", "positive", and "negative", to describe the relationship between two variables for various data sets with and without outliers	32 - 40
D1.6	analyse different sets of data presented in various ways, including in scatter plots and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	16 – 28, 41 – 44, 49 – 53, 58 – 67, 70 – 72, 75, 79 – 81, 99 – 118

Name: _____ 8

Curriculum Connection
D1.1

One-Variable vs Two-Variable Data

A **variable** is any attribute, number, or quantity that can be measured or counted.

One-variable data has one set of data that could be qualitative or quantitative.

Examples

(1) Length of arm span for grade 8 students (2) Favourite movie of grade 8s

Two-variable data has two sets of data that could be qualitative or quantitative

Examples

(1) Relationship between a person's arm span and their height

(2) How hours people read and their IQ levels

Part 1

Is each example one-variable or two-variable data? Use a checkmark ✓

	Example	One-Variable	Two-Variable
1)	Favourite sp... eniors		
2)	Average temperat... a last ...ch month		
3)	Length of arm span ver... ts ...		
4)	How far Liam ran each day last we...		
5)	Mia's test scores and how much sle... he gets		
6)	How far you drive to work and how much y... by your job		
7)	Number of siblings each student has in your class		
8)	Relationship between screen time of students and homework completed		

Part 2

Write your own examples of one-variable and two-variable data

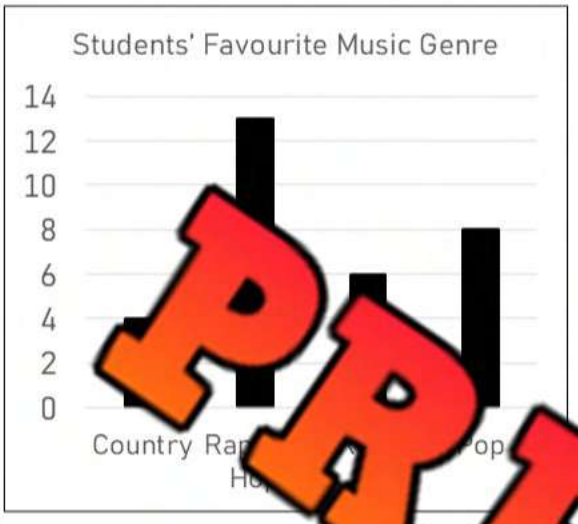
		Example
1)	One-Variable	
2)	One-Variable	
3)	Two-Variable	
4)	Two-Variable	

Name: _____ 9

Curriculum Connection
D1.1

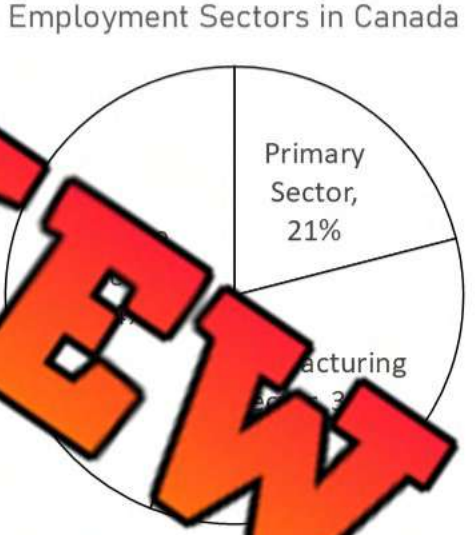
One-Variable vs Two-Variable Data

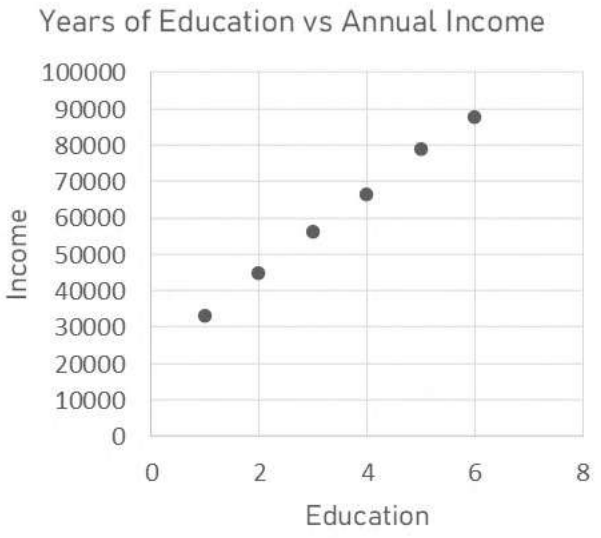
Directions Does the graph represent one or two variables? Describe both variables



1)	Does the graph represent one or two variables?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)

1)	Does the graph repre… …r two…?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)



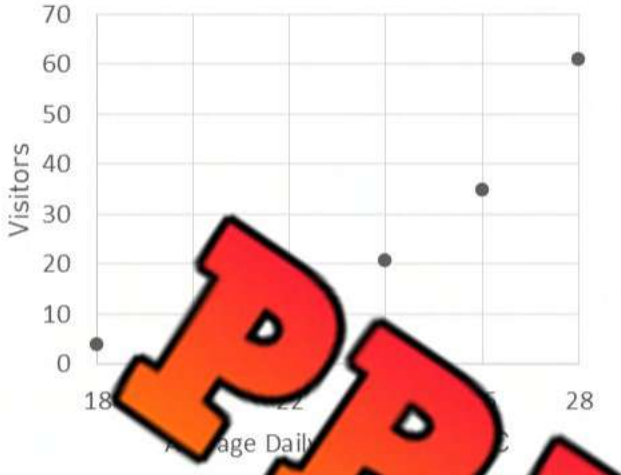


1)	Does the graph represent one or two variables?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)

Name: _____ 10

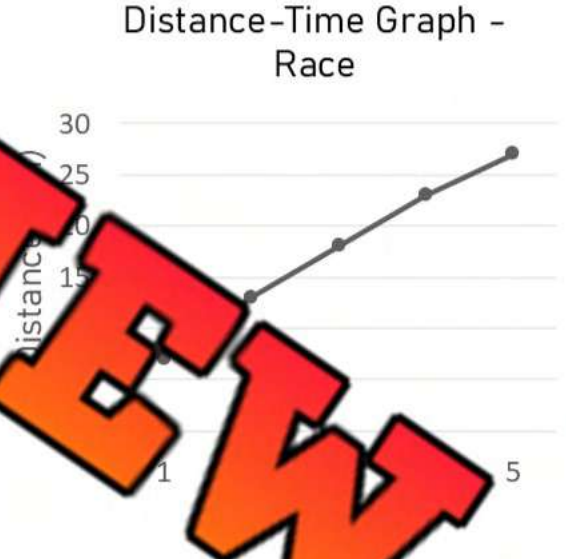
Curriculum Connection
D1.1

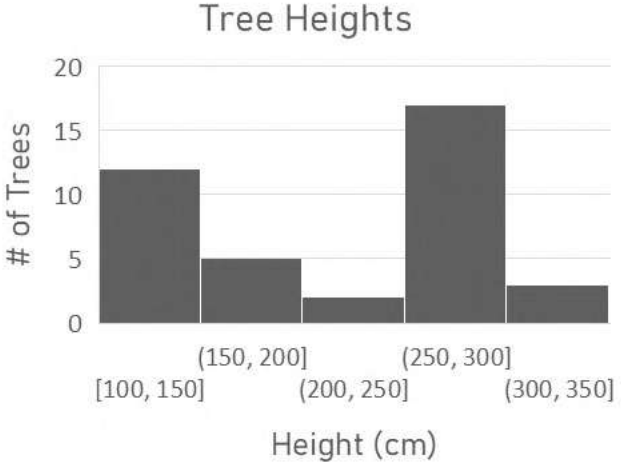
Directions Does the graph represent one or two variables? Describe both variables



1)	Does the graph represent one or two variables?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)

1)	Does the graph represent one or two variables?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)





1)	Does the graph represent one or two variables?
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)

Name: _____ 11

Curriculum Connection
D1.2

Representing Distribution Using Percentages

Why Use Percentages?

Percentages are used to show the distribution of a variable. Using percentages makes the data easier to read than simply just using the frequency.

For example: Which table is easier to draw conclusions from?

Ways I Get To Work	
Persona icle	3558
	241
	742
s	9
Total	5000

Ways I Get To Work			
Personal Vehicle	3558	0.71	71%
Bike	231	0.5	5%
Walk	752	0.15	15%
Bus	459	0.09	9%
Total	5000	1.00	100%

Questions Fill in t hy ac entages and decimals

1) Favourite Colour			
Options	**Frequency**	**Decimal**	**%**
Blue	2560		
Red	2123		
Pink	1575		
Green	3742		
Total			

2) avourite Music Genre			
O s	**cy**	**Decimal**	**%**
k	5		
Pop	232		
Rap	142		
Country	2940		
Total			

3) Top 50 Movies All Time - Genres			
Options	**Frequency**	**Decimal**	**%**
Comedy	11		
Action	15		
Drama	22		
Horror	2		
Total			

4) Best Season to Travel			
Options	**Frequency**	**Decimal**	**%**
Summer	12845		
Fall	5207		
Winter	24543		
Spring	7405		
Total			

Name: _____ 12

Curriculum Connection
D1.2

Frequency Tables Versus Relative Frequency Tables

Frequency Tables Versus Relative Frequency Tables

A **relative frequency table** displays the percent of each option in a data set. These relative frequencies are calculated by dividing the frequencies for each option by the total number of frequencies for all options.

A **frequency table** only lists the frequencies belonging to each group. Frequency tables are harder to generate comparisons between options in a data set.

Questions the tables. Is the table a frequency table or relative frequency table?

1) Nu… …ink… …ed Per Order			
Options	**Fre…**	**…cim…**	**%**
0	34		
1-2	99		
2-3	56		
4+	11		
Total			
Relative Frequency Table		Frequency Table	

2) How Many Trees On Your Property	
Options	**Frequency**
0	754
1-5	3145
…10	6485
	9616
…Total	
Re… …cy Tab…	…requency Table

3) Musical Instrument You Play	
Options	**Frequency**
None	154
Guitar	125
Piano	110
Other	111
Total	
Relative Frequency Table	Frequency Table

4) Type of Ve… …D			
Options	**Frequency**	**…mal**	**%**
Car	26714		
Van	8485		
Truck	11452		
Motorbike	3349		
Total			
Relative Frequency Table		Frequency Table	

Name: _____ 13

Curriculum Connection
D1.2

Discrete or Continuous Data?

Discrete and continuous data are both forms of quantitative data. This means both are numerical, meaning the data is acquired through counting or measuring.

Discrete data is collected when the answers to a survey are only numbers. It is quantitative data that has no relationship between the numbers. For example, "how many pets you have" is discrete data because there is no relationship between 1 and 2 pets. You cannot have 1 and a half pets, only 1 or 2. Discrete data is counted.

With **Continuous data**, there is a relationship between the numbers. For example, "how much rainfall there was last week?" You can have 1 and a half millimetres of rain, which means there is a relationship between 1 and 2. Continuous data is measured.

Part 1 Will the data from the research question be discrete or continuous?

Tip: Ask yourself if you can split the answer in half.

	Discrete/Continuous
1) How many cousins do you have?	
2) Which subject is your favourite?	
3) How many minutes did you study for the test?	
4) How many millimetres did your hair grow each month last year?	
5) How many books have you read in the last year?	

Part 2 How many variables does the data have? Is the data discrete or continuous or both?

Research Question	One/Two Variables	Discrete/Continuous/Both
1) How many homeruns a team scored last season		
2) How many steps you take in a day and how many calories you burn		
3) Most popular drink ordered at a café and what gender orders which drink		
4) Type of vehicle and its fuel economy		
5) Height of a dog and its weight over 5 years		
6) How many dunks a basketball player had last season		
7) Favourite music genre and what year you were born		
8) Practice time and results in a music festival		

Name: _____ 16

Curriculum Connection
D1.6

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, 6, 8, 5
Step 1: 5 + 6 + 8 + 5 = 24
Step 2: 24 ÷ 4 = (6)

Part 1

Find the mean for each data set below

	Data	Total – Add Numbers	Mean
1)	16, 1[illegible] 18		
2)	41, 48, 5[illegible]		
3)	121, 105, 129, 1[illegible]		
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

Name: _____ 17

Curriculum Connection
D1.6

Finding Missing Data Point Using Mean

We can determine the missing number in a series if we know the mean by using the following formula:

$$Mean = \frac{Sum\ of\ given\ numbers + x\ (unknown\ number)}{total\ numbers}$$

Example: 25, 27, ?, 30 Mean = 26

Steps

1) Multi… number of total numbers you have by the mean (26 x 4 = 104)
2) Add … bers you know (25 + 27 + 30 = 82)
3) Fin… (subtract) between 104 and 82 (104 – 82 = 22) – Answer = 22

Questions …e ta… below to find the missing data point

	Data Set		Calculations	Missing Data Point
Ex)	9, 16, ?, 22, 12, 19	15	1) …0 2) …6 + 2… + 19 = 78 3) …0 – 78	12
1)	8, ?, 7, 13, 12, 11	11		
2)	27, 19, 14, ?, 53	29		
3)	37, 22, 48, ?, 62, 77	50		
4)	-8, -5, -13, ?	-8		
5)	-15, ?, 17, -17, -7	-2		

Name: _____ 18

Curriculum Connection
D1.6

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
Tem		-7	-4	-8		3	-4

2) Gas prices for the last [illegible] were [illegible]age of $1.34 per litre. The prices for each day are listed below, e[illegible] day [illegible]. Calculate the missing value for day 3.

Day	1	2	3	4	5	[illegible]	[illegible]	8	9	10
Price	1.31	1.45		1.36	1.21	[illegible]7	[illegible]	[illegible]	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	

Curriculum Connection
D1.6

Exit Cards

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

Name: _____

1) The mean depth for water dives is -4.8 m. Find the missing depth for Dive 4.

Dive	1	2	3	4	5	6	7	8	9
Depth	-5.9	-4.5	-6.8		-2.5	-3.8	-4.7	-5.6	-3.9

2) The mean daily price over the 9 days is $1.38. Find the missing price for Day 4.

Day	1	2	3	4	5	6	7	8	9
Price	1.41	1.38	1.42		1.30	1.44	1.39	1.36	1.35

Name: _____

1) The mean depth for water dives is -4.8 m. Find the missing depth for Dive 4.

Dive	1	2	3	4	5	6	7	8	9
Depth	-5.9	-4.5	-6.8		-2.5	-3.8	-4.7		-3.9

2) The mean daily price over the 9 days is $1.38. Find the missing price for Day 4.

Day	1	2	3	4	5	6	7	8	9
Price	1.41	1.38	1.42		1.30	1.44	1.39	1.36	1.35

Name: _____ 20

Curriculum Connection
D1.6

Task Cards: Mean Detective

Objective

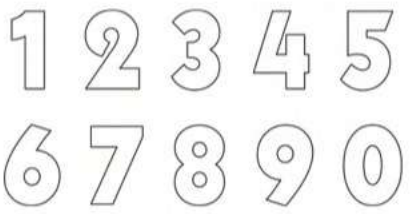
What are we learning about?

To help students understand and solve for a missing data point in a set by using the mean (average).

Materials

What you will need for the activity.

- 2
- Se e shee for answers
- Pencils



Instructions

How o activity

1. Introduce the concepts cov d in
2. Organize the students into pairs an ovide e their sets of task cards.
3. Give each pair an answer recording sheet dow ses.
4. Encourage teamwork by having students collabora eir p on finding solutions.
5. Allow students to select any task card to begin with, emphasiz an complete the cards in any order they prefer.
6. Instruct students to record the letter of their chosen answer (A, B, or C) on their answer sheet beside the task card's number.
7. Consider using a timer to create a dynamic challenge, adjusting the duration to fit the lesson's objectives and complexity.
8. After the activity, review the answers collectively, discussing any challenging questions and strategies used to solve them.
9. Have students reflect on the activity, sharing the methods they applied and obstacles they overcame.

Name: _____ 21

Curriculum Connection
D1.6

Task Cards | Cut out the task cards below

Card 1:
Find the missing value in the series: 45.2, ?, 48.6, 49.8, 44.1, 47.5, if the mean is 47.

a) 46.8
b) 46.5
c) 46.0

Card 2:
The temperatures in a city over six days were: 14.5°C, 16.1°C, 13.9°C, ?, 17.3°C, 15.8°C. The mean temperature was 15.2°C. What was the temperature on the missing day?

a) 14.9°C
b) 13.6°C
c) 14.7°C

Card 3:
The average h[illegible] pla[illegible] is 23.4 cm. The heigh[illegible]ff[illegible]tants [illegible]5 cm, 24.1 cm, 23.2 cm, [illegible] cm, [illegible]4[illegible]
What is the height [illegible]t[illegible] plant?

a) 23.2 cm
b) 24.0 cm
c) 22.9 cm

Card 4:
The temperatures recorded over five days were: -3.5°C, -4.0°C, ?, -5.2°C, -3.9°C. If the mean temperature was -4.2°C, what was the missing temperature?

a) -4.4°C
b) -4.2°C
c) -4.0°C

Card 5:
The mean of the numbers 11.5, 13.2, 14.1, ?, 13.7, and 12.8 is 13.2. Find the missing number.

a) 13.5
b) 12.5
c) 13.9

Card 6:
In [illegible]bask[illegible]t[illegible]e a player scored 22, 17, [illegible] 21 po[illegible] the average score [illegible]poin[illegible]t w[illegible]s the [illegible]sing[illegible]

a) 20
b) 19
c) 23

Card 7:
A worker earned an average of $450 per week over 6 weeks. His weekly earnings were $470, $440, $455, $465, and $425. How much did he earn in the 6th week?

a) $445
b) $435
c) $450

Card 8:
The average distance of five runners in a run was 12.4 km. Four of the runners ran distances of 12.8 km, 11.9 km, 12.1 km, and 12.6 km. What was the missing runner's distance?

a) 12.2 km
b) 12.6 km
c) 12.5 km

Name: _____ 23

Curriculum Connection
D1.6

Task Cards | Cut out the task cards below

Card 17:
A baker baked an average of 120 cupcakes per week over 5 weeks. The cupcakes baked in four weeks were: 115, 125, 118, and 123. How many cupcakes did the baker bake in the fifth week?

a) 122
b) 120
c) 19

Card 18:
The mean of the values 27.6, 25.9, 26.4, 24.8, and ? is 26.5. What is the missing number?

a) 28.2
b) 26.8
c) 27.8

A cyclist rod 6.0 d ? km over 5 days. I dista 5.8 km, how many ki ers d ride on the

a) 6 km
b) 5.7 km
c) 5.6 km

Card 20:
A business earned an average of $-5,400 per week over 4 weeks, and their earnings in 3 of those weeks were $-5,800, $-5,200, and $-5,600. What were their earnings in the missing week?

a) $-5,200
b) $-5,000
$-5,400

Card 21:
The mean of the numbers 48.9, 50.2, 49.1, ?, and 50.6 is 49.5. What is the missing number?

a) 48.7
b) 48.8
c) 49.3

2:
A core of 72% in five te st sc e 75%, 70%, 74%, ?, and ha g test sc

a) 71%
b) 72%
c) 73%

Card 23:
A car traveled at speeds of 80, 75, 85, 82, and ? km/h over 5 hours. If the average speed was 81 km/h, what was the missing speed?

a) 80 km/h
b) 78 km/h
c) 83 km/h

Card 24:
The average score of 7 players on a basketball team is 10.5 points. The points scored by 6 players are 9, 12, 11, 10, 8, and 13. How many points did the missing player score?

a) 10.5
b) 10
c) 12

Name: _____ 24

Curriculum Connection
D1.6

Task Cards: Mystery Mean Detectives

Answers | Record your answers below

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

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

Name: _____ 25

Curriculum Connection
D1.6

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, 3[illegible] 30, 3, 29, 36, 34, 71	4)	-4, -8, -6, -21, -9, -7, 12, -5
2)	148 [illegible] 79, 294, 147	5)	-9.4, -29.6, -8.7, -7.9, -10.1, -9.6
3)	1[illegible] 5.4, 15 [illegible].5, 11.4, 21.7	6)	1.1, 0.5, -0.4, -1.5, 13, -0.8, -24.2, 1.3

Part 2 — A[illegible] the qu[illegible]low

1) Owen practiced his 400[illegible]day. A[illegible] the stopwatch that automatically record his times on a compute[illegible]nes[illegible]ere: 49.5, 52.3, 138.1, 51.7, 49.8, 52.2.

a) Which of his scores was an outlier?

b) What might have caused the outlier [illegible]ore?

2) Tony looked at how many steps he took last week. [illegible]r of st[illegible] took over the last 7 days are recorded below:

11243, 13178, 9135, 20891, 12485, 3[illegible]287

a) Which of the values are outliers?

b) Explain why he may have an outlier of 3878 steps?

c) 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

a) Which of the values are outliers?

b) Explain what could have led to Chris earning $0 profits on day 6?

c) Explain what could have led to Chris earning $843 on day 5?

Name: _____ 26

Curriculum Connection
D1.6

Calculating Mean - Outliers

Outliers have a big impact on the mean of a data set. For example, if John records his last 5 long jumps and jumps the following distances:

6.5m, 6.8m, 1.5m, 6.2m, 6.1m

John explains after that on his third jump, he slipped and didn't perform a full jump. The data set has an outlier that doesn't reflect John's ability to jump. We can see th[illegible]ference when we use an outlier in our calculation of the mean

Mean Wi[illegible]
Mean[illegible]

Part 1

[illegible]using the outlier and without the outlier

	Data Se[illegible]	[illegible]h Outlier(s)	Mean Without Outlier(s)
1)	14, 16, 15, 48, 17		
2)	-5, -2, 38, -4, -6, -1		
3)	0.5, 0.8, -24.7, -0.4, 0.3		
4)	-16.7, 15.7, 13.9, 14.2, 16.4		
5)	-5.3, 13.4, -6.8, -6.1, -25.9		

Part 2

Answer the word problem below

1) Explain what happened in question 5. Why was the mean similar even [illegible]he outliers?

2) Cole has been playing very well in golf. His last 10 golf scores are listed below.

-2, 18, 3, -4, -1, 1, 4, -6, -4, -3

a) What is his handicap over the last 10 games?

b) If he removes the outlier, what would his handicap be?

Name: _____ 27

Curriculum Connection
D1.6

Calculating Mode and Median - Outliers

Part 1 Calculate the mode using the outlier(s) and without the outlier(s)

	Data Set	Mode With Outlier(s)	Mode Without Outlier(s)
1)	11, 18, 13, 17, 25, 88, 21, 12, 11, 18		
2)	138, 1[illegible] 144, 465, 144, 138, 144		
3)	[illegible] 15.8, 15.5, 15.8		
4)	[illegible]-12, -1[illegible]7, -12, -7		
5)	-0.5, 0.[illegible], 0.9, -[illegible]		

Do outliers have an [illegible] plain why or why not.

_____

_____

_____

Part 2 Calculate the median using the o[illegible](s) [illegible] outlier(s)

	Data Set	Median With Outlier(s)	Med[illegible]ier(s)
1)	15, 13, 19, 16, 17, 19, 67		
2)	108, 105, 308, 106, 107, 109		
3)	24.3, -8.2, 25.7, 24.6, 27.2, 26.1		
4)	-14, -19, -17, -22, 21, -24		
5)	-1.3, 0.1, 0.6, -0.5, 13.8, -1.2		

Do outliers have an effect on the median? Explain why or why not.

_____

_____

_____

Name: _____ 28

Curriculum Connection
D1.6

Mean, Median, Mode – Outliers Word Problem

Questions | Answer the questions below

Alex loves golf. He has kept track of his last 10 shots for 4 different clubs. He wrote down the distance in yards he hit each of the clubs in the table below.

	1	2	3	4	5	6	7	8	9	10
Pitching	132	143	137	24	134	136	132	130	133	132
7	164	161	237	168	163	164	168	164	158	153
		204	193	198	199	209	42	201	198	198
Driver		293	315	307	322	299	303	314	52	311

a) Calculate the distance for four clubs Alex used?

	Pitching Wedge	7 Iron	3 Iron	Driver
Me				

b) Calculate the median distance for four clubs used?

	Pitching			Driver
Median				

c) Calculate the mode of each club.

	Pitching Wedge	7 Iron	3 Iron	Driver
Mode				

d) Look for some outliers in the data. What could have caused these outliers?

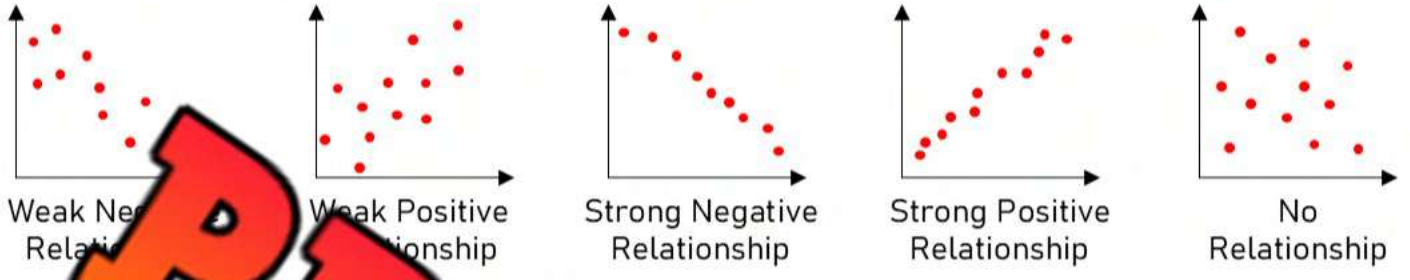
e) To calculate the average distance of all four clubs combined, find the mean of the medians for each club.

