

Important Concepts . . .

# Preview Review



**Mathematics   Grade 7   TEACHER KEY**  
**W2 - Lesson 4: Statistics**

## Important Concepts of Grade 7 Mathematics

W1 - Lesson 1 .....	Divisibility Rules
W1 - Lesson 2 .....	Decimal Numbers
W1 - Lesson 3 .....	Fractions
W1 - Lesson 4 .....	Improper Fractions, Mixed Numbers, Percents, and Decimals
W1 - Lesson 5 .....	Integers, Number Lines, and Sequencing
W1 - Quiz	
W2 - Lesson 1 .....	Table of Values and Graphing Linear Equations
W2 - Lesson 2 .....	Modeling Expressions, Equations, and the Preservation of Equality
W2 - Lesson 3 .....	Algebra and Linear Equations
W2 - Lesson 4 .....	Statistics
W2 - Lesson 5 .....	Circle Graphs and Calculating Probability
W2 - Quiz	
W3 - Lesson 1 .....	Circles
W3 - Lesson 2 .....	Area of Triangles and Parallelograms
W3 - Lesson 3 .....	Line Segments
W3 - Lesson 4 .....	Parts and Plotting on a Cartesian Plane
W3 - Lesson 5 .....	Transformations
W3 - Quiz	

## Materials Required

Math Set  
Calculator

**No Textbook Required**

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

Mathematics Grade 7

Version 6

Preview/Review W2 - Lesson 4

ISBN 1-894894-75-8

Publisher: Alberta Distance Learning Centre

Written by: Sandy

Reviewed by: Barb Phillips

Project Coordinator: Donna Silgard

Preview/Review Publishing Coordinating Team:

Laura Renkema and Nicole McKeand



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# Preview/Review Concepts for Grade Seven Mathematics

## Teacher Key



*W2 - Lesson 4:*

*Statistics*

## **Introductory Information for Teachers**

Preview/Review courses are aimed mainly at students who have completed the regular course but who need to review some of the material before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new concepts they will study in their next grade.

No Preview/Review course is intended to replace the regular course because each covers only what the writers have decided are the top 15 concepts from the Program of Studies for that course.

Preview/Review materials are intended for use by teachers and students in one-subject and one-grade classrooms. This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons. A short quiz is provided at the end of each section to test student knowledge of the material studied. In a classroom the course will likely be completed in three weeks.

This Preview/Review course is written to be stand-alone. There is no textbook required.

## 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:

<b>Organized Survey Results</b>	
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

