Name:

UNIT 7 LEARNING GUIDE – DATA ANALYSIS

INSTRUCTIONS:

Using a pencil, complete the following questions as you work through the related lessons. Show ALL of your work as is explained in the lessons. Do your best and always ask questions if there is anything that you don't understand.

7.1 AVERAGES

1. Name the three different types of averages known as central tendencies.

2. Match each central tendency with the method that is used to determine it.

a. Median	i. Add up all of the numbers, then divide by how many numbers there are.
b. Mode	ii. Place the numbers in numerical order, then find the middle number.
c. Mean	iii. Count the frequency of each number, then pick the most common one.

3. Which measure of central tendency (mean, mode, or median) is best suited for the following situations?
   a. The most common size of T-shirt sold at a concert.
   b. The average wage earned by servers at a restaurant.
   c. The election of a student council president.
   d. The middle height of a Grade 8 class.
   e. The favourite colour amongst all of your friends and family.
   f. Canada's most popular baby name.
   g. A hockey goalie's save percentage.
   h. Your test average in this course.

7.2 Mean & Range

1. Determine the mean for each of the following data sets. Round your answers to the nearest tenth when necessary. *Reminder: To find the mean, add up all of the numbers in the set. Next, count how many numbers are in the set. Lastly, divide the sum of the numbers by the number of numbers in the set.*

   Ex. 9, 4, 3, 5, 10, 8

   $9 + 4 + 3 + 5 + 10 + 8 = 39$

   6 numbers in the set, so:

   $39 \div 6 = \mathbf{6.5}$

   a. 11, 8, 9, 6, 12

   b. 3, 2, 4, 1 ,1, 3, 2, 1

   c. 63, 58, 55, 61, 59

   d. 240, 310, 225, 260, 313

   e. 16.1, 18.9, 15.2, 17, 18.3

   f. 7, 6, 7, 3, 4, 5, 7, 6, 3, 7, 5, 7

   g. 90%, 85%, 92%, 100%, 88%, 95%

2. Circle the outlier for each data set. You do not have to calculate the mean. *Reminder: An outlier is a number that is much smaller or much bigger than the other values in the set. Hint: There can be more than one outlier and there may be examples without any outliers.*

   a. 11, 8, 9, 3, 12

   b. 2, 5, 6, 2, 14, 3

   c. 15, 11, 17, 13, 18, 13

   d. 7, 9, 8, 8, 20, 10, 2, 7

   e. 0.9, 0.3, 0.4, 0.2, 0.3, 0.3

   f. 50%, 65%, 70%, 45%, 60%

   g. 1540, 1546, 1537, 1429, 1541

   h. 4, 0, 2, 1, 3, 4, 0, 3, 2, 9, 4

3. Calculate the range of the following data sets. *<u>Reminder</u>: The range is the spread, or difference, between the highest and the lowest number.*

Ex. 9, 4, 3, 5, 10, 8

$10 - 3 = \mathbf{7}$

The range of this data set is 7.

a. 11, 8, 9, 6, 12

b. 3, 2, 4, 1 ,1, 3, 2, 1

c. 63, 58, 55, 61, 59

d. 240, 310, 225, 260, 313

e. 16.1, 18.9, 15.2, 17, 18.3

f. 7, 6, 7, 3, 4, 5, 7, 6, 3, 7, 5, 7

g. 90%, 85%, 92%, 100%, 88%, 95%

4. Lily has 2 birthday parties, one with her friends and one with her family. Use the chart below to answer the following questions. Round to the nearest unit.

Guests in Attendance (with Ages)	
Party with Friends	Party with Family
Renata, 14	Rena, 11
Kirsten, 15	Haruki, 45
Niimi, 15	Solomon, 43
Kaya, 16	Mei, 87
Quinn, 15	Frances, 28
Dan, 14	Leo, 25
Ranjeet, 15	Georgia, 28

a. What is the mean age of the guests at the Friend Party?

b. What is the age range of the guests at the Friend Party?

c. Are there any outliers at the Friends Party?

d. What is the mean age of the guests at the Family Party?

e. What is the age range of the guests at the Family Part?

f. Are there any outliers at the Family Party?