Name: _____ 32

Curriculum Connection
D1.5

Relationship Between Variables

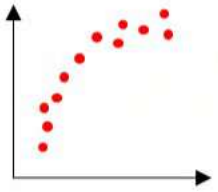
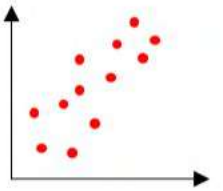
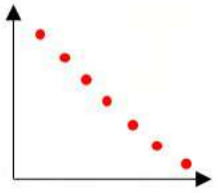
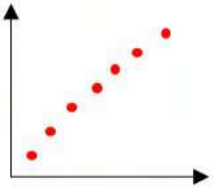
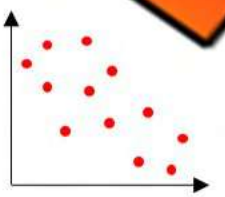
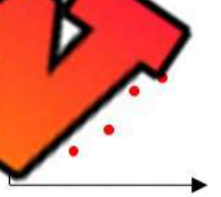
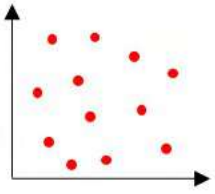
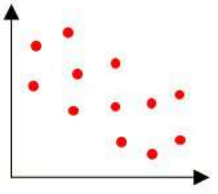
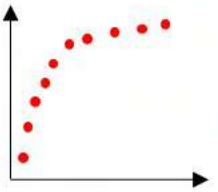
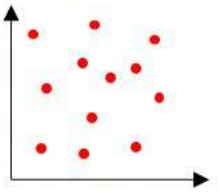
A scatter plot is a graph in which the values of two variables are plotted along the x and y axis. Using a scatter plot allows us to quickly see what type of relationship there is between the two variables.



Weak Ne… Relati… | Weak Positive …ionship | Strong Negative Relationship | Strong Positive Relationship | No Relationship

Practice

…ne… …ionship between the variables

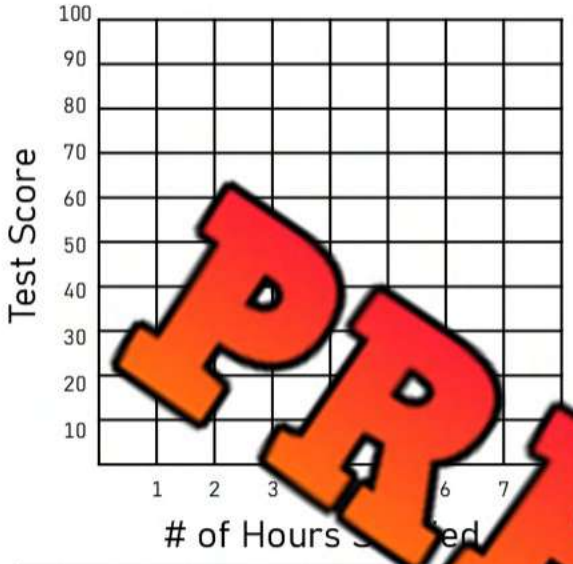
			
1)	2)	3)	4)
			
5)	6)	7)	8)
			
9)	10)	11)	12)

Name: _____ 33

Curriculum Connection
D1.5

Scatter Plot – Relationship Between Variables

Practice Plot the points on the scatterplot and answer the questions

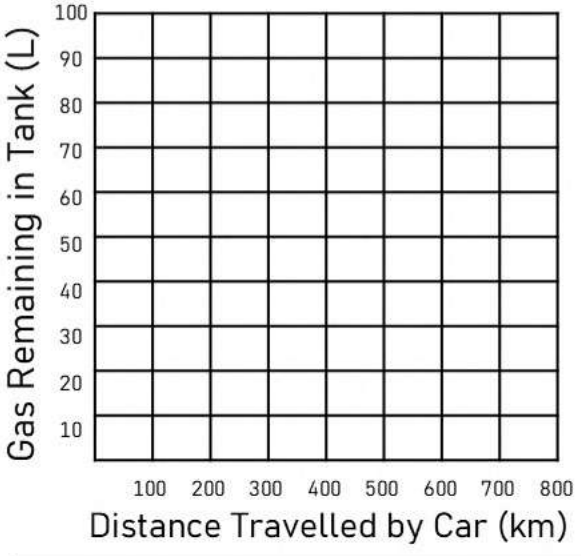


# of Hours Studies	Test Scores
6	90
2	55
1	45
3	70
4	75
7	95
5	80

1) What is the relationship between the variables?

2) Are you surprised about the relationship between the variables? Explain.

3) Could you have predicted the relationship between these variables without graphing the data? Explain



Distance (km)	Gas in Tank
100	70
200	58
300	45
400	31
500	20
600	10
700	0

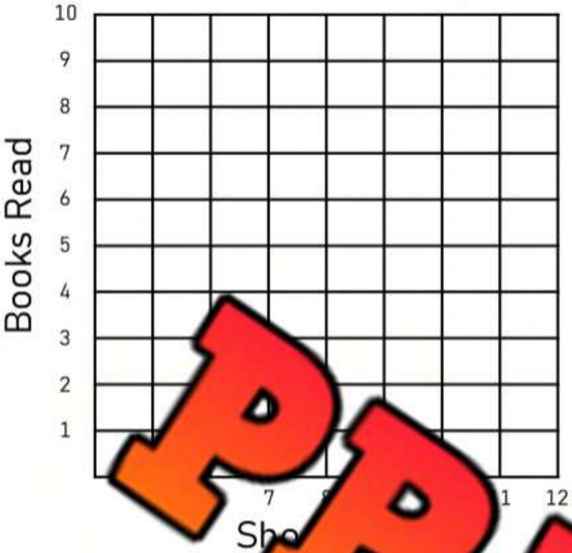
What relationship between variables?

Are you surprised about the relationship between the variables? Explain.

3) Could you have predicted the relationship between these variables without graphing the data? Explain.

Name: ____________________ 34

Practice Plot the points on the scatterplot and answer the questions

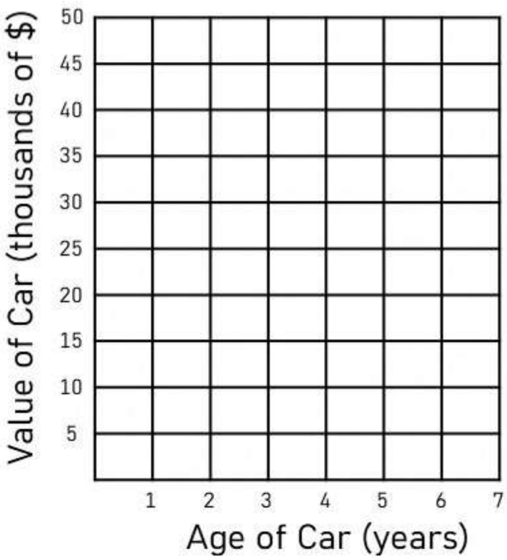


Shoe Size	Books Read
5	4
6	6
8	4
7	2
10	7
6	10
11	3

1) What is the relationship between the variables?

2) Are you surprised about the relationship between the variables? Explain.

3) We've learned t[illegible]e size [illegible]ect how many books someone reads. Write another example of tw[illegible]ari[illegible]ave no relationship.



Age	Value
4	35
6	10
7	15
1	50
3	45
4	40
5	20

A[illegible]	Val[illegible]
2	[illegible]
1	35
6	5
5	35
7	2
3	15
4	25

1) [illegible] the relationship betwe[illegible] variables?

2) [illegible]ed about the relati[illegible] between the variab[illegible]? Explain.

3) Write another example of two variables that would likely have a similar relationship.

Name: _____ 35

Curriculum Connection
D1.5

Explaining Relationship Between Variables

Explain Describe what type of relationship the variables would have. Explain.

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
1	Hours worked	Money earned	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
2	[illegible]	Test scores	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
3	Number of car payments made	Amount owed on car loan	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
4	Number of people in a family	Temperature the family keeps their house	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
5	Minutes of exercise	Calories burned	
Explain			

Name: _____ 36

Curriculum Connection
D1.5

Explaining Relationship Between Variables

Explain Describe what type of relationship the variables would have. Explain.

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
1	Time it takes to get to school (minutes)	Distance (metres) a student lives from school	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
2	How [illegible] ass	Number of absences in a class	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
3	Time the water is being heated (minutes)	Temperature of the water	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
4	Students' height	Students' grades	
Explain			

	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
5	Time spent practicing free throw shooting	Number of free throws missed each game	
Explain			

Name: _____ 37

Curriculum Connection
D1.5

Brainstorming Variables With Different Relationships

Your Turn! Write your own variables that would have the relationship provided

1)	**Strong Positive Relationship**
Variable 1	
Variable 2	
Explain	

	Weak Positive Relationship
Variable	
Variable 2	
Explain	

3)	**Negative Relationship**
Variable 1	
Variable 2	
Explain	

4)	**Weak Negative Relationship**
Variable 1	
Variable 2	
Explain	

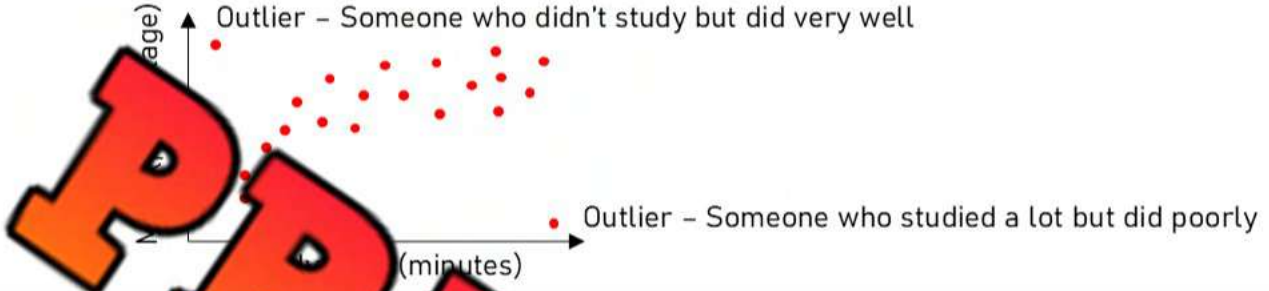
5)	**No Relationship**
Variable 1	
Variable 2	
Explain	

Name: _____ 38

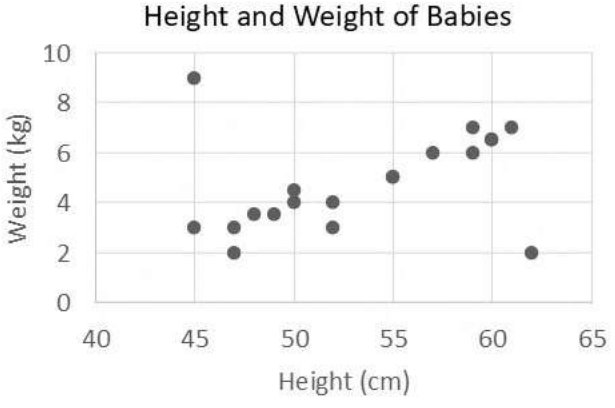
Curriculum Connection
D1.5

Relationship Between Variables - Outliers

When determining the relationship between variables, it is possible that the data has an outlier. An outlier could mean that something went wrong with the data collection, or it may be a valid, unexpected piece of the population that needs further clarification. In many cases, the outlier can be removed so that we can determine the relationship between the variables more accurately.



Practice he o d describe the relationship



1) Which values are outliers?	
2) What is the relationship between the variables?	
3) What caused these outliers?	_____ _____ _____ _____

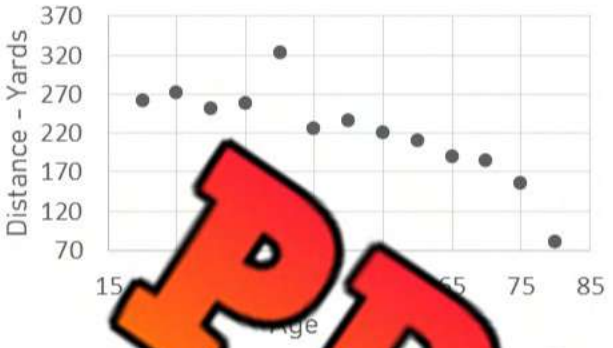
Name: _____ 39

Curriculum Connection
D1.5

Relationship Between Variables - Outliers

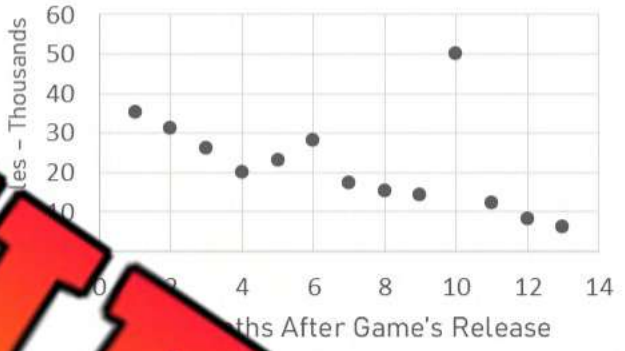
Practice Answer the questions about the scatter plot

1)



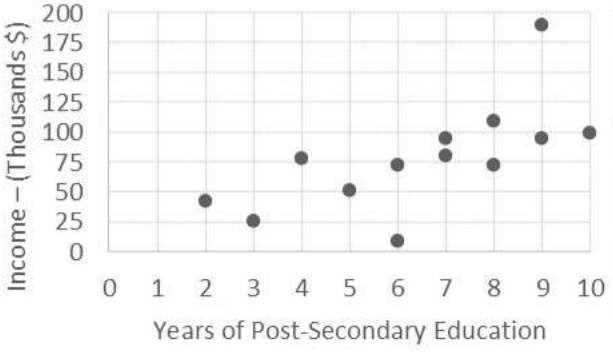
1) Which values are outliers?	
2) What is the relationship between the variables?	
3) What caused these outliers?	

2)



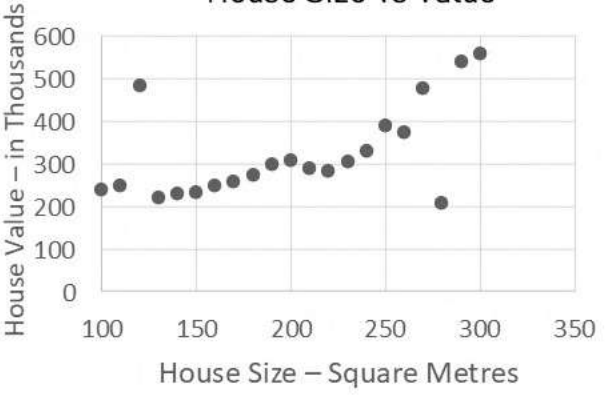
1) Which value	
2) What is the rela between the variables	
3) What could have caused the outlier?	

3)



1) Which va	
2) What is the re between the variable	
3) What caused these outliers?	

4)



1) Which values are outliers?	
2) What is the relationship between the variables?	
3) What caused these outliers?	

Name: _____ 40

Curriculum Connection
D1.5

Line of Best Fit

A line of best fit can be drawn through the majority of the points on a scatter plot. It can be used to make predictions if the relationship between the 2 variables is strong.

When drawing a line of best fit, we can <u>try</u> to use the following criteria:

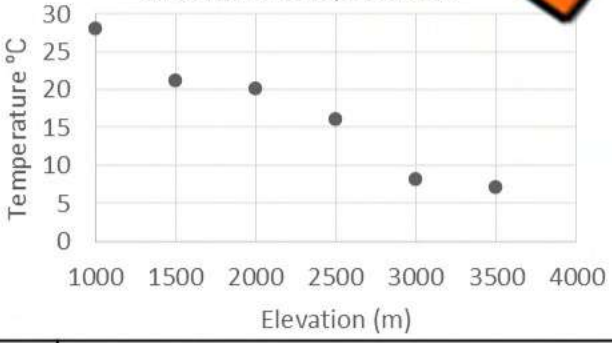
- Draw the line in the middle of the data
- Have equal points on both sides of the line
- Points are an equal distance from the line

<u>Remember</u> – drawing a line of best fit is not an exact science. We should **try** to meet the criteria above, but it will not always be possible. The more you can follow the criteria, the better your line of best fit will be.

A good line of best fit will allow us to make predictions about the data. The line of best fit in the example above is strong. It tells us that prices for tickets in 2030 will be around $47.

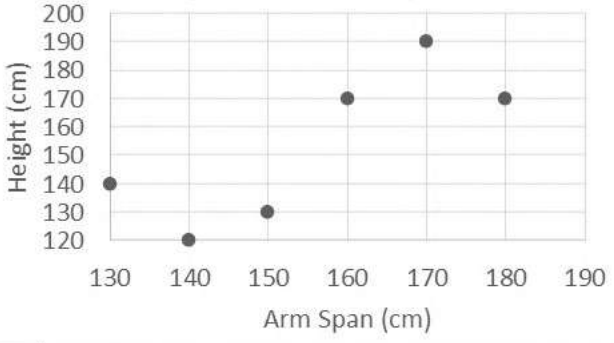
Practice

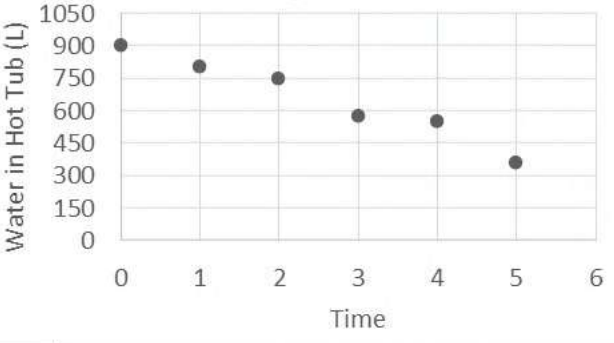
Draw a line of best fit and use it to make a prediction



1)	What will the temperature be at 4000m?

2)	How much wi hours?





3)	What height would someone be with 190cm arm span?

4)	How much water will be in the tub after 6 hours?

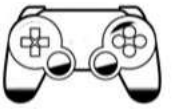
Name: _____ 41

Curriculum Connection
D1.6

Interpreting Scatter Plot – Video Games

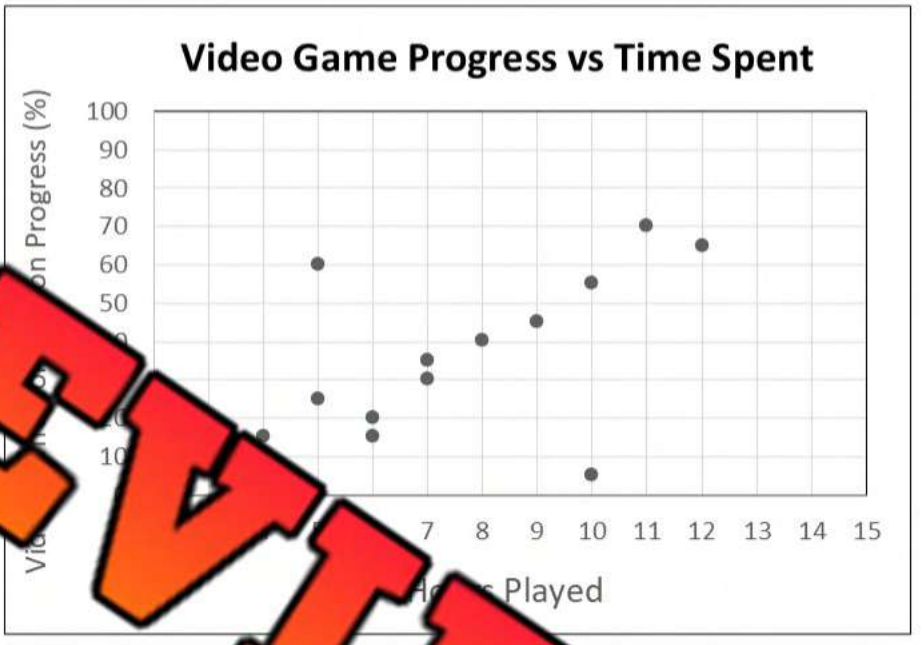
15 people were given a video game and were asked to track their progress in the game and how long they played it for. The results have been represented in the scatter plot below.

Practice | Answer the questions below



Fill in the table of values by reading th… tter plot. Assume ea… has been rounded … 5.

X-Va…	…



1)	What are … outli… t…
2)	What could explain t… outli…
3)	How many people finished over half of the game?
4)	How many people finished less than 30 percent?
5)	Draw a line of best fit. How far do you think a person would get if they played for 15 hours?

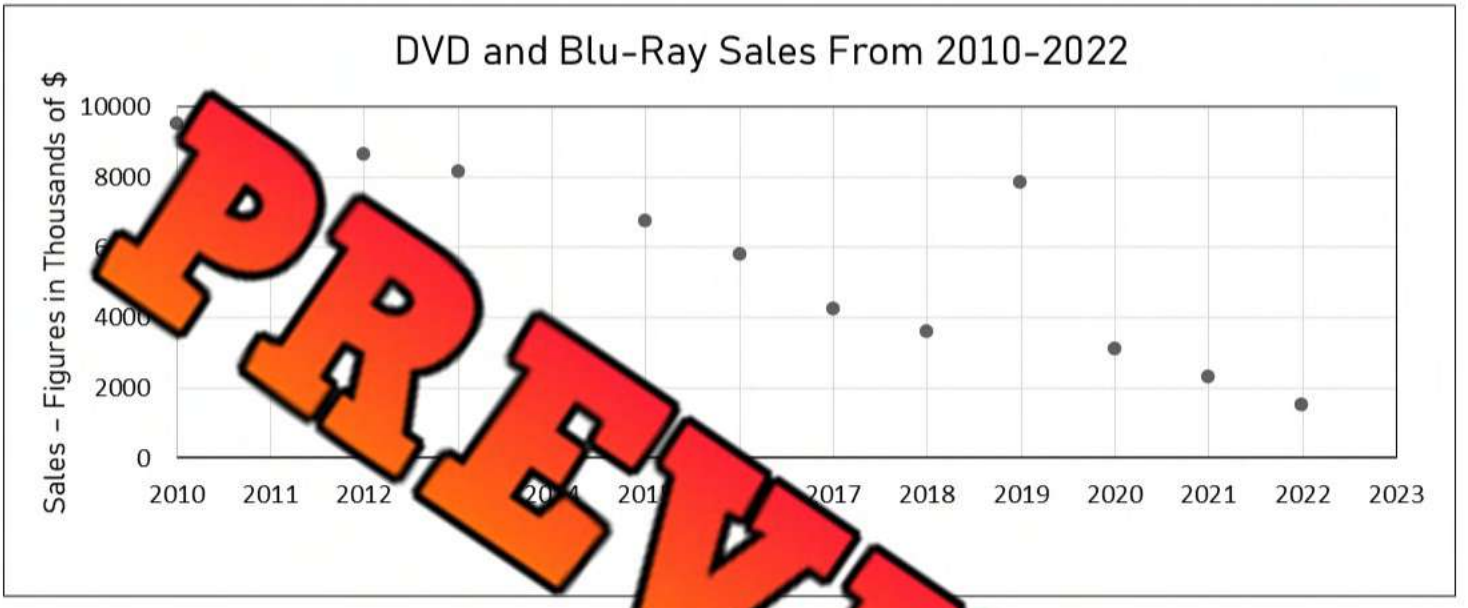
Name: _____ 42

Curriculum Connection
D1.6

Interpreting Scatter Plot – DVD/Blu-Ray Sales

The sales from 2010 to 2022 of blue-ray and DVD's are presented in the scatter plot below.

Practice | Answer the questions below



1)	What are the outliers in the data?
2)	What could explain the outliers?
	_____ _____ _____
3)	What is the relationship between the two variables? Is it strong/weak, positive/ negative?
4)	Which years were the top 5 in sales?
5)	Draw a line of best fit. How many sales do you think there will be in 2023?
6)	How many sales were made in 2022? How many dollars were sold?

Name: _____ 43

Curriculum Connection
D1.6

Creating a Scatter Plot – Gold Rush Population

Directions Display the data below in a scatter-plot

The population in Dawson City fluctuated a lot due to the gold rush. The population has been displayed in the table below. Represent the data in a scatter-plot.

Year	1894	1895	1896	1897	1898	1899	1900
Populat (in thous	1	1	30	35	40	8	6

Interpreting The Data Provide at least 3 conclusions you can draw from the graph.

