The Complete Book of Graphing

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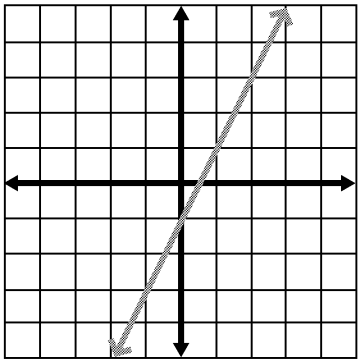
FINDING THE EQUATION OF A LINE FROM A GRAPH

To write the equation of a line from a graph, two points must first be found. Use these points to find the slope of the line, and from there use either point to find the *y*-intercept. If possible, one point should be where the line crosses the *y*-axis, since this point will be the *y*-intercept.

EXAMPLE: For this line, two points could be (2,3) and (0,–1). First the slope must be found.



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1-3}{0-2} = \frac{-4}{2} = 2$$

$$m = 2$$

To find the *y*-intercept, choose a point and substitute it into the slope-intercept form to find *b*. Using point (2,3), the equation would be as follows:

$$y = mx + b \Rightarrow 3 = 2(2) + b \Rightarrow 3 = 4 + b$$

$$3 + (-4) = 4 + (-4) + b$$

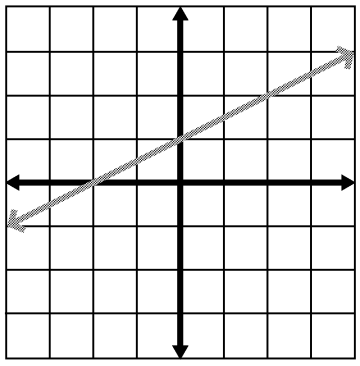
$$b = -1$$

The equation would be:

$$y = 2x - 1$$

Remember: Any two points can be used, so try to choose points that are simple. **Note:** the *y*-intercept ($b = -1$) was the second point that was chosen. This is a shortcut that can be used at times.

DIRECTIONS: Find the equation of the line from the graph (in slope-intercept form):



$m =$ _____

$b =$ _____

Equation: _____

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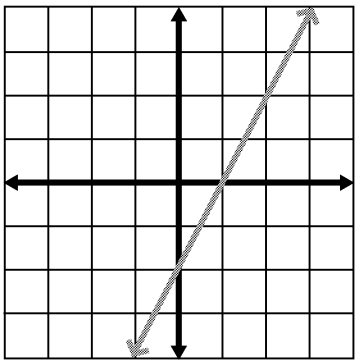
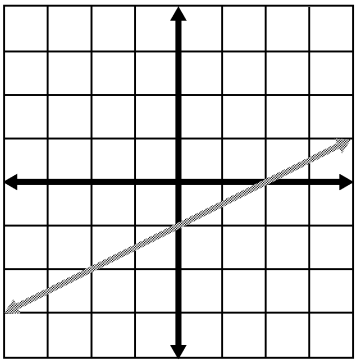
FINDING THE EQUATION OF A LINE FROM A GRAPH

DIRECTIONS: Find the equation of the line of each graph (in slope-intercept form):

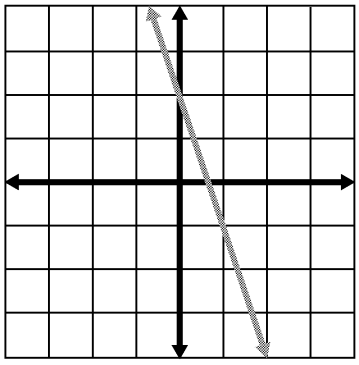
1. Equation: _____



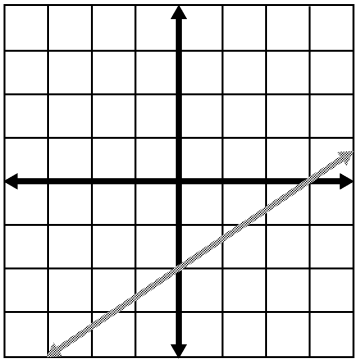
2. Equation: _____



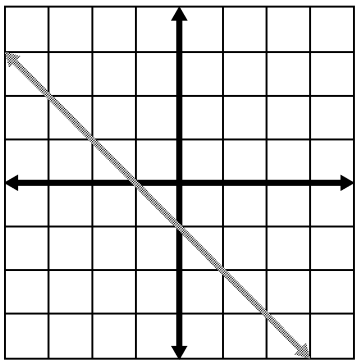
3. Equation: _____



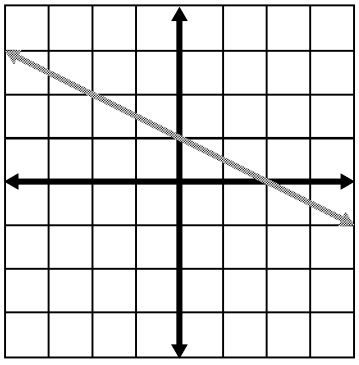
4. Equation: _____



5. Equation: _____



6. Equation: _____



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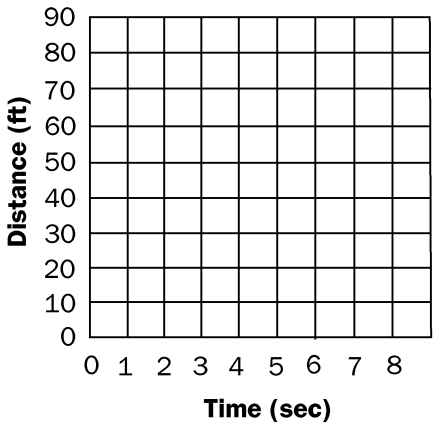
GRAPHING DATA POINTS AND FINDING THE SLOPE

