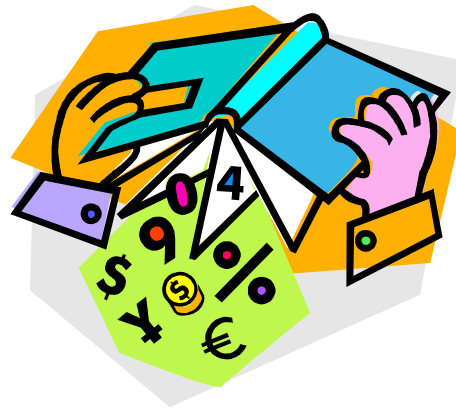


BELLEVUE SCHOOL DISTRICT
BELLEVUE, WASHINGTON

SUMMER PACKET

ANSWERS

FOR STUDENTS GOING INTO:
INTEGRATED MATH TOPICS 3
(REVIEWS CONCEPTS TAUGHT IN IMT2)



ANSWERS

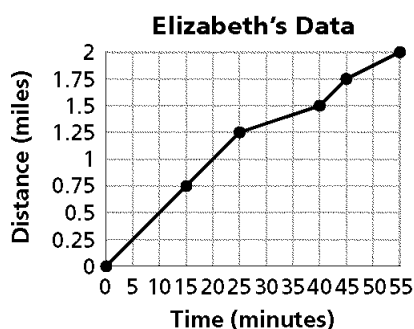
Variables and Patterns

1. The table shows some data Carmen collected during

Number of breaths	0	1	2	3
Number of meters swum	0	5	8	12

- What are the two variables?
- Graph the data from the table on a separate piece of paper.
- Does it make sense to connect the points? Explain your answer.
- When did Carmen make the most progress?
 - How does this show up in the table?
 - How does this show up in the graph?
- When did Carmen make the least progress?
 - How does this show up in the table?
 - How does this show up in the graph?
- How many breaths do you think she would take if she swam 25 meters?

2. The graph below shows data that Elizabeth collected

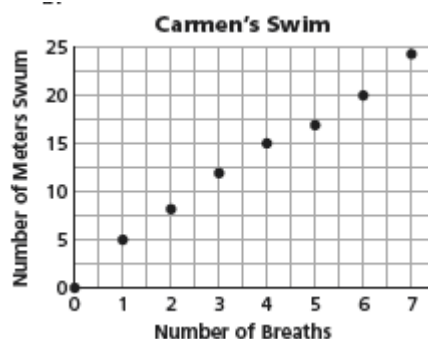


- When does she make the most progress?
- When does she make the least progress?

- Elizabeth makes the most progress at two different times—in the first 25 minutes and from 40 to 45 minutes. This progress is shown on the graph by the steepest inclines.
- She makes the least progress from 25 to 40 minutes. This is shown by the flattest incline.

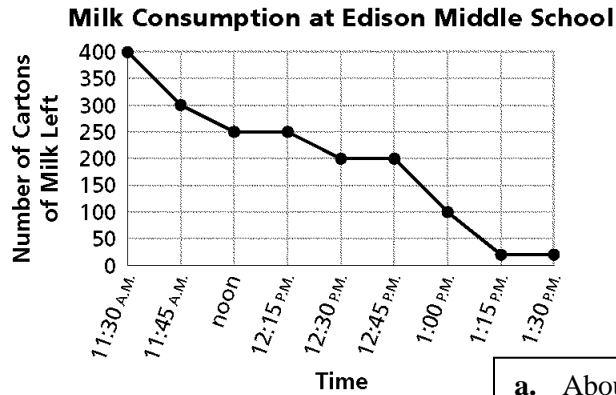
- The two variables are the number of breaths and the number of meters swum.

b.



- Answers will vary. Students may argue for or against connecting the points. Some may say that breathing is continuous, but in swimming the breaths are more defined.
- Carmen made the most progress during the first breath.
 - In the table the distance increases from 0 to 5 meters for the first breath. This is the largest between any two breaths.
 - The distance between the origin and the corresponding point, (0, 5) is greatest on the graph.
- The least progress is a change of 2 meters, which occurs between breaths 4 and 5.
 - In the table, this is the smallest distance between any two breaths.
 - The corresponding points on the graph (4, 15) and (5, 17) are the closest two points on the graph.
- About 14 or 15 breaths

3. Each day the cafeteria workers at Edison Middle School start out with 400 cartons of milk. They collected some data and made the following graph.



