

1. Completely factor each of the following.

a) $4a + 4a^5$ b) $4a^5 - 4a$ c) $a^5 + a^4$

2. Factor completely by completing the square or state if the expression does not factor.

a) $x + 2x^2 - 15$ b) $2x + x^2 + 26$ c) $12x - 2x^2 - 4$ d) $4x^2 - 24x - 64$ e) $6x^2 - 13x + 6$

3. Solve each of the following equations. Make sure to check your solution.

a) $2(x - 7) - 3(5 - 3x) = 2(x - 1)$ d) $12x = 2x^2 + 4$

b) $\frac{2x - 1}{3} - \frac{1 - 5x}{2} = 3x - 2$ e) $3x^2 + 12x = 0$

c) $20x + 5x^2 = 385$ f) $(2x - 3)^2 - 3(x - 2)^2 = 6\left(x - \frac{1}{2}\right)$

4. Simplify each of the following expressions.

a) $\sqrt{50} - 3\sqrt{18} + \sqrt{200}$ c) Rationalize $\frac{3}{\sqrt{10} - 4}$

b) $(8 - \sqrt{5})^2$ d) Find the exact value of $x^2 - 4x + 7$ if $x = 5 - \sqrt{2}$

5. Simplify each of the following.

a) 2^{-3} e) $\left(\frac{a}{b}\right)^{-3}$ i) $\frac{x^{-2}y}{x^{-1}y^2}$

b) -3^{-2} f) $\left(\frac{2xy^{-2}}{-x^{-4}y^{-3}}\right)^{-3} \left(-\frac{1}{2}x^{-5}y^{-2}\right)^{-2}$ j) $\frac{x^{-2} + y}{x^{-1} - y^2}$

c) $(-3)^{-2}$ g) $(a^{-2})^{-5} (a^0)^{-4} (-2a^3)^{-2} \left(\frac{1}{a^2}\right)$

d) $\left(-\frac{1}{3}\right)^{-2}$ h) $(3m^{-2})^{-2} \left(\frac{2}{m}\right)^{-1} (-3m)^2 \left(\frac{1}{2m^{-3}}\right)^{-2}$

6. a) Graph the straight lines $y = -\frac{2}{3}x + 1$ and $x + 2y = 0$ in the same coordinate system. Use your graph to find the coordinates of the point where the lines intersect.

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

7. One number is three less than twice another. Find these numbers if

a) their sum is 48 b) their product is 135.

8. The hypotenuse of a right triangle is 58 cm. The difference between the other two sides is 2 cm. Find the sides of the triangle.

9. An arch is in the shape of a semicircle. At a point along the base 2 feet from an end of the arch, the height of the arch is 10 feet. Find the maximum height of the arch.

10. Find the distance between $(7, -2)$ and $(3, 3)$.

11. Compute the exact value of the area of the triangle with sides 10 cm, 10 cm, and 8 cm long.

12. Write an equation for the line that is

a) parallel to $2x - 5y = 17$ and passes through $P(10, -2)$.

b) perpendicular to $2x - 5y = 17$ and passes through $P(10, -2)$.

c) passes through the points $(-2, 4)$ and $(6, 0)$

13. In each case, use algebraic methods to find the coordinates of all points where the line and the parabola intersect each other.

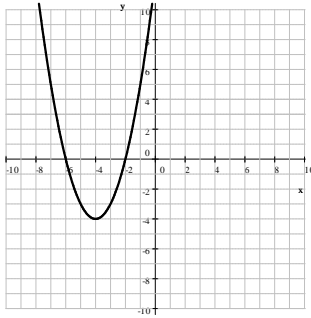
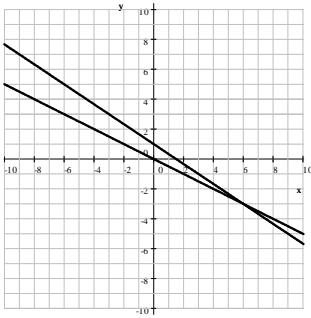
a) $y = x^2 - 12x + 30$ and $y = 6x - 35$

b) $y = x^2 - 4x + 8$ and $y = 2x - 10$

c) $y = -x^2 + 10x + 2$ and $y = 4x + 11$

Answers

- 1.) See handout Factoring 1. a) $4a(a^4 + 1)$ b) $4a(a^2 + 1)(a + 1)(a - 1)$ c) $a^4(a + 1)$
- 2.) See handouts Completing the Square parts 1, 2, 3, and 4. a) $(2x - 5)(x + 3)$ b) does not factor
- c) $-2(x - 3 + \sqrt{7})(x - 3 - \sqrt{7})$ d) $4(x + 2)(x - 8)$ e) $6\left(x - \frac{3}{2}\right)\left(x - \frac{2}{3}\right) = (2x - 3)(3x - 2)$
- 3.) See handouts Linear Equations, Factoring 1, and Completing the Square parts 1, 2, 3, and 4.
- a) 3 b) -7 c) -11, 7 d) $3 - \sqrt{7}, \sqrt{7} + 3$ e) 0, -4 f) 0, 6
- 4.) See handout Radical Expressions. a) $6\sqrt{2}$ b) $69 - 16\sqrt{5}$ c) $-\frac{\sqrt{10} + 4}{2}$ d) $14 - 6\sqrt{2}$
- 5.) a) $\frac{1}{8}$ b) $-\frac{1}{9}$ c) $\frac{1}{9}$ d) 9 e) $\frac{b^3}{a^3}$ f) $-\frac{y}{2x^5}$ h) $\frac{a^2}{4}$ h) $2m$ i) $\frac{1}{xy}$ j) $\frac{x^2y + 1}{x - x^2y^2}$
- 6.) a) See handout Graphing Lines. b) See handout Graphing Parabolas 1. Vertex: $(-4, -4)$,
 y -intercept: $(0, 12)$, x -intercepts: $(-2, 0)$ and $(-6, 0)$
 Additional points: $(-1, 5)$, $(-3, -3)$, $(1, 21)$, $(-5, -3)$



- 7.) See handouts Word problems 1 and 2. a) 17 and 31 b) $-\frac{15}{2}, -18$ and 9, 15

See handout the Pythagorean Theorem

- 8.) 40 cm and 42 cm 9.) 26 feet 10.) $\sqrt{41}$ units 11.) $A = 8\sqrt{21} \text{ cm}^2$
- 12.) See handout writing equations of lines. a) $y = \frac{2}{5}x - 6$ b) $y = -\frac{5}{2}x + 23$ c) $y = -\frac{1}{2}x + 3$
- 13.) We talked about non-linear systems in class. No handout yet but you can solve these!
- a) $(5, -5)$ and $(13, 43)$ b) they don't intersect c) $(3, 23)$