1. Andrea is starting a new workout schedule and has bought a bike so she can get out of the gym and get some fresh air. She has read that the best exercising speed on a bicycle is about 8 miles per hour. The following data points are for a person who is moving at that speed. The slope of the line that is plotted will be the person's speed in ft/sec. The reason this is possible is because speed (V), distance (D), and time (T) are all connected by the formula:

   $$D = V \times T$$

   D is measured in feet, V is measured in ft/sec, and T is measured in seconds. Graph each point and determine the slope of the line using any two points. At 8 miles per hour, what will Andrea's velocity be?

Time (sec)	Distance (ft)
1	12
2	24
3	36
4	48
5	60
6	72
7	84



Velocity = _____ ft/sec

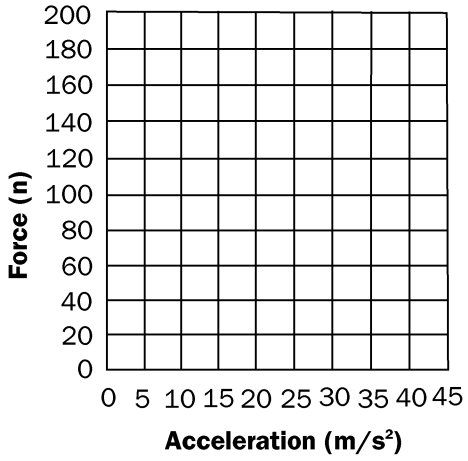
2. As Ethan is riding on his skateboard, he notices that every time he pushes with his foot he not only keeps moving but also continually speeds up. This process is called acceleration and is part of the formula:

   $$F = m \times a$$

   As he pushes, the force he pushes with increases and the acceleration of the skateboard increases. What doesn't change is the mass of the skateboard, and the slope of the line that compares force and acceleration will reveal the skateboard's mass in kilograms. Graph each point and determine the slope of the line using any two points.

   Question: What is the mass of the skateboard in pounds? (1 kilogram is equivalent to 2.2 pounds.)

Force (newtons)	Acceleration (m/s^2)
20	5
40	10
60	15
80	20
100	25
120	30
140	35
160	40



Mass = _____ lbs

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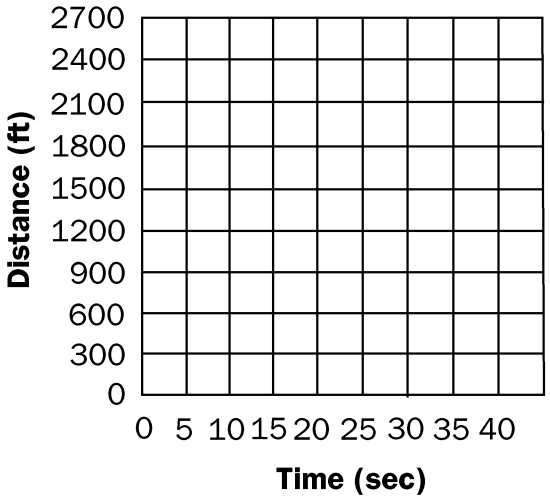
GRAPHING DATA POINTS AND FINDING THE SLOPE *(continued)*

3. In a car going 55 miles an hour, you can cover a large number of feet every second. Graph each point and determine the slope of the line using any two points. The slope of this line will reveal the speed of that car in feet/second.

Time (sec)	Distance (ft)
0	0
5	400
10	800
15	1200
20	1600
25	2000
30	2400



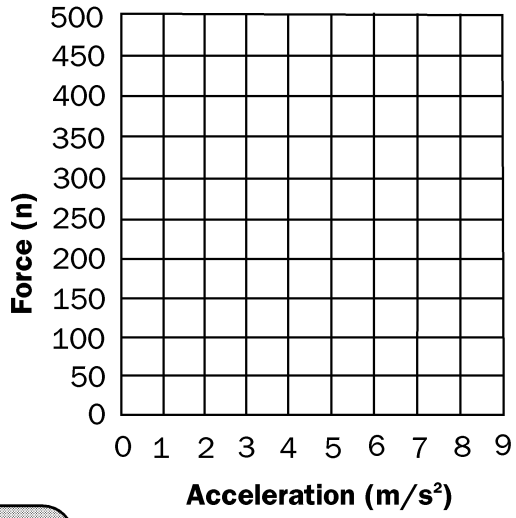
Velocity = _____

Remember: Include units in the final answer.

4. In question 2 you found the mass of a skateboard using the slope of a line you graphed. With the following data points, find the mass of the object that was accelerated. Use the same method of graphing and calculating the slope from two data points. Remember that force = mass × acceleration ($F = m \times a$).

Question: Could this object be a person?

Force (newtons)	Acceleration (m/s^2)
0	0
45	1
90	2
135	3
225	5
315	7
360	8
405	9



Mass = _____

Remember: Include units in the final answer.