- a. What is the total number of cartons of milk sold during the day?
- b. How many cartons were sold between noon and 12:15 P.M.?
- c. During what 15-minute time period(s) was the number of cartons of milk left constant?
- d. During what 15-minute time period(s) was the number of cartons of milk left decreasing most rapidly?
- e. Describe how the total number of cartons of milk sold progressed.
- f. Should the cafeteria workers have connected the points on the graph? Why or why not?

- a. About 380 cartons
- b. About 50 cartons
- c. Between 11:30 and 11:45 and between 12:45 and 1:00
- d. Between noon and 12:15, between 12:30 and 12:45, and between 1:15 and 1:30
- e. The number of milk cartons available during the day decreased rapidly with breaks at noon, 12:30, and 1:15.
- f. Possible answer: The points should not be connected because they cannot sell part of a milk carton.
- g. Answers will vary. Some students might say no because the graph gives a picture of what happened. Others might say yes because it would be helpful to have more specific information especially since the y-axis has a fairly large scale.

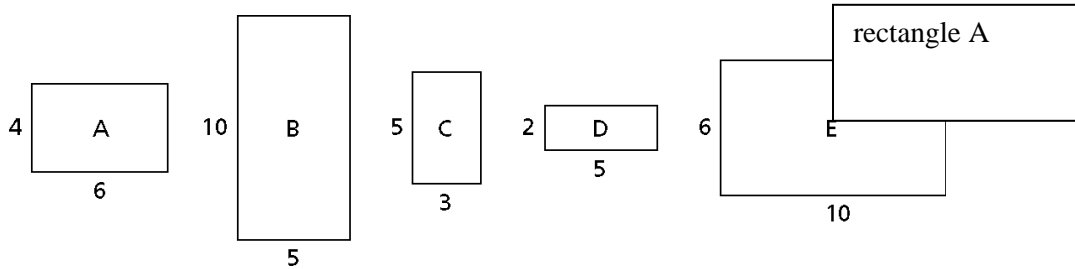
Stretching and Shrinking

4. The ratio of two adjacent sidelengths of a rectangle is $\frac{2}{3}$. Which of these could be the ratio of two adjacent sidelengths of a similar rectangle? Explain your choice.

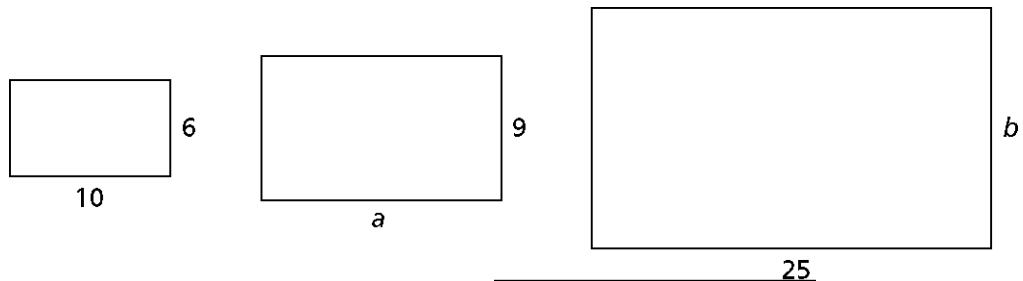
$\frac{4}{9}$ $\frac{4}{3}$ $\frac{2}{6}$ $\frac{4}{5}$ $\frac{6}{9}$

$\frac{6}{9}$

5. Which of the following rectangles is similar to a 10 by 15 rectangle?



6. The three rectangles below are similar. Find the missing measurements.



$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$

$a = 15, b = 15$

7. Complete the table below.

Rectangle A: 1 by 4

Rectangle	Scale Factor	Short Side
A	1	1
B	3	
C	10	
D	$\frac{1}{2}$	

Rectangle	Scale Factor	Short Side	Long Side	Perimeter	Area
A	1	4	4	10	4
B	3	3	12	30	36
C	10	10	40	100	400
D	$\frac{1}{2}$	$\frac{1}{2}$	2	5	1

8. If two figures are similar, which of the following *might* be different? Circle your answers, and explain each choice you make.

