

Review Problems

1. Simplify each of the following.

a) $(3x - 7)^2$	f) $\frac{2x + 6}{18x - 2x^3}$	k) $\frac{5}{a - 1} - \frac{6a - 1}{a^2 - a}$
b) $(2a^3 - 5b)(2a^3 + 5b)$	g) $\frac{3x^2 - 10x + 3}{9x^2 - 1}$	l) $(a + b)(a^4 - a^3b + a^2b^2 - ab^3 + b^4)$
c) $\frac{2x - 7}{7 - 2x}$	h) $\frac{3a - 12}{3a + 15} \cdot \frac{5a + 20}{a^2 - 16}$	m) $\sqrt{300} - 2\sqrt{75} + \sqrt{12}$
d) $\left(\frac{2a^{-2}b^3}{-2^2(a^{-1}b)^{-3}}\right)^{-2}$	i) $\frac{7x - 13}{2x - 5} - \frac{7 - x}{2x - 5}$	n) $(3\sqrt{2} - 1)^2$
e) $\frac{x^{-1} + y^{-1}}{x^{-2} - y^{-2}}$	j) $\frac{5m + 6}{4m + m^2 - 12} - \frac{3}{m + 6}$	o) $(3\sqrt{2} - 1)^3$

2. Rationalize the denominator in each of the following expressions.

a) $\frac{4}{\sqrt{7}}$	b) $\frac{1}{\sqrt{7} - 3}$	c) $\frac{1}{\sqrt{10} + 3}$	d) $\frac{2}{3\sqrt{5} - 8}$
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3. Find the exact value of $-x^2 - 6x + 1$ if $x = 3 - \sqrt{10}$.

4. Factor $2x^2 - 13x + 15$ by completing the square.

5. Completely factor each of the following.

a) $8b^2 - 42b + 2b^3$	b) $28a^2bp^2 - 2a^2bp - 6a^2b$	c) $14m + 5m^2 - 3$
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6. In each case, use completing the square to decide whether the expression factors or not. Explain your answer.

a) $x^2 - 14x + 53$	b) $14x + x^2 + 46$	c) $x^2 - 16x + 64$
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7. Solve each of the following equations. Make sure to check your solutions.

a) $\frac{3x - 1}{5} - \frac{7 - x}{3} = x - 2$	f) $(3x - 8) - (4x - 5) = x - 3$	k) $m^2 + 55 = 16m$
b) $5p^7 = 20p^5$	g) $\left \frac{1}{3}x - 2\right + 11 = 5$	l) $7p + 15p^2 = 4$
c) $5p^7 = 20p^6$	h) $x^2 - 6x = 1$	m) $14 - (2x - 5)^2 = 2x - x(4x - 7)$
d) $\frac{2a + 1}{5} - \frac{7 - a}{2} = -a - 9$	i) $5(x - 2) - (3 - 4x) = 8(x - 2) - (5 - x)$	
e) $\left \frac{1}{3}x - 2\right - 5 = 11$	j) $(-1 - 2x) - (3x + 5)(2x - 1) = (x - 2)^2$	

8. Graph the straight lines $2x + y = 5$ and $y = -x + 1$ in the same coordinate system.

- Use your graph to find the coordinates of the point where the lines intersect.
- Use algebraic methods to check your solution for part a).

9. Graph the parabola $y = x^2 - 6x + 5$. Clearly label the coordinates of five points on the parabola, including vertex and intercepts.
10. Word Problems.
- We have invested \$8000 in two bank accounts. One account earns an annual interest rate of 6%, the other account earns an annual interest rate of 9%. How much money was invested at each rate if after one year, the combined interest from these accounts was \$624?
 - The difference between two numbers is 34, their sum is 20. Find these numbers.
 - Ann and Betty are roommates. The monthly rent is \$ 980. The amount paid by Ann is \$ 130 less than twice the amount paid by Betty. How much do they each pay for rent?
 - One side of a rectangle is 5 ft shorter than twice the other side. Find the sides if the perimeter is 32 ft.
 - One side of a rectangle is 5 ft shorter than twice the other side. Find the sides if the area is 150 ft^2 .

Answers

1. a) $9x^2 - 42x + 49$ b) $4a^6 - 25b^2$ c) -1 d) $\frac{4a^{10}}{b^{12}}$ e) $\frac{xy}{y-x}$ f) $\frac{-1}{x(x-3)}$

g) $\frac{x-3}{3x+1}$ h) $\frac{5}{a+5}$ i) 4 j) $\frac{2}{m-2}$ k) $-\frac{1}{a}$ l) $a^5 + b^5$ m) $2\sqrt{3}$

n) $19 - 6\sqrt{2}$ o) $63\sqrt{2} - 55$

2. a) $\frac{4\sqrt{7}}{7}$ b) $-\frac{\sqrt{7}+3}{2}$ c) $\sqrt{10} - 3$ d) $-\frac{6\sqrt{5}+16}{19}$

3. $12\sqrt{10} - 36$

4. $2\left(x - \frac{3}{2}\right)(x-5) = (2x-3)(x-5)$

5. a) $2b(b-3)(b+7)$ b) $2a^2b(2p-1)(7p+3)$ c) $(5m-1)(m+3)$

6. a) does not factor $(x-7)^2 + 4$ b) factors $(x+7+\sqrt{3})(x+7-\sqrt{3})$

c) factors $(x+8)^2$

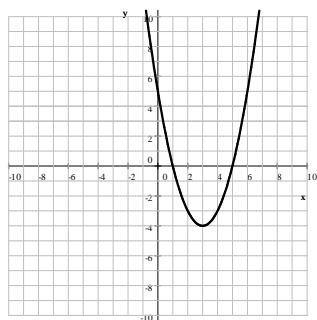
7. a) -8 b) $-2, 0, 2$ c) $0, 4$ d) -3 e) $-42, 54$ f) 0 g) no solution

h) $3 - \sqrt{10}, 3 + \sqrt{10}$ i) identity, all numbers are solution j) $0, -\frac{5}{7}$ k) $5, 11$ l) $-\frac{4}{5}, \frac{1}{3}$

m) 1

8. a) $(4, -3)$ b) The coordinates of the point $(-4, 3)$ form a solution to both equations.

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



10. a) \$3200 at 6% and \$4800 at 8% b) $-7, 27$ c) \$370, \$610 d) 7 ft, 9 ft e) 10 ft, 15 ft