7.3 Median

1. Determine the median for each data set. *Reminder: The median is the middle number when the numbers are arranged in order from least to greatest.*

   Ex. 11, 8, 9, 3, 12
   3, 8, **9**, 11, 12
   9 is the median

   a. 2, 5, 6, 2, 14, 3, 4

   b. 15, 11, 13, 18, 13

   c. 7, 9, 8, 8, 20, 10, 2, 7, 6

   d. 0.9, 0.3, 0.4, 0.2, 0.2

   e. 50%, 65%, 70%, 45%, 60%

   f. 1540, 1546, 1537, 1429, 1541

   g. 4, 7, 2, 8, 3, 4, 8, 3, 6, 9, 5

2. Determine the median for each data set. *Reminder: If there is an even number of numbers in the data set, the median is the mean of the 2 middle numbers.*

   Ex. 9, 4, 3, 5, 10, 8
   3, 4, **5**, **8**, 9, 10
   $(5 + 8) \div 2 = \mathbf{6.5}$

   a. 13, 11, 8, 9, 6, 12

   b. 19, 18, 25, 19, 20, 26

   c. 63, 58, 55, 61, 59, 56, 59, 60

   d. 240, 310, 225, 260

   e. 16.2, 15.2, 17, 18.3

   f. 6, 7, 3, 4, 5, 7, 6, 3

   g. 87%, 85%, 93%, 100%, 88%, 95%

3. Fourteen runners are raising money for charity by running laps around a track. Use the data set of the number of laps that each student ran to answer the following questions.

10, 12, 7, 8, 1, 13, 11, 13, 15, 2, 14, 8, 14, 11

a. What is the range of the number of laps run by students?

b. What is the mean of the number of laps run by students? Round to nearest tenth.

c. What is the median of the number of laps run by students?

d. Which measure of central tendency (mean or median) is a better reflection of the number of laps run by students? Why?

7.4 Mode

1. Determine the mode for each data set. *Reminder: The mode is the number that occurs most frequently in a data set.*

   Ex. 2, 2, 5, 8, 2, 5

   Mode = 2

   a. 9, 5, 2, 9, 9, 5

   b. 6, 6, 0, 4, 10, 4, 1, 4

   c. 21, 15, 18, 15, 22, 30

   d. $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{3}{4}, \frac{1}{3}, \frac{1}{2}, \frac{5}{6}$

   e. \$5, \$2, \$1, \$2, \$1, \$2, \$5

2. Determine the mode for each data set. *Reminder: Data sets can include data other than numbers.*

   a. Orders at a fair:
   hot dog, veggie burger, veggie burger, hot dog, hamburger, hot dog, hot dog

   b. Weight of a pinch of sugar:
   1.1 g, 0.9 g, 0.8 g, 1.1 g, 1.2 g, 0.5 g, 0.9 g, 1.1 g, 1.3 g, 0.9 g, 1.1 g, 2.4 g

   c. T-shirts sizes purchased:
   L, M, XS, M, L, XL, M, L, L, XL, M, L, S, S, L, M, M

   d. Colour of salamander found:
   orange, blue, green, orange, black, green, black, green, orange, blue, green

3. For which data sets in Question 2 would you be able to calculate the mean?

4. For which data sets in Question 2 would you be able to calculate the median?

7.5 Conclusions

1. Determine the mean, median, mode, and range for each data set, then indicate which average (central tendency) best suits that data set.
   a. A journalist wants to know the average age of the actors in a theatre company. The actors are aged 8, 27, 36, 6, 24, 42, 70, 45, 31, 39, 45, 29.

Mean	Median	Mode	Range

Best measure of central tendency for this data set:

Why?

   b. Before visiting Toronto, ON in August, a traveler wants to know the average daily rainfall it received in August last year. Use the chart below to answer the questions.

Rainfall in Toronto, ON - August 2019 (measured in *mm*)																
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Rainfall	0	0	9	0	0	0	0	0	0	12	0	0	11	0	0	0
Date	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	
Rainfall	0	11	0	0	0	0	0	9	0	0	0	15	11	0	0	

Mean	Median	Mode	Range

Best measure of central tendency for this data set:

Why?