number of sides
lengths of corresponding sides
shape

size of angles
ratio of corresponding sides
area

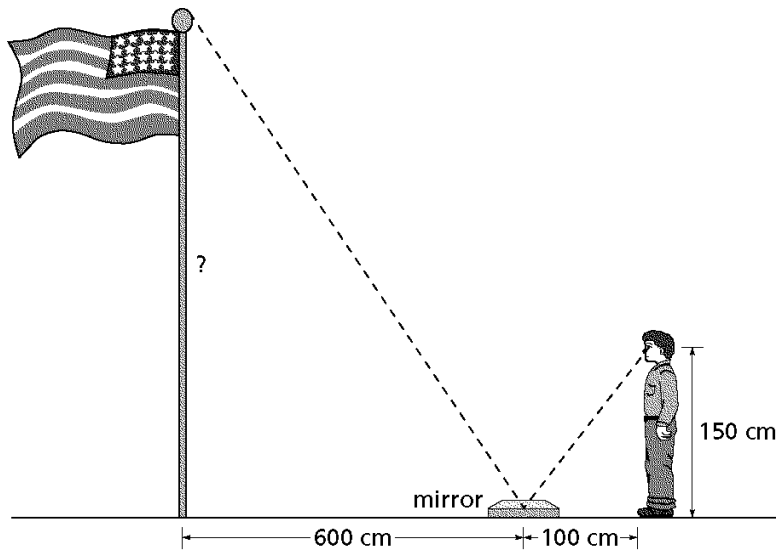
The following might be different: lengths of corresponding sides (if the scale factor is anything other than 1) and area (they will differ as the square of the scale factor).

9. A rectangle has dimensions of 1 and 6. Another rectangle was drawn from it using a scale factor of 1.5.

- a. The area of the large rectangle is how many times the area of the small rectangle?
- b. The perimeter of the large rectangle is how many times the perimeter of the small rectangle?

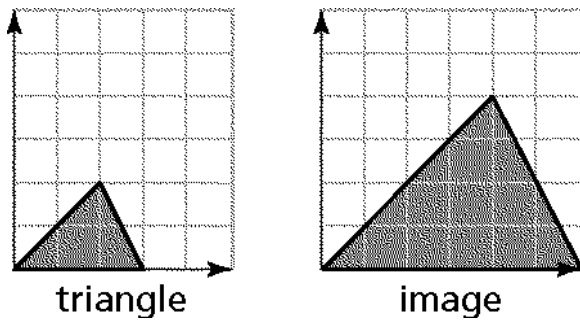
a. The area is $1.5^2 = 2.25$ times as great.
 b. The perimeter is 1.5 times as great.

10. Gerald wanted to find the height of the flagpole at the entrance to his school. He used a mirror and recorded some measurements on a drawing. What is the height of the flagpole?



The flagpole measures
 $\frac{600}{100} \times 150 = 900$ cm.

11. Below is a triangle and its image.



a. Which of these rules was used to make the image?

(2x, 2y)

(x, 2y)

(2x, y)

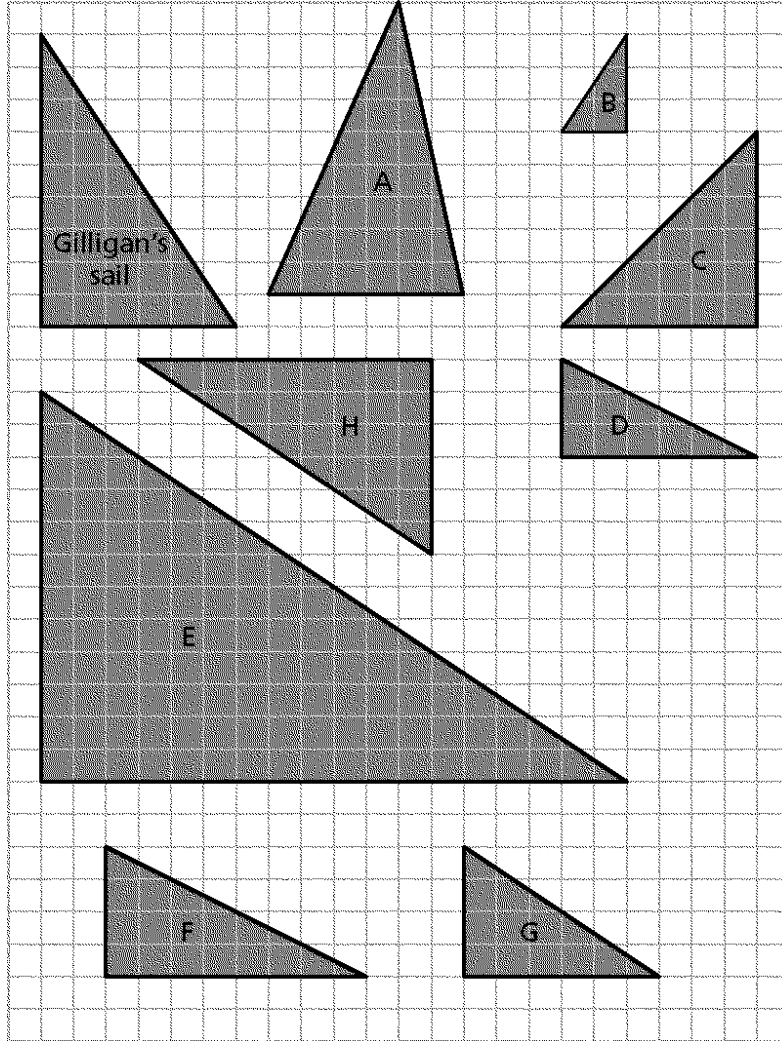
(2x, 4y)

