North Penn School District

Elementary Math Parent Letter

Grade 5

Unit 4 – Chapter 9: Algebra: Patterns and Graphing

Examples for each lesson:

Lesson 9.1

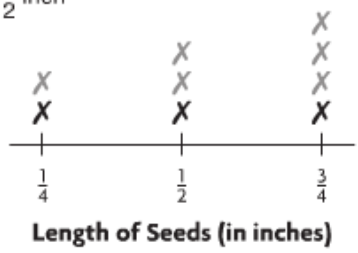
Line Plots

A **line plot** is a graph that shows the shape of a data set by placing *X*s above each data value on a number line. You can make a line plot to represent a data set and then use the line plot to answer questions about the data set.

Students measure the lengths of several seeds.
The length of each seed is listed below.

$\frac{1}{2}$ inch, $\frac{3}{4}$ inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, $\frac{3}{4}$ inch, $\frac{3}{4}$ inch, $\frac{3}{4}$ inch, $\frac{1}{4}$ inch, $\frac{1}{2}$ inch

What is the combined length of the seeds that are $\frac{1}{4}$ inch long?



Length of Seeds (in inches)

Step 1 To represent the different lengths of the seeds, draw and label a line plot with the data values $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$. Then use an *X* to represent each seed. The line plot has been started for you.

Step 2 There are 2 *X*s above $\frac{1}{4}$ on the line plot.

Multiply to find the combined length of the seeds:

2 × $\frac{1}{4}$ = $\frac{2}{4}$, or $\frac{1}{2}$ inch

The combined length of the seeds that are $\frac{1}{4}$ inch long is $\frac{1}{2}$ inch.

You can use the same process to find the combined lengths of the seeds that are $\frac{1}{2}$ inch long and $\frac{3}{4}$ inch long.

Lesson 9.2

Ordered Pairs

A coordinate grid is like a sheet of graph paper bordered at the left and at the bottom by two perpendicular number lines. The **x-axis** is the horizontal number line at the bottom of the grid. The **y-axis** is the vertical number line on the left side of the grid.

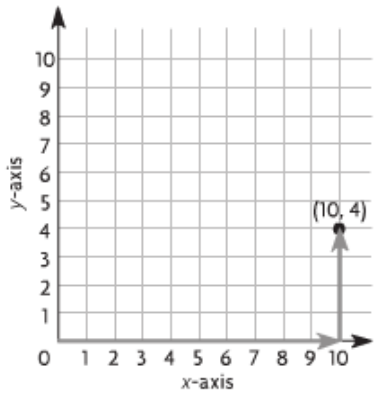
An ordered pair is a pair of numbers that describes the location of a point on the grid. An ordered pair contains two coordinates, *x* and *y*. The **x-coordinate** is the first number in the ordered pair, and the **y-coordinate** is the second number.

$(x, y) \longrightarrow (10, 4)$

Plot and label (10, 4) on the coordinate grid.

To graph an ordered pair:

- Start at the origin, (0, 0).
- Think: The letter *x* comes before *y* in the alphabet. Move across the *x*-axis first.
- The *x*-coordinate is 10, so move 10 units right.
- The *y*-coordinate is 4, so move 4 units up.
- Plot and label the ordered pair (10, 4).



More information on this strategy is available on Animated Math Models #30, 31.

Lesson 9.3

Graph Data

Graph the data on the coordinate grid.

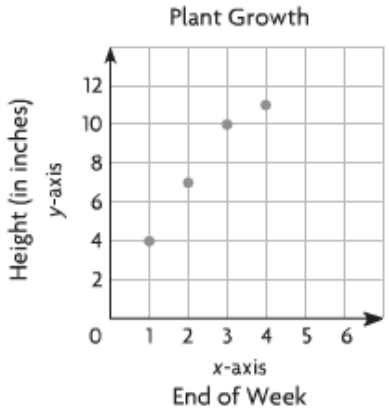
Plant Growth				
End of Week	1	2	3	4
Height (in inches)	4	7	10	11

- Choose a title for your graph and label it. You can use the data categories to name the *x*- and *y*-axis.
- Write the related pairs of data as ordered pairs.

(1, 4), (2, 7)

(3, 10), (4, 11)

- Plot the point for each ordered pair.



Lesson 9.4

Line Graphs

A **line graph** uses a series of line segments to show how a set of data changes over time. The **scale** of a line graph measures and labels the data along the axes. An **interval** is the distance between the numbers on an axis.

Use the table to make a line graph.

