

Important Concepts . . .

Preview Review



Mathematics Grade 7
W2 - Lesson 4: Statistics

Important Concepts of Grade 7 Mathematics

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W1 - Lesson 2	Decimal Numbers
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Materials Required

Math Set
Calculator

**No Textbook
Required**

**This is a stand-
alone course.**

Mathematics Grade 7

Version 6

Preview/Review W2 - Lesson 4

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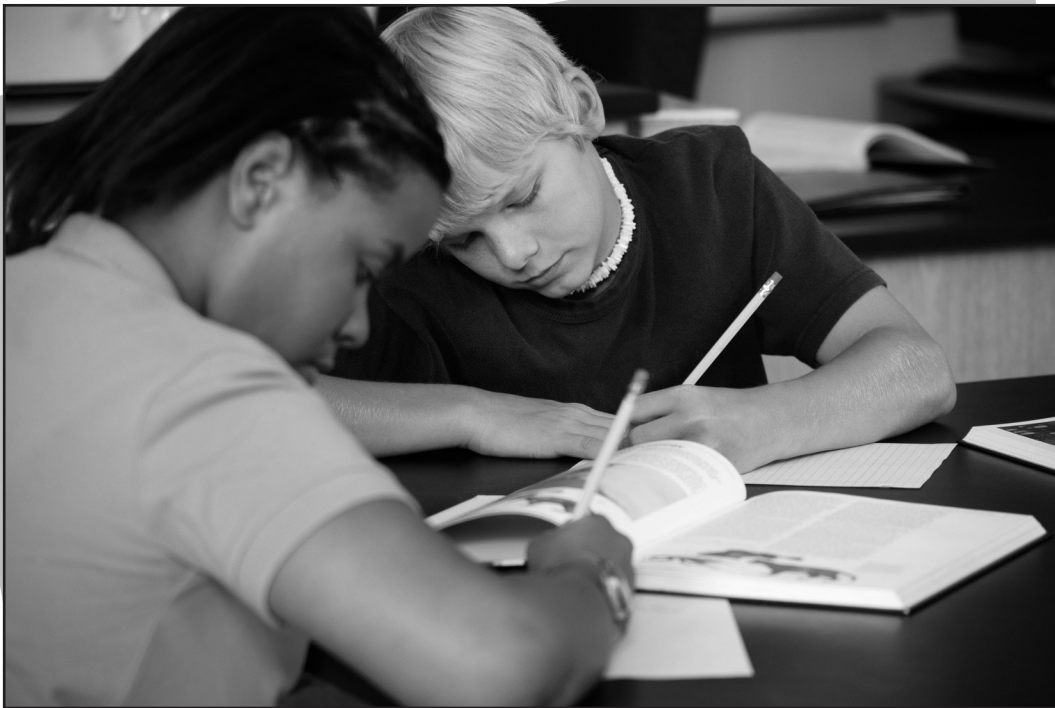
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Preview/Review Concepts for Grade Seven Mathematics



W2 – Lesson 4:

Statistics

W2 – Lesson 4: Statistics

Objective:

- *I can understand terms used in statistics.*

Collecting Data

Example: Malcolm wanted to know which subject was the most popular at School. He conducted a **personal survey** asking all the grade 7 students which subject was their favorite. Using tally marks, his data looked like this:

Survey Results	
Subject	Tally
Math	
Science	
Language Arts	
Social Studies	

Personal Survey: collecting data in person. Data can also be collected by mail, telephone, newspapers, books, or magazines.

He used the tally chart to make a **frequency table**. The table looked like this:

Survey Results		
Subject	Tally	Frequency
Math		14
Science		12
Language Arts		8
Social Studies		9

Frequency Table: a table that uses tallies to count the frequency (number) of data.

Using the **database** he just created, Malcolm could now create an organized table:

Organized Survey Results	
Math	14
Science	12
Language Arts	9
Social Studies	8

Database: an organized collection of data or information.

Using the organized results, Malcolm could answer the following questions.

1. Which subject was the most popular?
2. Which subject is the least popular?
3. What was the **sample size** (number of people surveyed)?