(4x, 2y)

b. Are the triangle and its image similar? Explain.

a. (2x, 2y)
 b. They are similar, because all corresponding sides increased by a scale factor of 2 and corresponding angles are equal.

12. Gilligan belongs to the Model Sailboat Club. All club members have *similar* boats with *similar* sails. Find all the triangles below that could be used as sails by the club members. Explain your reasoning.



Sails B, E, G, and H are similar to Gilligan's sail.
Possible explanation:
The scale factor from Gilligan's sail to sail B is $\frac{1}{3}$, to sail E is 2, to sail G is 1.5, and to sail H is 1.

Comparing and Scaling

13. *Donuts4U* has donuts on sale at 12 for \$5.40. Find the unit rates that answer the following questions:

- a. What is the cost per donut?
b. How many donuts can you buy for a dollar?

a. \$0.45 per donut
b. about 2.2 donuts, or 2 since you cannot cut them up in the store, for \$1

17. One face of a cube has an area of 25 cm^2 .

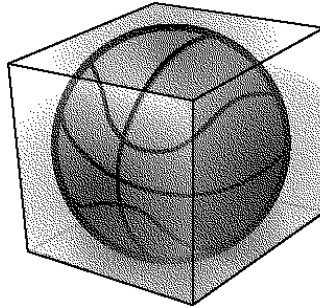
a. 150 cm^2

b. 125 cm^3

a. What is the surface area of the cube?

b. What is the volume of the cube?

18. Sterling Sports manufactures high-quality basketballs. They package their basketballs in 1-cubic-foot cardboard boxes. The basketballs fit nicely in the boxes, just touching the sides. To keep the ball from being damaged, Sterling fills the empty space in the box with foam. How much foam is put in each basketball box?



The box's volume is 1 ft^3 . The basketball's volume is $\frac{2}{3} \pi r^2$ or $\frac{2}{3} \pi (.5^2) \text{ ft}^3$ or $(0.5236) \text{ ft}^3$. Each box contains approximately $1 - 0.5236$ or 0.4764 ft^3 of foam.

19. Make a sketch of a rectangular box with a base of 3 ft by 5 ft by 5 ft and a height of 7 ft.

a. How many unit cubes would fit in a single layer at the bottom of the box?

b. How many identical layers of unit cubes could be stacked in the box?

c. What is the volume of the box?

a. 15 cubes

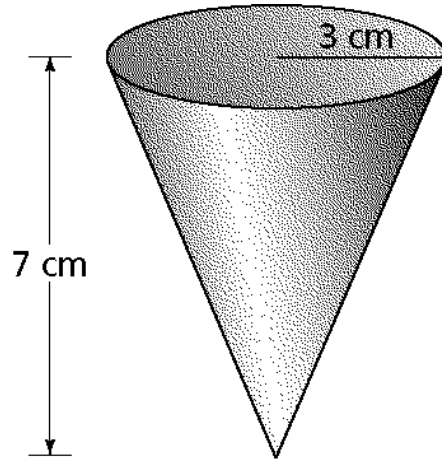
b. 7 layers

c. 105

20. Cement is sold by the cubic yard. A cubic yard of cement is the amount of cement that would fit into a box yd long, 1 yd wide, and 1yd high. How many cubic yards of cement are needed to make a rectangular patio 9 yd long, $6\frac{1}{2}$ yd wide and 6 in. ($\frac{1}{6}$ yd) thick?

$$9 \times 6\frac{1}{2} \times \frac{1}{6} = 9.75 \text{ yd}^3 \text{ of cement}$$

21. Use this information: Ms. Wohlshied has to purchase paper cups and containers of water for the track-and-field competition. She knows that students often use a cup only once and then throw it away. She buys cone-shaped cups because they are nice for holding, don't hold very much water (which she thinks is good, as students often don't finish the water in their cups), and don't cost very much. This is an illustration of the cups she buys.