2. JoJo's Pizza keeps track of the number of customers they serve each day for a week as well as which pizza they put on special each day. Use the information from the chart below to answer the following questions.

JoJo's Pizza		
Day	# of Customers	Pizza on Special
Monday	88	Cheese
Tuesday	96	Hawaiian
Wednesday	15	Anchovy
Thursday	89	Hawaiian
Friday	175	Pepperoni
Saturday	159	Vegetarian
Sunday	110	Pepperoni

a. Calculate the mean, median and mode of the number of customers. Which measure of central tendency best represents the average number of customers at JoJo's in a day? Why?

b. Identify any outliers in the number of customers during the week at JoJo's. Is there anything that can explain the outlier?

7.6 Probability

1. A bag contains 4 green marbles and 1 silver marble. Without looking, you pick one marble out of the bag. Use the terms below to answer the following questions.

Impossible **Unlikely** **Even Likelihood** **Likely** **Certain**

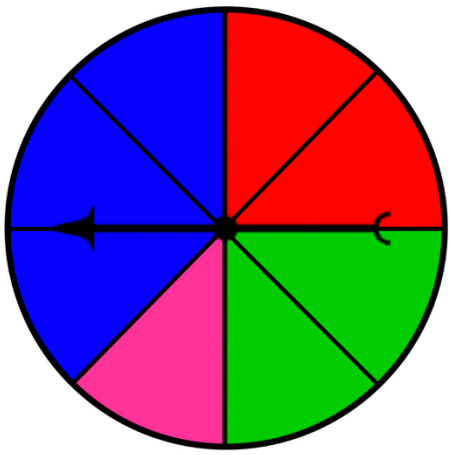
a. What is the likelihood of pulling a green marble out of the bag?

b. What is the likelihood of pulling a silver marble out of the bag?

c. What is the likelihood of pulling a blue marble out of the bag?

d. What is the likelihood of pulling a marble out of the bag?

2. There is a spinner game at the fair and you want to play it. Use the image below to answer the following questions.



a. What are the possible outcomes?

b. What's more probable: red or green?

c. What's more probable: pink or green?

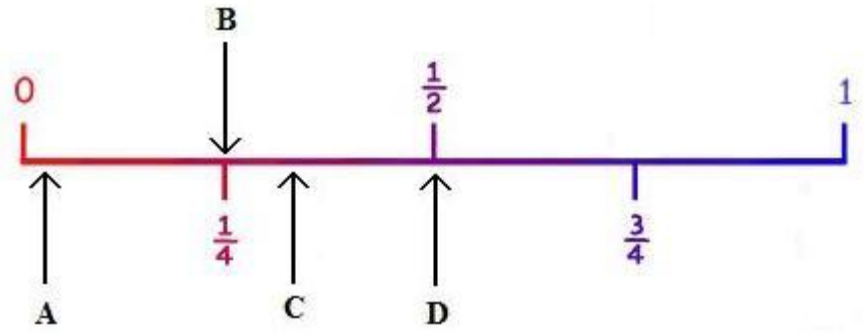
d. What's the likelihood of landing on a colour?

e. What's the likelihood of landing on pink?

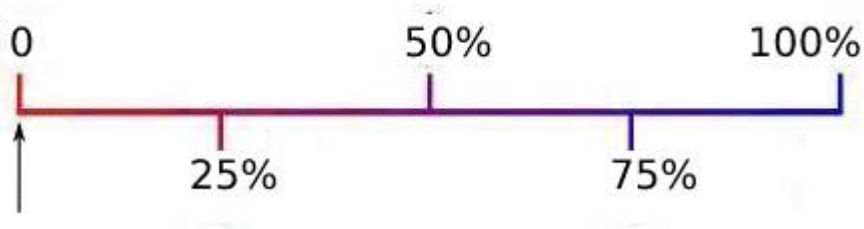
f. On which colour is the spinner most likely to land?

g. What's the likelihood of landing on yellow?

3. A name is chosen at random from the telephone book. Which of the arrows A, B, C or D shows the best position on the probability line for the event 'The name begins with Z'? Explain your answer.