Math

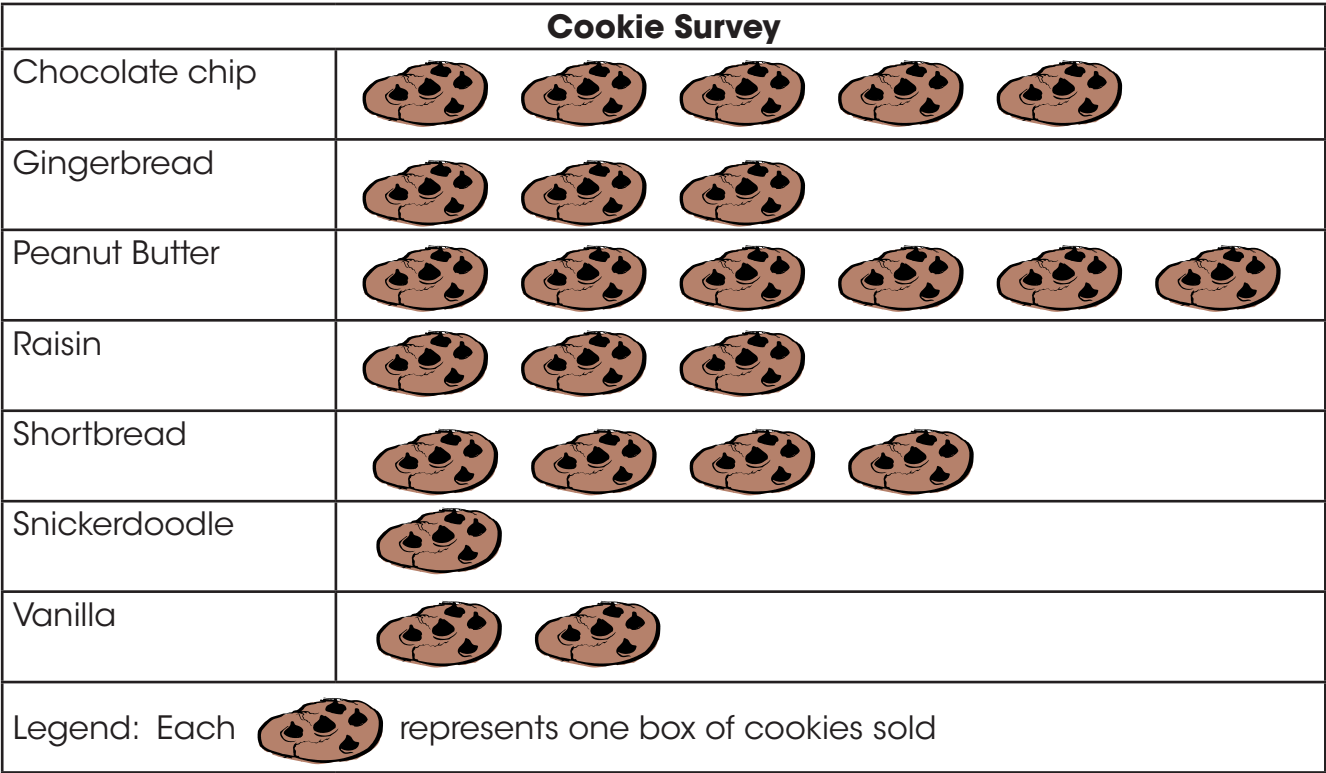
Language Arts

$$14 + 12 + 9 + 8 = 43 \text{ people}$$

Sample: a selection of the total information.

Practice:

Use the pictograph to answer the following questions.



- 1. How are the data in the pictograph arranged?
- 2. Which cookie sold the most?
- 3. Which cookie sold the least?
- 4. What was the frequency of shortbread cookies sold?
- 5. What was the frequency of raisin cookies sold?

Objective:

- *I can find the mean of a set of data.*

Finding the mean

Mean: the arithmetic average.

Example:

Basketball Results					
Game Number	1	2	3	4	5
Points scored	24	51	34	22	43

Find the total points over all five games:

$$24 + 51 + 34 + 22 + 43 = 174$$

174 points in five games.

Find the mean by dividing the total points by the number of games.

$$174 \div 5 = 34.8 \text{ (but since you can't score 0.8 points in basketball round to 35)}$$

The mean (average) points were 35 per game.

How many games:

scored close to 35 points?

Only one out of five games.

scored above 35 points?

Two out of five games

scored below 35 points?

Two out of five games

Practice:

Find the mean of the following sets of data.
Round your answer to one decimal point.

a. 24, 5, 14, 9, 32

b. 11, 5, 8, 6, 20, 15

c. 2, 9, 22, 12, 26, 5, 11

d. 18, 12, 9, 11

Objective:

- *I can find the median of a set of data .*

Finding the median**Example:**

Some prices are listed below, find the median.