_____

_____

_____

_____

Name: _____ 44

Curriculum Connection
D1.6

Creating a Scatter Plot – Lemonade Sales

Directions Display the data below in a scatter-plot

Zackary sells lemonade at the end of his driveway. He tracked his sales for the last 17 days and he also tracked the temperature as he wanted to learn more about his business. Represent his data on the scatter plot below.

Temperature °C	# of Sales
24	6
20	3
28	16
25	12
27	17
29	4
29	20
30	18
21	2
26	12
24	10
28	16
25	13
	4
	2
	19
	18

Interpreting The Data Answer the questions below

1) What two outliers did you notice?	
2) What could have caused the outliers?	
3) Draw a line of best fit. How many sales would you expect on a day that is 31°C?	

Name: _____ 45

Curriculum Connection
D1.2

Collecting Primary Data – Scatter Plot

Brainstorm Display the data below in a scatter-plot

Areas of Interest (basketball, video games, music, etc.)	_____ _____

Research Circle the graph you would use to represent the data

Res (Ex. H any ho screen time do daily and ho hours do you exer	_____ _____ _____ _____

Hypothesis Do you expect ship be variables? Explain the type and why

Example I expect a strong negative relationship because the more screen time someone has the less time they have to exercise.	_____ _____ _____ _____

Draw a table that will help you collect and organize your data.

Name: _____ 46

Curriculum Connection
D1.3

Creating a Scatter Plot

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

X axis label ☐ Y axis label ☐ Title ☐ Scale ☐ Value for y-axis ☐

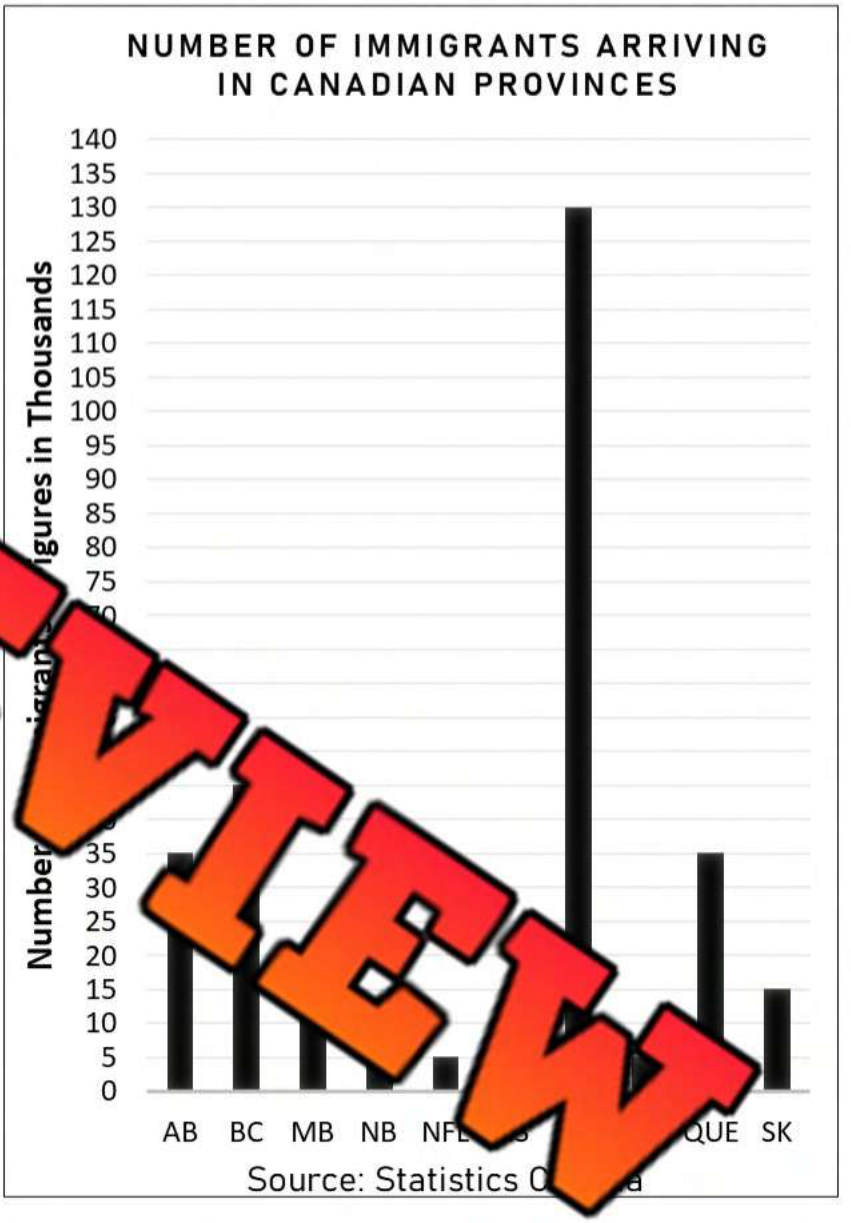
Name: _____ 50

Curriculum Connection
D1.6

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.

F... Table	
MB	
NB	
NFL	
NS	
ON	
PEI	
QUE	
SK	
Mean of Canada	
Mode of Canada	
Median of Canada	



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

Name: _____ 59

Curriculum Connection
D1.6

Activity Title: Flip the Data

Objective

What are we learning about?

Students will engage in a fun and active game where they read data from a bar graph and answer questions to earn the opportunity to flip a bottle or cup. This activity combines data interpretation skills with a physical challenge, adding excitement and a competitive element to learning.

Materials

What you will need for the activity.

- B or cups g
- A sm tboar r t display bar graphs
- Timer (sto h martp p)
- Question card on th data
- Scoreboard to ke

Instructions

How you wi mpl

1. Divide the class into small teams, ideally of 5 tude ch.
2. Prepare a series of bar graphs to display c smart with corresponding question cards that ask about t gr
3. One team at a time comes to the front where the gr play
4. Display the first bar graph on the smartboard.
5. The first student from the active team reads the graph and sel card. Start the timer when the question is first shown.
6. The student answers the question based on the data presented in the graph. The teacher checks the answer.
7. If the student answers correctly, they flip their bottle or cup repeatedly until they land it upright. When they do, the next teammate can take their turn.
8. If the student's answer is incorrect, they must try another question card before they can attempt to flip.
9. The team's turn ends either when all members have successfully flipped their bottle/cup or when the timer reaches a set limit (e.g., 3 minutes).
10. Record the team's time or number of successful flips on the scoreboard.
11. Repeat steps 4-10 for each team. The team with the fastest time wins.

Name: _____ 60

Curriculum Connection
D1.6

Graph 1 | What did you learn from the graph?

Name: _____ 62

Curriculum Connection
D1.6

Graph 3 | What did you learn from the graph?

Name: _____ 65

Curriculum Connection
D1.6

Graph 6 | What did you learn from the graph?

Name: _____ 66

Curriculum Connection
D1.6

Graph 7 What did you learn from the graph?

Name: _____ 67

Curriculum Connection
D1.6

Questions Choose a question to ask the student who is about to flip their bottle

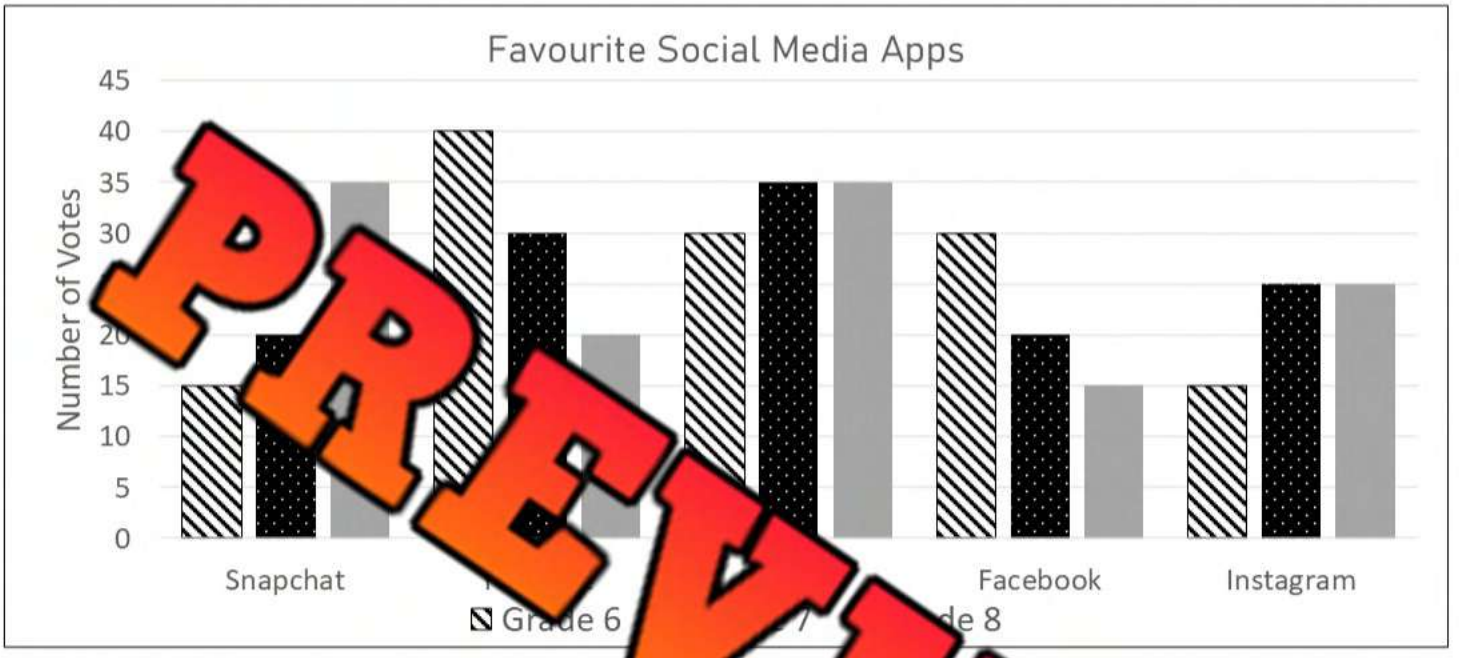
What is the title of the graph?
What is the title of the Y-axis?
What is the title of the X-axis?
What does each bar on the graph represent?
Which cat[illegible]y shows the highest values for both bars?
Which ca[illegible]ows the lowest values for both bars?
How [illegible]go[illegible] displayed on the graph?
What is the ra[illegible]s sh[illegible]n on the Y-axis?
What is the tota[illegible]er of [illegible]sented by all bars?
What is the difference [illegible]etwee[illegible] highest and lowest categories for both bars?
Are there any categories that [illegible]ve si[illegible]des[illegible]ich ones?
How does the value of one specific c[illegible]gory co[illegible]e to [illegible]ers?
What could be a possible reason for the hig[illegible]alue?
What could be a possible reason for the lowest va[illegible]
What trends can you observe from the graph?
How might this data be useful?
If you could add another category to this graph, what would it be?
How would you describe the overall distribution of data?
What insights or conclusions can you draw from this graph?
How might the information on the graph impact decisions or opinions?
What are the 2 sets of data representing?
Name one surprising fact from this data
What scale was used in this graph?
What is a different scale that you could use in this graph?

Name: _____ 70

Curriculum Connection
D1.6

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		7		8	
	#	%	#	%	#	%
Snapchat	15/130	12				
YouTube						
Tik Tok						
Facebook	30/130	23				
Instagram						
Total	/130					

Part 2 Answer the questions below

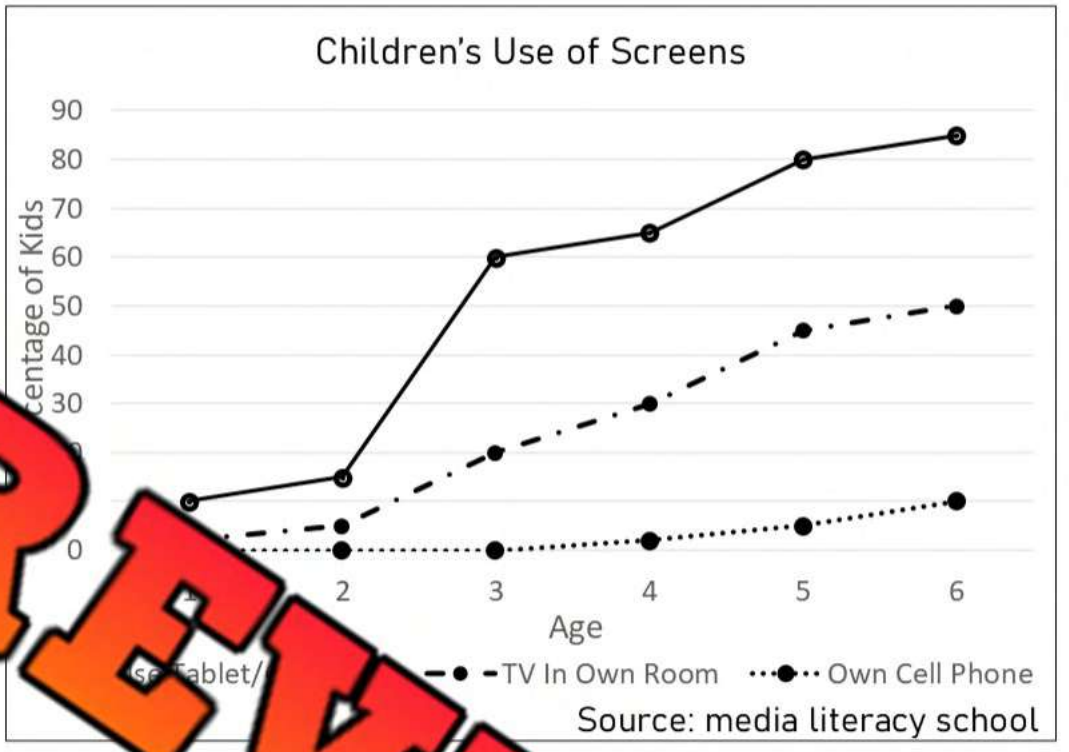
a) How many students in each grade were surveyed?	
b) Which social media was the most popular? How many votes did it get?	

Name: _____ 71

Curriculum Connection
D1.6

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 or TV in their 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 screen use? Explain.

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.

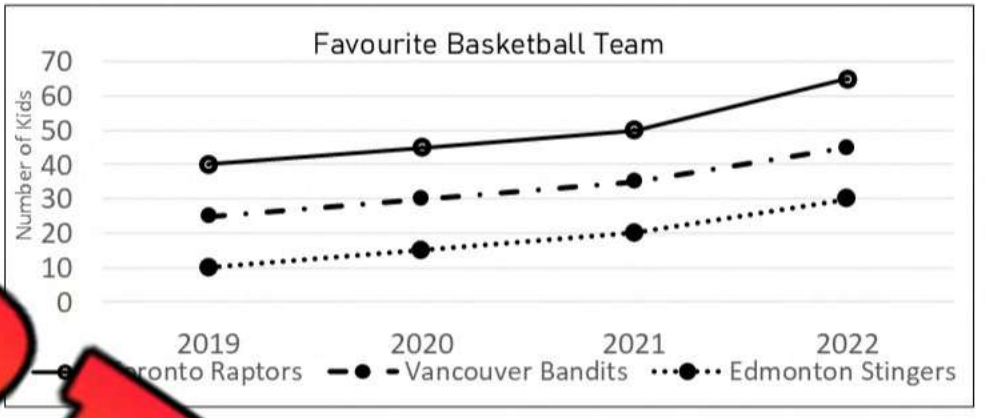
Curriculum Connection
D1.6

Exit Cards

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

Name: _____

The graph represents how many students in a school like each of the Canadian basketball teams (Toronto Raptors, Va... Bandits, and ...on Stingers) a... ...urite team. Th... over ... fr... 2019 to ...



1) How many stude... the To... s as their favourite team in 2021?

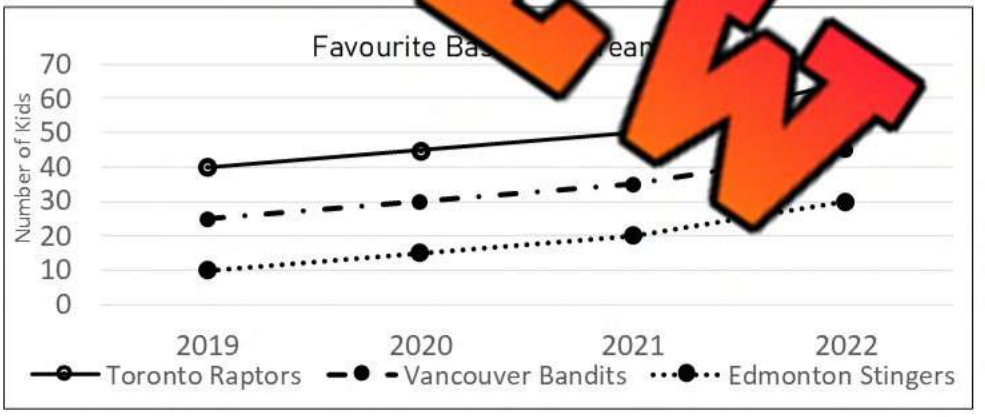
2) How much did the popu... ...ancouv... ...its increase between 2019 and 2022?

3) What is the trend for the Edmo... ...ger... ...er the 4-year period?

4) What conclusions can you draw about how ... basket... Canada?

Name: _____

The graph represents how many students in a school like each of the Canadian basketball teams (Toronto Raptors, Vancouver Bandits, and Edmonton Stingers) as their favourite team. The data is collected over a 4-year period from 2019 to 2022.



1) How many students listed the Toronto Raptors as their favourite team in 2021?

2) How much did the popularity of the Vancouver Bandits increase between 2019 and 2022?

3) What is the trend for the Edmonton Stingers' popularity over the 4-year period?

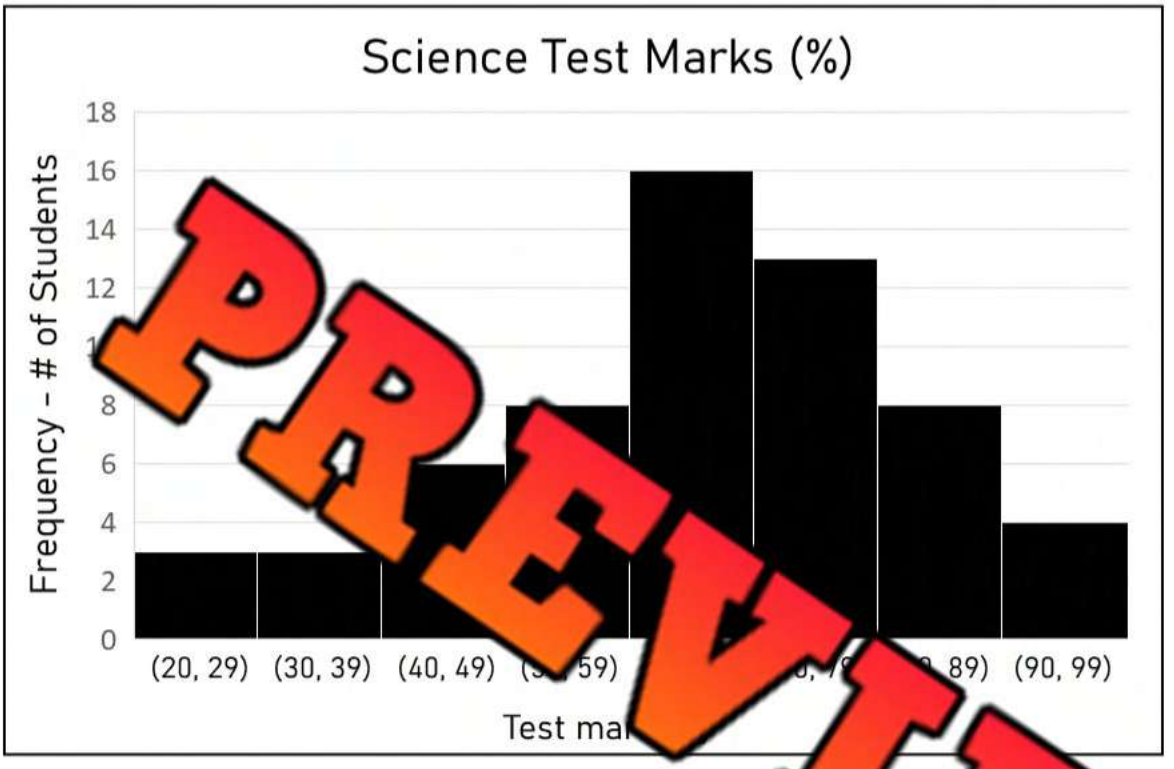
4) What conclusions can you draw about how popular basketball is in Canada?

Name: _____ 75

Curriculum Connection
D1.6

Interpreting a Histogram

The science teacher posted a histogram of the results of the last test.



Questions Fill in the tables below

Frequency Table	
0-9	
10-19	
20-29	
30-39	
40-49	
50-59	
60-69	
70-79	
80-89	
90-99	

a) Which test score was mos ?	
b) Did most people pass or fail?	
c) How many students failed the test (< %)?	
d) How big are the intervals? What range of marks do they include?	
e) How many students took the test?	
f) How many students got an A (80%+)?	
g) Based on the results, do you think the test was easy, hard, or fair? Explain your thinking.	

Name: _____ 76

Curriculum Connection
D1.3

Creating a Histogram

A **histogram** is used to display the frequency of numerical data. We can use a histogram to display continuous or discrete data, but only with quantitative data. If the data is qualitative, we would use a bar graph instead.

Directions | Display the data below in a histogram

A restaura[illegible]r wanted to know what age groups used his restaurant the most[illegible] asked 30 customers their age. His data is prese[illegible]w. Represent the data in a histogram.

15	18	5[illegible]	25	28	13	33	55	57
62	21	[illegible]	[illegible]	0	30	44	41	58
68	61	72	5[illegible]	[illegible]1	8	42	53	64

Name: _____ 77

Curriculum Connection
D1.2

Collecting Data - Histogram

Data Collection Collect primary or secondary data and represent it in a histogram

Question of Interest	_____
	_____

Use the b w to organize your data.

Interpreting The Data Answer quest low

1) Was your data collected from a primary or secon rce?

2) Why did you choose to learn more about this topic?

_____

_____

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

_____

_____

_____

4) What further research should be done in relation to the topic you chose?

_____

_____

Name: _____ 78

Curriculum Connection
D1.3

Creating a Histogram

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

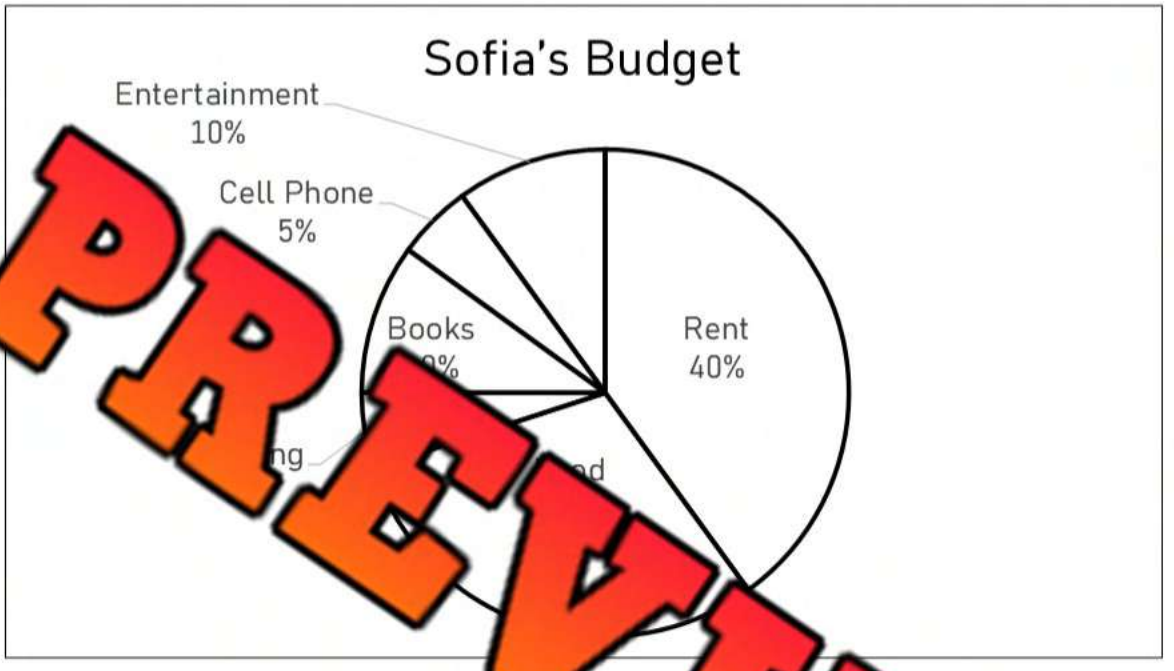
X axis label ☐ Y axis label ☐ Title ☐ Scale ☐ Intervals/Bins ☐

Name: _____ 79

Curriculum Connection
D1.6

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 tabl adin le graph

	Rent	Food	Clothing	Boo	ell Pho	ntertainment
%						
$ 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?	
_____ _____	

Curriculum Connection
D1.6

Exit Cards

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

Name: _____

Alex is planning a vacation. He has $1500 to spend in total on various activities and needs. He created a circle graph to better understand how he will allocate his money.

