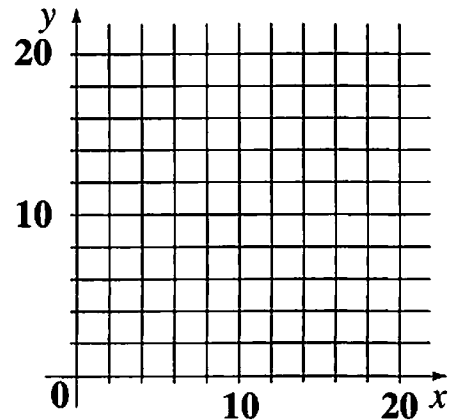


Chapter 10

- [10.1] Suppose a van pool has 5 adults and 3 children, and the expenses each week total \$60. Let x be a child's weekly fare and let y be an adult's weekly fare. Draw a graph showing the possible combinations of x and y , and write an equation for the graph.



- [10.2] Suppose you went to the post office to spend \$10 on stamps for postcards and letters, and found that the price was \$0.20 per postcard stamp and \$0.30 per letter stamp.
- Write an expression in terms of x and y for the cost of x postcards and y letters.
 - Find at least three (x, y) combinations of \$0.20 and \$0.30 stamps that would cost exactly \$10.
 - What equation must all answers to part (b) satisfy?

O.N.

- [10.2] Suppose Nelson found that the cranberry-apple juice he was mixing with pure apple juice was actually 75% cranberry and 25% apple. Let x be the amount of pure apple juice, and y the amount of cranberry-apple juice.
- Write an expression in terms of x and y for the total amount of apple juice in the mix.
 - Write an expression in terms of x and y for the total amount of cranberry juice in the mix.
 - What would be the smallest amount of apple juice possible in the one of Nelson's 20-cup mixtures?

- [10.3] Solve the system. Use Lab Gear if desired. Show your work or explain fully how you solved it.

$$\begin{cases} 3x - y = 5 \\ y = 2x + 1 \end{cases}$$

- [10.3] Solve for y : $2x + 5y = 10$

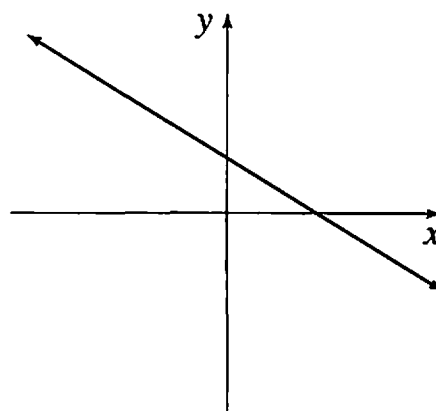
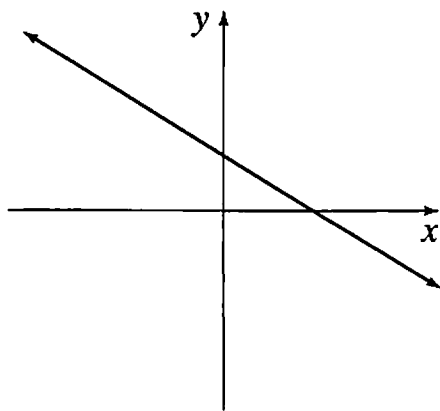
[10.4] Solve the system:
$$\begin{cases} 3x - y = 7 \\ x + 2y = 7 \end{cases}$$

[10.4] Solve the system:
$$\begin{cases} 3x - 2y = 8 \\ 5x + 4y = 6 \end{cases}$$

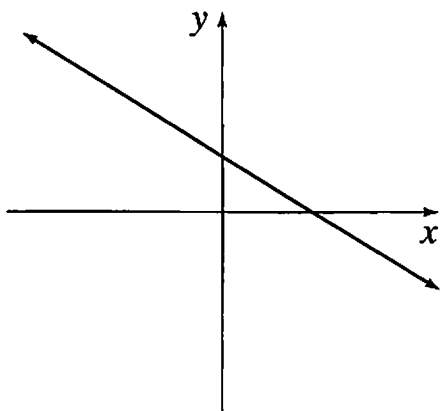
[10.5] Find the equation of a line that has intercepts (0, 3) and (5, 0).

