

Part 1

- Simplify $5 - 2(4b - 5(b - 3))$.
A) $2b + 35$ B) $35 - 18b$ C) $2b - 25$ D) $35 - 2b$
- Simplify the expression $(\sqrt{x} - \sqrt{2})^2$
A) $x - 2\sqrt{2x} + 2$ B) $x - 2$ C) $x - 2\sqrt{x} + 2\sqrt{2} - \sqrt{2x}$ D) $x - 4\sqrt{x} + 4$
- Solve the equation $x^2 - 29 = 4x$ over the real numbers.
A) There is no solution. B) $2 - \sqrt{33}$ and $2 + \sqrt{33}$ C) -3 and 7 D) -25
- Perform the indicated operations and simplify. $\frac{x^2 - 9}{x^2 + 7x + 12} \div \frac{x - 3}{x + 5}$
A) $\frac{x + 5}{x + 4}$ B) $\frac{x^2 - 6x + 9}{9x + x^2 + 20}$ C) $\frac{x - 3}{9x + x^2 + 20}$ D) $\frac{x + 5}{x - 4}$
- Solve the equation $x^2 = 4x + 1$.
A) $-\frac{1}{2}, \sqrt{5} + 1$ B) $2 - \sqrt{5}, 2 + \sqrt{5}$ C) $2 - \sqrt{10}, 2 + \sqrt{10}$ D) $2 + \sqrt{20}, 2 - \sqrt{20}$
- Simplify the expression $\frac{1 - x^{-2}}{1 + x^{-1}}$.
A) $\frac{x - 1}{x}$ B) $\frac{1 - x}{x^2 + 1}$ C) 1 D) $-\frac{1}{x - 1}$
- Perform the indicated operations and simplify. $\frac{1}{x - y} - \frac{1}{x + y}$
A) 0 B) $-\frac{2}{x + y}$ C) $\frac{-2y}{y^2 - x^2}$ D) $\frac{2x}{y^2 - x^2}$
- Simplify $\frac{2^{1/2}4^{-1/2}}{64^{-2/3}}$.
A) $\sqrt{2}$ B) $\frac{\sqrt{2}}{8}$ C) $-32\sqrt{2}$ D) $8\sqrt{2}$
- Find the area of a rectangle if its diagonal is 39 cm long and one of its sides is 15 cm long.
A) 292.5 cm^2 B) 540 cm^2 C) 585 cm^2 D) 102 cm^2
- Solve $-2 < -\frac{1}{2}x + 3 \leq 5$
A) $[-10, 4)$ B) $(-\infty, \infty)$ C) $(-10, 4]$ D) $[-4, 10)$

Part 2

1. Simplify each of the following expressions. Show all work.

a) $2^{-2} - 2^{-3}$

e) $\frac{x^{-2} - y^{-2}}{x^{-1} - y^{-1}}$

b) $\frac{(x^{-2})^{-2} y^3 x^0 (-2yxy^{-2}x^{-2})^{-3}}{yx^5 (y^{-2}x)^{-3} (2x^{-1}yx^3)^{-1}}$

f) $(2 - \sqrt{x})(3 + 2\sqrt{x})$

c) $\frac{5a - 2}{a^2 - a} - \frac{3}{a - 1}$

g) $\frac{\sqrt{5} - 1}{\sqrt{5} - 2}$

d) $\sqrt{80} - 2\sqrt{180} + 3\sqrt{245}$

h) $\frac{px^2 - 16q - 16p + qx^2}{x^2 + 5x + 6} \cdot \frac{x^2 + 6x + 9}{4px^2 + px^3 + 4qx^2 + qx^3}$

2. Completely factor each of the following.

a) $357ab^2 - 30ab^2x - 3ab^2x^2$

c) $2a^3x^2 - 2a^3y^2 + 2b^3x^2 - 2b^3y^2$

b) $4a^2px^5 - 2a^2qx - 4a^2px + 2a^2qx^5$

3. Factor each of the following by completing the square.

a) $100x - x^2 - 2419$

c) $11x + 6x^2 - 10$

e) $x^2 - 4x + 7$

b) $x^2 - x - 462$

d) $x^2 - 8x + 13$

f) $2x^2 - 8x + 1$

4. Graph the parabola $y = x^2 - 6x + 8$. Clearly label the coordinates of at least 5 points, including vertex and intercepts.

