

Name: _____ Class: _____ Date: _____

Variables & Patterns
Lesson 1.1 - Jumping Jacks Experiment

Part I: Read the introduction.

Jumping Jack Experiment

You will need a group of at least four people:

- a jumper (to do jumping jacks)
- a timer (to keep track of the time)
- a counter (to count jumping jacks)
- a recorder (to write down the number of jumping jacks)

As a group, decide who will do each task.

When the timer says “go,” the jumper begins doing jumping jacks. The jumper continues jumping for 2 minutes. The counter counts the jumping jacks out loud. Every 10 seconds, the timer says “time” and the recorder records the total number of jumping jacks the jumper has done.

Part II: Determine who will have what job. You will only record TWO student jumpers.

Round 1: The Jumper - _____

The Timer - _____

The Counter - _____

The Recorder - _____

Round 2: The Jumper - _____

The Timer - _____

The Counter - _____

The Recorder - _____

Part III: Do the jumping jack experiment, everyone do their job! The Recorder fills in the table below:

Round 1:

| | | | | | | |
|-------------------------------|---|----|----|----|----|----|
| Time (seconds) | 0 | 10 | 20 | 30 | 40 | 50 |
| Total Number of Jumping Jacks | | | | | | |

| | | | | | | |
|----|----|----|----|-----|-----|-----|
| 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| | | | | | | |

Round 2:

| | | | | | | |
|-------------------------------|---|----|----|----|----|----|
| Time (seconds) | 0 | 10 | 20 | 30 | 40 | 50 |
| Total Number of Jumping Jacks | | | | | | |

| | | | | | | |
|----|----|----|----|-----|-----|-----|
| 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| | | | | | | |

Part IV: Answer the following questions.

- 1.) How did the jumping jack rates (the number of jumping jacks per second) in your group change as time passed? How is this shown in your tables?

- 2.) What might this pattern suggest about how the bike-riding speed would change over a day's time on the bicycle tour?

There are four steps to follow when you make a coordinate graph.

Step 1 Identify two variables.

In Problem 1.1, the two variables are *time* and *number of jumping jacks*.

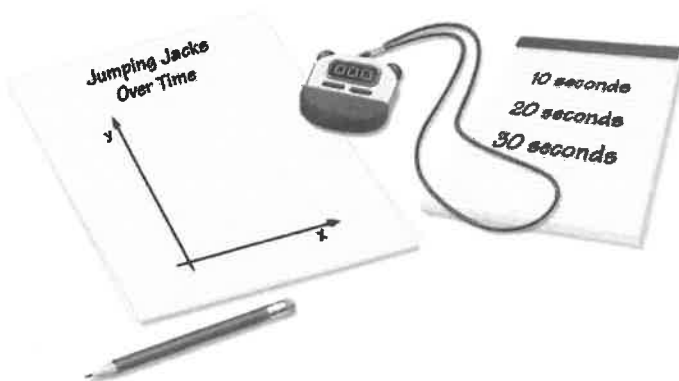
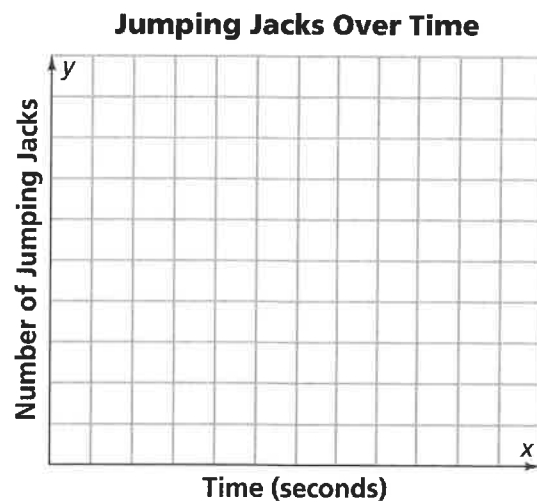
Step 2 Select an axis to represent each variable.

Often, you can assign each variable to an axis by thinking about how the variables are related. If one variable depends on the other, put the **dependent variable** on the **y-axis** (the vertical axis) and the **independent variable** on the **x-axis** (the horizontal axis). You may have encountered the terms *dependent variable* and *independent variable* in your science classes.

If time is a variable, you usually put it on the *x-axis*. This helps you see the “story” that occurs over time as you read the graph from left to right.

In Problem 1.1, the number of jumping jacks depends on time. So, put number of jumping jacks (the dependent variable) on the *y-axis* and time (the independent variable) on the *x-axis*.