\$215, \$211, \$246, \$213, \$287

Arrange in ascending order:

\$211, \$213, \$215, \$246, \$287

Since there is an odd number of numbers, the middle number is the median: \$215

Example 2:

Find the median of the numbers.

49, 62, 57, 44, 51, 67, 46, 54

Arrange in ascending order:

44, 46, 49, 51, _____, 54, 57, 62, 67

Since there is an even number of numbers, the median will be exactly between the two middle numbers:

$$(51 + 54) \div 2 = 52.5$$

Practice:

Find the median of the following sets of data.

a. 1.3, 2.1, 1.8, 2.3, 2.2, 1.5

b. 149, 218, 321, 156, 223, 219

c. 23, 56, 34, 11, 44, 62

d. \$123, \$234, \$132, \$138, \$205

Objective:

- *I can find the mode of a set of data .*

Finding the mode**Example:**

Steven counted the number of people in the cars that stopped in front of the school. Find the mode.

2	3	1	2	4	4	1	3	4	5
2	2	2	3	3	2	5	2	1	4

Arrange the numbers in ascending order:

1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5

Count the frequency of each number:

1's – 3 2's – 7 3's – 4 4's – 4 5's – 2

The highest frequency is the mode – 2 people in the car

Example 2:

Find the mode of the following numbers.

1, 2, 7, 2, 4, 5, 1, 7

Arrange in ascending order:

1, 1, 2, 2, 4, 5, 7, 7

Since there are **three modes**, we call this a **trimodal distribution**.

→ 1, 2, 7 are the three modes.

A data set with no repeated numbers has no mode.

A data set with two modes is called a **bimodal distribution**.

Practice:

Find the mode of the following sets of data.

a. 3, 44, 17, 17, 44, 15, 15, 15, 27, 40

b. 91, 79, 84, 85, 84, 90, 68, 100

c. 23, 32, 34, 22, 32, 24, 33

d. 11, 12, 15, 13, 12, 11, 14

Objective:

- *I can determine the range of a set of data .*

The range**Example:**

Find the range of 150, 250, 825, 400, 18, and 500

Arrange the numbers in ascending order:

20, 150, 250, 400, 500, 825

Calculate range:

Range = largest value – smallest value = $825 - 20 = 805$

The range is 805

Range: the difference between the highest and lowest values.

Example 2:

A seven day forecast looks like this

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
17°C	15°C	20°C	18°C	17°C	18°C	16°C

Find the range of the temperatures

15, 16, 17, 17, 18, 18, 20

Range = largest value – smallest value = $20 - 15 = 5$

The temperatures had a range of 5°C during the week.

Practice:

Find the range of the following sets of data.

a. 243, 221, 210, 252, 231, 224

b. 1.1, 1.7, 2.3, 1.6, 1.2, 1.4

c. 11, 40, 21, 32, 8

d. 2, 5, 7, 2, 6, 8, 4, 3

Objective:

- *I can analyze a set of data to identify any outliers.*

Outliers**Example:**

A bus company will add another bus if the wait time at a busy bus stop is longer than 5 minutes.

The following numbers represents the time in minutes that people wait at the bus stop.

1, 3, 4, 3, 5, 2, 5, 45, 1, 3, 4, 4, 2, 5, 2, 4, 1, 3, 4, 2

Using this information the mean, median and mode is:

Mean:

$$(1 + 3 + 4 + 3 + 5 + 2 + 5 + 45 + 1 + 3 + 4 + 4 + 2 + 5 + 2 + 4 + 1 + 3 + 4 + 2) \div 20 \\ = 103 \div 20 = \mathbf{5.15 \text{ minutes}}$$

Median:

1, 1, 1, 2, 2, 2, 2, 3, 3, 3, ____, 3, 4, 4, 4, 4, 4, 5, 5, 5, 45 **Median: 3**

Mode is 4

The 45 minute wait was because there was an accident on the road.

Therefore 45 minutes is an outlier.

If the outlier is removed, the new mean, median and mode is:

Mean:

$$(1 + 3 + 4 + 3 + 5 + 2 + 5 + 1 + 3 + 4 + 4 + 2 + 5 + 2 + 4 + 1 + 3 + 4 + 2) \div 19 = \mathbf{3.05}$$

Median:

1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 4, 4, 4, 4, 4, 5, 5, 5 **Median: 3**

Mode is 4

Should the bus company add another bus? Explain.

Outliers: a value in a data set which is far removed in value from the other data.