5. Solve each of the following.

a) $7 - (3 + 4t) + 2t = -5(1 - t) + 3 - t$

c) $3x^3 - x^2 = x$

b) $\frac{2x - 1}{3} - \frac{-3 - x}{4} = x - 1$

d) $x + \frac{14}{x - 2} = \frac{7x}{x - 2} + 1$

6. Write an equation for the line that is

a) parallel to the line $5x - 3y = 10$ and passes through the point $(-15, 2)$.

b) perpendicular to the line $5x - 3y = 10$ and passes through the point $(-15, 2)$.

c) passes through the points $(-4, 7)$ and $(1, -3)$

7. Word Problems.

a) One side of a rectangle is 16 cm longer than the other side. The area of the rectangle is 80 cm^2 . Find the dimensions of the rectangle. Include units in your answer.

b) The sides of a right triangle have lengths (in centimeters) that are consecutive even integers. What are the lengths of the sides?

c) Two investments produce an annual interest income of 708. The total amount of money invested is \$8000, and the two interest rates paid are 7% and 11%. How much money is invested at each rate?

d) A bank teller has 23 more five-dollar bills than ten-dollar bills. The total value of the money is \$610. How much of each denomination of bill does he have?

e) How much of each of a 30% and an 8% solutions should be mixed to obtain 33 milliliters of a 20% solution?

Answers - Part 1

- 1) C 2) A 3) B 4) A 5) B 6) A 7) C 8) D 9) B 10) D

Part 2

1. a) $\frac{1}{8}$ b) $\frac{-x^7}{4}$ c) $\frac{2}{a}$ d) $13\sqrt{5}$ e) $\frac{x+y}{xy}$ f) $6 + \sqrt{x} - 2x$

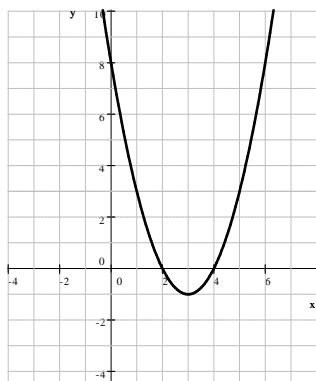
g) $3 + \sqrt{5}$ h) $\frac{(x+3)(x-4)}{x^2(x+2)}$

2. a) $-3ab^2(x+17)(x-7)$ b) $2a^2x(x-1)(x+1)(x^2+1)(2p+q)$
c) $2(a+b)(a^2-ab+b^2)(x-y)(x+y)$

3. a) $-(x-41)(x-59)$ b) $(x+21)(x-22)$ c) $6\left(x+\frac{5}{2}\right)\left(x-\frac{2}{3}\right) = (2x+5)(3x-2)$

d) $(x-4+\sqrt{3})(x-4-\sqrt{3})$ e) does not factor f) $2\left(x-2-\frac{\sqrt{14}}{2}\right)\left(x-2+\frac{\sqrt{14}}{2}\right)$

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



5. a) 1 b) 17 c) $x = 0$ or $x = \frac{1 + \sqrt{13}}{6}$ or $x = \frac{1 - \sqrt{13}}{6}$ d) 8

6. a) $y = \frac{5}{3}x + 27$ or $y - 2 = \frac{5}{3}(x + 15)$ b) $y = -\frac{3}{5}x - 7$ or $y - 2 = -\frac{3}{5}(x + 15)$

c) $y = -2x - 1$ or $y - 7 = -2(x + 4)$ or $y + 3 = -2(x - 1)$

7. a) 4 cm by 20 cm b) 6 cm, 8 cm, and 10 cm c) \$3700 at 11% and \$4300 at 7%

d) 33 ten-dollar bills and 56 five-dollar bills e) 18 mL of 30% solution and 15 mL of 8% solution