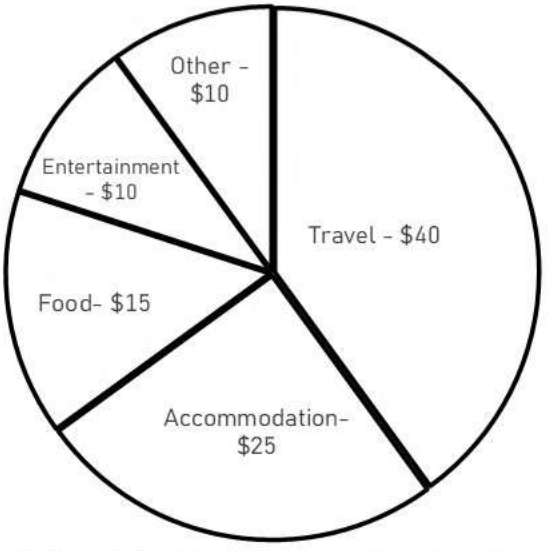
Alex's Vac udget

1) What will Alex spend most of his money on?	
2) Which two categories together account for 65% of his vacation budget?	
much money will Alex food and entertainment	
t per do all 5 egories	

Name: _____

Alex is planning a vacation. He has $1500 to spend in total o iou
needs. He created a circle graph to better understand how he will a .

Alex's Vacation Budget



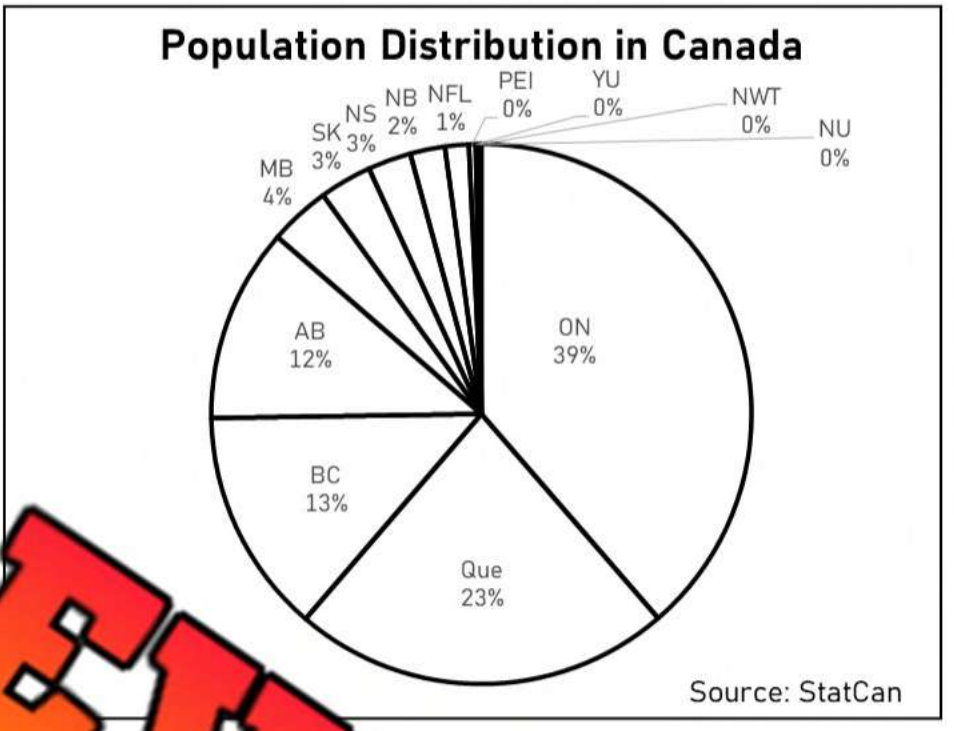
1) What will Alex spend most of his money on?	
2) Which two categories together account for 65% of his vacation budget?	
3) How much money will Alex spend on food and entertainment combined?	
4) What percentage do all 5 categories add up to?	

Name: _____ 81

Curriculum Connection
D1.6

Circle Graph – Population Distribution

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



Part 1

Fill in the frequency table by using 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.

_____

_____

Name: _____ 82

Curriculum Connection
D1.3

Drawing a Circle Graph – Global Emissions

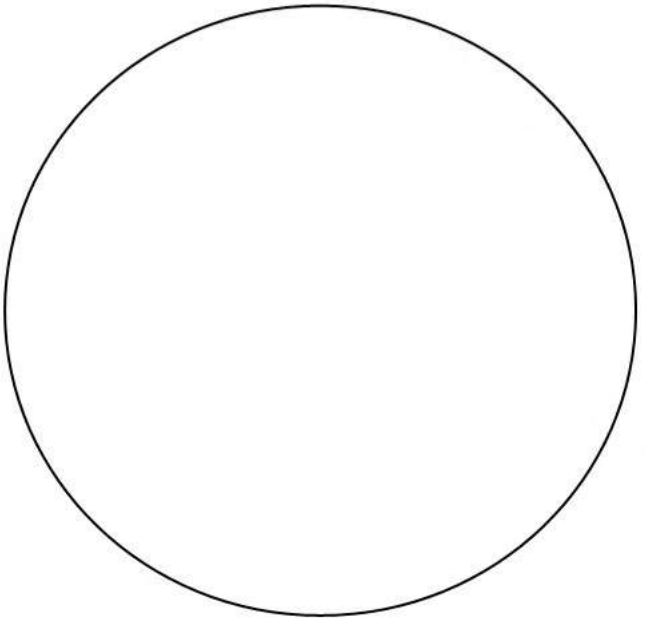
According to the World Resources Institute, Canada accounts for approximately 2% of global greenhouse emissions. The emissions each country produces are listed in the table below.

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
Ch	30	30/100	0.30	0.30 x 360 = 108°
	15	15/100	0.15	0.15 x 360 = 54°
Europe	9			
Russia	5			
India				
Japan				
Brazil	2			
Canada	2			
Others	29			

Part 2 Use a protractor to draw the angles for a circle gr

_____



1) How many times does China produc

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

_____

_____

_____

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

_____

_____

_____

Name: _____ 83

Curriculum Connection
D1.2

Collecting Qualitative Data – Circle Graph

Data Collection	Collect categorical data that you can plot using a circle graph

Question of Interest (Ex. Favourite _____ or which app you use most)	_____ _____

Draw a table that will help you collect and organize your data.

Interpreting The Data

1) Was your data collected from a primary or secondary source? _____

2) What conclusions can you draw from your data? List your findings.

_____

_____

_____

_____

_____

3) How will graphing this data as a circle graph help readers understand the data?

_____

_____

_____

Name: _____ 84

Curriculum Connection
D1.3

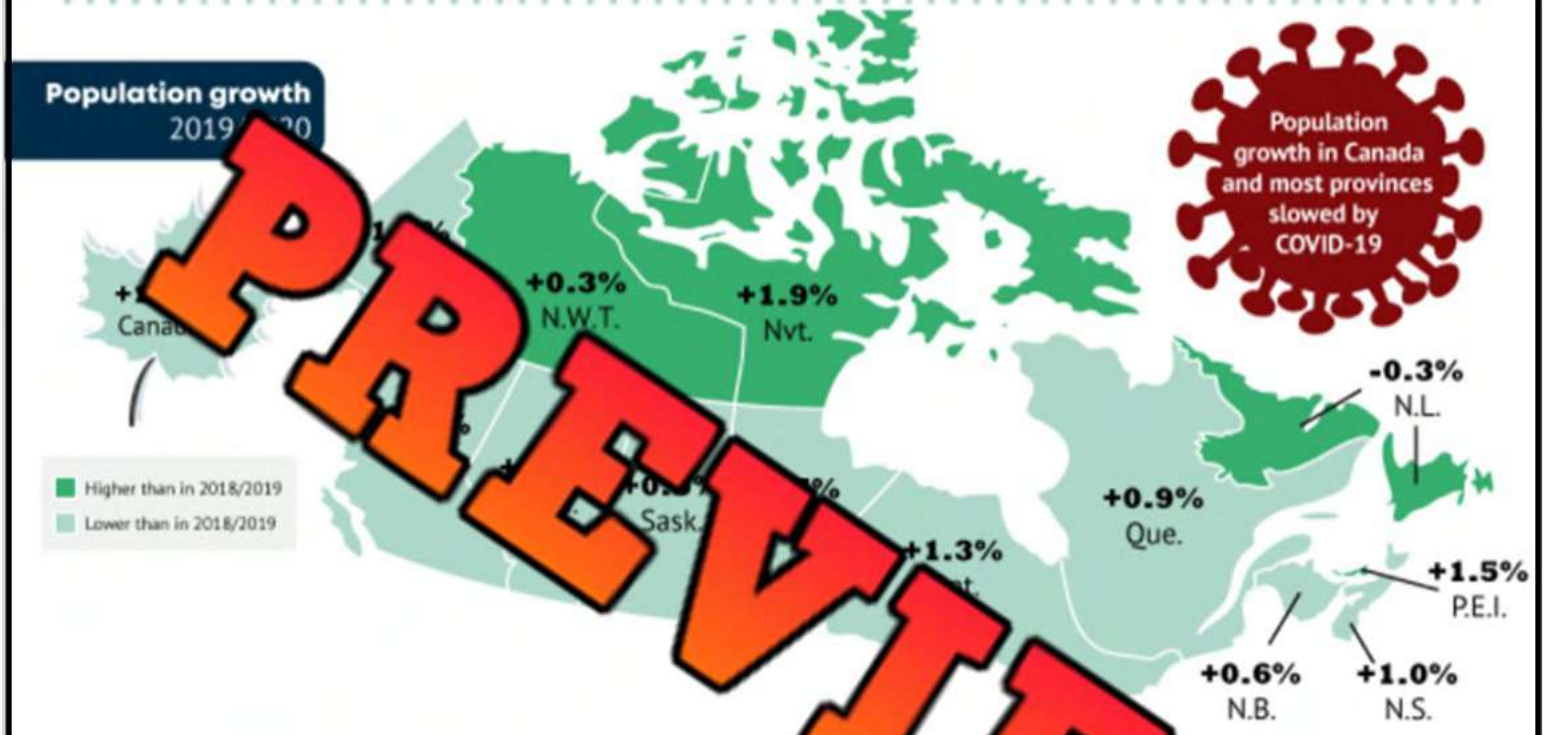
Creating a Circle Graph

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

- ☐ Title
- ☐ Labels for each section
- ☐ Percentages/totals

CANADA'S POPULATION | JULY 1, 2020

Canada's population reached the **38-million** mark between April 1 and July 1, 2020. However, the annual increase of **411,854** was the lowest since 2015/2016 due to international migration being slowed by COVID-19.



Canada recorded its lowest natura

This was expected because of the overall aging of the po it was lified by the impacts of the COVID-19 pandemic, with more g

While Canada has welcomed record numbers of permanent and temporary immigrants since 2015/2016, international migratory growth decreased sharply from April 1 to June 30, 2020, following the border restrictions introduced as a result of the pandemic.

Name: _____ 95

Curriculum Connection
D1.4

Creating an Infographics

Directions Display the data set in different ways. Write in the boxes and draw pictures

Students in high school often have jobs outside of school. A study was done to determine if having a job led to better or worse grades. The number of hours a student worked, and their grades are represented in the table below.

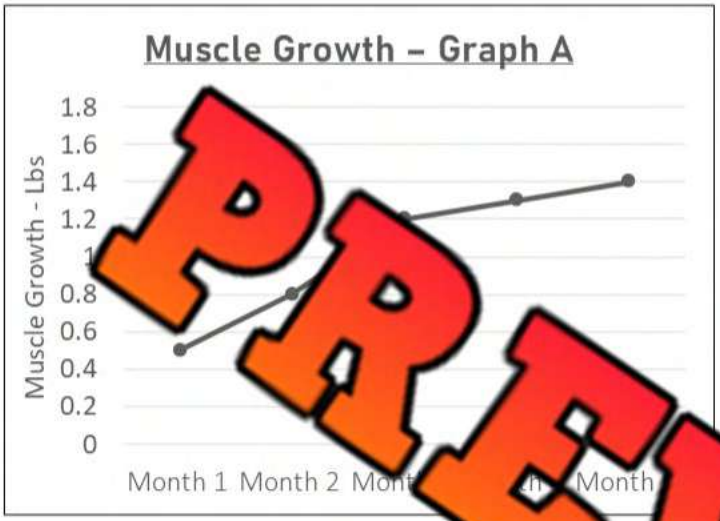
Hours W (we	1	3	2	1	4	3	6	7	5	6	4	5	6
A Grades			70	55	80	70	80	95	85	95	75	80	90

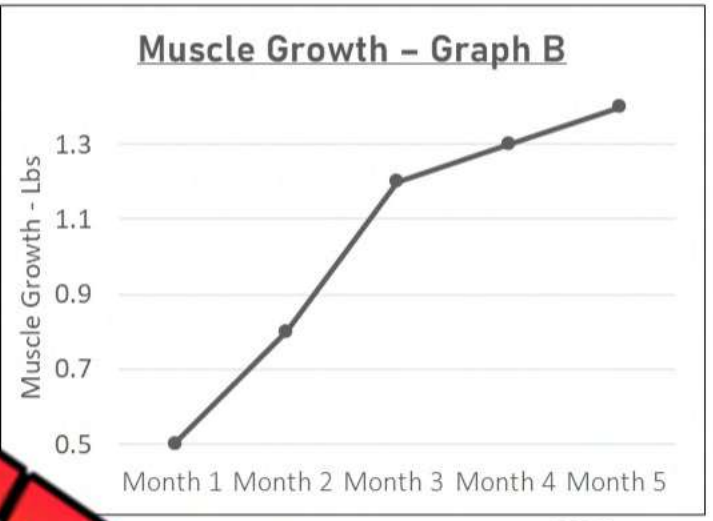
Name: _____ 99

Curriculum Connection
D1.6

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?





Questions What do you notic[illegible]ne t[illegible]phs?

a) Which graph would you use to show custom[illegible]at yo[illegible] 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.

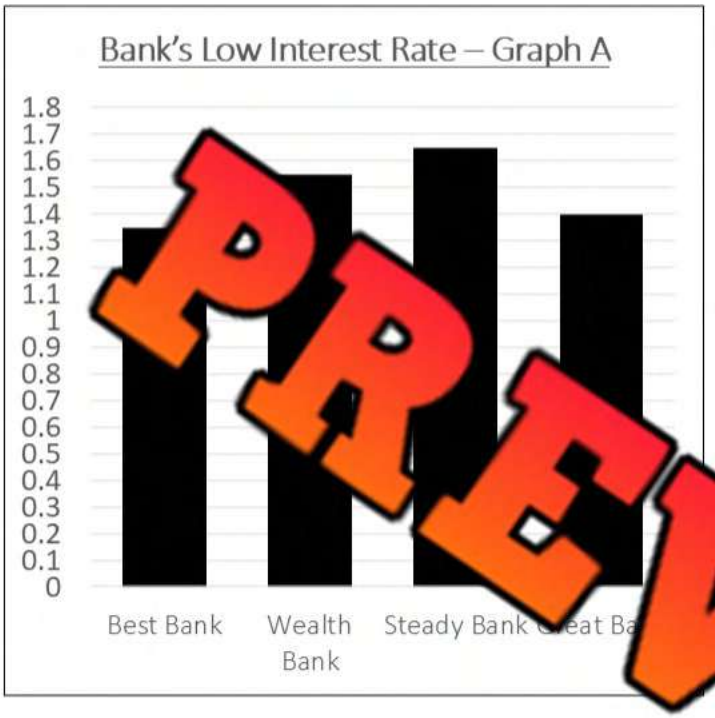
e) Why is it important to read a graph carefully?

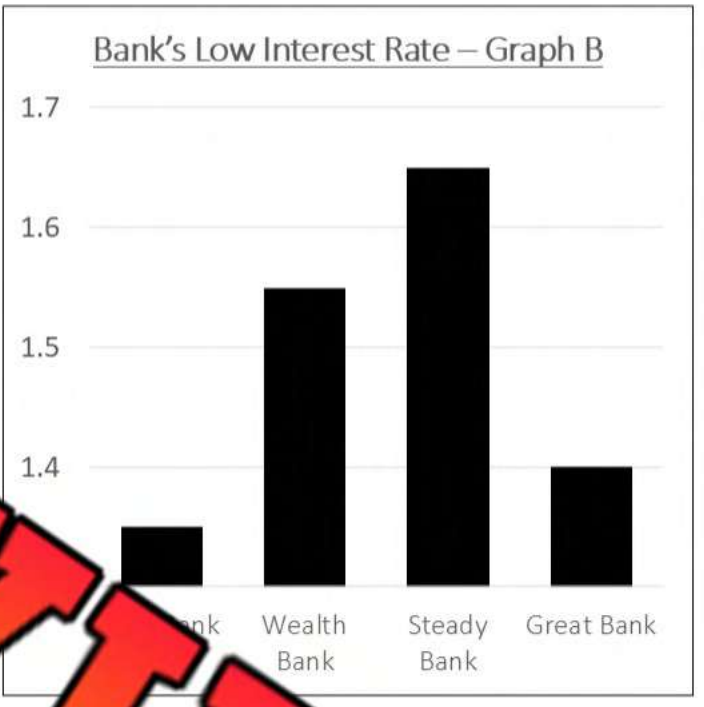
Name: _____ 100

Curriculum Connection
D1.6

Misleading Graph – Bar Graph

Best Bank is advertising their low interest rate compared to 3 other bank's interest rates. They want to show their rate is by far the lowest. Which graph should they use?





Questions What do you notice about

a) How are the graphs different? Do they have the sa

b) Which graph would you use if you were Best Bank? Explain.

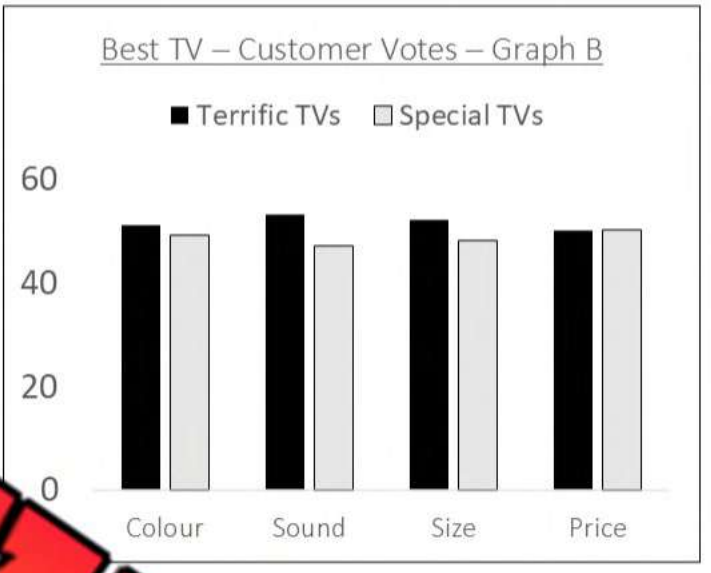
c) Why would advertisers use misleading charts like this to sell their products?

Name: _____ 101

Curriculum Connection
D1.6

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.



Questions What do you notic t the t phs?

a) Which graph would you use if you were T TVs?

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

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.

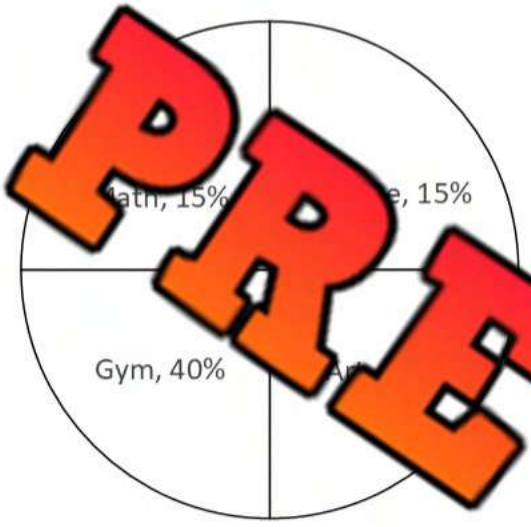
Name: _____ 102

Curriculum Connection
D1.6

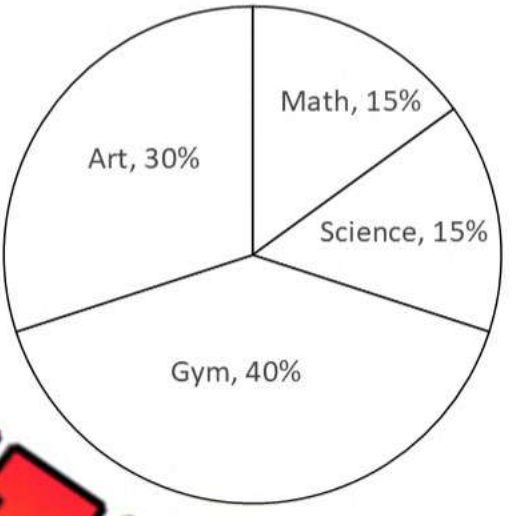
Misleading Graph – Circle Graph

A Science and Technology school is trying to advertise that Science is a popular subject for students. A study that surveyed 100 students asking 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.

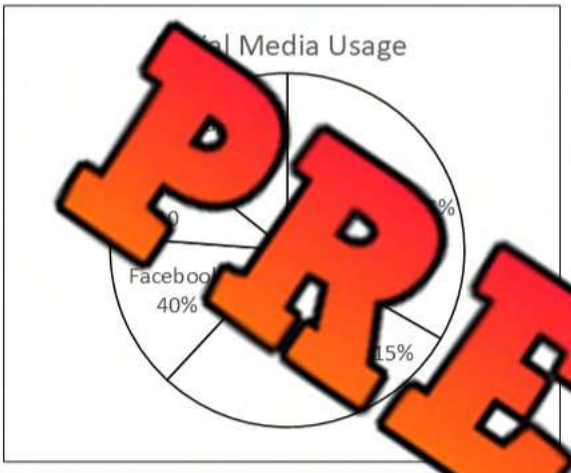
Curriculum Connection
D1.6

Exit Cards

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

Name: _____

A tech company conducted a survey to find out which social media platforms were the most popular. They asked 200 teenagers, aged 13–17. The results are displayed below:



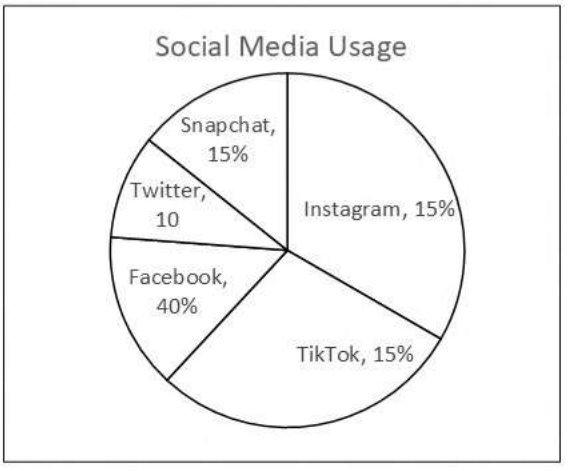
a) Why is this circle graph misleading?

b) Why is it important to look at the group being surveyed (teenagers) before trusting the data?

c) Can you trust all data? What are some ways companies can create misleading data through surveys?

Name: _____

A tech company conducted a survey to find out which social media platforms were the most popular. They asked 200 teenagers, aged 13–17. The results are displayed below:



a) Why is this circle graph misleading?

b) Why is it important to look at the group being surveyed (teenagers) before trusting the data?

c) Can you trust all data? What are some ways companies can create misleading data through surveys?

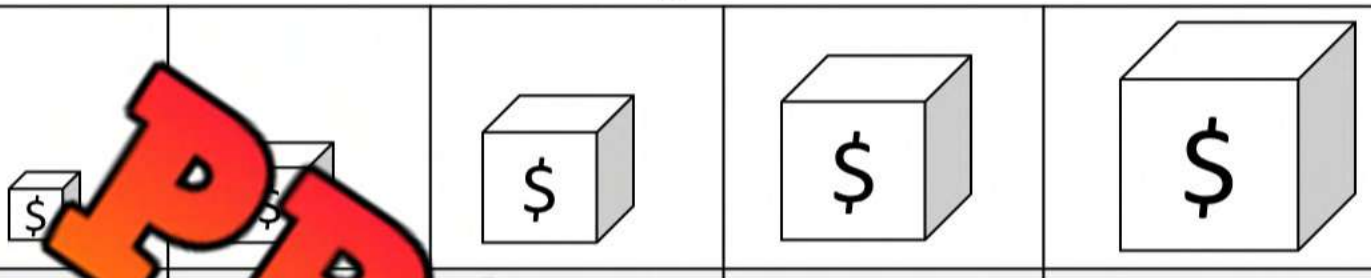
Name: _____ 105

Curriculum Connection
D1.6

Misleading Pictograph – Company Earnings

Newco Software Company has been operating for the last 5 years. Their earnings each year have been represented in the pictograph below.

