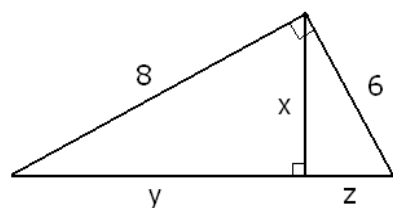


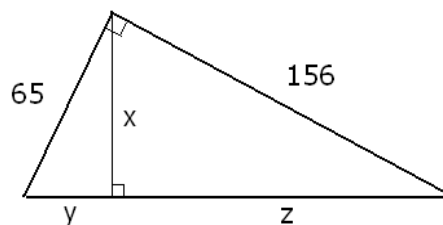
## Review Problems

- Re-write  $0.30\overline{72}$  as a fraction of integers.
- Simplify each of the following.
  - $(4\sqrt{3} - 2)^2$
  - $\sqrt{20} - 3\sqrt{180} + \sqrt{500}$
  - Rationalize the denominator in  $\frac{6}{5 - \sqrt{7}}$
  - Find the exact value of  $x^2 - 5x + 8$  if  $x = 1 - 2\sqrt{3}$
- Solve each of the following equations. Make sure to check your solution.
  - $x^3 = 24x^2 + 217x$
  - $\frac{3-x}{4} - \frac{10-3x}{5} = x + 2$
  - $(x+4)(1-2x) = 3x - 2(x-3)^2$
  - $3(x-5) - 5(x-1) = -2x + 1$
  - $18x^3 = 2x$
  - $\sqrt{4x+1} - \sqrt{x+2} = 1$
- Solve each of the following inequalities.
  - $12x - 2x^2 > 20$
  - $12x + x^2 \geq 45$
  - $\frac{1}{3}x^2 - 4x \leq -12$
  - $-x^2 + 6x > 1$
- Solve each of the following system of equations.
  - $$\begin{cases} 3x - 5y = -12 \\ y - x = 4 \end{cases}$$
  - $$\begin{cases} 2x + 5y = -11 \\ 3x - y = -25 \end{cases}$$
  - $$\begin{cases} 2x + 3y = -1 \\ y = -\frac{2}{3}x + 2 \end{cases}$$
- Completely factor each of the following.
  - $8a^2m - n - 2m + 4a^2n$
  - $125p^{21} + 1$
  - $a^3 - x^2 + a^3x^2 - 1$
  - $16y^4 - 1$
- Factor each of the following by completing the square.
  - $3x^2 - 4x - 319$
  - $3x^2 - 3x + 4$
  - $20x - 2x^2 - 46$
  - $-4x^2 + 3x + 7$
- Graph each of the following equations.
  - $f(x) = -\frac{2}{3}x + 1$
  - $g(x) = 8x - 2x^2 - 6$
  - $10x + x^2 + y^2 = 6(y - 5)$
  - $2x - 3y + xy = 6$
- Find the point(s) of intersection of  $y = x^2 - 4x - 21$  and  $y = 4x - 28$ .
- Find the coordinates of all points of intersection of the circles  $(x+3)^2 + (y+1)^2 = 50$  and  $(x-1)^2 + (y-2)^2 = 25$ .
- Write an equation for the circle centered at  $(2, -2)$  with radius  $\sqrt{3}$ .
- Find the equation of the straight line passing through the intersections of  $(x+1)^2 + (y-6)^2 = 25$  and  $(x-13)^2 + (y-4)^2 = 125$ .
- Find an equation of the tangent line drawn to  $(x-10)^2 + (y+6)^2 = 29$  at the point  $P(8, -1)$ .
- Suppose that  $x$  and  $y$  are real numbers with  $x + 3y = 20$ .
  - Find the smallest possible value of  $x^2 + y^2$ .
  - Find the greatest value of  $xy$ .
  - Find the smallest value of  $(x-y)^2$ .
  - Find the greatest value of  $y^2 - x^2$ .
- A citrus grower estimates that if 60 orange trees are planted, the average yield per tree will be 400 oranges. The average yield will decrease by 4 oranges per tree for each additional tree planted on the same acreage. Find the total number of trees the grower should plant to maximize yield.
- There is an animal farm where chickens and cows live. All together, there are 53 heads and 174 legs. How many chickens, how many cows?

17. We invested \$10000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if the combined interest from the two accounts is \$1238 after the first year?
18. Sally worked 50 hours last week and made \$495 for the week. For every hour worked over 40 her job pays time and a half. What is Sally's regular hourly pay rate?
19. The cost of manufacturing  $q$  units of a product is given by  $C(q) = 6q^2 + 10q$ . Suppose we can sell all  $q$  units for a total of  $142q + 1674$  dollars. Find the maximum profit we can achieve.
20. Find the distance between the points  $A(-3, -5)$  and  $B(3, 3)$ .
21. A person is standing 3 ft away from a street light that is 15.6 ft tall. How long is his shadow if he is 5.2 ft tall?
22. Find the exact value of  $x$ ,  $y$ , and  $z$ , based on the figures shown below.

