1. Completely factor each of the following.

   a) $3ab^2 + 9a - 2ab^3 - 6ab$

   b) $3xy - 3x - 3x^2 + 3x^2y$

   c) $2amx^3 + 10anx^3 - 8amxy^2 - 40anxy^2$

   d) $6x^3 - 10x^2 - 4x$

   e) $5ax^4 - 15p - 5a + 15px^4$

   f) $4x^2 - 9y^2 + x^2y^2 - 36$

2. Simplify each of the following.

   a) $\dfrac{x^2 - 3x}{x^2 + 4x - 21} \cdot \dfrac{6x + x^2 - 7}{x^2 - x}$

   b) $\dfrac{1 - 9p^2}{-p^2 + 8p - 15} \div \dfrac{3p - 1}{p - 3}$

   c) $\dfrac{x^2 - 6x + 29}{2x + x^2 - 35} - \dfrac{x - 3}{x + 7}$

   d) $3\sqrt{7} + 2\sqrt{63} - 3$

   e) $\dfrac{\sqrt{8} - 12}{4}$

   f) $\sqrt{5}\left(2 - \sqrt{5}\right) - \left(7 - 3\sqrt{5}\right)^2$

   g) $\dfrac{3\sqrt{10}}{\sqrt{10} - 1}$

   h) $\dfrac{a^{-2}b^3}{a^{-5}b^0}$

   i) $\dfrac{a^{-2} + b^3}{a^{-5} - b^0}$

   j) $\left(-2xy^3\right)^3 \left(-x^3yx^0\right)^{-2}$

   k) $\dfrac{x^{-1} + y^{-1}}{x^{-2} - y^{-2}}$

   l) $\left(\dfrac{2a^{-3}ba^2b^0}{-3b^{-1}ab^4}\right)^{-2}$

3. Find the exact value of $-x^2 + 3x - 8$ if $x = 3 - \sqrt{5}$.

4. Solve each of the following equations.

   a) $\dfrac{5x + 1}{28} + \dfrac{12x - 6}{56} = \dfrac{x - 1}{14}$

   b) $8x^2 + x^3 = 33x$

   c) $2(x - 3) - \dfrac{x}{2} = \dfrac{3}{2}(x - 4)$

   d) $3x^2 - 5x - 1 = 0$

5. Solve the formula $C = \dfrac{5}{9}(F - 32)$ for F.

6. We have invested \$6000 in two accounts. One account earns a 4% interest per year, the other earns 7% per year. How much did we invest in the two account if the combined interest after one year is \$336?

7. Solve each of the following systems.

   a) $\begin{cases} 2x - 3y = -1 \\ 3x - 4y = 1 \end{cases}$

   b) $\begin{cases} 4x + 5y = -20 \\ y = -\dfrac{4}{5}x + 2 \end{cases}$

8. a) Graph the straight lines determined by $y = 2x - 3$ and $x + 6 = 2y$. Use your graph to find the coordinates of the intersection.

   b) Graph the parabola $y = 8x + x^2 + 12$. Clearly indicate the coordinates of five points, including vertex and intercepts.

9. A soda costs \$1.20 and a sandwich costs \$2.50. We purchased 23 items for a total of \$38. How many sodas and sandwiches did we purchase?

10. We threw an object upward from the top of a 880 ft tall building. t seconds after we dropped it, the distance of the object from the ground, measured in feet, is

$$h(t) = -16t^2 + 96t + 880$$

a) Find $h(t)$ if $t = 0\,\text{s}$.
b) Find $h(t)$ if $t = 1\,\text{s}$.
c) Find $h(t)$ if $t = 3\,\text{s}$.
d) Find $h(t)$ if $t = 4\,\text{s}$.
e) Find $h(t)$ if $t = 7\,\text{s}$.
f) How long until the object hits the ground?

Answers

1. a) $a(3-2b)(b^2+3)$ b) $3x(x+1)(y-1)$ c) $2ax(x+2y)(x-2y)(m+5n)$
   d) $6x\left(x+\frac{1}{3}\right)(x-2) = 2x(3x+1)(x-2)$ e) $5(a+3p)(x^2+1)(x+1)(x-1)$
   f) $(y^2+4)(x+3)(x-3)$

2. a) 1 b) $\frac{3p+1}{p-5}$ c) $\frac{2}{x-5}$ d) $-3\sqrt{7}$ e) $\frac{\sqrt{2}-6}{2}$ f) $-99+44\sqrt{5}$
   g) $\frac{\sqrt{10}+10}{3}$ h) a^3b^3 i) $-\frac{a^3+a^5b^3}{a^5-1}$ j) $-\frac{8y^7}{x^3}$ k) $\frac{xy}{y-x}$ l) $\frac{9a^4b^4}{4}$

3. $-13+3\sqrt{\mathbf{5}}$

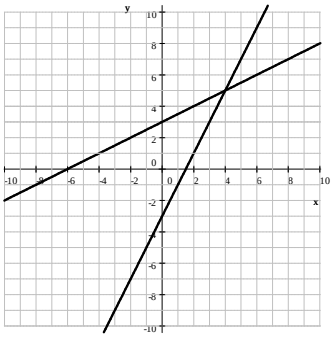
4. a) 0 b) $3, 0, -11$ c) identity, all numbers are solution d) $\frac{5}{6} \pm \frac{\sqrt{37}}{6}$

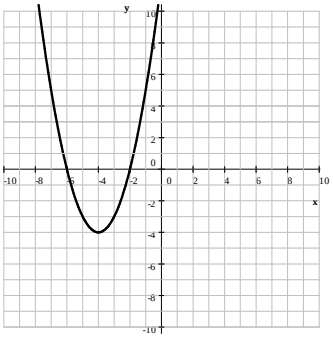
5. $F = \frac{9}{5}C + 32$ or $F = \frac{9C+160}{5}$

6. 3200 at 7% and 2800 at 4%

7. a) $(7,5)$ b) no solution

8. a) $(4,5)$
   b) Solution: $y-$intercept: $(0,12)$ $x-$intercepts: $(-6,0)$ and $(-2,0)$ vertex:$(-4,-4)$. Additional points: $(-5,-3)$, $(-3,-3)$, $(-1,5)$





9. 15 sodas and 8 sandwiches

10. a) 880 ft b) 960 ft c) 1024 ft d) 1008 ft e) 768 ft f) 11 s