

1. Evaluate each expression without using a calculator.

(a)  $(-3)^4$       (b)  $-3^4$       (c)  $3^{-4}$   
(d)  $\frac{5^{23}}{5^{21}}$       (e)  $\left(\frac{2}{3}\right)^{-2}$       (f)  $16^{-3/4}$

2. Simplify each expression. Write your answer without negative exponents.

(a)  $\sqrt{200} - \sqrt{32}$   
(b)  $(3a^3b^3)(4ab^2)^2$   
(c)  $\left(\frac{3x^{3/2}y^3}{x^2y^{-1/2}}\right)^{-2}$

3. Expand and simplify.

(a)  $3(x + 6) + 4(2x - 5)$       (b)  $(x + 3)(4x - 5)$   
(c)  $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$       (d)  $(2x + 3)^2$   
(e)  $(x + 2)^3$

4. Factor each expression.

(a)  $4x^2 - 25$       (b)  $2x^2 + 5x - 12$   
(c)  $x^3 - 3x^2 - 4x + 12$       (d)  $x^4 + 27x$   
(e)  $3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$       (f)  $x^3y - 4xy$

5. Simplify the rational expression.

(a)  $\frac{x^2 + 3x + 2}{x^2 - x - 2}$       (b)  $\frac{2x^2 - x - 1}{x^2 - 9} \cdot \frac{x + 3}{2x + 1}$   
(c)  $\frac{x^2}{x^2 - 4} - \frac{x + 1}{x + 2}$       (d)  $\frac{\frac{y}{x} - \frac{x}{y}}{\frac{1}{y} - \frac{1}{x}}$

6. Rationalize the expression and simplify.

(a)  $\frac{\sqrt{10}}{\sqrt{5} - 2}$

(b)  $\frac{\sqrt{4+h} - 2}{h}$

7. Rewrite by completing the square.

(a)  $x^2 + x + 1$

(b)  $2x^2 - 12x + 11$

8. Solve the equation. (Find only the real solutions.)

(a)  $x + 5 = 14 - \frac{1}{2}x$

(b)  $\frac{2x}{x+1} = \frac{2x-1}{x}$

(c)  $x^2 - x - 12 = 0$

(d)  $2x^2 + 4x + 1 = 0$

(e)  $x^4 - 3x^2 + 2 = 0$

(f)  $3|x - 4| = 10$

(g)  $2x(4-x)^{-1/2} - 3\sqrt{4-x} = 0$

9. Solve each inequality. Write your answer using interval notation.

(a)  $-4 < 5 - 3x \leq 17$

(b)  $x^2 < 2x + 8$

(c)  $x(x-1)(x+2) > 0$

(d)  $|x - 4| < 3$

(e)  $\frac{2x-3}{x+1} \leq 1$

10. State whether each equation is true or false.

(a)  $(p+q)^2 = p^2 + q^2$

(b)  $\sqrt{ab} = \sqrt{a}\sqrt{b}$

(c)  $\sqrt{a^2 + b^2} = a + b$

(d)  $\frac{1+TC}{C} = 1 + T$

(e)  $\frac{1}{x-y} = \frac{1}{x} - \frac{1}{y}$

(f)  $\frac{1/x}{a/x - b/x} = \frac{1}{a-b}$