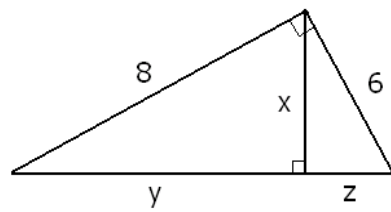


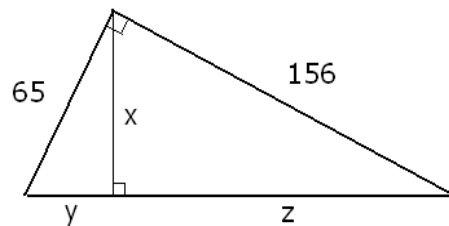
## Review Problems

- 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.
  - $x^3 = 24x^2 + 217x$
  - $\frac{3-x}{4} - \frac{10-3x}{5} = x+2$
  - $(x+4)(1-2x) = 3x - 2(x-3)^2$
  - $3(x-5) - 5(x-1) = -2x+1$
  - $18x^3 = 2x$
- 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.

16. 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.

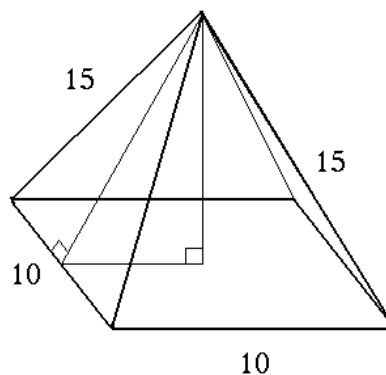


(a)



(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.

## 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)  $-\frac{1}{3}, 0, \frac{1}{3}$

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

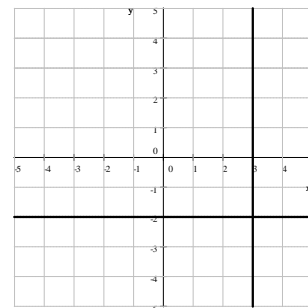
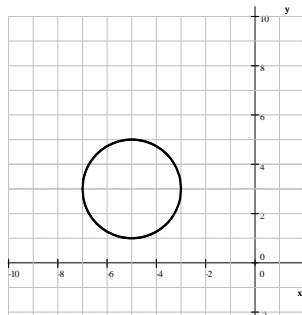
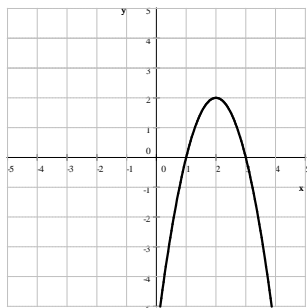
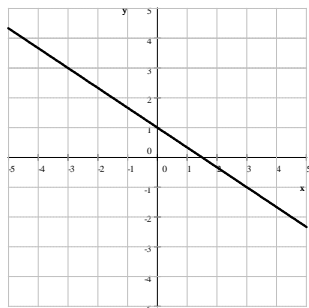
5.) a)  $x = -4, y = 0$  b)  $x = -8, y = 1$  c) no solution

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