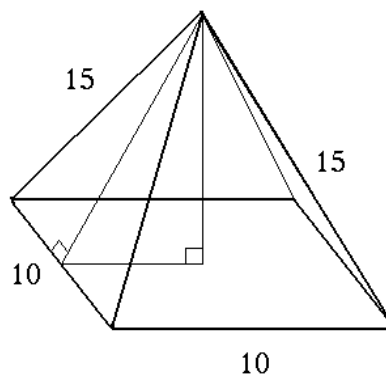


(a)



(b)

23. Compute the exact value of the area of the triangle with sides 6, 6, and 8 units long.
24. The picture below shows a straight pyramid with a square base. The sides of the base are 10 in long. The other sides are 15 in long.



- a) Find the height of a triangular face.      b) Use part a) to find the height of the pyramid.
25. Consider the arithmetic sequence defined by its first element  $a = -50$  and its common difference  $d = 7$ . Compute each of the following.
- $a_{10}$        $s_{10}$        $a_{35}$        $s_{35}$
26. Consider the arithmetic sequence 100, 97, 94, 91, ..... Compute each of the following.
- $a_{20}$        $s_{20}$        $a_{60}$        $s_{60}$

## Review Problems - Answers

1.)  $\frac{3042}{9900}$  2.) a)  $52 - 16\sqrt{3}$  b)  $-6\sqrt{5}$  c)  $\frac{\sqrt{7} + 5}{3}$  d)  $6\sqrt{3} + 16$

3.) a)  $-7, 0, 31$  b)  $-5$  c)  $1$  d) no solution e)  $-\frac{1}{3}, 0, \frac{1}{3}$  f)  $2$  ( $-\frac{2}{9}$  does not work)

4.) a) no solution b)  $x \leq -15$  or  $x \geq 3$  c)  $x = 6$  d)  $3 - 2\sqrt{2} < x < 3 + 2\sqrt{2}$

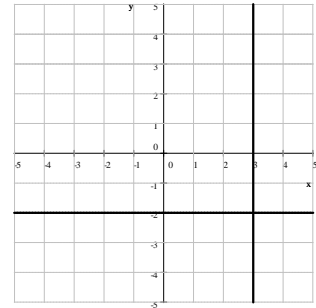
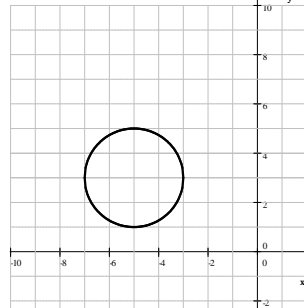
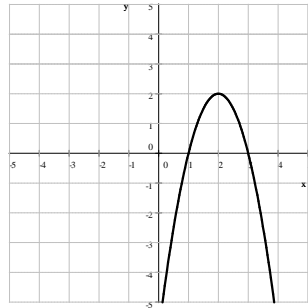
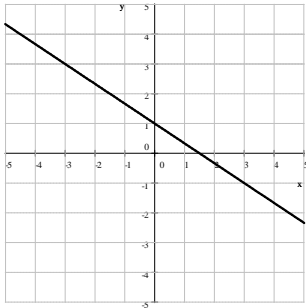
5.) a)  $x = -4, y = 0$  b)  $x = -8, y = 1$  c) no solution

6.) a)  $(2a - 1)(2a + 1)(2m + n)$  b)  $(5p^7 + 1)(25p^{14} - 5p^7 + 1)$  c)  $(x^2 + 1)(a - 1)(a^2 + a + 1)$

d)  $(4y^2 + 1)(2y - 1)(2y + 1)$

7.) a)  $3\left(x + \frac{29}{3}\right)(x - 11)$  b) does not factor c)  $-2(x - 5 + \sqrt{2})(x - 5 - \sqrt{2})$  d)  $-4(x + 1)\left(x - \frac{7}{4}\right)$

8.) a)  $f(x) = -\frac{2}{3}x + 1$  b)  $g(x) = 8x - 2x^2 - 6$  c)  $10x + x^2 + y^2 = 6(y - 5)$  d)  $2x - 3y + xy = 6$



9.)  $(1, -24)$  and  $(7, 0)$  10.)  $(-2, 6)$  and  $(4, -2)$  11.)  $(x - 2)^2 + (y + 2)^2 = 3$  12.)  $y = 7x - 12$

13.)  $y + 1 = \frac{2}{5}(x - 8)$

14.) a) 40 when  $x = 2, y = 6$  b)  $\frac{100}{3}$  when  $x = \frac{10}{3}, y = \frac{10}{3}$  c) 0 when  $x = 5, y = 5$

d) 50 when  $x = -\frac{5}{2}, y = \frac{15}{2}$

15.) if we plant 80 trees, then we will obtain a maximal yield of 25 600 oranges.

16.) 19 chickens and 34 cows 17.) \$7300 at 14% and \$2700 at 8% 18.) \$9 19.) \$2400 20.) 10 units

21.) 1.5 ft 22.) a)  $x = \frac{24}{5} = 4.8, y = \frac{32}{5} = 6.4, z = \frac{18}{5} = 3.6$  b)  $x = 60, y = 25, z = 144$

23.)  $8\sqrt{5}$  24.) a)  $10\sqrt{2}$  in  $\approx 14.142136$  in b)  $5\sqrt{7}$  in  $\approx 13.228757$  in

25.)  $a_{10} = 13$   $s_{10} = -185$   $a_{35} = 188$   $s_{35} = 2415$  26.)  $a_{20} = 43$   $s_{20} = 1430$   $a_{60} = -77$   $s_{60} = 690$