O.N. [10.5] Consider the graphs of $Ax + By = C$ pictured. Sketch on the same axes the graph that could result if:

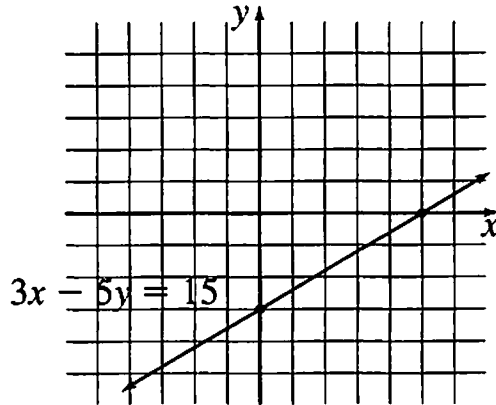
- a) C gets larger (A, B unchanged) b) A gets larger (B, C unchanged)



- c) B gets smaller (A, C unchanged)



[10.6] Mark the point on the graph of $3x - 5y = 15$ where the sum of x and y is 4.



[10.6] Consider the system:
$$\begin{cases} 5x - y = 7 \\ Ax + By = C \end{cases}$$

Find values of A , B , and C so that the lines

- are parallel.
- are the same line, but $A \neq 5$.
- meet in one point.

[10.7] Anna bought a total of one hundred \$0.19 and \$0.29 stamps, and they cost her \$25.50. How many stamps of each denomination did she buy? Show your work.

[10.7] At Gelb's Deli, all sandwiches are the same price, and all sodas are the same price (which might be different from the sandwich price). One person bought 6 sandwiches and 5 sodas for \$23.35, and the next person paid \$14.60 for 3 sandwiches and 7 sodas. How much does a sandwich cost? How much does a soda cost? Show your work.

[10.8] Find an equation of the line through $(8, 1)$ with slope $= -\frac{3}{2}$.

[10.8] Find an equation of the line through the points $(-3, 1)$ and $(6, 4)$. Show your work.

Chapter 11

[11.1] A ball is dropped from a height of 150 ft. with a bounce ratio of 0.6. Show how to use the multiply-subtract-solve method to find the total distance traveled by the ball in 20 bounces.

- [11.2] Consider the repeating decimal $0.14\overline{14}$, and think of it as the sum of a geometric sequence.
- What are the first term and the common ratio?
 - Use the multiply-subtract-solve method to find a fractional expression for the sum of the first three terms. Show your work.
 - How would the answer to part (b) change if you were finding the sum of the first 100 terms?
 - What fraction does this sum get closer to as the number of terms increases?

[11.2] Show that $0.\overline{76}$ is rational.

[11.3] Find the rise and run for two different staircases for the line $y = 6x - 2$.

[11.3] If a line passes through the origin and the point $(1, 1.4)$, what is a general description of all the lattice points on the line?

[11.4] Show that $\sqrt{5}$ is irrational.

[11.5] In this game two dice are rolled and if the total is 2, 4, 6, 9, 10, or 11, then player one wins. If the total is 3, 5, 7, 8, or 12, then player two wins. Is this a fair game? Explain.

[11.6] If two dice are rolled, what is the probability the product is more than 23?

[11.6] Zoltan decided to investigate the probability of getting at least one tail in three tosses of a coin. He did 20 trials, and got at least one tail on 18 of the trials.

- What was the relative frequency of Zoltan's getting at least one tail?
- Does this answer represent the probability of getting at least one tail in 3 tosses of a coin? Why or why not?

[11.7] How many equally likely outcomes are there for 10 tosses of a coin?

