

Linear Relations – Test Review

The highlighted titles indicate what you need to know for the test, followed by practice questions.

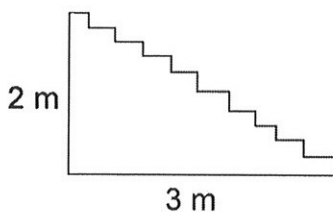
Summary (what you need to know):

- A. How to calculate slope of an object
- B. How to calculate slope from two points
- C. How to graph (from 2 points)
- D. (from a point and a slope)
- E. (from an equation)
- F. How to determine the equation of a line from a word problem
- G. How to create a table of values from an equation
- H. How to identify the y-intercept on a graph
- I. How to identify direct and partial variation from: a graph
- J. words
- K. an equation
- L. a table
- M. How to calculate first differences
- N. Putting it all together (Rule of 4)

A. How to calculate slope of an object

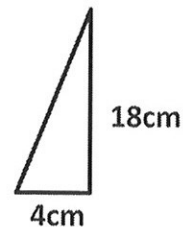
1. What are the slopes of each of these objects?

a.



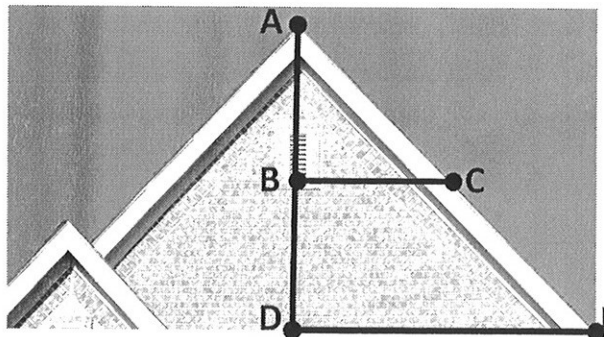
$$m = \frac{2}{3}$$

b.



$$m = \frac{9}{2}$$

2. Joseph and Chris both calculated the pitch (slope) of the roof pictured below. Joseph calculated the run from points D to E, and the rise from points A to D. Chris calculated the run from points B to C and the rise from points A to B. Who calculated the slope correctly (one of the students, neither, or both)? Explain.



Both calculated the slope correctly, as the slope is the same everywhere on the roof. Finding the slope between any two points on the slant will give the same result.

3. A ladder reaches 8m up a wall, and its foot is 2 m from the base of the wall. What is its slope?
 $m=4$
4. A ladder reaches 30m up a wall and has a slope of 3.2 How far is the base of the ladder from the wall?
 $9.375\text{m from the wall}$
5. The tops of two houses are connected by a phone line. One house is 15m tall, and the other one is 17m tall. If the houses are 12.5m apart, what is the slope of the phone line?
 $m=0.16$

B. How to calculate slope from two points

6. Without graphing, determine the slope of the line that passes through each of the two points:

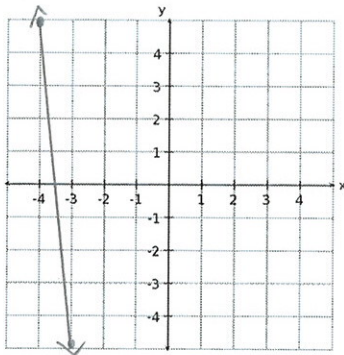
- a. (3.4, 180) and (2.9, 15) $m=330$
- b. (198, -298) and (-23, -137) $m=-0.7285$
- c. (-2, 4) and (-5, -1) $m=5/3$
- d. (39, 13) and (-3, -12) $m=25/42$
- e. (-30, 39) and (-2, 15) $m=-6/7$
- f. (-3.5, 14) and (91, 48) $m=0.3598$

* solutions are left as fractions in lowest terms or converted to a decimal and rounded to 4 decimal places.