Practice:

1. A class average is the mean of all the marks of each student in the class.

Dave's class has the following scores.

67%, 78%, 59%, 66%, 72%, 5%, 65%, 69%, 68%, 75%,
82%, 77%, 73%, 78%, 67%, 78%, 65%, 66%, 62%, 85%

- a. Calculate the mean including the outlier.
 - b. Calculate the mean without the outlier.
 - c. The school rewards classes with an average above 70%, should the outlier be included when reporting this class average?
 - d. What if the 0% was the result of a student who had moved away, but her name was still on the class list?
2. Some friends compared the amount of allowance they get. Their allowance each week was:

\$5, \$7, \$5, \$25, \$6, \$5, \$8, \$6, \$5
 - a. What is the mean, median and mode of the allowances?
 - b. If Greg receives \$25 in allowance partly as payment for helping with farm chores every day, should his allowance be counted as an outlier? Why or why not?

Objective:

- *I can give real-world examples where the mean, median or mode is the most appropriate measure to use when reporting findings.*

Deciding which to use, mean/ median/ mode

Example: A sports team has a different contract for all their players. Rookies get \$1000 per game, players over 5 years get \$1500 a game, and veterans over 10 years get \$5000 a game.

The team roster currently has: 6 rookies, 5 five years, and 1 veteran.

Or

1000, 1000, 1000, 1000, 1000, 1000, 1500, 1500, 1500, 1500, 1500, 5000

In a TV interview, the team manager is asked “*about how much does each player make?*”

If the manager reports the **mean**:

$$(1000 + 1000 + 1000 + 1000 + 1000 + 1000 + 1500 + 1500 + 1500 + 1500 + 1500 + 5000) \div 12 = \mathbf{\$1541}$$

If the manager reports the **median**:

$$1000, 1000, 1000, 1000, 1000, 1000, \text{ ______ }, 1500, 1500, 1500, 1500, 1500, 5000 \\ = (1000 + 1500) \div 2 = \mathbf{\$1250}$$

If the manager reports the **mode**:

$$1000, 1000, 1000, 1000, 1000, 1000, 1500, 1500, 1500, 1500, 1500, 5000 \\ = \mathbf{\$1000}$$

Which amount would be the most accurate representation of the players’ earnings? Why?

Practice:

1. Scott's math test marks for the year are 65%, 83%, 90%, 84%, 65%, and 21%
 - a. Calculate the mean
 - b. Find the median
 - c. Find the mode
 - d. If Scott's parents asked his teacher how Scott was doing which average is the best representation of what Scott has learned? Why?
2. Robin has some money she has to share with her 4 brothers. The bills she was given has are:
1, 1, 1, 1, 5, 5, 5, 5, 20, 100
 - a. She decides that she will use the modes to distribute the bills, and gives her brothers each a dollar bill and a five. Is this a fair method to share the money? Why or why not?
 - b. How much did Robin keep from each of her brothers?

Summary and Practice:

- *Using what you've learned, answer the following questions.*

1. Susanne scored 75, 83, 92, 79, 96, and 88 points on her spelling tests. What is her average score?
2. If different boxes of cookies cost \$4.10, \$4.32, \$4.79, \$5.52, \$7.18, \$7.92 and \$9.58, what is the median price?
3. Find the mode of 68, 77, 79, 84, 85, 84, 90, 91, 93, 100
4. Find the range of the values: 2, 5, 6, 6, 8, 10, 12, 17
5. Which measure (mean, median or mode) would you use to describe each of the following cases? Explain.
 - a. Size of pants sold in a store, if you wanted to send in an order for more pants.
 - b. Mass of bags of candy, if you were quality control.
 - c. Cost of lunch over a one month period, if you were planning next month's budget.
 - d. Salary of people in a company with only a few managers and lots of entry level employees, if you were trying to prove wages are too low.

6. Describe a situation when an outlier should be included when calculating an average.
7. Describe a situation when an outlier should not be included.
8. Betty was conducting a survey about the school’s cafeteria menu. She asked people in the lunch line what food they liked the most. Her results were:

Survey Results		
Food Item	Tally	Frequency
Fries		
Pizza		
Hamburger		
Tacos		
Chicken wrap		
Chicken fingers		
Hotdog		
Macaroni and cheese		

- a. Complete the frequency table.
- b. Create an organized table listing foods from most popular to least popular.
- c. What was the sample size of this survey?

Organized Survey Results	

If you were to replace an item on the menu, which item would you replace.



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