O.N. [11.7] If you take a random walk from the origin in which heads means move one unit right and tails means move one unit up, what is the probability that you are at $(4, 2)$ after six tosses?

[11.8] What is the conversion factor used to convert inches into feet? Include the units in your answer.

[11.8] What is the conversion factor used to convert inches per day to feet per week? Include the units in your answer.

Chapter 12

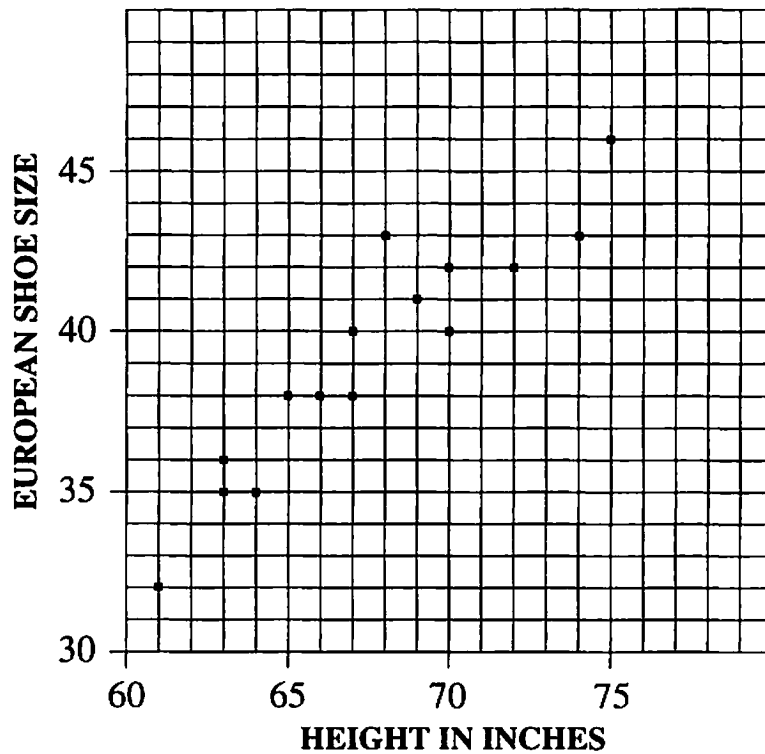
[12.1] The population of Picolo was 1,234 in 1970 and 1,485 in 1980. Estimate the population in 1990 assuming

- linear growth.
- exponential growth.

[12.2] A survey was taken of height and shoe size of 15 people.

Height in inches	61	63	63	64	65	66	67	67	68	69	70	70	72	74	75
European shoe size	32	35	36	35	38	38	38	40	43	41	40	42	42	43	46

- Mark with a + on the graph the three points used to find the median-median line.
- Draw the median-median line.
- Find the equation of the median-median line.

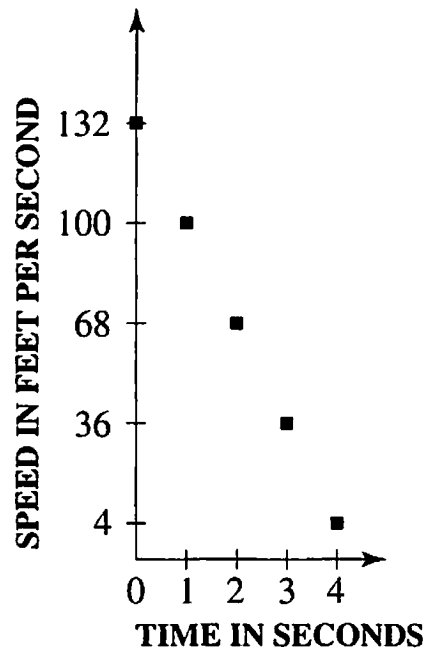


[12.3] The number of days, D , needed to paint a house depends on the surface area, S , and the number of painters, P , according to the formula $D = S/(500P)$. For each pair of variables, tell whether they are directly proportional, inversely proportional, or neither. (Assume the third variable is held constant.)