Newco's Earnings – Last 5 Years



Year 1	Year 2	Year 3	Year 4	Year 5
$15 405	[illegible]	[illegible]	$64 851	$81 235

Questions What do yo[illegible] abo[illegible] graph above?

a) How much more earnings did Nev[illegible] ake in [illegible] than Year 1?

b) What do you notice or wonder about the grap[illegible] a[illegible] st at t[illegible]? things.

c) Why is the graph misleading? Hint: look at the size difference between Year 1 and Year 5. Remember your understanding of volume.

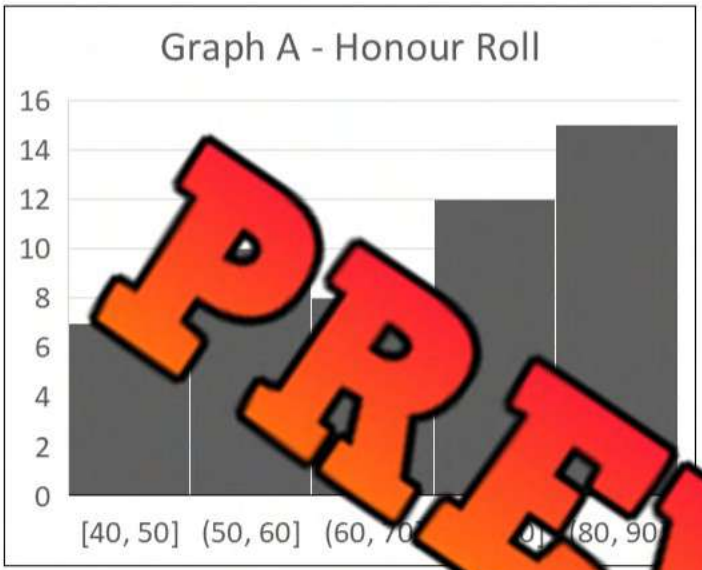
d) Approximately how many times larger is the Year 5 cube than the Year 1 cube?

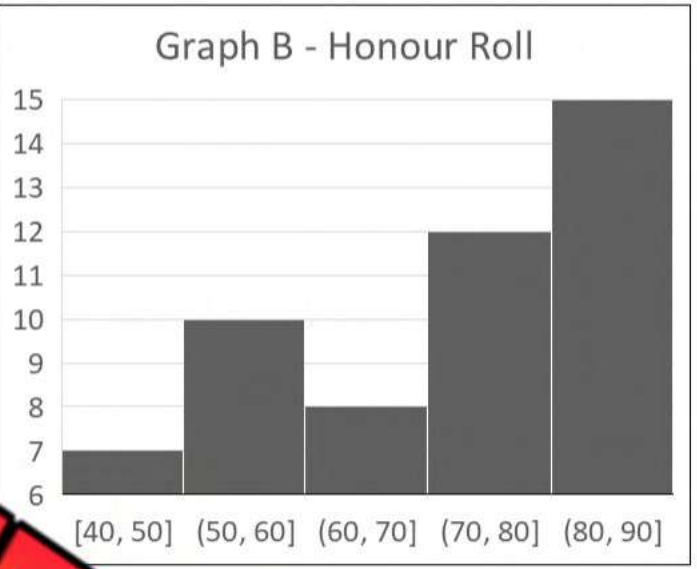
Name: _____ 107

Curriculum Connection
D1.6

Misleading Graphs

Wellington High School is proud of how many students they have on their honour roll (80% or more). They want to show off their success by posting their data.





Questions What do you notic[illegible]ne t[illegible]phs?

a) Which histogram should Wellington High [illegible] use [illegible]nt to emphasize their success?

_____

_____

_____

b) How many more students were on the honour roll? _____

c) How many did not make the honour roll? _____

d) Would it be fair to use Graph B? Why or why not?

_____

_____

_____

e) Make a connection – Have you ever seen an advertisement use a misleading graph?

_____

_____

Name: _____ 108

Curriculum Connection
D1.6

Truth or Lie? Graph Edition

Objective

What are we learning about?

Students will learn to identify and explain misleading elements in graphs, developing critical thinking skills and understanding how data can be manipulated in visual representations.

Materials

What you will need for the activity.

- A [illegible] printe[illegible] graphs (some accurate, some misleading)
- Smartboa[illegible]or to [illegible] the graphs

Instructions

How y[illegible]mple[illegible]ctivity

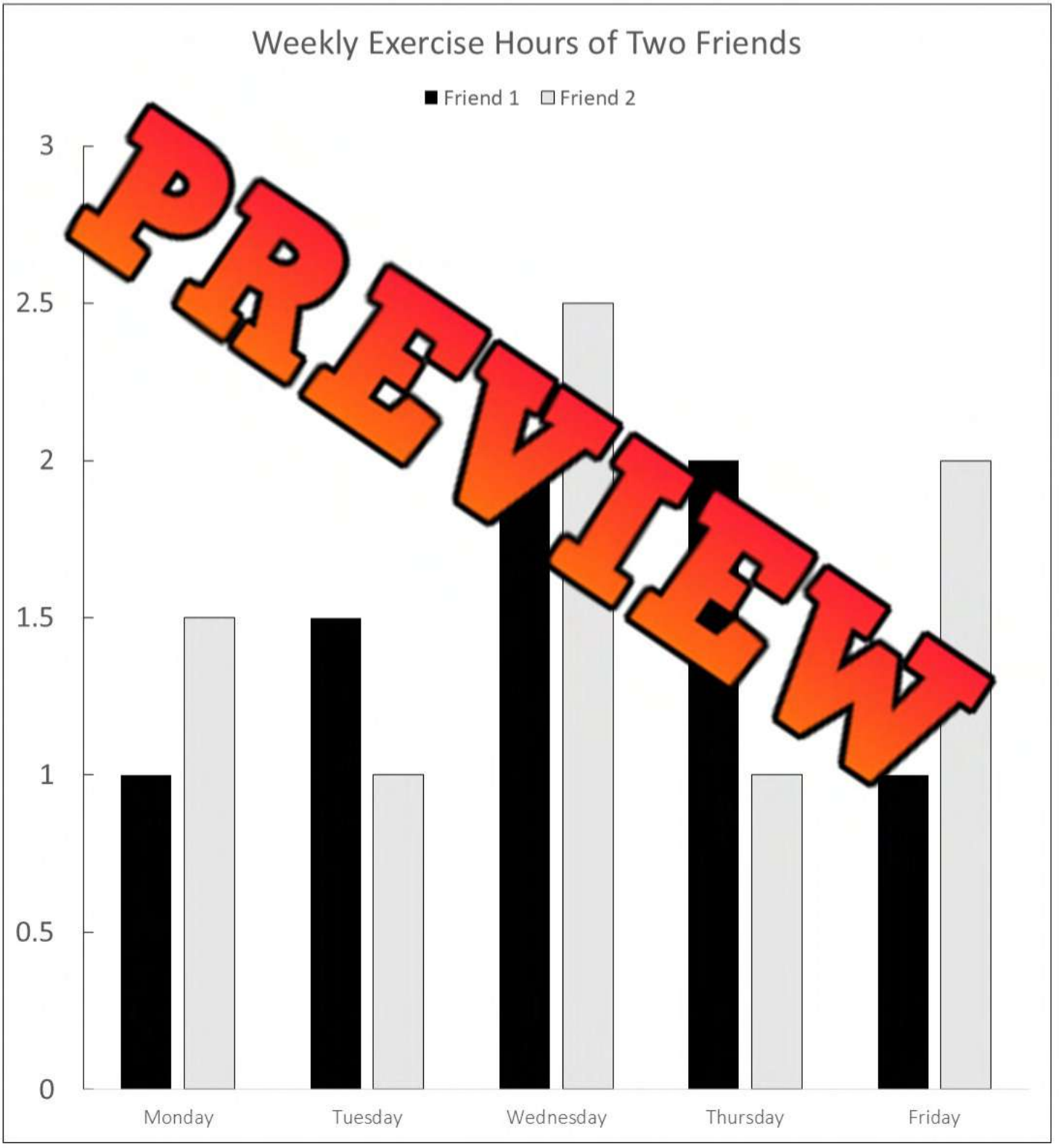
1. Begin by explaining the concept of [illegible]ing gr[illegible] the students, highlighting common ways graphs can be mani[illegible]ed (e.g[illegible]ales, omitting data, exaggerating differences).
2. Show each graph one at a time on the smart[illegible]d or[illegible] sure all students can see the graph clearly.
3. After showing each graph, ask the students to use fing[illegible]ials[illegible]ir decision. They show one finger if they believe the graph is true[illegible] misleading) and they show two fingers if they believe the grap[illegible]ading in some way).
4. Once all students have made their decisions, invite a few students to explain their reasoning. Ask them to point out specific elements of the graph that make it true or misleading, such as the use of a misleading scale or omitted data.
5. Facilitate a class discussion to reinforce key concepts, summarizing the points made by the students and providing additional examples if necessary.
6. Repeat steps 3-6 for each graph in the set. Encourage students to look for new elements that might be misleading as they view different graphs.
7. After all graphs have been discussed, ask the students to reflect on what they have learned. Provide them with questions to think about or answer in their math journals or as a group.

Name: _____ 109

Curriculum Connection
D1.6

Graph What do you notice about the graph?

Two friends, Alex and Jamie, tracked the hours they spent exercising from Monday to Friday. The graph compares their daily workout routines over the course of the week.



Name: _____ 110

Curriculum Connection
D1.6

Graph What do you notice about the graph?

A local bakery recorded its monthly sales over the first half of the year. The graph illustrates the sales trends, aiming to show a rapid increase in income.

Name: _____ 111

Curriculum Connection
D1.6

Graph What do you notice about the graph?

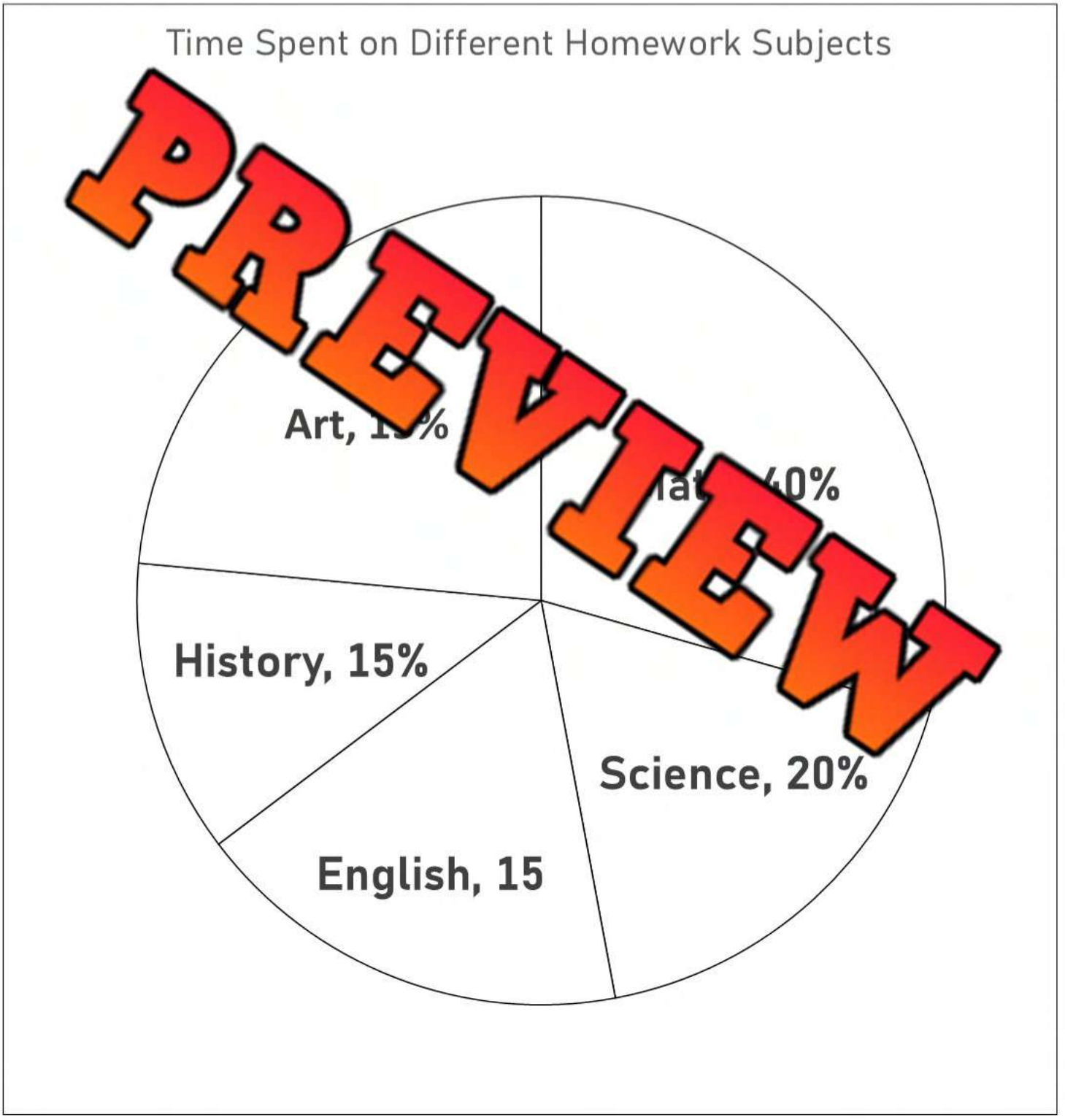
Two households tracked their internet usage from January to May to monitor their data consumption. The graph displays how much data each household used each month.

Name: _____ 113

Curriculum Connection
D1.6

Graph What do you notice about the graph?

A group of students tracked how much time they spent on different homework subjects—Math, Science, English, History, and Art. The circle graph displays how their time was divided between the subjects.

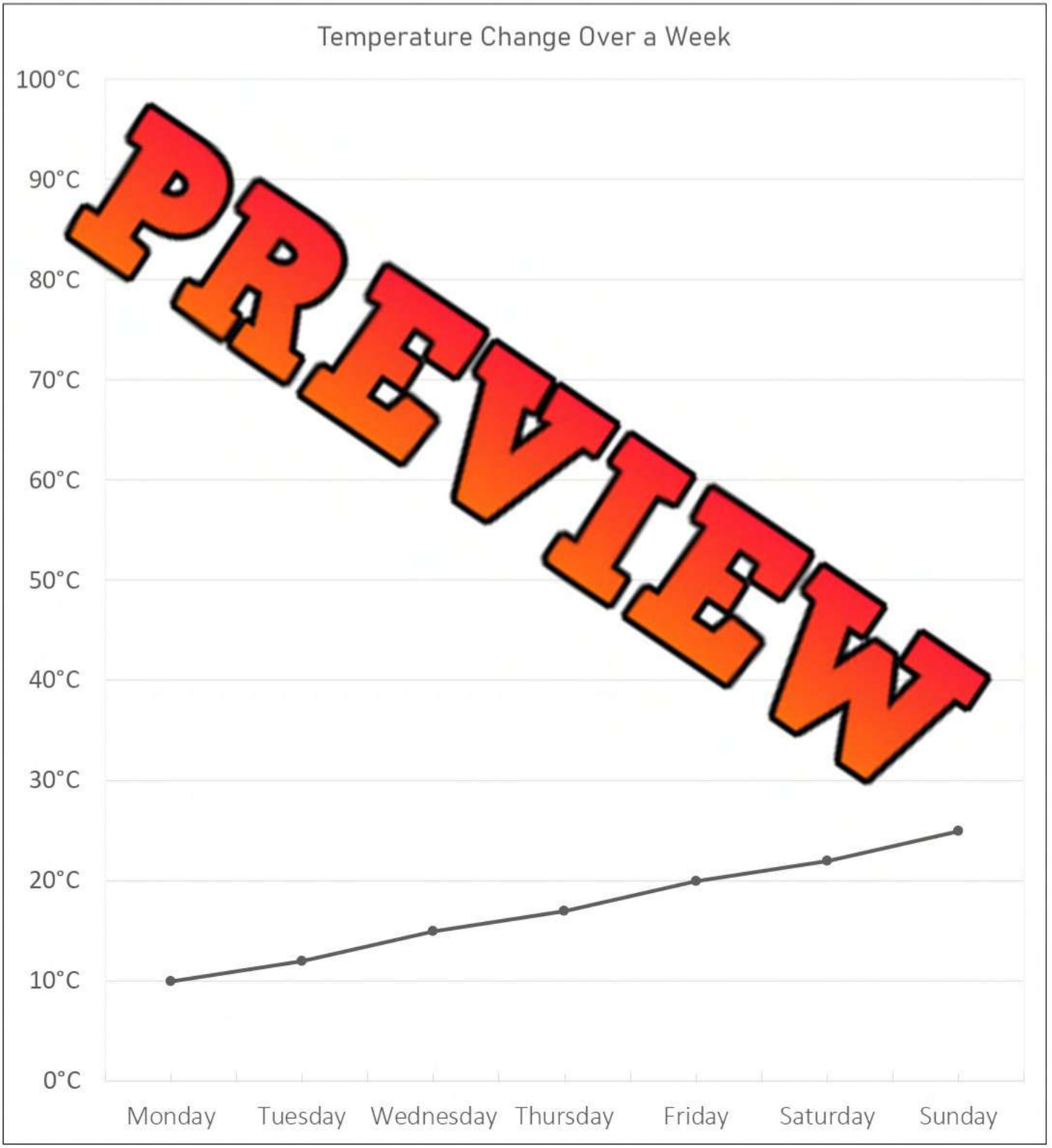


Name: _____ 114

Curriculum Connection
D1.6

Graph | What do you notice about the graph?

The graph shows how temperatures fluctuated in a city over the course of a week, from Monday to Sunday.

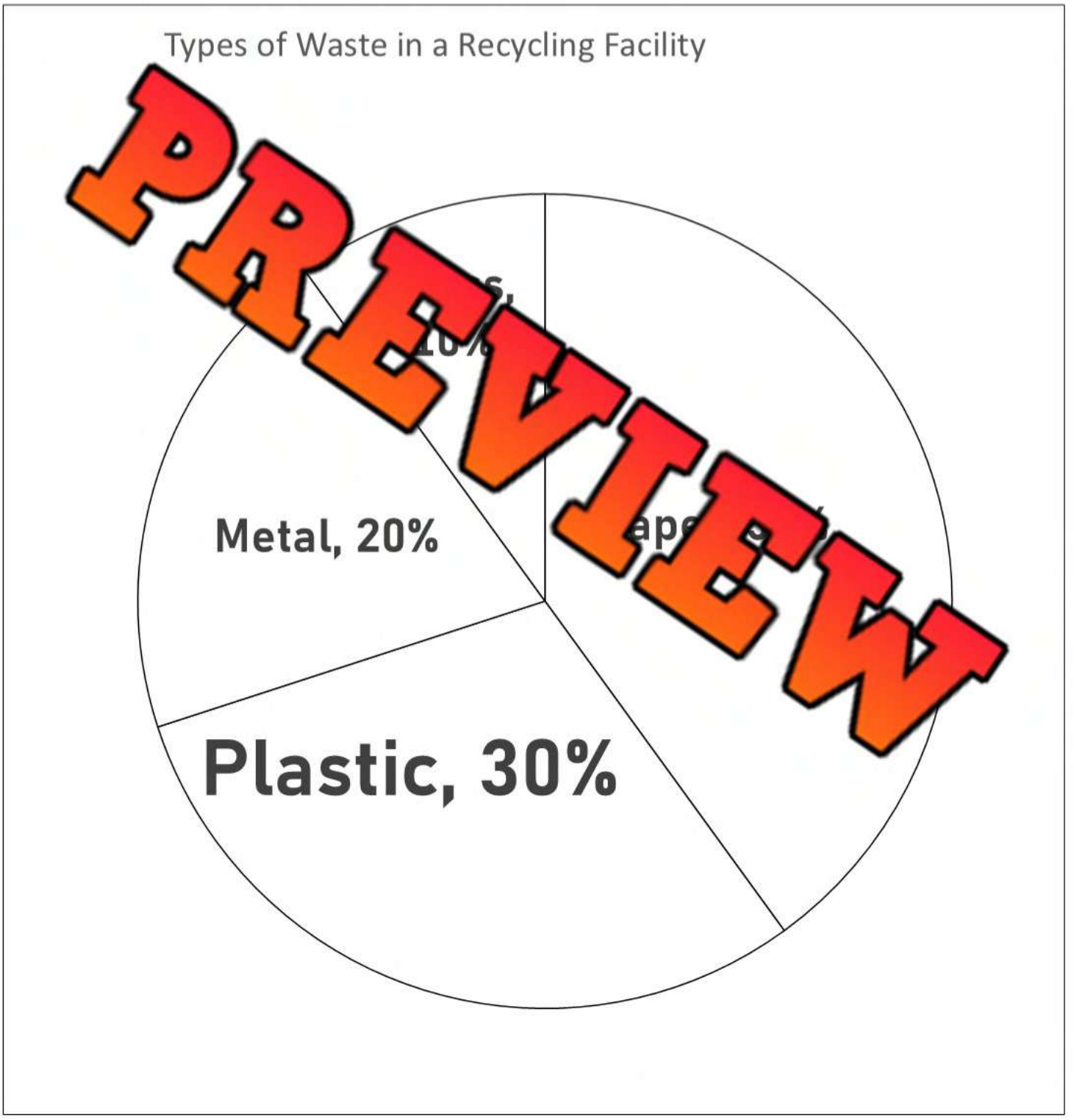


Name: _____ 116

Curriculum Connection
D1.6

Graph | What do you notice about the graph?

A recycling facility is against the use of plastic for packaging, so they track the types of waste processed—paper, plastic, metal, and glass—and displayed them as a percentage of the total waste processed at their facility.



Name: _____ 117

Curriculum Connection
D1.6

Graph What do you notice about the graph?

This graph compares the average salaries in two professions—Engineering and Marketing—over five years. The graph was made by professionals in the field of engineering and marketing who believe their incomes have not increased enough.

Name: _____ 119

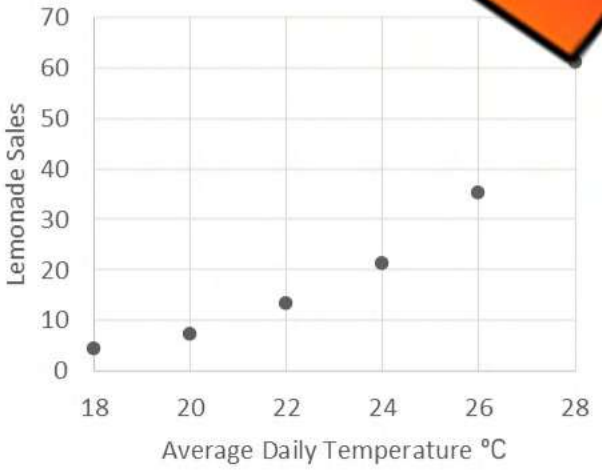
Unit Test – Data Analysis

Part 1 Is the example one-variable or two-variable data? Use a checkmark ✓

	Example	One-Variable	Two-Variable
1)	Favourite subject in school		
2)	How many minutes studied and mark received on test		
3)	How [illegible] fans in attendance and how loud the arena is		
4)	How [illegible] player scores in a season		
5)	[illegible] piano and mistakes made pl[illegible] a son[illegible]		

Part 2 Does [illegible]ph re[illegible]e or two variables? Describe both variables

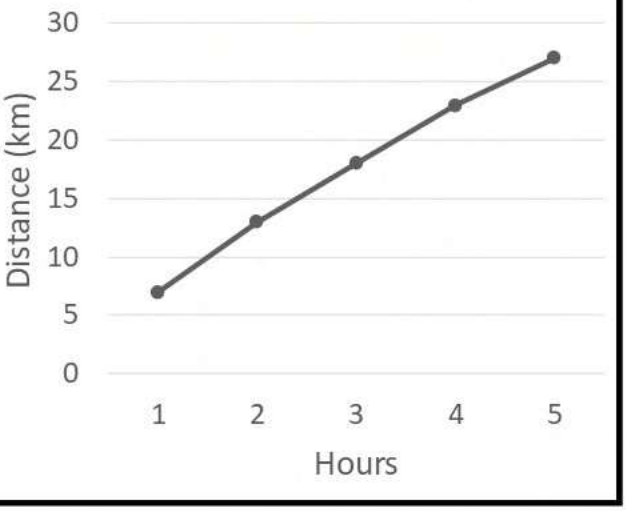
Lemonade Sales vs Tempe[illegible]



	[illegible]e graph represent one or two variables?
1	
2a)	Describ[illegible]abl[illegible]mber 1
2b)	Describe va[illegible]mber[illegible]pplicable)

	Does the graph represent one or two variables?
1)	
2a)	Describe variable number 1
2b)	Describe variable number 2 (if applicable)

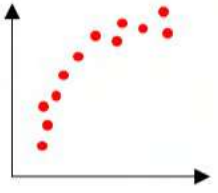
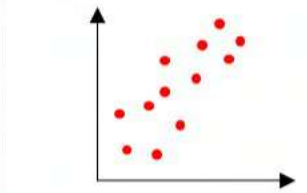
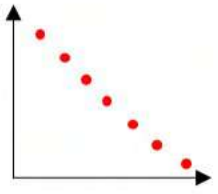
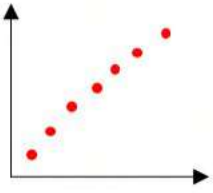
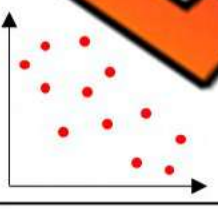
Distance-Time[illegible] Graph - Race



Part 3 — Circle the graph you would use to represent the data

	Description	Graph A	Graph B
1)	You are displaying two sets of data from grade 7s and grade 8s	Multiple Bar Graph	Histogram
2)	You want to show the relationship between two variables	Histogram	Scatter Plot
3)	You want to graph continuous data	Broken-Line	Histogram
4)	You h[illegible]tegorical data and want to represent each[illegible]as parts of a whole	Broken Line Graph	Circle Graph
5)	Y[illegible]y[illegible]t scores from students in [illegible]ls of 40[illegible], 70-80, 80-90 and 90-100	Broken-Line Graph	Histogram

Part 4 — D[illegible]the re[illegible]in between the variables

			
1)	2)	3)	4)
			
5)	6)	7)	8)

Part 5 — Describe what type of relationship the variables would have. Explain.