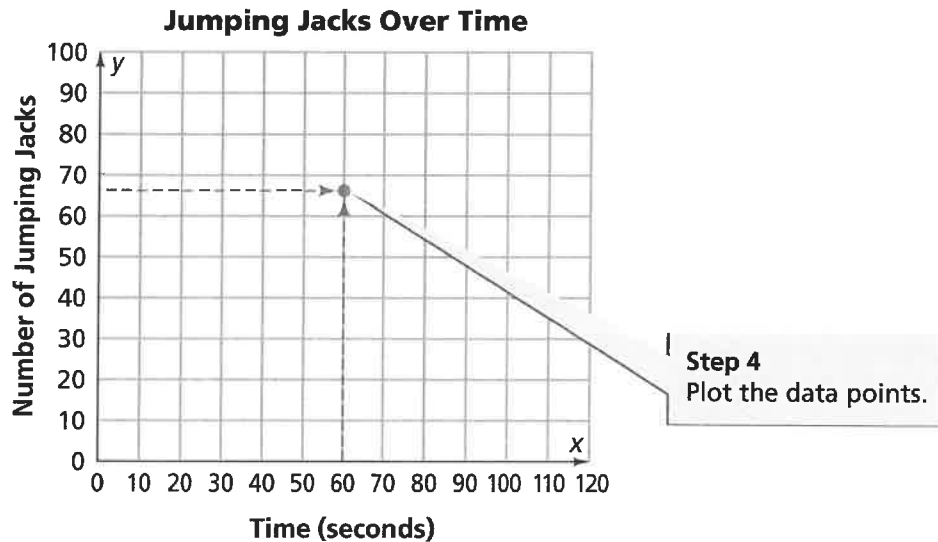
Label your graph so that someone else can see what it represents. You can label the *x-axis* as “Time (seconds)” and the *y-axis* as “Number of Jumping Jacks.” You can use these labels to help you choose a title for your graph. You might title this graph, “Jumping Jacks Over Time.”



Step 3 Select a **scale** for each axis. For each axis, determine the least and greatest values to show. Then decide how to space the scale marks.

In Problem 1.1, the values for time are between 0 and 120 seconds. On the graph, label the x -axis (time) from 0 to 120. Because you collected data every 10 seconds, label by 10's.

The scale you use on the y -axis (number of jumping jacks) depends on the number of jumping jacks you did. For example, if you did 97 jumping jacks, you could label your scale from 0 to 100. Because it would take a lot of space to label the scale for every jumping jack, you could label by 10's.



Step 4 Plot the data points.

Suppose that at 60 seconds, you had done 66 jumping jacks. To plot this information, start at 60 on the x -axis (time) and follow a line straight up. On the y -axis (number of jumping jacks), start at 66 and follow a line straight across. Make a point where the two lines intersect. You can describe this point with the **coordinate pair** (60, 66). The first number in a coordinate pair is the x -coordinate, and the second number is the y -coordinate.

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Variables & Patterns
Lesson 1.2 - Jumping Jacks Experiment CONTINUED...

Important vocabulary:

variable - a quantity that changes or varies

coordinate graph - a way to show the relationship between two variables

dependent variable - on the y-axis, the variable that DOES depend on the other

independent variable - on the x-axis, the variable that DOES NOT depend on the other

scale - least and greatest values to show on the x-axis and the y-axis

coordinate pair - the first number in the coordinate pair is the x-coordinate, and the second number is the y-coordinate

relationship - if one of the variables changes, the other variable may also change

Part I: Make a coordinate graph following these steps:

Step 1: Identify the two variables in your jumping jacks experiment.