- D versus S
- D versus P
- S versus P

[12.4] A baseball player throws a ball as hard as he can straight up, and its speed, as tracked with a radar gun, is shown on the graph.

- At what speed was the ball thrown?
- How much speed does the ball lose each second?
- What is the equation that relates speed to time elapsed?
- Can the graph be extended? Discuss why or why not.



[12.5] If I ride my bike uphill for 1.5 miles at a speed of 6 mph and then ride back down at 30 mph, what is my average speed for the trip?

[12.5] Ms. Valdez left for work, forgetting her briefcase. Her husband left $\frac{1}{6}$ of an hour later, and caught her after $\frac{1}{3}$ hour more. If Ms. Valdez averaged 30 mph, what was her husband's average speed?

[12.6] A bike with 28-inch-diameter wheels has its chain on a chainwheel with 42 teeth and a rear sprocket with 35 teeth.

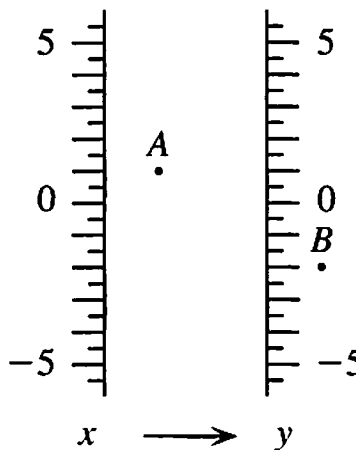
- What is the gear ratio?
- What is the gear?
- What is the distance traveled for each turn of the pedals?
- At a cadence of 60 revolutions per minute, what is the speed in miles per hour?

[12.7] Obie Ease weighs 300 lbs., and he is on a diet. His plan is to lose 2% of his weight each month, and reward himself at the end of each successful month with a feast which will add 4 lbs.

- Write a recurrence equation expressing Obie's weight at the end of each month in terms of his weight at the end of the previous month, assuming he follows his plan successfully.
- What will happen in the long run. Explain how you know.

[12.8] Each dot on the function diagram is the focus of an equation of the form $y = mx + b$.

- Draw an in-out line which shows the b -parameter of equation A .
- Draw another in-out line through A and use it to find equation A .
- If lines A and B were represented on a Cartesian graph, at what point would they intersect? Explain how you can find this from the function diagram, without finding equation B .



Chapter 13

[13.1] A rectangle has perimeter 80 and length L .

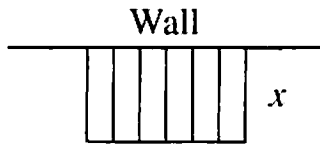
- Write an expression for the width.
- Write an expression for the area.
- If you graph the area as a function of length, what will be the coordinates of the highest point on the graph? What do these coordinates represent in terms of rectangles with perimeter 80?

[13.1] Find the x -intercepts and vertex of each parabola.

a) $y = x(16 - x)$

b) $y = x(x - 16)$

- [13.2] Six rectangular pens are made with 200 ft. of fencing, using a wall to form one side, as shown. If the length of each segment perpendicular to the wall is x , write an expression for the total area of the pens.