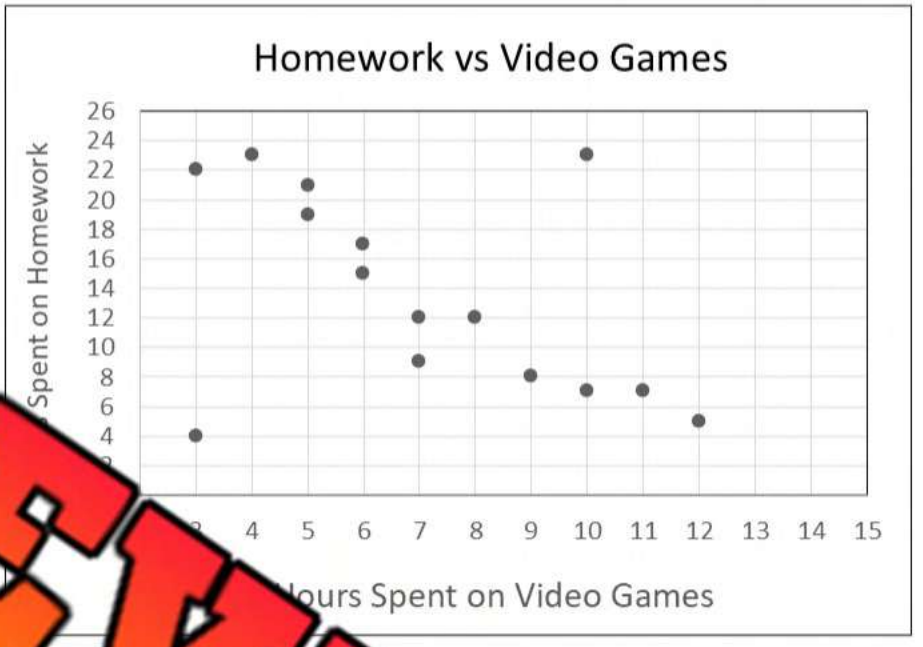
	Variable 1 (x-axis)	Variable 2 (y-axis)	Relationship
	Number of times you have been on an airplane	Fear of flying (scale from 1 – 10)	
Explain	_____		

15 students were asked how many hours they spend on homework a week and how many hours they play video games a week. The results are displayed in the scatter plot below.

Part 6 Answer the questions below

Fill in the table of values by reading the scatter plot.

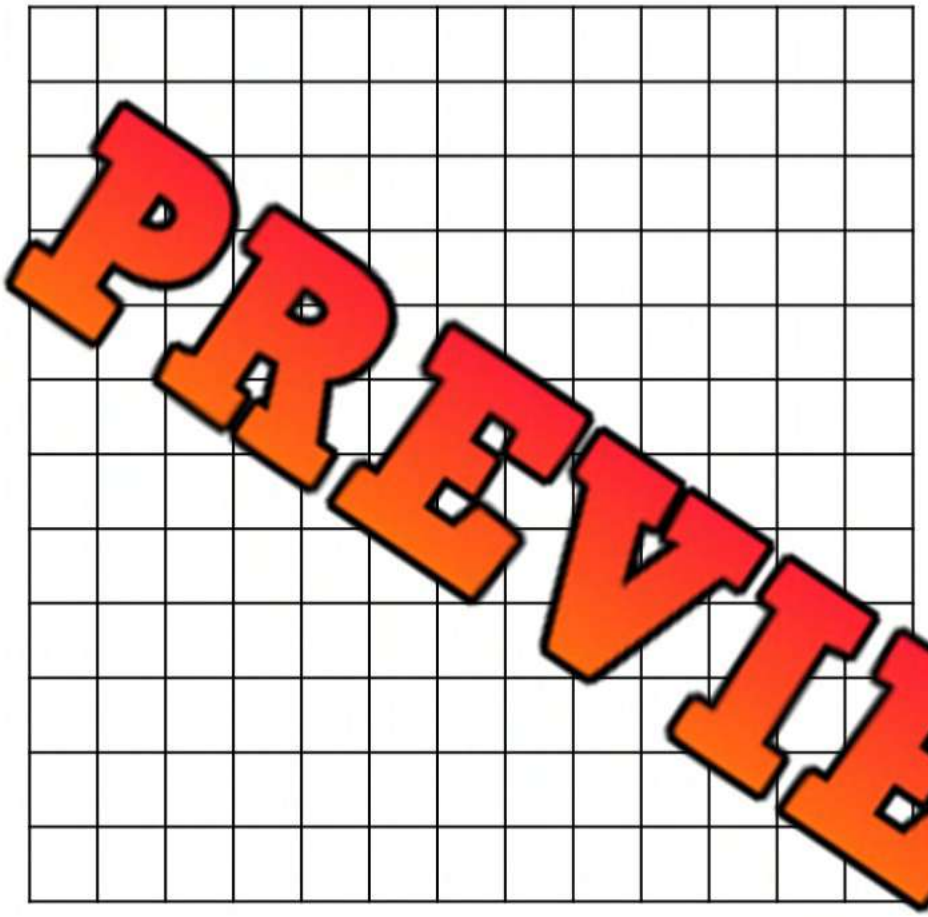
X-Values	Y-Values



1)	What are the [illegible] in the data?
2)	What co[illegible]plai[illegible]
3)	What is the relationship between the variables?
4)	How many students play more than 7 hours of games **and** do more than 7 hours of homework?
5)	Draw a line of best fit. If someone played 14 hours of video games, how many hours of homework do you think they would do??

Part 7 — Display the data below in a scatter-plot

Harris has an online business selling his artwork. He tracked how many views he had of his store and how many sales he had for the last 17 days.



Views	# of Sales
1	1
5	3
4	2
3	2
6	5
8	1
5	4
4	4
9	9
10	8
7	5
5	4
6	4
8	5
	5
	1
	5

Part 8 — Answer the questions below

1) What outlier did you notice?	
2) What caused the outlier?	
3) Draw a line of best fit. How many sales would you expect if Harris had 12 views?	
4) What is the relationship between the variables?	

Grade 8
D2. Probability

	Curriculum Expectations	Pages That Cover the Expectations
D2.1	solve various problems that involve probability, using appropriate tools and strategies, including Venn and tree diagrams	127 – 138, 160 - 163
D2.2	determine and compare the theoretical and experimental probabilities of multiple independent events happening and of multiple dependent events happening	124 – 126, 139 – 159, 164 - 165

Name: _____ 124

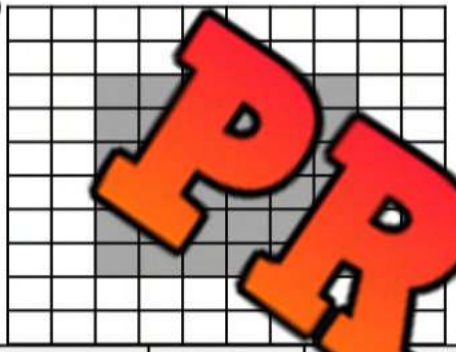
Curriculum Connection
D2.2

Independent Events – Darts

Independent events are two or more events that could happen at the same time without affecting the outcomes of the other events. Imagine below, that the shaded in area is a target and the white part is the wall. What is the probability of you hitting the target twice if you had two throws?

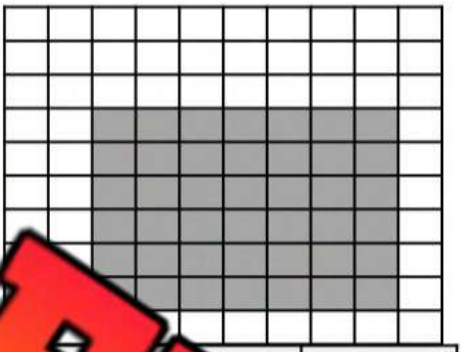
Questions	What is the probability of you hitting the target twice if you had two throws?

1)



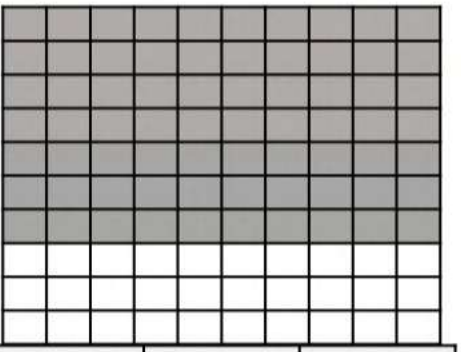
Fraction	Decimal	Percent

2)



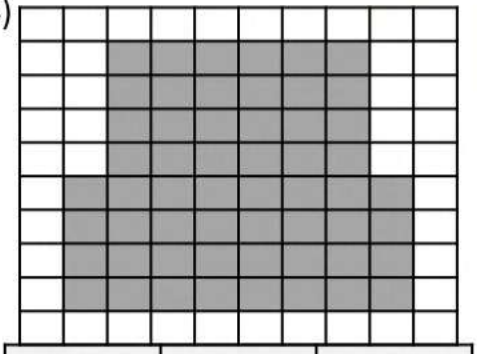
Fraction	Decimal	Percent

3)



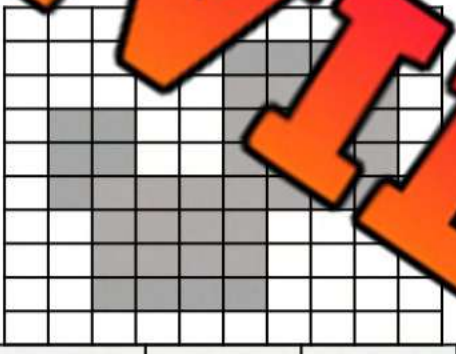
Fraction	Decimal	Percent

4)



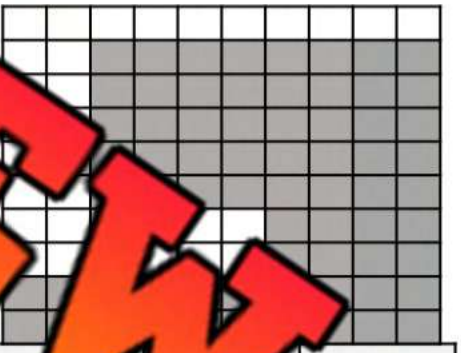
Fraction	Decimal	Percent

5)



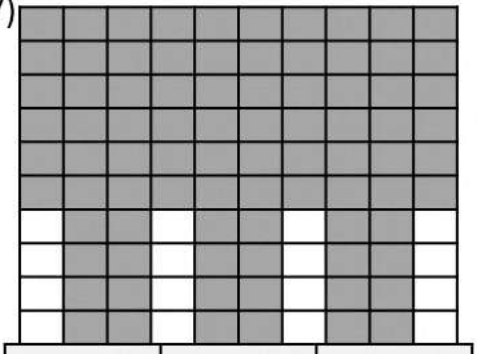
Fraction	Decimal	Percent

6)



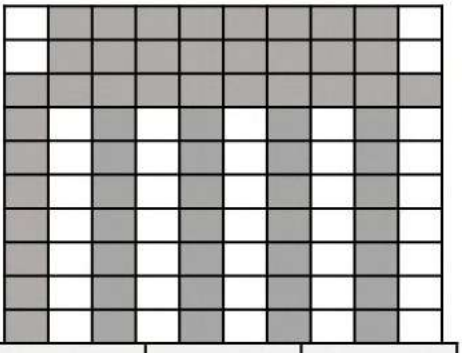
Fraction	Decimal	Percent

7)



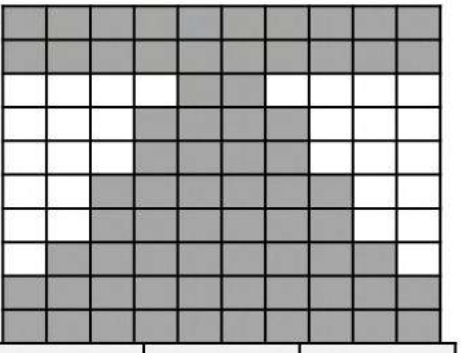
Fraction	Decimal	Percent

8)



Fraction	Decimal	Percent

9)



Fraction	Decimal	Percent

Name: _____ 126

Curriculum Connection
D2.2

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

Fraction	Decimal	Percent

2) Rolling a 5

Fraction	Decimal	Percent

3) Rolling an odd number?

Fraction	Decimal	Percent

4) Rolling two six-sided dice and getting two 5s

Fraction	Decimal	Percent

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

Fraction	Decimal	Percent

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

Fraction	Decimal	Percent

7) When rolling 2 dice, what is the probability of rolling a 1, 2, 3, 4, or 5 on both rolls?

Fraction	Decimal	Percent

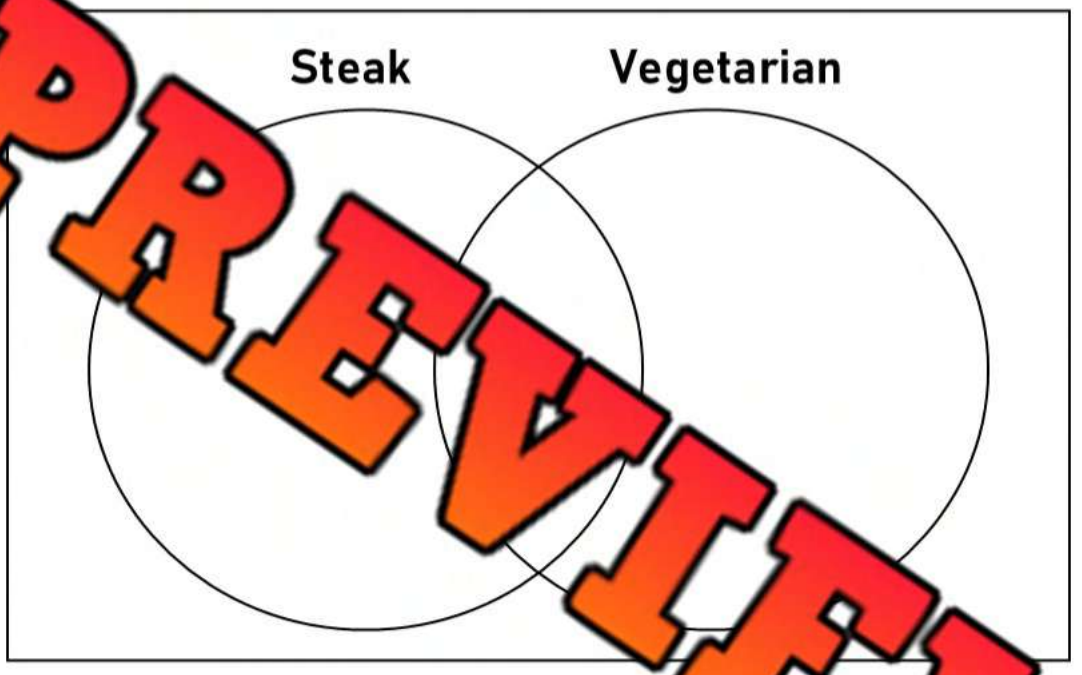
Name: _____ 127

Curriculum Connection
D2.1

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



Part 2 Answer the questions below

Questions – What is the probability that a randomly selected guest…		Fraction	Deci	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			

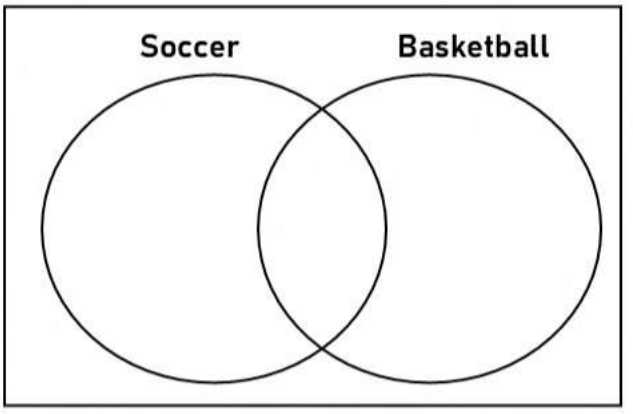
Curriculum Connection
D2.1

Exit Cards

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

Name: _____

At a local sports event, participants had two options for activities – soccer or basketball. Out of the 60 participants, 35 are playing soccer, 25 are playing basketball, and 10 participants are playing both sports.



2) What is the probability that a randomly selected participant...	Fraction	Decimal	Percent
a) played soccer?			
b) played basketball?			
c) played soccer or basketball but not both?			
d) played both soccer and basketball?			
e) didn't participate in any activity?			

Name: _____

At a local sports event, participants had two options for activities – soccer or basketball. Out of the 60 participants, 35 are playing soccer, 25 are playing basketball, and 10 participants are playing both sports.

2) What is the probability that a randomly selected participant...	Fraction	Decimal	Percent
a) played soccer?			
b) played basketball?			
c) played soccer or basketball but not both?			
d) played both soccer and basketball?			
e) didn't participate in any activity?			

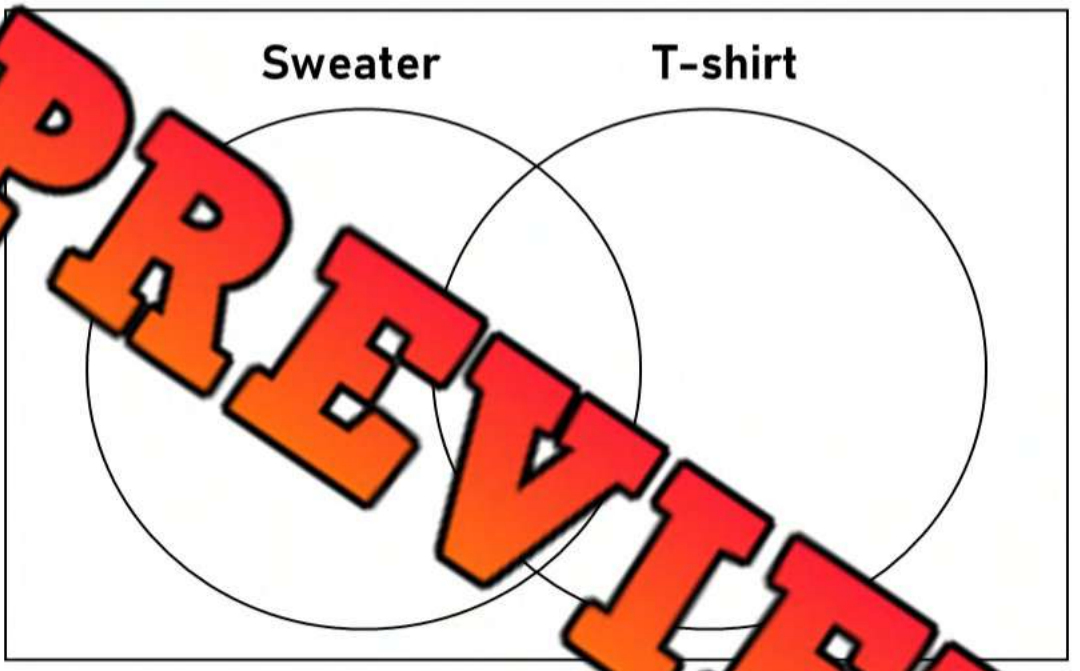
Name: _____ 129

Curriculum Connection
D2.1

Calculating Probability – Venn Diagram

In a class of 30 students, 14 are wearing a sweater, 16 are wearing a t-shirt and 7 are wearing both.

Part 1 Fill in the Venn diagram with the data above



Part 2 Answer the questions below

What is the probability that a randomly selected student is wearing...		Fraction	Deci	Percent
1)	a sweater			
2)	a sweater but not a t-shirt			
3)	a t-shirt			
4)	a t-shirt but not a sweater			
5)	neither a sweater nor a t-shirt			
6)	a sweater and a t-shirt			
7)	a sweater or a t-shirt but not both			

Name: _____ 130

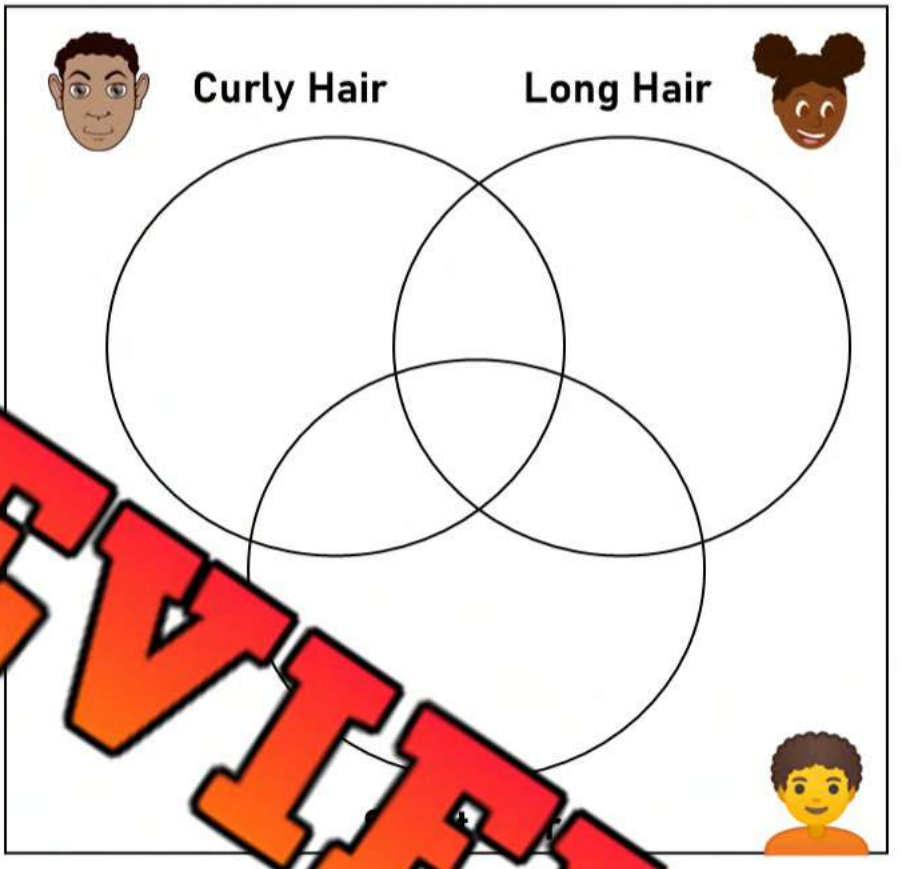
Curriculum Connection
D2.1

Calculating Probability – Venn Diagram

Part 1 Fill in the Venn diagram with the data below

21 students were surveyed about their hair

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



Part 2 Answer the questions below

What is the probability that a randomly selected student...		Fraction	De	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			

