1. Perform the operations as indicated.

   (a) $\dfrac{\frac{3}{4}+\frac{8}{15}\div\left(-\frac{2}{5}\right)}{2\frac{1}{3}}=$

   (b) $4-\left|\left|2^2-(-2)^4\right|-5^2\right|=$

   (c) $\dfrac{2\left((-2)^2-\left(3^2-3\right)\right)}{-2^2}-\dfrac{\left(-3^2+2\right)3}{3-(-4)}=$

   (d) $\dfrac{\left||-2^2+2|-5\right|-1}{-2^2-\left((-3)^3+5^2\right)}=$

   (e) $\sqrt{(-1)^4-2\cdot 3^2\div(-2)\cdot 6+(-3)^2}=$

   (f) $\left(3\frac{3}{5}\right)\div\left(1\frac{1}{3}\right)+\frac{3}{10}=$

2. Evaluate the expression $\dfrac{11a-2a^2-15}{2a-5}$ if

   (a) $a=0$

   (b) $a=2$

   (c) $a=\frac{1}{2}$

   (d) $a=-\frac{1}{2}$

   (e) $a=1\frac{1}{2}$

   (f) $a=2\frac{1}{2}$

3. Consider the equation $16x^2+6x^3+1=-x^2+4(x+1)$. For each of the numbers given, determine whether it is a solution of the equation or not.

   (a) $x=-2$

   (b) $x=\frac{1}{2}$

   (c) $x=\frac{1}{3}$

   (d) $x=-\frac{1}{2}$

4. (Exponential Expressions.) Simplify each of the following.

   (a) $\left(-2xy^3\right)^2 xy^5x^2 =$

   (b) $\dfrac{\left(3ab^2\right)^2\left(2a^3b\right)^4}{\left(2ab\right)^3} =$

   (c) $\dfrac{\left(-2x^2y^3\right)^4 xy^3\left(2x^2y\right)^2}{\left(2x\right)^2 y^9\left(2x^2y\right)^4} =$

5. Completely factor each of the following.

   (a) $-x^4 + 81 =$

   (b) $3p^2 - 12p - 288 =$

   (c) $36x^2y^3 + 4x^4y^3 =$

   (d) $5a^3b^2 - 15ab =$

   (e) $x^2 + 16x + 73 =$

6. (Linear Equations) Solve each of the following equations. Make sure to check your solutions.

   (a) $\dfrac{x+1}{4} = -6$

   (b) $\dfrac{x}{4} + 1 = -6$

   (c) $\dfrac{2}{3}x + \dfrac{3}{10} = \dfrac{1}{30}$

   (d) $\dfrac{4}{5}x - \dfrac{26}{15} = \dfrac{2}{3}$

   (e) $-2x - (3x - 1) = 2(5 - 3x)$

   (f) $3(x - 4) - 4(x - 3) = 3(x - 2) + 2(3 - x)$

7. (Absolute Value Equations) Solve each of the following equations. Make sure to check your solutions.

   (a) $\left|\dfrac{3}{4}x - 2\right| - 1 = 7$

   (b) $|2x - 1| - 5 = 30$

   (c) $|2x - 1| - 5 = -30$

8. (Higher Degree Equations) Solve each of the following equations. Make sure to check your solutions.

   (a) $x^3 - 270x = 3x^2$

   (b) $2(x - 5)^2 - (x - 1)(4x + 3) = 10 - (x + 1)(2x - 3)$

   (c) $(2x + 3)^2 - (2x - 3)^2 = -20 + 14x$

   (d) $(x + 1)(1 - 2x) = -3x^2 + 7x + 34$

9. Word Problems.

   (a) Sally is making $ 2800 per month. How much would she make if she received a 4% raise?

   (b) The population of a town is currently 60 000. What would be the population after a year if during the next year, there will be a

      i. 15% decrease

      ii. 15% increase

   in the population?

   (c) We measured the temperature during the last four days. The first three measurements were (in Farenheit) 57, 65, and 49 degrees. We have lost the temperature measurements for the fourth day. Find this missing data if we know that the average temperature for these four days was 58 degrees.

   (d) If we multiply a number by -5 and add 30, the result is 15. Find this number.

   (e) If we subtract 50 from the opposite of a number, we get -12. Find this number.

   (f) One number is 32 less than the other. Find these numbers if their sum is 134.

   (g) One number is 32 less than the other. Find these numbers if their product is -135.

   (h) One side of a rectangle is 4 in longer than 3 times the other side. Find the sides of the rectangle if its perimeter is 96 in.

   (i) A bank teller has 7 more five-dollar bills than ten-dollar bills. The total value of the money is $ 500. How much of each denomination of bill does he have?

   (j) We throw an object upward from the top of a 112 ft high building. The height of the object, (measured in feet) t seconds after we threw it is

$$h(t) = -16t^2 + 96t + 112$$

      i. Where is the object 3 seconds after we threw it?

      ii. How long does it take for the object to hit the ground?

   (k) The largest angle in a triangle is 10 degrees greater than five times the smallest angle. The middle angle is 10 degrees greater than twice the smallest angle. Find the three angles in the triangle.

10. Consider the equations $2x + y = 6$ and $x - 2y = 8$.

   (a) Graph these lines in the same coordinate system. Use your graph to find the coordinates where the points intersect.

   (b) Use algebraic methods to check your answer for part a).

11. Graph the parabola $y = 6x + x^2 + 8$. Clearly label the coordinates of five points on the parabola, including vertex and intercepts.