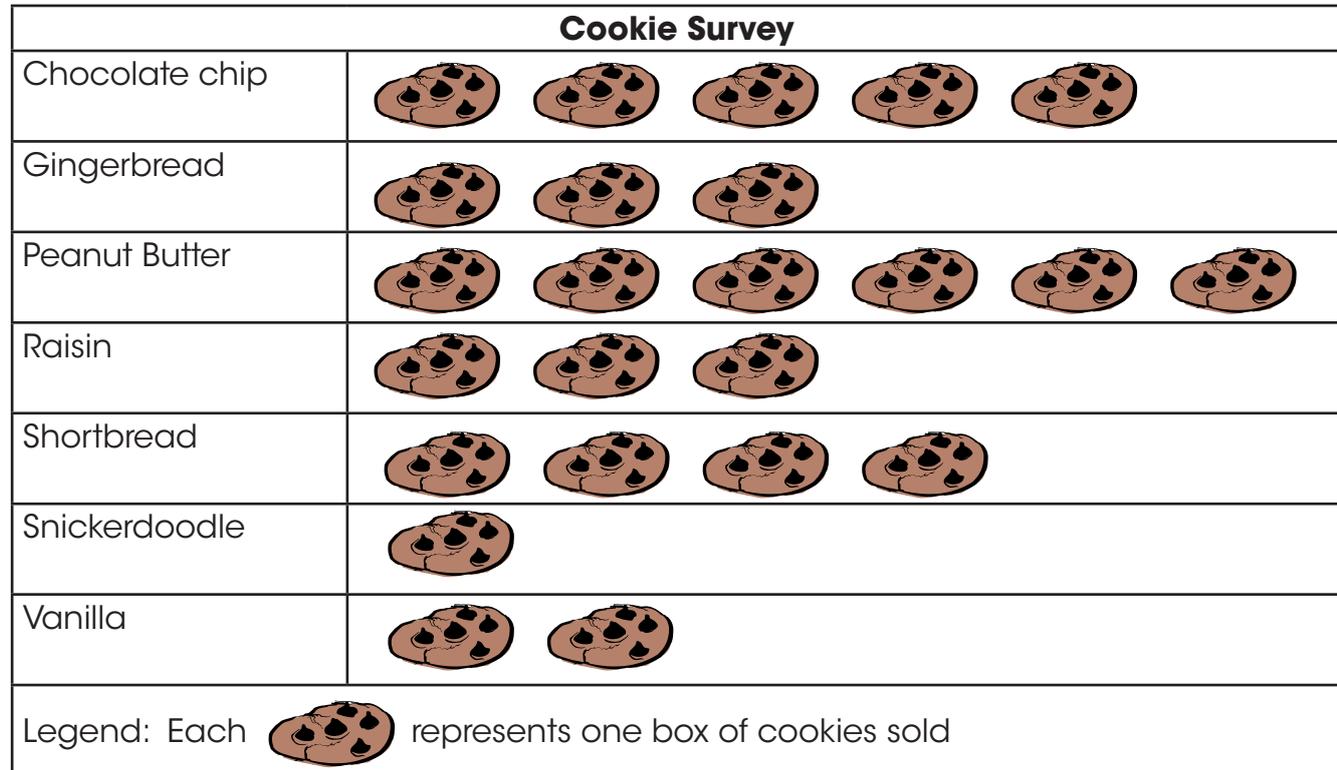
Language Arts

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

**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?  
**The data are arranged in alphabetical order**
2. Which cookie sold the most?  
**Peanut butter cookies sold the most**
3. Which cookie sold the least?  
**Snickerdoodles sold the least**
4. What was the frequency of shortbread cookies sold?  
**Four boxes of shortbread cookies sold**
5. What was the frequency of raisin cookies sold?  
**Three boxes 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:

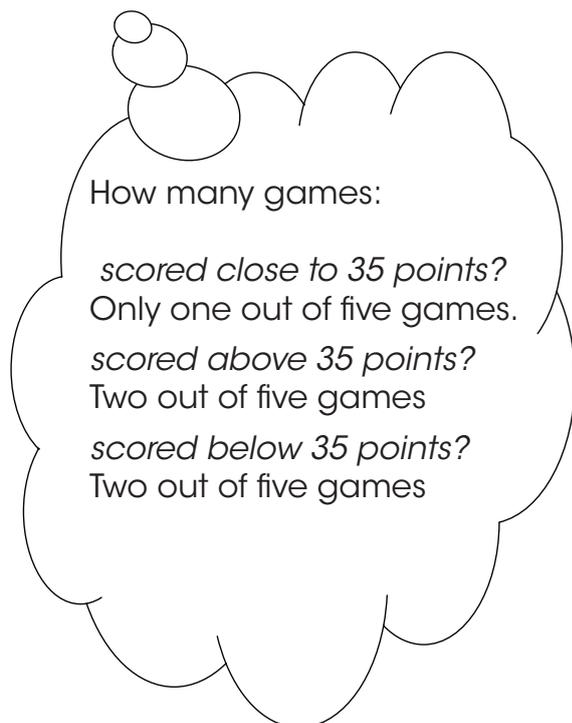
$$24 + 51 + 34 + 22 + 43 = 174$$

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.



**Practice:**

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

- a. 24, 5, 14, 9, 32  
**16.8**
- b. 11, 5, 8, 6, 20, 15  
**10.8**
- c. 2, 9, 22, 12, 26, 5, 11  
**12.4**
- d. 18, 12, 9, 11  
**12.5**

**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

**Median:** the middle value in a distribution.

**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

**1.3, 1.5, 1.8, \_\_\_\_\_, 2.1, 2.2, 2.3**  
 **$(1.8 + 2.1) \div 2 = 1.95$  or **2****

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

**149, 156, 218, \_\_\_\_\_, 219, 223, 321**  
 **$(218 + 219) \div 2 = 218.5$**

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

**11, 23, 34, \_\_\_\_\_, 44, 56, 62**  
 **$(34 + 44) \div 2 = 39$**

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

**123, 132, 138, 205, 234**  
**138**

**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.

**Mode:** the most frequently occurring value in a set of data.

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, 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  
**3, 15, 15, 15, 17, 17, 27, 40, 44, 44**  
**Mode: 15**