Name: _____ 131

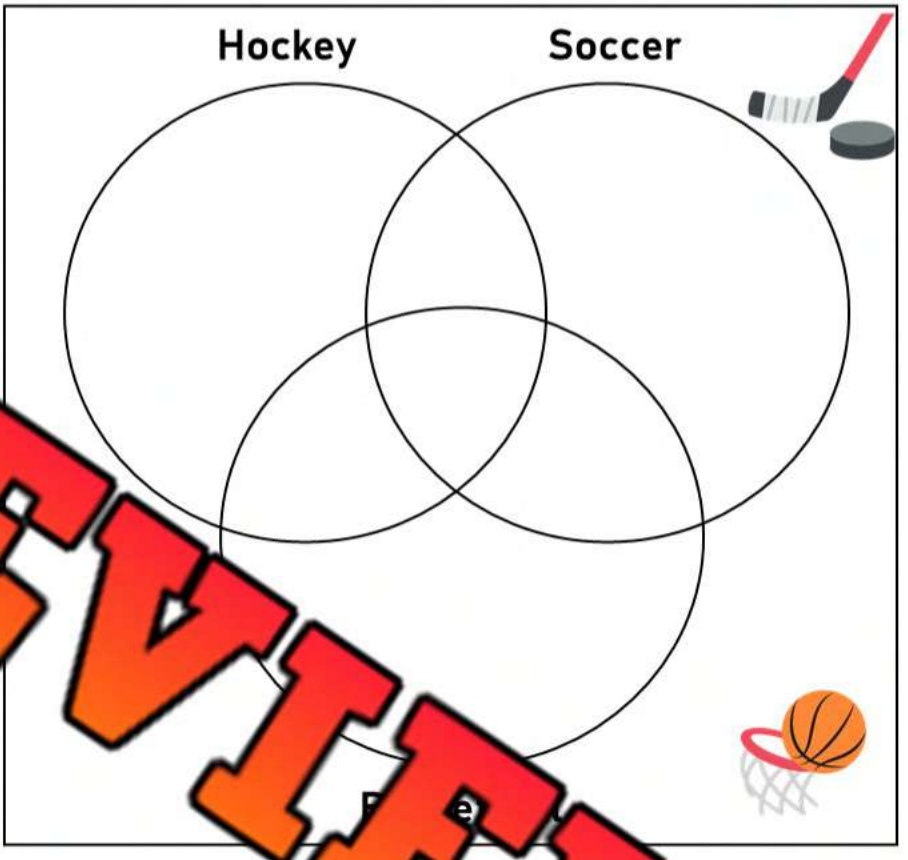
Curriculum Connection
D2.1

Calculating Probability – Venn Diagram

Part 1 Fill in the Venn diagram with the data above

100 people were surveyed about which sports they play

- 33 pla[illegible]sketball
- 45 pl[illegible]r
- 41 [illegible]y
- 1[illegible]h[illegible]nd soc[illegible]
- 8 play bo[illegible] and hockey
- 9 play both soc[illegible]nd basketball
- 6 play all three sports



Part 2 Answer the questions below

What is the probability that a randomly selected person...		Fraction	De[illegible]	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

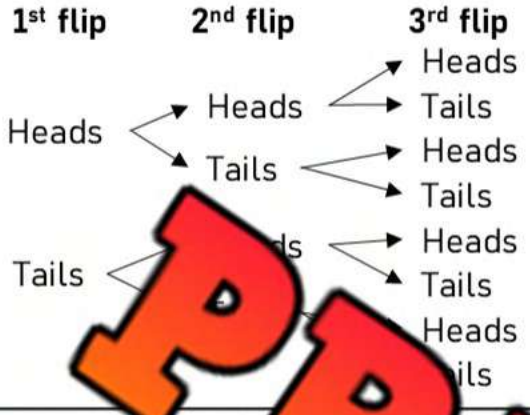
	What is the probability that a randomly selected worker…	Percent
a)	likes coffee and tea	
b)	likes just tea and not coffee	
c)	likes neither coffee nor tea	

Name: _____ 133

Curriculum Connection
D2.1

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

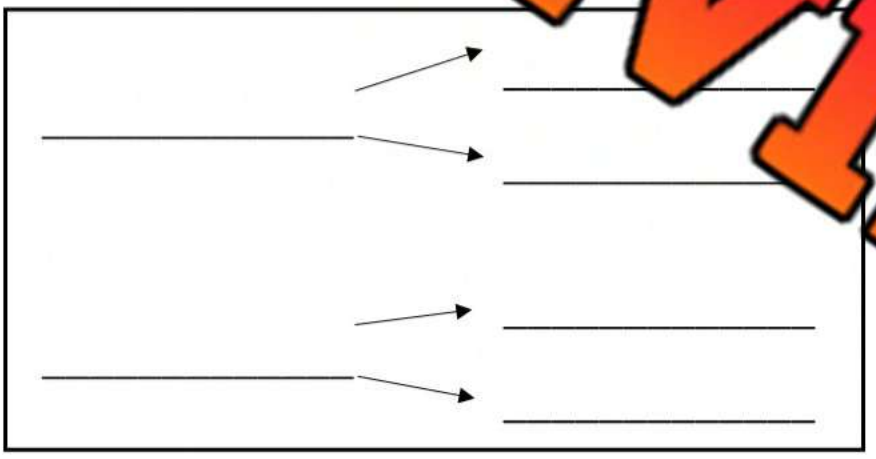
If you flip a coin three times, you could have 8 different combinations of outcomes.

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

This means you have a 1/8 probability of flipping three heads or tails in a row.

Questions Dra… agram… how many different combinations you could have

Rebecca was allowed t… e can… one drink at a Halloween party. The types of drinks and candy are list…



…mbinations

Candy
- Chocolate
- Gummies

…inks

1) How many combinations could Rebecca have? _____

2) What is the probability she will choose…	Fraction	Decimal	Percent
a) chocolate and soda			
b) chocolate and juice			
c) gummies and soda			
d) gummies or chocolate and juice			

Name: _____ 134

Curriculum Connection
D2.1

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
...gar Cone (S)	Vanilla (V)	Butterscotch (B)
...ne (W)	Chocolate (C)	Fudge (F)

Combinations

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

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

Name: _____ 136

Curriculum Connection
D2.1

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)

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			

Curriculum Connection
D2.1

Exit Cards

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

Name: _____

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

You are designing an avatar, and you have the following options for customizing its outfit. You can choose one shirt colour, one pants type, and one shoe type for the avatar:

Shirt Colour	Pants Type	Shoe Type
Red (R)	Jeans (J)	Sneakers (SK)
Blue (B)	Shorts (S)	Boots (BO)
Green (G)		

Name: _____

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

You are designing an avatar, and you have the following options for customizing its outfit. You can choose one shirt colour, one pants type, and one shoe type for the avatar:

Shirt Colour	Pants Type	Shoe Type
Red (R)	Jeans (J)	Sneakers (SK)
Blue (B)	Shorts (S)	Boots (BO)
Green (G)		

Name: _____ 138

Curriculum Connection
D2.1

Determining Probability of Multiple Events

Questions | Solve each problem

1) A customer walks in Premiere Pizza where you can order one type of pizza and a drink for $6. The menu is below.

Pizza	Drink
[illegible]oni	Soda
[illegible]	Juice
[illegible]	Milk

a) How many combinations could the customer order?

b) What is the probability the customer orders bacon pizza with soda?

c) What is the probability the customer orders onion or pepperoni pizza with juice or soda?

2) Your teacher teaches 3 classes in the morning. The options for each class are below.

Class 1	Class 2	Class 3
Math	Music	Social Studies
Language	French	Science
Health	Drama	Gym

a) How many combinations could your teacher choose?

b) What is the probability your teacher chooses math, music or drama, and gym?

c) What is the probability your teacher chooses math, drama or French, and science or gym?

3) At a fancy restaurant, you can order a surprise dinner. They tell you the options for the meat, vegetables, and dessert.

Meat	Vegetables	Dessert
Chicken	Potatoes	Cake
Steak	Salad	Brownie
Fish	Corn	

a) How many combinations could the chef make?

b) What is the probability the chef makes steak or chicken with potatoes and cake?

c) What is the probability the chef makes chicken or fish with corn or salad and brownie?

4) Fill this form to choose you with your outfit options below.

Top	Bottom	Shoes	Hat
Shirt	Jeans	[illegible]	[illegible]oque
Sweater	Shorts	Sandals	Cap
Jersey	Jogs		

a) How many combinations could your mom pick?

b) What is the probability your mom picks a shirt with pants and shoes and a cap?

c) What is the probability your mom picks a jersey or shirt with jogs and sandals or shoes with a toque?

Name: _____ 139

Curriculum Connection
D2.2

Independent Events – Dice Challenge

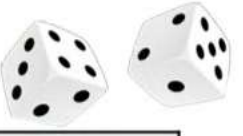
Part 1 Find the probability of each sum when two dice are rolled

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 greater than 10?

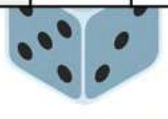
3) What is the probability of you rolling two six-sided dice and getting a sum of the two dice less than 4?

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



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?

Name: _____ 140

Curriculum Connection
D2.2

Independent vs Dependent Events

Two events are **independent events** if the outcome of one event does not affect the outcome of the other. Example - flipping a coin twice or rolling a dice and flipping a coin.

Two events are **dependent events** if the outcome of one event affects the outcome of the other. Example – drawing names from a hat (the number of names decreases after each draw, which affects the probability of the next event(s).

Questions Are the events independent or dependent?

1)	...sting ch... ...rom a box of different fla...oured c...	Dependent	Independent
2)	Perform... ...s ... on a ... ...d landing on 300 points both t...	Dependent	Independent
3)	Snowing today and s... ...mor...	Dependent	Independent
4)	Randomly selecting two t-shirts ... ...ur cl... that is full of multi-coloured shi...	Dependent	Independent
5)	A teacher hands out candy from their bin ... ...erent types of candy	...ent	Independent
6)	Making 5 three pointers in a row	...nen...	In...pendent
7)	Your teacher is selecting 2 students to help them. You hope you and your best friend get chosen.	Dep...	...pendent
8)	Drawing a heart from a deck of cards and then drawing another heart from the same deck of cards	Dependent	Independent
9)	Drawing an 8 from a deck of cards and then drawing an 8 from a different deck of cards	Dependent	Independent
10)	You winning 3 hockey games in a row	Dependent	Independent
11)	Winning today's race and next week's race	Dependent	Independent
12)	Flip a coin and select a card from a deck of cards	Dependent	Independent

Name: _____ 141

Curriculum Connection
D2.2

Dependent Events – Money Bag

A bag has one of each Canadian coins - 5¢, 10¢, 25¢, $1, $2.

What is the probability you will select a dime and then a quarter?

Solution

Probability to pick a Dime is 1/5

Probability to pick a Quarter is 1/4 (no dime in the bag)

Desired probability = $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$

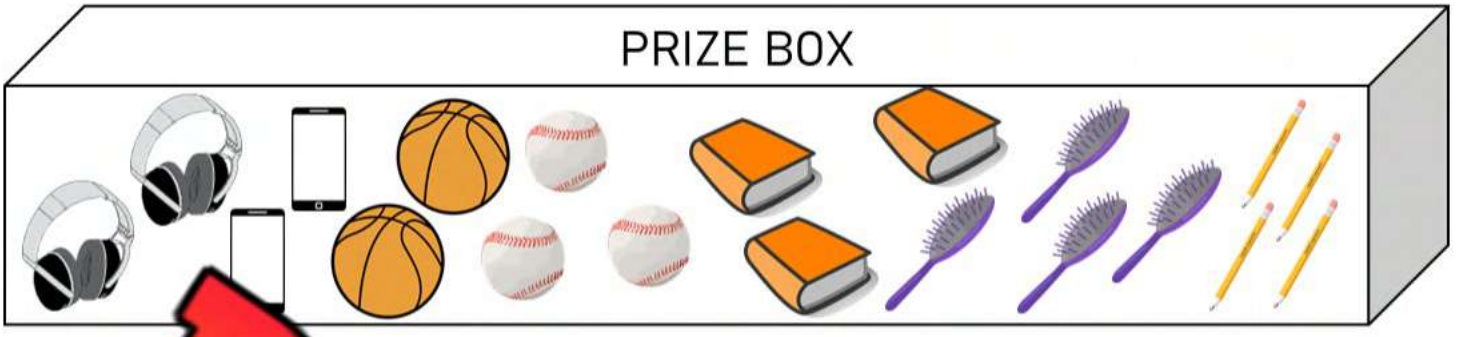
Question: What is the probability of the following scenarios

	Scenario – Probability	Answer – Show Your Work
1)	Selecting a Toonie?	
2)	Selecting a Quarter and then a Loonie	
3)	Selecting a Nickel and then a Dime, and then a Loonie?	
4)	Selecting a Toonie, and then a Loonie, and then a Nickel?	
5)	Selecting the following coins in the order presented: Nickel, Quarter, Toonie, Dime?	
6)	Selecting the following coins in the order presented: Nickel, Dime, Quarter, Loonie, Toonie?	

Name: _____ 142

Curriculum Connection
D2.2

Dependent Events – Prize Box



Questi[illegible] the probability of the following scenarios

	Scenari[illegible] of	Answer – Show Your Work
1)	You get one [illegible] What [illegible] hood of picking a book?	
2)	You get two picks. Wha[illegible] li[illegible] picking a set of headphones firs[illegible] pencil second?	
3)	You get three picks. What is the likeliho[illegible] picking a baseball first, a pencil second, a phone third?	
4)	You get four picks. What is the likelihood of picking a phone first, a basketball second, headphones third, and a hairbrush fourth?	
5)	You are picking from the prize box third. One phone and one set of headphones are already gone. What is the likelihood of you picking a phone?	
6)	You are picking from the prize box fifth. One phone, one hairbrush, and two baseballs are already gone. You get two picks. What is the likelihood of you picking a phone first and then headphones second?	

Name: _____ 143

Curriculum Connection
D2.2

Theoretical vs Experimental Probability

Theoretical Probability
What should happen

Example - The theoretical probability of flipping a heads is 1 time out of 2 or ½.

Experiment Probability
What did happen after the event (experiment)

Example – You flipped a coin 10 times and got 7 heads. The experimental probability is 7/10.

Part 1 Write the theoretical probability of the events happening below

Question	Fraction	Decimal	Percent
1) Wh… …robability of flipping a heads?			
2) What …ne the… …bability of flipping a tails?			
3) What is the… …proba… …f flipping a heads if you flipped the co… …mes?			
4) What is the theoretic… …y of f… …a heads and then rolling a dice and … …2?			
5) What is the theoretical probab… …y of … … getting an odd number and then flippin… …s?			

Part 2 Experimental Probability - Flip a… …0 tim… …ord your results

1) How many heads and tails do you think you will flip … …?

	Tails
…	20

2) Perform the experiment by flipping a coin 20 times. Record how many he… …and tails you get.

	Tallies	Frequency	Fraction	Decimal	Percent
Heads					
Tails					

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

_____

_____

Name: _____ 144

Curriculum Connection
D2.2

Theoretical vs Experimental Probability

Examples of Theoretical and Experimental Probability
Theoretical: You should roll a 3 once every 6 rolls = 1/6
Experimental: You rolled a 3 twice when you rolled a dice six times = 2/6

Part 1 Circle if the example is theoretical or experimental

Example	Theoretical	Experimental
1) There [illegible] of rain today	Theoretical	Experimental
2) Yo[illegible] and got heads 3 times	Theoretical	Experimental
3) You have a 1/[illegible] heart from a deck of cards	Theoretical	Experimental
4) A scratch ca[illegible] of winning a prize	Theoretical	Experimental
5) Your batting averag[illegible] get a hit 1 in 4	Theoretical	Experimental
6) You made 4 of 10 three p[illegible]	Theoretical	Experimental
7) Seabiscuit won the race even though h[illegible]	Theoretical	Experimental
8) The Toronto Raptors won 4/7 games [illegible]	Theoretical	Experimental
9) You have a 1/80 chance of winning a giveaway [illegible]	[illegible]ical	Experimental
10) You won a cross-country race with 90 people in [illegible]	[illegible]	Experimental

Part 2 Is the example theoretical or experimental? What is the [illegible]ing?

Example	Theoretical or Experimental	Fraction	D[illegible]al	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 3, 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				

Curriculum Connection
D2.2

Exit Cards

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

Name: _____

Answer the following questions.

1) You roll a fair die, and based on theory, each number should appear once every 6 rolls = 1/6.

Circle Answer: Theoretical or Experimental

2) A bag contains 5 blue marbles and 5 red marbles. You picked 5 blue marbles out of 9 picks from the bag.

Circle Answer: Theoretical or Experimental

3) Fill the table

Example	Theoretical or Experimental	Fraction	Decimal	Percent
The probability of selecting an ace from a deck of cards is 4/52				

Name: _____

Answer the following questions.

1) You roll a fair die, and based on theory, each number should appear once every 6 rolls = 1/6.

Circle Answer: Theoretical or Experimental

2) A bag contains 5 blue marbles and 5 red marbles. You picked 5 blue marbles out of 9 picks from the bag.

Circle Answer: Theoretical or Experimental

3) Fill the table

Example	Theoretical or Experimental	Fraction	Decimal	Percent
The probability of selecting an ace from a deck of cards is 4/52				

Name: _____

Answer the following questions.

1) You roll a fair die, and based on theory, each number should appear once every 6 rolls = 1/6.

Circle Answer: Theoretical or Experimental

2) A bag contains 5 blue marbles and 5 red marbles. You picked 5 blue marbles out of 9 picks from the bag.

Circle Answer: Theoretical or Experimental

3) Fill the table

Example	Theoretical or Experimental	Fraction	Decimal	Percent
The probability of selecting an ace from a deck of cards is 4/52				

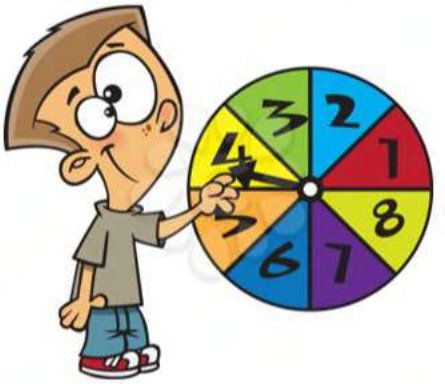
Name: _____ 146

Curriculum Connection
D2.2

Activity – Math Hot Seat: Probability Showdown

Objective

What are we learning about?



Students will practice differentiating between theoretical and experimental probability by participating in a fun and interactive game, enhancing their ability to understand probability concepts.

Materials

What you will need for the activity.

- Index cards with probability questions (theoretical and experimental)
- Chairs arranged in a circle
- Stopwatch or timer
- Whiteboard and marker

Instructions

How you will complete the activity.

1. Prepare a stack of index cards with various probability questions. Ensure some questions ask students to identify theoretical probabilities and others to calculate experimental probability.
2. Arrange chairs in a circle with one "hot seat" in the center.
3. Explain the rules of the game to the students. One student will sit in the hot seat while the rest sit in the surrounding chairs.
4. The teacher will read a probability question from the stack. The student in the hot seat has a limited time (e.g., 30 seconds) to answer the question.
5. If the student in the hot seat answers correctly within the time limit, they stay in the hot seat for the next round. If they answer incorrectly or run out of time, they switch places with another student from the circle.
6. Continue the game until each student has had the opportunity to sit in the hot seat multiple times, or until the designated game time is up.
7. Keep track of the number of correct answers each student provides while in the hot seat. The student with the most correct answers at the end of the game wins.

Name: _____ 147

Curriculum Connection
D2.2

Index Cards | Use the math problems below

#	Probability Question	Answer
1	A coin is flipped 50 times and lands on heads 22 times. What is the experimental probability of heads as a percent?	44%
2	A die is rolled 10 times, and it lands on a 5 two times. What is the experimental probability of rolling a 5 as a percent?	20%
3	A deck of cards is shuffled, and one card is drawn. What is the theoretical probability of drawing a red card as a percent?	50%
4	A jar contains 25 marbles, and 7 are red. What is the probability of randomly selecting a red marble as a fraction?	7/25
5	A spinner is spun 20 times and lands on green 6 times. What is the experimental probability of landing on green as a fraction?	6/20 or 3/10
6	What is the theoretical probability of rolling a 6 on a standard die? Provide your answer as a fraction.	1/6
7	A bag has 10 blue and 10 red balls. What is the probability of drawing a red ball as a percent?	50%
8	In 25 coin flips, 14 land on tails. What is the experimental probability of tails as a fraction?	14/25
9	A die is rolled 5 times, and it lands on three once. What is the experimental probability of rolling a 3 as a percent?	20%
10	A jar has 50 candies, and 12 are blue. What is the probability of selecting a blue candy as a percent?	24%
11	What is the theoretical probability of drawing an Ace from a standard deck of cards? Provide your answer as a fraction.	4/52 or 1/13
12	A spinner is divided into 4 equal sections. What is the theoretical probability of landing on one section as a percent?	
13	A die is rolled 20 times and lands on an even number 8 times. What is the experimental probability of rolling an even number as a fraction?	8/20 or 2/5
14	A jar has 30 marbles, and 6 are green. What is the probability of picking a green marble as a fraction?	6/30 or 1/5
15	What is the theoretical probability of flipping a coin and getting heads? Provide your answer as a percent.	50%
16	In a jar of 20 candies, 8 are red. What is the probability of picking a red candy as a percent?	40%
17	A spinner is spun 50 times and lands on red 18 times. What is the experimental probability of landing on red as a fraction?	18/50 or 9/25
18	What is the theoretical probability of rolling a number greater than 4 on a die? Provide your answer as a fraction.	2/6 or 1/3

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Curriculum Connection
D2.2

Index Cards | Use the math problems below

#	Probability Question	Answer
19	A deck of cards has 52 cards. What is the theoretical probability of drawing a black card as a percent?	50%
20	A die is rolled 25 times and lands on a 2 six times. What is the experimental probability of rolling a 2 as a percent?	24%
21	A coin is flipped 10 times and lands on tails 7 times. What is the experimental probability of tails as a fraction?	7/10
22	What is the theoretical probability of drawing a heart from a standard deck? Provide your answer as a percent.	25%
23	A bag contains 15 marbles: 5 red, 5 blue, and 5 yellow. What is the probability of drawing a blue marble as a percent?	33.33%
24	A coin is flipped 40 times and lands on heads 22 times. What is the experimental probability of heads as a fraction?	22/40 or 11/20
25	A die is rolled 2 times and lands on 6 both times. What is the experimental probability of rolling a 6 as a percent?	100%
26	What is the theoretical probability of rolling a number on a die? Provide your answer as a fraction.	3/6 or 1/2
27	In 20 flips of a coin, 8 land on tails. What is the experimental probability of tails as a percent?	40%
28	A jar contains 10 marbles, 3 are blue. What is the probability of picking a blue marble as a percent?	30%
29	A spinner has 8 equal sections, and it is spun 20 times. It lands on red 7 times. What is the experimental probability of landing on red as a fraction?	7/20
30	What is the theoretical probability of drawing a King from a standard deck of cards? Provide your answer as a fraction.	1/13
31	A die is rolled 6 times, and it lands on a 4 two times. What is the experimental probability of rolling a 4 as a fraction?	2/6 or 1/3
32	In a bag of 25 candies, 9 are red. What is the probability of picking a red candy as a fraction?	9/25
33	A coin is flipped 15 times and lands on heads 6 times. What is the experimental probability of heads as a fraction?	6/15 or 2/5
34	A jar has 50 marbles, 18 are blue. What is the probability of picking a blue marble as a percent?	36%
35	What is the theoretical probability of rolling a number less than 3 on a die? Provide your answer as a fraction.	2/6 or 1/3
36	A spinner has 6 equal sections. What is the theoretical probability of landing on one section as a fraction?	1/6

Name: _____ 149

Curriculum Connection
D2.2

Index Cards | Use the math problems below

#	Probability Question	Answer
37	A die is rolled 12 times and lands on a 5 four times. What is the experimental probability of rolling a 5 as a fraction?	4/12 or 1/3
38	A jar contains 20 candies, and 8 are yellow. What is the probability of picking a yellow candy as a percent?	40%
39	A spi[illegible]pun 30 times and lands on blue 12 times. What is the expe[illegible]robability of landing on blue as a fraction?	12/30 or 2/5
40	[illegible]robability of drawing a face card from a standard de[illegible] cards? [illegible]r answer as a fraction.	12/52
41	In 10 rolls [illegible]ands o[illegible] number 4 times. What is the experimental p[illegible]lity of [illegible]n number as a fraction?	4/10 or 2/5
42	A coin is flipped 5 time[illegible]s on t[illegible]. What is the experimental probability o[illegible]a f[illegible]	3/5
43	A jar has 10 marbles, and 3 are gree[illegible]s the p[illegible]ty of picking a green marble as a percent?	30%
44	A spinner is spun 25 times and lands on yellow[illegible]s. W[illegible]th experimental probability of landing on yellow as a [illegible]	8/25
45	A deck of cards has 52 cards. What is the theoretical proba[illegible] drawing a Jack as a fraction?	[illegible]
46	A die is rolled 30 times, and it lands on a 6 nine times. What is the experimental probability of rolling a 6 as a fraction?	[illegible]/30 or 3/10
47	A spinner is spun 10 times, and it lands on red 4 times. What is the experimental probability of landing on red as a percent?	40%
48	What is the theoretical probability of drawing a club from a standard deck of cards? Provide your answer as a percent.	25%
49	A die is rolled 4 times, and it lands on a 2 twice. What is the experimental probability of rolling a 2 as a fraction?	2/4 or 1/2
50	A jar contains 25 marbles, 10 are red, and 5 are blue. What is the probability of picking a blue marble as a percent?	20%

Name: _____ 150

Curriculum Connection
D2.2

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			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.

_____

_____

_____

Name: _____ 151

Curriculum Connection
D2.2

Theoretical vs Experimental - Dice

Part 1 What is the theoretical probability of the dependent events below?

	Scenario – What is the probability of...	Probability (Fraction)	Probability (Percent)
1)	Rolling a 1 and then a 2 using a 6-sided dice		
2)	Rolling a 3 and then a 4 using a 6-sided dice		
3)	Rolling a 1, 2, 3 and then a 3 using a 6-sided dice		
4)	Rolling a 1 and then a 1 and then a 1 using a 6-sided dice		
5)	Rolling a 1 three times in a row using a 6-sided dice		

Part 2 Follow the instructions and complete the experiments

1) The theoretical probability of rolling two 6's in a row is 1/36 or 2.7 percent. Try this experiment for yourself by filling in the table below.