Variable #1: _____

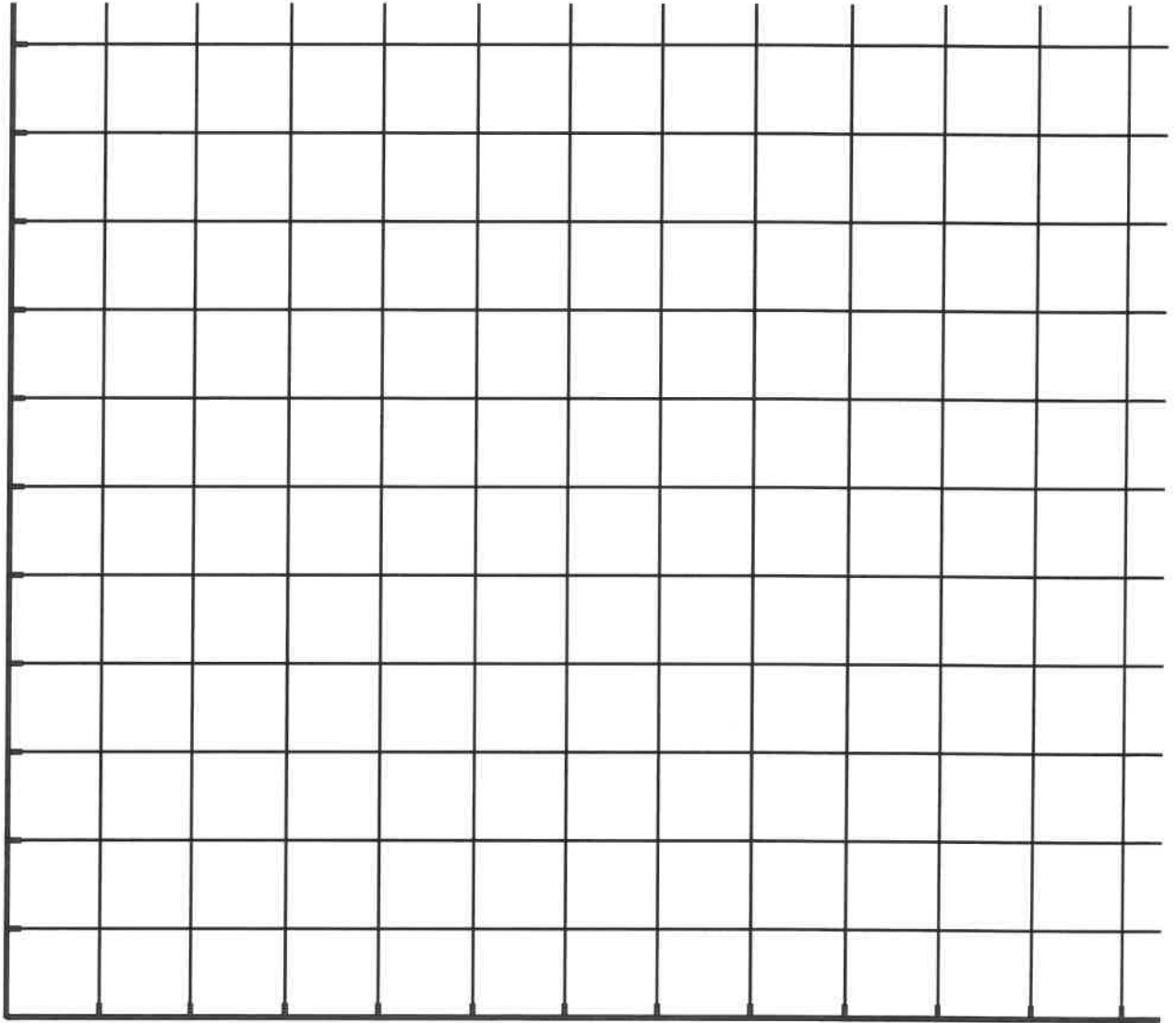
Variable #2: _____

Step 2: Select an axis to represent each variable. Label the x-axis and y-axis (on the coordinate graph on the back of this page). Read more about how to do this on page 8 of your Variables & Patterns textbook where it says "Step 2".

Step 3: Select a scale for each axis. For each axis, determine the least and greatest values to show. Then decide how to space the scale markers. Read more about how to do this on page 9 of your Variables & Patterns textbook where it says "Step 3". Add your scales to the x-axis and the y-axis (on the coordinate graph on the back of this page).

Step 4: Plot the data points (on the coordinate graph on the back of this page). Read more about how to do this on page 9 of your Variables & Patterns textbook where it says "Step 4".

Part II: Complete the coordinate graph using your group's jumping jack data.



Check your coordinate graph...

- Does your coordinate graph have a title?
- Are your x-axis and y-axis labeled?
- Do your x-axis and y-axis have an appropriate scale?
- Did you plot the data (coordinate pairs)?

Variables & Patterns
Lesson 1.1 & 1.2 HOMEWORK – Convenience Store

A convenience store has been keeping track of its popcorn sales and created the following table:

Popcorn Sales

| Time | Total Bags Sold |
|------------|-----------------|
| 6:00 A.M. | 0 |
| 7:00 A.M. | 3 |
| 8:00 A.M. | 15 |
| 9:00 A.M. | 20 |
| 10:00 A.M. | 26 |
| 11:00 A.M. | 30 |
| noon | 45 |
| 1:00 P.M. | 58 |
| 2:00 P.M. | 58 |
| 3:00 P.M. | 62 |
| 4:00 P.M. | 74 |
| 5:00 P.M. | 83 |
| 6:00 P.M. | 88 |
| 7:00 P.M. | 92 |