- b. 91, 79, 84, 85, 84, 90, 68, 100  
**68, 79, 84, 84, 85, 90, 91, 100**  
**Mode: 84**

- c. 23, 32, 34, 22, 32, 24, 33  
**22, 23, 24, 32, 32, 33, 34**  
**Mode: 32**

- d. 11, 12, 15, 13, 12, 11, 14  
**11, 11, 12, 12, 13, 14, 15**  
**Mode: 11, 12**

**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

**Range =  $252 - 210 = 42$**

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

**Range =  $2.3 - 1.1 = 1.2$**

c. 11, 40, 21, 32, 8

**Range =  $40 - 8 = 32$**

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

**Range =  $8 - 2 = 6$**

**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.

**No, since the accident was a one-time problem, the 45 minute wait should be considered an outlier which makes the wait time less than 5 minutes.**

**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.

$$\mathbf{67.85 = 67.9}$$

- b. Calculate the mean without the outlier.

$$\mathbf{71.2}$$

- c. The school rewards classes with an average above 70%, should the outlier be included when reporting this class average?

**Unfortunately all student in the class must be included as part of the 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?

**In this case, the student is no longer part of the class so her mark can be excluded.**

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?

$$\mathbf{5, 5, 5, 5, 6, 6, 7, 8, 25}$$

**Mean: \$8**

**Median: \$6**

**Mode: \$5**

- 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?

**Answers may vary. Example: Yes, because Greg has to work for his money. Or, no, it is not uncommon to do chores to get an allowance.**

**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?

**Since most players do not earn \$5000 a game, the best average is the median, at \$1250, which best represents the rookies and the five-year players.**

**Practice:**

1. Scott's math test marks for the year are 65%, 83%, 90%, 84%, 65%, and 21%

- a. Calculate the mean

**Mean = 68%**

- b. Find the median

**Median: 74%**

- c. Find the mode

**Mode: 65%**

- d. If Scott's parents asked his teacher how Scott was doing which average is the best representation of what Scott has learned? Why?

**The median is the best indicator overall of how much Scott understands math as a subject.**

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?

**No, Robin should have used the mean as the average to share the money since it is the value of the bills that is important, not the frequency of each.**

- b. How much did Robin keep from each of her brothers?

**Each brother should have gotten \$28.80 (rather than \$6) which means Robin kept \$22.80 from each brother.**

**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?

**85.5**

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?

**\$5.52**

3. Find the mode of 68, 77, 79, 84, 85, 84, 90, 91, 93, 100

**84**

4. Find the range of the values: 2, 5, 6, 6, 8, 10, 12, 17

**$17 - 2 = 15$**

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.

**Mode, to tell you which size sold the most numbers.**

- b. Mass of bags of candy, if you were quality control.

**Mean, to see if most of the bags are the same weight.**

- c. Cost of lunch over a one month period, if you were planning next month's budget.

**Mean, to balance out the expensive days with the cheaper days.**

- 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.

**Mode, since more people would have smaller salaries.**

6. Describe a situation when an outlier should be included when calculating an average.

**Answers will vary. Example: low test score because of not studying**

7. Describe a situation when an outlier should not be included.

**Answers will vary. Example: wrong number measured because the ruler was upside down.**

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		<b>20</b>
Pizza		<b>12</b>
Hamburger		<b>8</b>
Tacos		<b>9</b>
Chicken wrap		<b>14</b>
Chicken fingers		<b>17</b>
Hotdog		<b>13</b>
Macaroni and cheese		<b>5</b>

- 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?  
**98**

Organized Survey Results	
<b>Fries</b>	<b>20</b>
<b>Chicken fingers</b>	<b>17</b>
<b>Chicken wrap</b>	<b>14</b>
<b>Hotdog</b>	<b>13</b>
<b>Pizza</b>	<b>12</b>
<b>Tacos</b>	<b>9</b>
<b>Hamburger</b>	<b>8</b>
<b>Macaroni and cheese</b>	<b>5</b>

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

**I would replace the macaroni and cheese because it is currently the least popular menu item.**



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