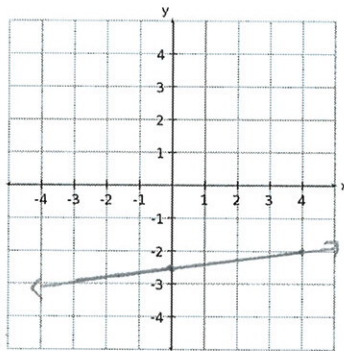
C. How to graph (from 2 points)

7. Graph each of the following:

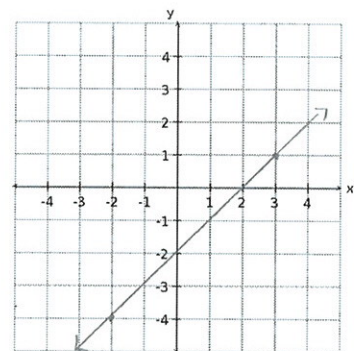
a. (-4, 5) and (-3, -5)



b. (0, -2.5) and (4, -2)



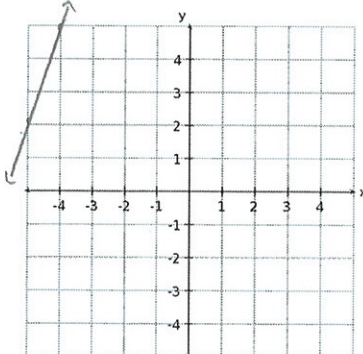
c. (3, 1) and (-2, -4)



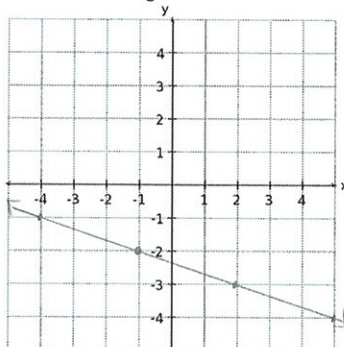
D. How to graph (from a point and a slope)

8. Graph each of the following:

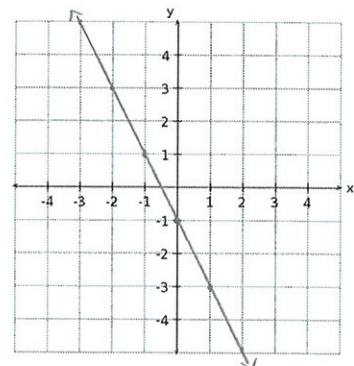
a. Passes through (-4, 5)
and $m=3$



b. Passes through (-1, -2)
and $m=\frac{-1}{3}$



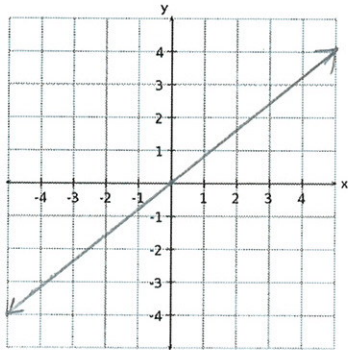
c. Passes through (0, -1)
and $m=-2$



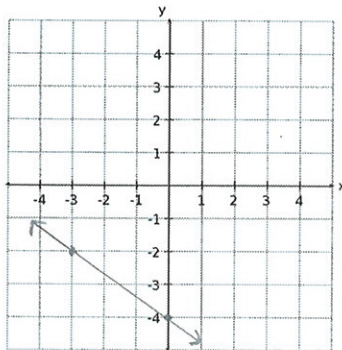
E. How to graph (from an equation)