- a. How many cubic centimeters of water does the cone-shaped cup hold?
- b. If Ms. Wohlshied buys water in 1-liter jugs, about how many jugs of water? (1 liter = 1000 cubic centimeters)
- c. How many times greater is the volume of a cone with a radius of 6 cm and a height of 7 cm than the volume of Ms. Wohlshied's cup?
- d. How many times greater is the volume of a cone with a radius of 3 cm and a height of 14 cm than the volume of Ms. Wohlshied's cup?
- e. How many times greater is the volume of a cone with a radius of 6 cm and a height of 14 cm than the volume of Ms. Wohlshied's cup?

- a. $\frac{1}{3} \times 7 \times 3^2 \times \pi \approx 66 \text{ cm}^3$
- b. $1000 \div 66 =$ about 15 cups
(Students might suggest 16 or 17, reasoning that the cups would not be completely filled.)
- c. As $\frac{1}{3} \times \pi \times 6^2 \times 7 \approx 264 \text{ cm}^3$,
the volume is 4 times greater.
- d. As $\frac{1}{3} \times \pi \times 3^2 \times 14 \approx 132 \text{ cm}^3$,
the volume is 2 times greater.
- e. As $\frac{1}{3} \times \pi \times 6^2 \times 14 \approx 528 \text{ cm}^3$,
the volume is 8 times greater.

Data Distributions

22. Ariel has a total of 320 points on all four of his exams. If these points are shared equally among the four exams, the result is 80 points per exam.

- a. What would Ariel's mean score be if he had 5 exams?
- b. Give four possible exam scores that would result in a mean score of 80 points.
- a. His mean score would be 93 points.
- b. Possible answer: 90 points, 95 points, 98 points and 89 points.
- c. Answers will vary, for the given example in part b, the range is 9 points which tells us that his scores did not vary a great deal.

- c. What is the range of the scores for these four exam scores? What does this tell you about the variability of the scores?

23. Five good friends have the following number of basketball cards:

Glen	352
Benny	347
Yari	265
Jillian	261
Mark	325

- a. What is the range of number of cards you about the variability in the amount

a. The range is 91 basketball cards, which implies that the data is fairly spread out.

b. Each person would receive 310 cards. To find this total the individual amounts are combined and then shared equally among the five friends.

c. The first five friends would receive less cards (about 302 cards per person), because Susanna's amount of cards is less than the original average (310 cards).

- b. The five friends decided to share their cards. How many cards will this be? Explain your reasoning.

- c. The five friends forgot about another friend, Susanna, when cards were shared. Susanna has 261 cards, the same amount of cards as Jillian. If Susanna's cards are included with the others' cards and shared equally among the six friends, will the first five friends now receive less, the same as, or more than they did before Susanna's cards were included? Explain your reasoning.

24. The following data are the number of hours of homework done by several students on a Monday night: 0.5, 0.5, 1, 1, 1, 1, 2, 3. If you replaced data from a student who did 0.5 hours of homework with a student who did 2 hours of homework:

- a. Do you think the mean would increase, decrease, or stay the same?
- b. Do you think the median would increase, decrease, or stay the same?
- c. Do you think the range would increase, decrease, or stay the same?