- [13.2] Find a function of the form $y = ax(x - q)$ for a parabola with x -intercepts 0 and 8, and vertex $(4, 32)$.
- [13.2] Find the intercepts and vertex of the parabola $y = x(24 - 6x)$.
- [13.3] Use the zero-product property to solve $x^2 + 4x = -3$. Show your work.
- [13.3] Find the intercepts and vertex of the parabola $y = 0.5(x - 6)(x + 10)$.
- [13.4] Suppose you want to make a rectangular pen of area 100 square feet.
- Write an expression for the perimeter in terms of the length, L .
 - What is the minimum perimeter?
 - Is there a maximum perimeter? Explain.
- [13.4] If two numbers have a product of 60, what is the smallest value their sum could take?
- [13.5] If a tray is formed from a 30-cm-by-30-cm piece of cardboard by cutting a square of side x from each corner and folding up the sides, what is the volume of the tray in terms of x ?
- [13.5] If a tray is formed from a 30-cm-by-30-cm piece of cardboard by cutting a square of side x from each corner and folding up the sides, what is the height of the tray that will give the maximum volume?
- [13.6] Complete the square to solve the equation $x^2 + 10x = -9$. Explain each step and illustrate with Lab Gear sketches.
- [13.7] Write the equation of a parabola that is a translation of $y = x^2$ and has vertex $(3, -5)$.
- [13.7] Find H and V (the coordinates of the vertex) for the graph of $y = x^2 + 4x + 10$.
- [13.7] Explain how the Lab Gear drawing of $x^2 + 8x + 19$ can be used to find the coordinates of the vertex of $y = x^2 + 8x + 19$.
- [13.8] A parabola which is a translation of $y = x^2$ has vertex at $(-3, -5)$. What are the exact values of the x -intercepts?

- [13.8] Write an equation of the form $y = x^2 + bx + c$, neither b nor $c = 0$, which has
- one x -intercept.
 - no x -intercepts.

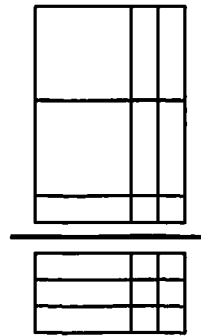
Chapter 14

- [14.1] A rectangle has width 5 and length x . It is cut into two equal rectangles, each with dimensions 5 by $\frac{1}{2}x$. Each smaller rectangle is similar to the original.

Find x . Explain your work.

- [14.1] A rectangle has width 5 and length x . When the rectangle is cut into 9 equal parts, each small rectangle is similar to the original. What is x ?

- [14.2] a) Write the fraction represented by the figure at the right.
b) Write the simplified fraction.



- [14.2] Simplify the fraction: $\frac{2x^2 + 6x}{5x + 15}$

- [14.2] When is it true that $\frac{5x^2 - 10x}{x - 2} = 5x$?

- [14.3] Write a fraction equivalent to $\frac{6x}{x - 1}$ that has

- numerator $12x^2y$.
- denominator $3x^2 - 3x$.

- [14.3] Find a common denominator and add: $\frac{2}{5x} + \frac{y}{4x^2}$.

- [14.3] Rewrite as an equivalent quadratic equation: $x = 5 - \frac{3}{x}$.

- [14.4] A parabola has vertex $(0, 0)$ and contains the point $(2, -12)$. What is its equation?

- [14.4] Find the coordinates of the vertex of the graph of $y = 5x^2 + 20x - 11$. Show your work.

[14.5] The coordinates of the vertex of $y = 3x^2 + 12x + 8$ are $(-2, -4)$. Show how to use this to find the x -intercepts of the parabola. Illustrate with a sketch.

[14.5] Use the quadratic formula to solve: $5x^2 + 2x - 6 = 0$. Show your work.

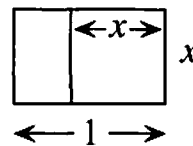
[14.6] What is the equation of a frown parabola having the same shape as $y = 3x^2$ and vertex $(-5, 2)$?

[14.6] Solve $(x + 4)^2 - 6 = 0$ by the equal squares method.

[14.7] Explain why a parabola with equation $y = ax^2 + bx + c$ and vertex (H, V) in which a and V have the same sign has no x -intercepts.

[14.7] Explain what we can conclude about a , H , and V if the parabola $y = a(x - H)^2 + V$ has two x -intercepts.

[14.8] A rectangle has length 1 foot and width x feet. When a square is cut off one end of the rectangle, the remaining rectangle is similar to the original one. Find x . Explain your work.



[14.8] Consider the Fibonacci-like sequence: $1, a, 1 + a, 1 + 2a, 2 + 3a, \dots$

a) What is the next term?

b) If the sequence is also geometric, write an equation which must be true, and solve to find the value of a .