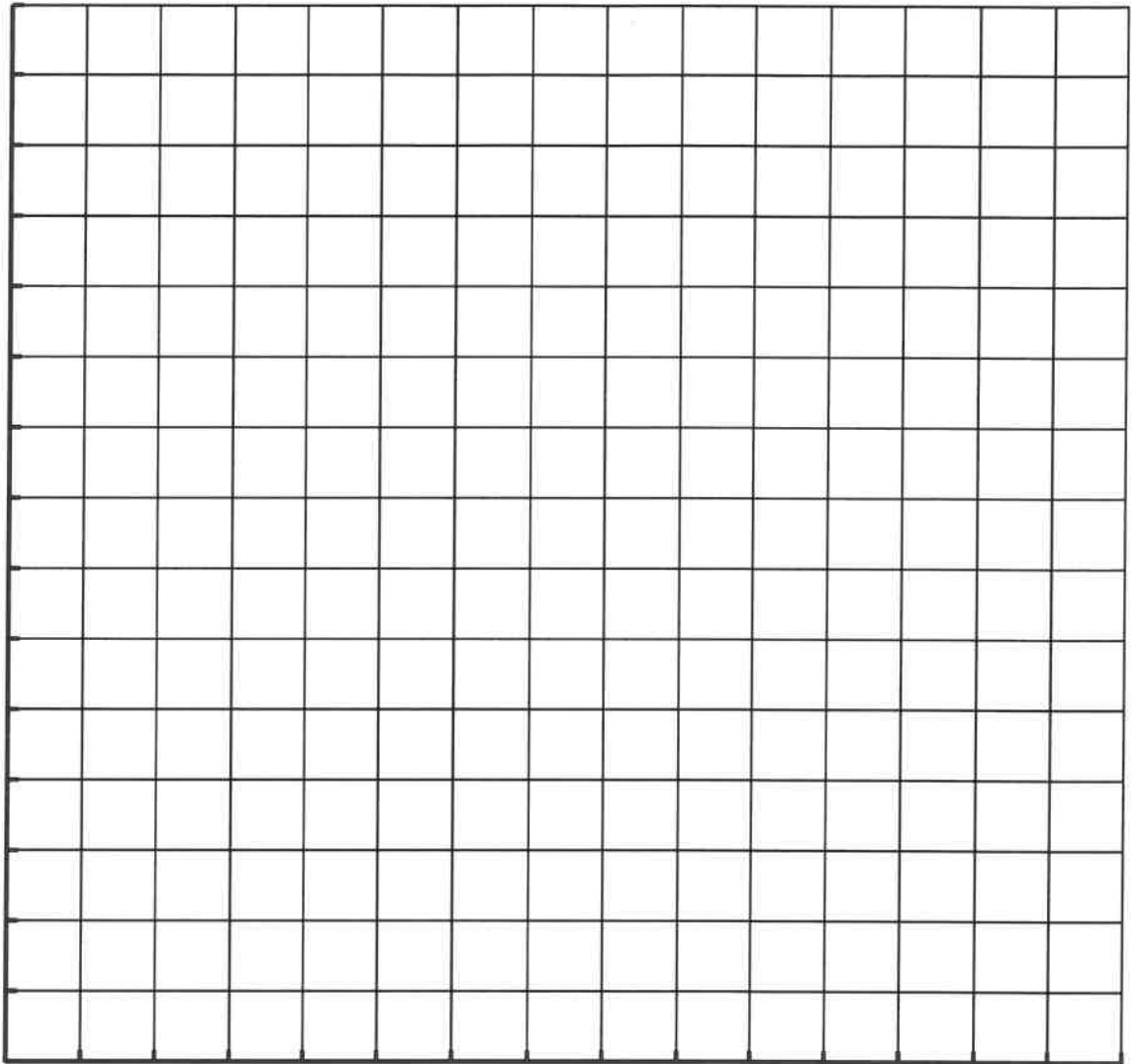


- 1.) On the back of this worksheet, make a coordinate graph of the data in the table above.
- 2.) Which variable did you put on the x-axis of your coordinate graph? Why?

- 3.) Describe how the number of bags of popcorn sold changed during the day.

- 4.) During which hour did the store sell the most popcorn?

- 5.) During which hour did the store sell the least popcorn?



Check your coordinate graph...

- Does your coordinate graph have a title?
- Are your x-axis and y-axis labeled?
- Do your x-axis and y-axis have an appropriate scale?
- Did you plot the data (coordinate pairs)?