Average Monthly High Temperature in Sacramento, California					
Month	Jan.	Feb.	Mar.	April	May
Temperature (°F)	53	60	65	71	80

- Write a title for your graph. In this example, use **Average Monthly High Temperature in Sacramento**.
- Draw and label the axes of the line graph. Label the horizontal axis **Month**. Write the months. Label the vertical axis **Temperature (°F)**.
- Choose a scale and an interval. The range is 53–80, so a possible scale is 0–80, with intervals of 20.
- Write the related pairs of data as ordered pairs: (Jan, 53); (Feb, 60); (Mar, 65); (April, 71); (May, 80).

More information on this strategy is available on Animated Math Model #32.

Lesson 9.5

Numerical Patterns

A soccer league has 7 teams. How many players are needed for 7 teams? How many soccer balls are needed by the 7 teams?

	Number of Teams	1	2	3	4	7
Add 8.	**Number of Players**	8	16	24	32	56
Add 4.	**Number of Soccer Balls**	4	8	12	16	28

Step 1 Find a rule that could be used to find the number of players for the number of teams.

Think: In the sequence 8, 16, 24, 32, you add 8 to get the next term.

As the number of teams increases by 1, the number of players increases by 8. So the rule is to add 8.

Step 2 Find a rule that could be used to find the number of soccer balls for the number of teams.

Think: In the sequence 4, 8, 12, 16, you add 4 to get the next term.

As the number of teams increases by 1, the number of soccer balls needed increases by 4. So the rule is to add 4.

Step 3 For 7 teams, multiply the number of players by $\frac{1}{2}$ to find the number of soccer balls.

So, for 7 teams, 56 players will need 28 soccer balls.

Lesson 9.6

Problem Solving • Find a Rule

Samantha is making a scarf with fringe around it. Each section of fringe is made of 4 pieces of yarn with 2 beads holding them together. There are 42 sections of fringe on Samantha's scarf. How many wooden beads and how many pieces of yarn are on Samantha's scarf?

Read the Problem	Solve the Problem
What do I need to find? Possible answer: I need to find the number of beads and the number of pieces of yarn on Samantha's scarf.	
What information do I need to use? Possible answer: I need to use the number of sections on the scarf, and that each section has 4 pieces of yarn and 2 beads.	
How will I use the information? I will use the information to search for patterns to solve a simpler problem.	

Sections of Fringe	1	2	3	4	6	42
Number of Beads	2	4	6	8	12	84
Pieces of Yarn	4	8	12	16	24	168

Possible answer: I can multiply the number of sections by 2 to find the number of beads. Then, I can multiply the number of sections by 4, or the number of beads by 2, to find the number of pieces of yarn. So, Samantha's scarf has 2×42, or 84 beads, and 4×42, or 168 pieces of yarn.

Lesson 9.7

Graph and Analyze Relationships

The scale on a map is 1 in. = 4 mi. Two cities are 5 inches apart on the map. What is the actual distance between the two cities?

Step 1 Make a table that relates the map distances to the actual distances.

Map Distance (in.)	1	2	3	4	5
Actual Distance (mi)	4	8	12	16	?

Step 2 Write the number pairs in the table as ordered pairs.

(1, 4), (2, 8), (3, 12), (4, 16), (5, ?)

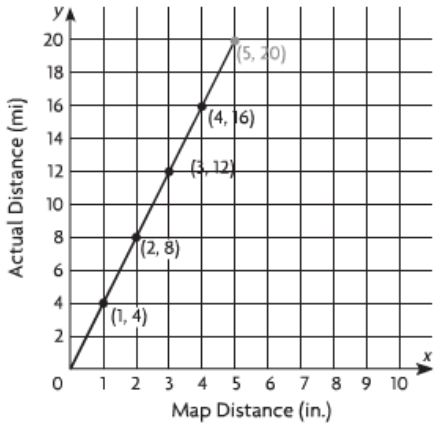
Step 3 Graph the ordered pairs. Connect the points with a line from the origin.

Possible rule: Multiply the map distance by 4 to get the actual distance.

Step 4 Use the rule to find the actual distance between the two cities.

So, two cities that are 5 inches apart on the map are actually 5 × 4, or 20 miles apart.

Plot the point (5, 20) on the graph.



More information on this strategy is available on Animated Math Models #30, 31.

Vocabulary

Interval – the fixed distance between any two consecutive numbers on the scale of a graph

Line graph – a graph that uses line segments to show how data changes over time

Ordered pair – the pair of numbers used to locate points on a grid

Origin – the point where the x-axis and the y-axis intersect (0, 0)

Scale – a series of numbers placed at fixed distances on the graph that help label it

x-axis – the horizontal number line on a coordinate plane

x-coordinate – the first number in an ordered pair, which tells the distance to move right or left from (0, 0)

y-axis – the vertical number line on a coordinate plane

y-coordinate – the second number in an ordered pair, which tells the distance to move up or down from (0, 0)