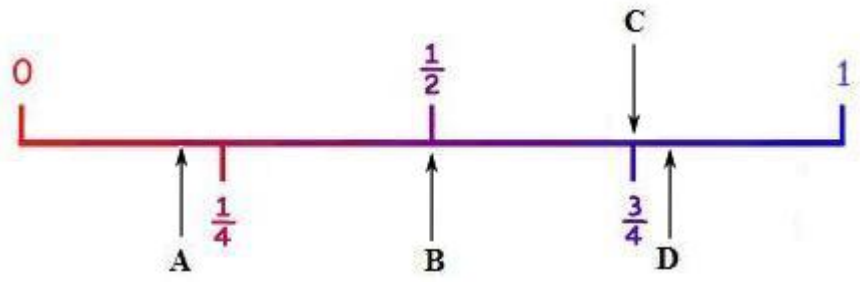
4. Which of the following events is NOT represented by the arrow on the probability line? Explain your answer.



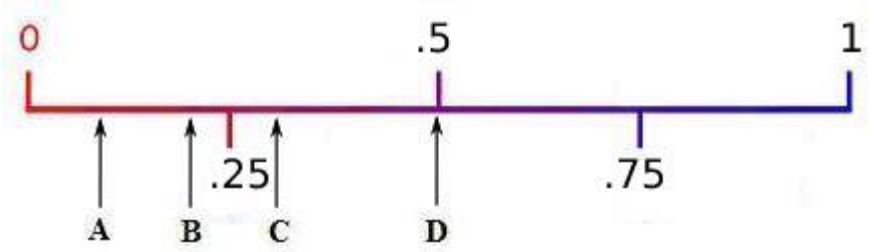
A Obtaining a score of 1 from two dice.
B Choosing an odd number from the multiples of 2.
C Choosing a letter B from the letters of the word PROBABILITY.
D Choosing a month of the year whose name contains the letter K

5. A letter is chosen at random from the 26 letters of the alphabet.

Which of the arrows A, B, C or D shows the best position on the probability line for the event 'The letter is a consonant'? (The letters a,e,i,o and u are vowels. All other letters are consonants.)



6. A bag contains 1 red ball and 9 blue balls. A ball is chosen at random from the bag. Which of the arrows A, B, C or D shows the best position on the probability line for the event 'The ball is red'? Explain your answer.



7.7 Theoretical Probability

1. How many <u>possible outcomes</u> are there in each scenario? *<u>Reminder</u>: The number of possible outcomes is the number of ways that the scenario could play out.*

   Ex. A number from 1 to 10 is chosen at random.
   10 (Because there are 10 different numbers that could be drawn out of the hat.)

   a. A number from 1 to 25 is chosen at random.

   b. A number from 1 to 100 is chosen at random.

   c. A normal six-sided die is rolled.

   d. There are 7 candies in your pocket, and you grab one out.

   e. A card from a regular 52-card deck is chosen at random.

2. List all of the possible outcomes for each situation.

   Ex. Randomly picking a marble out of a bag that contains 3 blue marbles, 2 green marbles and 1 black marble.
   Blue, blue, blue, green, green, black

   a. Rolling a 6-sided die.

   b. Flipping a coin.

   c. Randomly choosing a number from 1 to 10.

   d. Randomly picking a marble out of a bag that contains 4 yellow marbles, 2 white marbles and 3 red marbles.

   e. Randomly picking a letter of the English alphabet.

3. What is the probability for each scenario? *<u>Reminder</u>: The number of successful (favourable) outcomes is the number of different ways that the scenario works out or is successful.*

$$Probability\ of\ an\ event = \frac{\#\ of\ favourable\ outcomes}{total\ \#\ of\ possible\ outcomes}$$

