

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) $x - 2\sqrt{x} + 2\sqrt{2} - \sqrt{x}\sqrt{2}$ D) $x - 4\sqrt{x} + 4$
- Solve the equation $x^2 - 29 = 4x$ over the complex 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

Part 2

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

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

e) $\sqrt[3]{56} + 4\sqrt[3]{189} - \sqrt[3]{875}$

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) $\sqrt{48x^5y^3}$

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

d) $\sqrt{80a^{11}} - 2\sqrt{180a^{11}} + 3\sqrt{245a^{11}}$

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

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) $x^2 - 8x + 13$

4. Graphing.

a) Graph the parabola $y = -2x^2 + 3x + 1$. Clearly label the coordinates of at least 5 points, including vertex and intercepts.

b) Graph the parabola $y = 5x - 2x^2 + 3$ and the line $y = 5x - 5$ in the same coordinate system. Use your graph to find the coordinates of the points where they intersect.

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) $5 - \sqrt{2x + 1} = -2$

6. Word Problems.

a) One side of a rectangle is 16 cm longer than the other side. The area of the rectangle is 80 cm². 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?

Answers - Part 1

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

Part 2

1. a) $\frac{1}{8}$ b) $\frac{-x^7}{4}$ c) $4x^2y\sqrt{3xy}$ d) $13a^5\sqrt{5a}$ e) $9\sqrt[3]{7}$ f) $6 + \sqrt{x} - 2x$

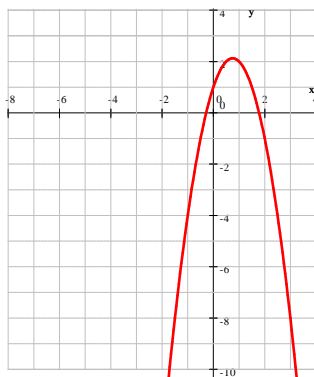
g) $3 + \sqrt{5}$ h) $\frac{(x+3)(x-4)}{x^2(x+2)}$

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

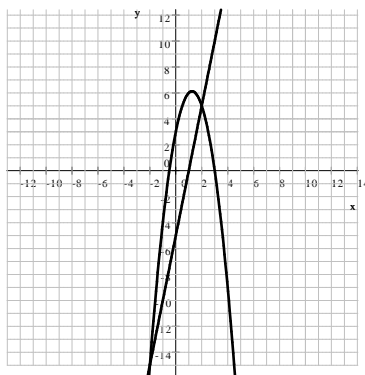
3. a) $-(x-41)(x-59)$ b) $(x+21)(x-22)$ c) $(2x+5)(3x-2)$ d) $(x-4+\sqrt{3})(x-4-\sqrt{3})$

e) Does not factor over the real numbers. Over the complex numbers, $(x-2+\sqrt{3}i)(x-2-\sqrt{3}i) = x^2 - 4x + 7$

4. a) Vertex: $\left(\frac{3}{4}, \frac{17}{8}\right)$, x -intercepts: $\left(\frac{3-\sqrt{17}}{4}, 0\right) \simeq (-0.281, 0)$ and $\left(\frac{3+\sqrt{17}}{4}, 0\right) \simeq (1.781, 0)$.



5. $(2, 5)$ and $(-2, -15)$



6. a) 1 b) 17 c) $x = 0$ or $x = \frac{1 + \sqrt{13}}{6}$ or $x = \frac{1 - \sqrt{13}}{6}$ d) 24
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