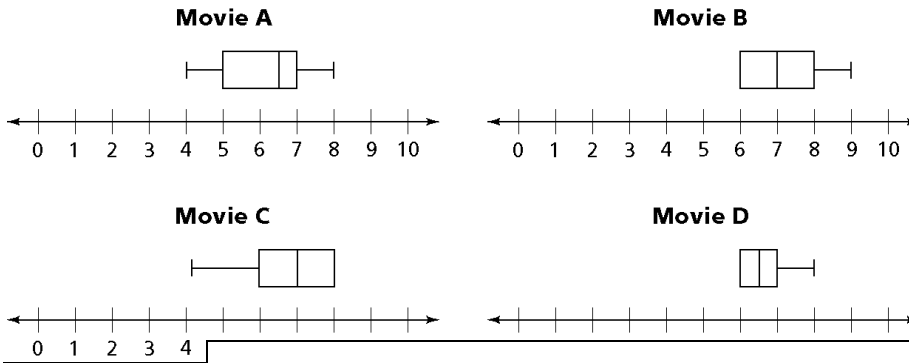
a. The mean would increase because you are replacing a lower data value with a higher data value. The mean would increase by $\frac{3}{16}$ of an hour since the total hours would increase by 1.5 hours.

b. The median would not change since the 4th and 5th values in the ordered data set of eight values remain at 1 hour.

c. The range would not change since the smallest value would still be 0.5 and the largest value would still be 3.0.

These box plots represent the distribution of the ratings given to four movies by 20 newspapers and magazines. Compare the box plots. Which movie do you believe is the most highly recommended? Explain your reasoning.

Comparing the middle 50% of the values (from the lower quartile to the upper quartile), movies B and C have equal ratings, but comparing the maximum values of movies B and C, movie B has higher ratings.



- a. A class of ten backpacks, of \$1.35 \$0.42 \$0.75 \$0.12
- b. Describe what in this class.

Pocket Change

Amount (dollars)

b. Answers will vary. By looking at the 50% of the data represented by the box, students could say that the typical amount of money carried is between \$0.28 and \$0.90. Or, by looking at the median, students could say that about \$0.44 is typical.

Moving Straight Ahead

- 25a. This table shows two points that are on the same straight line. Complete the table to show three other points on the same line.

x	-3				1
y	-2				6

a.

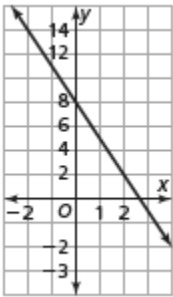
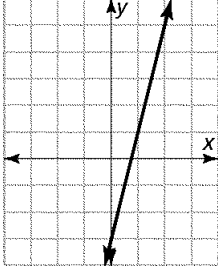
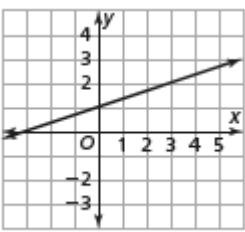
x	-3	-2	-1	0	1
y	-2	0	2	4	6

b. slope = $\frac{2}{1} = 2$, y-intercept = 4

- b. Find the slope and the y-intercept of this line that represents the data.

26. Given one of the representations below, find the other two.

Table	x	y		
	-2	14		
	0	8		
	1	5		
	2	2		
	3	-1		

Graph	Table	<table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>-2</td><td>14</td></tr> <tr><td>0</td><td>8</td></tr> <tr><td>1</td><td>5</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>-1</td></tr> </tbody> </table>	x	y	-2	14	0	8	1	5	2	2	3	-1	<table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>-3</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>5</td></tr> </tbody> </table>	x	y	0	-3	1	1	2	5	<table border="1"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>-2</td><td>$\frac{1}{3}$</td></tr> <tr><td>-1</td><td>$\frac{2}{3}$</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>$1\frac{1}{3}$</td></tr> <tr><td>2</td><td>$1\frac{2}{3}$</td></tr> </tbody> </table>	x	y	-2	$\frac{1}{3}$	-1	$\frac{2}{3}$	0	1	1	$1\frac{1}{3}$	2	$1\frac{2}{3}$
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	Equation	$y = 3x + 8$	$y = 4x - 3$	$y = \frac{1}{3}x + 1$																																

a. The y-intercepts are 8, -3, and 1.

b. The slopes are -3, 4, and $\frac{1}{3}$.

27. The formula relating n (the number of cricket chirps per minute) to t (the temperature in degrees Fahrenheit) is $n = 4t - 160$.

- a. Using a symbolic method, find how many times a cricket would chirp in a minute at 90° F.
- b. It is evening, and a cricket is chirping 48 times per minute. Use a symbolic method to find the temperature.

a.

$$n = 4t - 160 = 4(90) - 160 = 360 - 160 = 200$$

chirps per minute

b. $48 = 4t - 160$

$$48 + 160 = 4t - 160 + 160$$

$$208 = 4t$$

$$\frac{208}{4} = \frac{4t}{4}$$

$$52 = t$$

The temperature is 52°F.