Ex. A number from 1 to 10 is chosen at random. What is the possibility of selecting an even number?
Favourable Outcomes: *5 (Because there are 5 even numbers between 1 and 10.)*
Possible Outcomes: *10 (Because there are 10 numbers in total.)*
Probability: $\frac{5}{10}$ or simplified to $\frac{1}{2}$

a. A number from 1 to 25 is chosen at random. What is the possibility of selecting an even number?
Favourable Outcomes:
Possible Outcomes:
Probability:

b. A number from 1 to 100 is chosen at random. What is the probability of selecting a number less than 11?
Favourable Outcomes:
Possible Outcomes:
Probability:

c. A letter from the alphabet is chosen at random. What is the chance of selecting a vowel (not counting *y*)?
Favourable Outcomes:
Possible Outcomes:
Probability:

d. A normal six-sided die is rolled. What is the possibility of landing on a 3?
Favourable Outcomes:
Possible Outcomes:
Probability:

e. There are 7 coins in your pocket: 1 quarter, 2 loonies, and 4 toonies. If you reach in your pocket and grab a coin at random, what are the chances of pulling a toonie out of your pocket?
Favourable Outcomes:
Possible Outcomes:
Probability:

4. Use the image below to answer the following questions.

a. How many total pieces of gum are in the gumball machine?

b. What is the probability of getting a red piece?

c. What is the probability of getting a yellow piece?

d. What is the probability of getting a blue piece?

e. Which colour of gumball are you most likely to get?

f. Are you more likely to get a red gumball or a blue gumball?

g. What is the probability of getting a green gumball?

h. What is the probability of getting a gumball?

Unit 7 – Answer Key

Section 7.1

1. Mean, median, mode.
2. a. **ii** b. **iii** c. **i**
3. Arguments could be made for various answers here. Without knowing the data, these are the most likely measures to be useful. a. Mode b. Mean c. Mode d. Median e. Mode f. Mode g. Mean h. Mean

Section 7.2

1. a. 9.2 b. 2.1 c. 59.2 d. 269.6 e. 17.1 f. 5.6 g. 91.7
2. a. 3 b. 14 c. none d. 2 & 20 e. 0.9 f. none g. 1429 h. 9
3. a. 6 b. 3 c. 8 d. 88 e. 3.7 f. 4 g. 15
4. a. 15 b. 2 years c. No d. 38 e. 76 years f. Yes, Mei (87)

Section 7.3

1. a. 4 b. 13 c. 8 d. 0.3 e. 60 f. 1540 g. 5
2. a. 10 b. 19.5 c. 59 d. 250 e. 16.6 f. 5.5 g. 90.5
3. a. 14 b. 9.9 c. 11 d. Median, because the mean is pulled down by the 2 outliers.

Section 7.4

1. a. 9 b. 4 c. 15 d. $\frac{1}{2}$ & $\frac{3}{4}$ e. $2
2. a. Hot dog b. 1.1 g c. M & L d. Green
3. 2. b.
4. 2. b. & 2. c.

SECTION 7.5

1. a. Mean: 33.5 Median 33.5 Mode: 45 Range: 64 Best Measure: Mean or Median
   b. Mean: 2.5 Median 0 Mode: 0 Range: 15 Best Measure: Median or Mode because most days have no rain, so it more accurately represents an average August day in Toronto.
2. a. Mean: 104.6 Median: 96 Mode: None Best Measure: Mean b. (Multiple possible answers) People don't tend to go out for dinner on Wednesdays. People don't like anchovy pizza.

SECTION 7.6

1. a. Likely b. Unlikely c. Impossible d. Certain
2. a. blue, blue, blue, red, red, green, green, pink b. Even likelihood c. Green d. Certain e. Unlikely f. Blue g. Impossible 3 – 6 Explanations are required and will vary.

SECTION 7.7

1. a. 25 b. 100 c. 6 d. 7 e. 52
2. a. 1, 2, 3, 4, 5, 6 b. Heads, Tails c. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 d. yellow, yellow, yellow, yellow, white, white, red, red, red e. A, B, C, D, E, F, G, H, I, J, K, L, M, N ,O, P, Q, R, S, T, U, V, W, X, Y, Z
3. a. 12, 25, $\frac{12}{25}$ b. 10, 100, $\frac{10}{100}$ $or \frac{1}{10}$ c. 5, 26, $\frac{5}{26}$ d. 1, 6, $\frac{1}{6}$ e. 4, 7, $\frac{4}{7}$
4. a. 13 b. $\frac{4}{13}$ c. $\frac{6}{13}$ d. $\frac{3}{13}$ e. Yellow f. Red g. 0 h. 1