9. Graph each of the following:

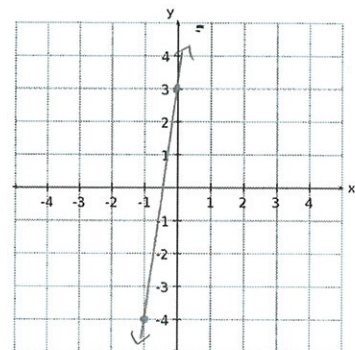
a. $y = \frac{4}{5}x$



b. $y = \frac{-2}{3}x - 4$



c. $y = 7x + 3$



F. How to determine the equation of a line from a word problem

10. Determine the equation of the line represented by each situation, and answer any secondary questions:

- a. Melissa is draining water out of her pool. After 4h, she has 45 000L left. After 6h, she has 42 500L left. Write an equation relating the volume of water and time. How full was the pool when Melissa started?
 $y = -1250x + 52\ 500$ It had 52 500L when she started.
- b. Jennifer works at a clothing store. She makes a flat salary, plus an hourly rate. She makes \$825 when she works a 25h week. When she works 40h, she makes \$1050. Write an equation relating total earnings to number of hours. Using your equation, determine how much she will make if she works a 50h week.
 $y = 15x + 450$ She will make \$1200 in a 50h week.
- c. Matt is taking a road trip and keeping track of the kilometres travelled, as well as the amount of gas he's left with. After 80km, he has 42.8L of gas left. After 450km, he has 9.5L of gas left. Write an equation relating number of kilometres travelled to total gas in the tank. Using your equation, determine how many kilometers he can drive until his tank is empty.
 $y = -0.09x + 50$ He can drive 555.56 km until his tank is empty.
- d. A plane is descending to land. It begins at 28 000 feet. It hits the ground after 11.2 minutes. Create an equation to model this situation. How high will the plane be after 5 minutes?
 $y = -2500x + 28\ 000$ It will be 15 500 feet high.
- e. A company is tracking its sales over the years. In year 0, it makes \$358 000. By year 4, the company is making \$376 000. When will the company's income be \$500 000?
 $y = 4500x + 358\ 000$ Between year 31 and year 32 (31.5)
- f. Sarah is performing an experiment where she measures the temperature of a cup of water while it cools down. The cup starts at 10°C and drops at a rate of 2.5°C each minute. When will it be -15°C?
 $y = -2.5x + 10$ After 10 minutes.
- g. Karen is renting a bus for a school trip. The bus company charges \$100 for the bus, plus \$5 per student. How much will it cost to rent the bus for 42 students?
 $y = 5x + 100$ It will cost \$310.

G. How to create a table of values from an equation

11. For each of the following equations, create a table of values:

* you may have chosen different x-values (which is fine!) ↓

a. $y = \frac{-1}{8}x - 12$

x	y
-2	-11.75
-1	-11.875
0	-12
1	-12.125
2	-12.25

b. $y = 32x - 10$

x	y
-2	-74
-1	-42
0	-10
1	22
2	54

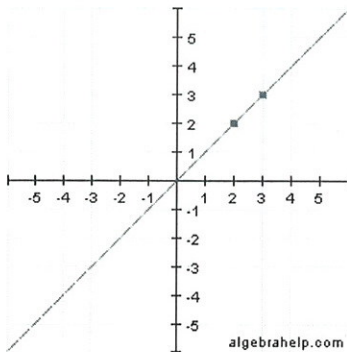
c. $y = -3.5x + 1$

x	y
-2	8
-1	4.5
0	1
1	-2.5
2	-6

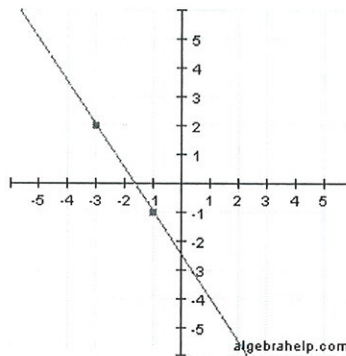
H. How to identify the y-intercept on a graph

12. For each of the following, determine the y-intercept:

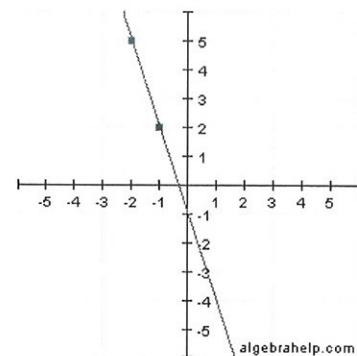
a. $b = 0$



b. $b = -2.5$



c. $b = -1$



I. How to identify direct and partial variation from a graph

13. For each of the graphs in the question above, identify the relation as being **direct** or **partial**.

a. *direct*

b. *partial*

c. *partial*

J. How to identify direct and partial variation from words

14. For each of the following situations, identify the relation as being **direct** or **partial**.

partial

a. Betti charges \$12/hr for her cleaning services, plus a \$60 house call fee

partial

b. Bally Total Fitness charges \$45 per month for a gym membership, as well as a \$70 registration fee.

partial

c. Kyle's kiddie pool begins with 100L of water, and is emptying at a rate of 5L each minute.

partial

d. Akintoye's total earnings can be calculated by considering his \$25/hr pay rate, minus his \$50 uniform cost.

partial

e. A plan begins at 35 000 feet in the air and descends at a rate of 2200 feet every minute.