Steps:

1) Get 2 dice or roll one dice twice.
2) Every time you roll, mark 1 tally.
3) If you get two sixes in a row, mark a tally under the 6/6 column.
4) Complete 36 trials. How many times should you roll double 6?

Number of Rolls - Tally	6/6

2) The theoretical probability of rolling a 1 and then a 2 is 1/36 or 2.7 percent. Complete the same steps as above for the numbers 1 and 2. Can you get more than 1 favourable outcome in 36 rolls?

Number of Rolls - Tally	1/2

Name: _____ 152

Curriculum Connection
D2.2

Rolling Doubles

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

1) What is the theoretical probability of rolling doubles when rolling 2 six-sided dice?

Tip: favourable outcomes / total possible outcomes

2) How many times would you expect to roll doubles if you performed 24 trials?

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

1) Roll 2 six-sided dice 24 times. Keep track of how many rolls you complete using the table below. Put a tally every time you roll doubles.

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.

Name: _____ 153

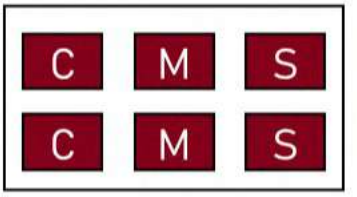
Curriculum Connection
D2.2

Tree Diagrams – Independent Events

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

There is a bag full of the following different flavoured chocolates:

- 2 coconut (C)
- 2 mint (M)
- 2 salte aramel (S)



Draw a tr m for the following scenario:
You pull and then put it back in the bag before pulling another chocolate

Tree Diagram	Combinations
1st D 2nd 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			

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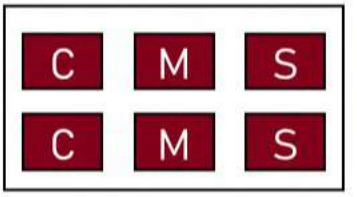
Curriculum Connection
D2.2

Tree Diagrams – Dependent Events

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

There is a bag full of the following different flavoured chocolates:

- 2 coconut (C)
- 2 mint (M)
- 2 salte aramel (S)



Draw a tre m for the following scenario:
You pull and eat it before pulling another chocolate

Tree Diagram	Combinations
1st Dr 2nd 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 or salted caramel and then mint			

Name: _____ 155

Curriculum Connection
D2.2

Tree Diagrams – Dependent Events

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

Jeremy has 10 socks in his drawer.

- 2 of the socks are white
- 2 of th[illegible]s are black
- 2 of t[illegible]blue
- 2 [illegible]
- 2 of the sock[illegible]

Brad takes out two socks [illegible] one after the other.

Draw a tree diagram to represent the scenario above

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

What is the probability taking out...	Fraction	Percent
2) A red sock and then a blue sock?		
3) Two black socks?		
4) A white sock and then a black sock?		

Name: _____ 156

Curriculum Connection
D2.2

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.

2) How many combinations could Lane get? _____

3) In this order, what is the probability that she flips the following...	Fraction	Percent
a) heads, heads, tails, tails		
b) heads, tails, heads, tails		
c) tails, tails, tails, heads		
d) 4 tails		
e) 2 heads and 2 tails in any order		
f) 1 heads and 3 tails in any order		

Name: _____ 157

Curriculum Connection
D2.2

Number Simulation – Independent Events

Part 1 Theoretical Probability – Answer the questions below

Pretend you are drawing two numbers from 1-15. Since these are independent events, you can select the same number more than once.

If you picked 3 numbers, what is the theoretical probability of...	
1) Picking d numbers?	
2) Pick s	
3) P a 2, 5, a	

If you complet (t = draw mbers)	
4) 10 trials, how ma me ll odd numbers?	
5) 30 trials, how many tim you numbers?	
6) 100 trials, how many times w d yo bers?	

Part 2 Experimental Probability – Perform expe t below

Set up the experiment by cutting the numbers out f m d put em in a bag. Perform the number of trials below by selecting 3 num the ter you select a number, you put the number back in the bag befor tin er.

Complete...	
1) 10 trials - how many times did you get all odd numbers?	
2) 30 trials - how many times did you get all odd numbers?	
3) 100 trials - how many times did you get all odd numbers?	

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	

Name: _____ 158

Curriculum Connection
D2.2

Number Simulation – Dependent Events

Part 1 Theoretical Probability – Answer the questions below

Pretend you have the numbers 1-15 on slips of paper in a bag. When you draw a number, you cannot get that number again for that trial. Each trial is selecting 3 numbers. Once you have completed a trial (selected 3 numbers), the numbers go back in the bag.

If you pic umbers, what is the theoretical probability of...	
1) Picki mbers?	
2) P s?	
3) Picki a 2, th en ?	

If you completed... = dra rs)	
4) 10 trials, how many ti d you dd numbers?	
5) 30 trials, how many times you umbers?	
6) 100 trials, how many times would y odd rs?	

Part 2 Experimental Probability – Perf e ex elow

Set up the experiment by cutting out the numbers bel cing t a bag. Perform the number of trials below by selecting 3 numbe the select three numbers, you put the numbers back in the bag.

Complete...	
1) 10 trials - how many times did you get all odd numbers?	
2) 30 trials - how many times did you get all odd numbers?	
3) 100 trials - how many times did you get all odd numbers?	

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	

Name: _____ 159

Curriculum Connection
D2.2

Class List – Random Selections

Challenge Write your answers as a fraction

1) A class has 24 students. Ms. Lee is randomly picking students to hand out classroom prizes.

a) What is the probability that Eli is picked first?

b) What [illegible]obability that either Eli or his best friend Sasha is picked first?

c) W[illegible] the pr[illegible]at Eli is picked first and Sasha is picked second (without replaceme[illegible]

2) There are 24 studen[illegible] a[illegible]e is c[illegible]g three students for lunchroom duty. The order matters.

a) What is the probability that [illegible] Sas[illegible]a[illegible]e chosen in that exact order?

b) Jenna was picked, but there are two picks l[illegible]at is t[illegible]bility that Eli and Sasha will both be chosen in that order?

3) Only 7 students haven't been chosen for any jobs yet. They are: El[illegible] Tasha, Leo, Amir, and Noah.

a) What is the probability that Tasha and Leo are picked next, back-to-b[illegible], in that order?

b) If Tasha and Leo are picked, what is the probability Amir is picked next?

c) Amir was picked and now only 4 students remain: Eli, Sasha, Jordan, and Noah. What is the probability that Noah won't be picked?

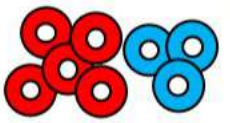
Name: _____ 160

Curriculum Connection
D2.1

Tree Diagrams – Dependent Events

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

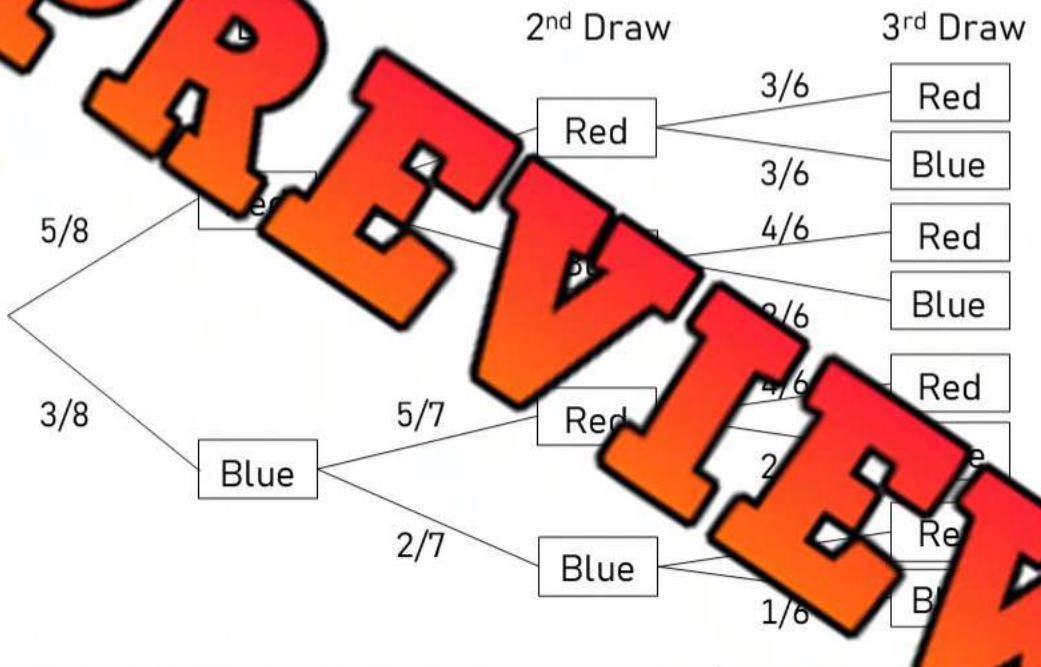
There is a bag full of the following different coloured beads:



- 5 red beads
- 3 blue beads

Ivy selects 2 beads from the box. She does not replace any of the beads before the next bead was selected.

Use the completed tree diagram to solve the questions below.



What is the probability that Ivy will select...	Fraction	Percent
1) 3 red beads?		
2) 2 red beads in a row and then 1 blue bead?		
3) 3 blue beads in a row?		
4) 1 blue bead and then 2 red beads?		
5) 2 blue beads and then a red bead?		
6) 1 red bead and then 2 blue beads?		

7) Why are these trials dependent events?

_____

_____

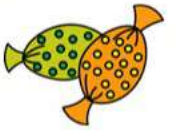
Name: _____ 161

Curriculum Connection
D2.1

Tree Diagrams – Dependent Events

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

There is a box of multi-coloured candy with the following candies inside:



- 7 green (G) candies
- 4 orange (O) candies

Sage will select 3 candies from the box. She will not replace any of the candies before she takes the next ca

Fill in the n the tree diagrams below.

What is the probability that Sage will select...	Fraction	Percent
1) 3 green candies?		
2) 3 orange candies?		
3) 2 green candies and then 1 orange candy?		
4) 2 orange candies and then 1 green candy?		
5) 1 green candy and then 2 orange candies?		

Name: _____ 162

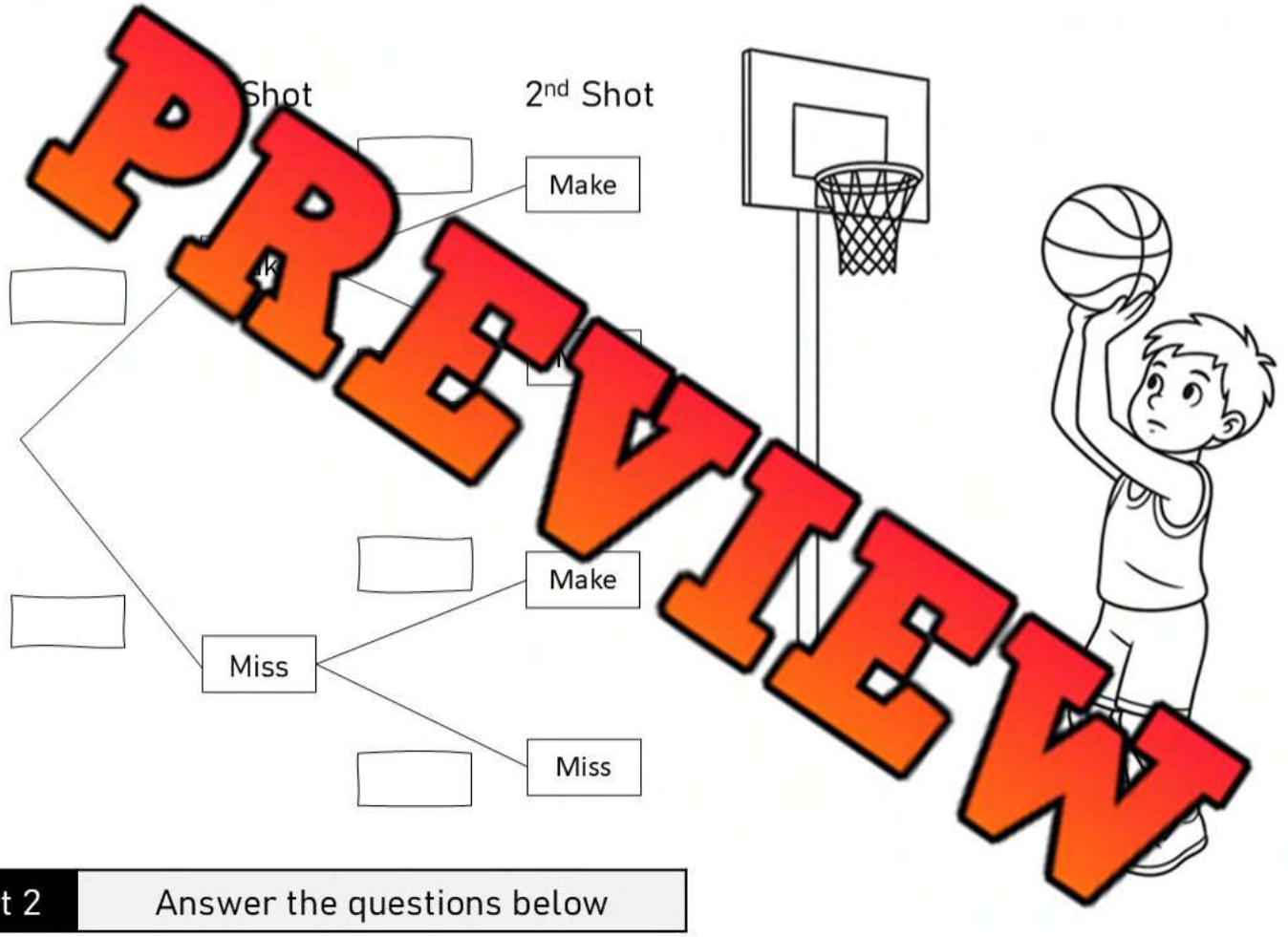
Curriculum Connection
D2.1

Tree Diagram – Free Throws

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

When Roger goes to the free throw line in a game, he has a 0.5 chance of making the first free throw. He has a 0.4 chance of making the second free throw.

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		

Name: _____ 163

Curriculum Connection
D2.1

Tree Diagram – Dunk Contest

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

Ryan is in his first dunk contest. He will try to perform 3 different dunks in the contest. He has practiced each dunk and learned the following:

- He has a 0.4 chance of completing the first dunk
- He ha chance of completing the second dunk
- He ha ance of completing the third dunk

Draw a w

What is the probability that Ryan will...	Decimal	Percent
1) make all three dunks		
2) make his first dunk and miss his next two		
3) miss his first dunk and then make his next two		
4) miss his first and second dunk and make his third		
5) make his first and second dunk and miss his third		

Name: _____ 164

Curriculum Connection
D2.2

Odds In Favour

Understanding Odds in Favour
Odds in favour compare the number of ways an event can happen to the number of ways it cannot happen. These are called **complementary** events because they cover all possible outcomes together.

While pro[illegible]ty tells us the chance of an event ou[illegible]tal, odds are written as a ratio of [illegible]omes to unfavourable one[illegible]

Example:
If you roll two dice, there is 1 way to get a sum of 2 and 35 ways not to.

The odds in favour of rolling a sum of 2 are 1:35 (read as "1 to 35").

This means for every 1 way to roll a 2, there are 35 ways to roll something else.

Questions [illegible]e th[illegible]s in favour and display it as a ratio

#	[illegible]o[illegible]	Odds in Favour - Ratio
1	A soccer player score[illegible]t of [illegible]nalty kicks. What are the odds in **favo**[illegible] sc[illegible]t one?	
2	A jar has 12 sour candies and 28 sweet ca[illegible] What the odds in **favour** of pulling a sweet cand[illegible]	
3	A student guesses on a multiple choice test with 5 answer choices per question. What are the odds in **favour** of guessing the correct answer?	
4	A video game loot box gives a rare item 4 times out of 50 tries. What are the odds in **favour** of getting a rare item?	
5	A Grade 8 student has a playlist with 30 rock songs, 15 pop songs, and 5 classical tracks. What are the odds in **favour** of randomly hearing a rock or pop song?	
6	A library has 120 fiction books and 80 nonfiction books. What are the odds in **favour** of picking a fiction book at random?	

Name: _____ 165

Curriculum Connection
D2.2

Odds In Favour

Questions | Determine the odds in favour and display it as a ratio

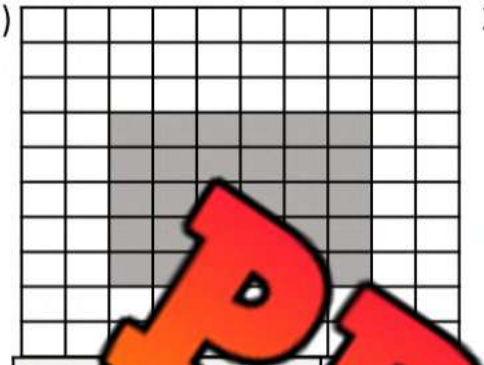
#	Word Problem	Odds in Favour - Ratio
1	A student rolls two dice. What are the odds in **favour** of getting a sum greater than 10?	
2	ketball r… 5 out of every 8 free throws. What ar… e odd… f making both shots in two attempts	
3	A raffle has 50 total tic… eo… m. What are the odds in **favour** of M… o wi… winner is drawn?	
4	A vending machine has 8 different drinks. 3 are f… and 5 are sodas. What are the odds in **favour** of ge… fruit juice twice in a row without replacement?	
5	A student flips 3 coins. What are the odds in **favour** of getting exactly 2 heads?	
6	A combination lock has digits 0–5. What are the odds in **favour** of guessing the 3-digit code on the first try?	

Name: _____ 166

Unit Quiz - Probability

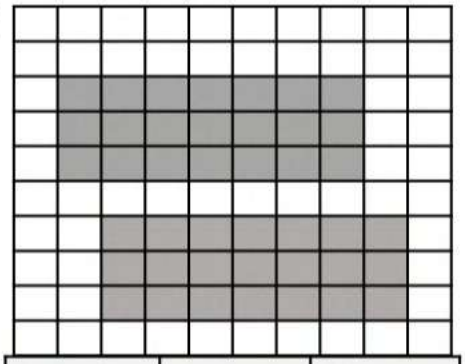
Part 1 Represent the probability of hitting the target using a fraction, decimal and percent

1)



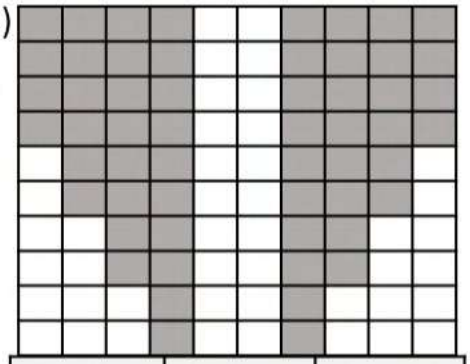
Fraction	Decimal	Percent

2)



Fraction	Decimal	Percent

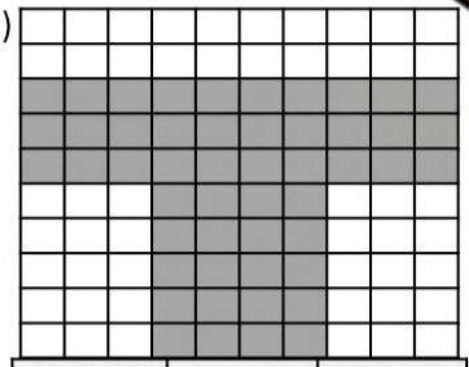
3)



Fraction	Decimal	Percent

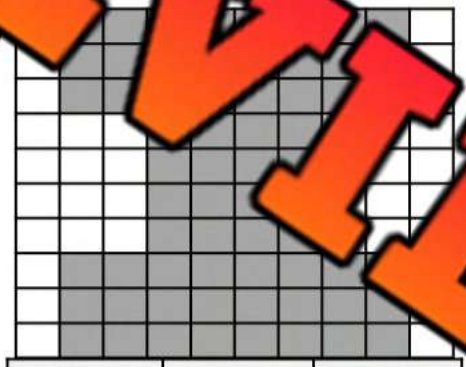
Part 2 What is t[illegible] the target twice if you get 2 throws?

1)



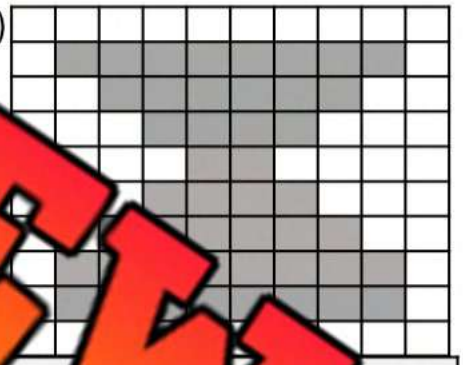
Fraction	Decimal	Percent

2)



Fraction	Decimal	Percent

3)

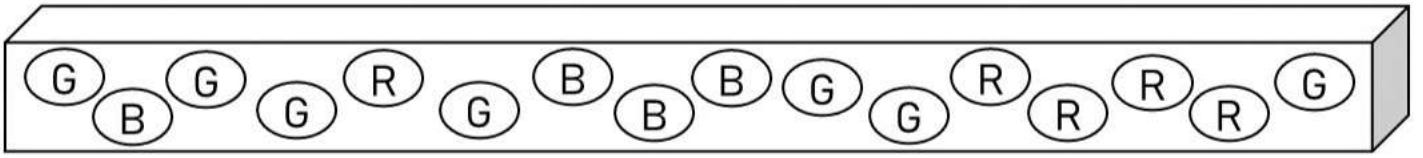


Fra[illegible]	ercent

Part 3 Are the events independent or dependent?

1)	Raining today and then raining tomorrow	Dependent	Independent
2)	Pulling out a red marble from a box of multi-coloured marbles three times in a row	Dependent	Independent
3)	Drawing a heart from a standard deck of 52 cards twice in a row	Dependent	Independent
4)	Winning the lottery this year and next year	Dependent	Independent

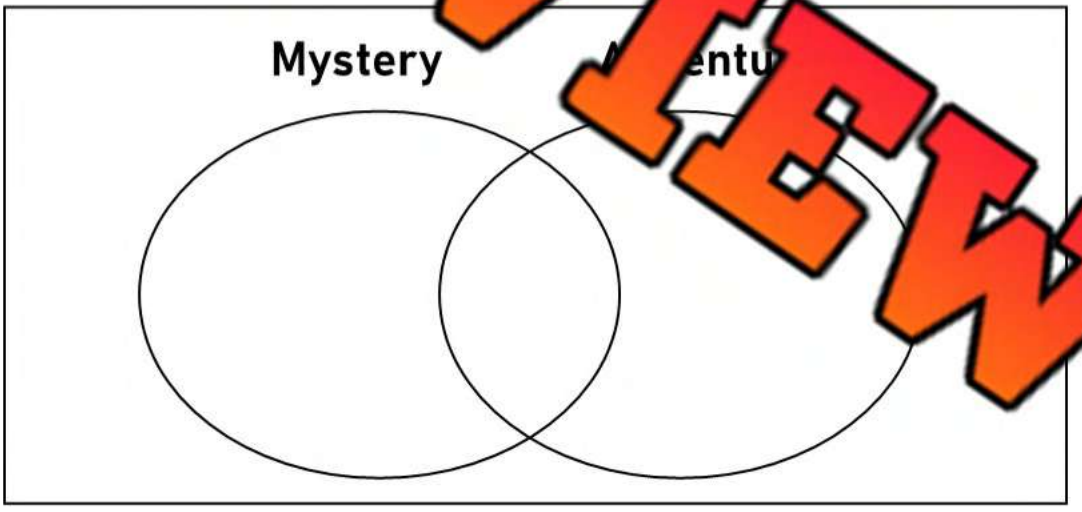
Part 4 What is the probability of the following scenarios when selecting candies from a box



	Scenario – Probability of...	Answer – Show Your Work
1)	Picking a green and then blue candy?	
2)	Pick en candies?	
3)	d, then green candy	

Part 5 Fill enn d ith the data below

In a class of 30 students, nts ry books, 17 like adventure books and 15 like both types of boo



What is the probability that a student...		Fraction	Decimal	Percent
1)	likes mystery books and not adventure books			
2)	likes adventure books			
3)	likes neither adventure nor mystery books			

Part 6 Draw a tree diagram to help you find the probability of different combinations

Dan has 9 different coloured shirts in his closet

- 4 of the shirts are white
- 3 of the shirts are black
- 2 of the shirts are grey

Dan has 3 more days of work this week and he wants to plan which shirts he will wear. He pulls out 3 shirts randomly as he is in a hurry.

1) Draw a tree diagram to represent the scenario above

2) How many combinations of shirts could he draw? _____

3) What is the probability of taking out...	**Fraction**	**Percent**
a) a white, then black, then grey shirt?		
b) three black shirts?		
c) a white shirt, and then two black shirts?		