1. Evaluate the expression without using a calculator.

$64^{-2/3}$

$= \frac{1}{64^{2/3}} = \frac{1}{\sqrt[3]{64^2}} = \frac{1}{\sqrt[3]{64 \times 64}} = \frac{1}{\sqrt[3]{16 \times 16 \times 16}} = \frac{1}{16}$

$64 = 8 \times 8 = 16 \times 4$

$64 = 16 \times 4$

2. Simplify using the quotient rule for square roots.

$\frac{\sqrt{378x^4}}{\sqrt{6x}} = \frac{\sqrt{378} \cdot x^2}{\sqrt{6}\ |x|} = \sqrt{\frac{378}{6}} \cdot |x|$

$= \sqrt{63}\,|x|$

$= 3\sqrt{7}\,|x|$

3. Solve the equation. Be sure to check your proposed solution by substituting it for the variable in the original equation.

$8x - (3x - 15) = 50$

$\Rightarrow 5x + 15 = 50$

$5x = 35 \quad x = 7$

4. Multiply using the rule for the square of a binomial.

$(6x^2 - 3)^2$

$(a-b)^2 = a^2 + b^2 - 2ab$

$= (6x^2)^2 + 9 - 2 \times 3 \times 6x^2$

$= 36x^4 - 36x^2 + 9$

5. Solve the equation by using the quadratic formula.

$y^2 - 6y + 18 = 0$

$b^2 - 4ac = 36 - 4 \times 18 = -36 < 0$

no real root

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{6 \pm \sqrt{-36}}{2} = 3 \pm 3i$

6. Use interval notation to express the solution set and graph the solution set on a number line.

$5 - (x + 4) \geq 1 - 8x$

$-x + 1 \geq 1 - 8x$

$7x \geq 0$

$x \geq 0$

7. Simplify the given exponential expression.

$\frac{9x^2y^4}{42x^4y^{-3}} = \frac{9}{4x} x^{-2} y^{7}$ $\frac{x^a}{x^b} = x^{a-b}$

8. Simplify the exponential expression.

$\left(\frac{7x^4}{y}\right)^{-3} = \frac{7^{-3} x^{-12}}{y^{-3}} = \frac{y^3}{7^3 x^{12}}$ $(x^a)^b = x^{ab}$

9. In the following problem, add or subtract terms whenever possible. Simplify the answer.

$3\sqrt{100} + 6\sqrt{64}$

$= 3 \times 10 + 6 \times 8$

$= 78$

10. $\frac{5}{x} + 3 = \frac{5}{3x} + \frac{19}{6}$

a. Write the value or values of the variable that make a denominator zero. These are the restrictions on the variable. $x = 0$ make denominator zero

b. Keeping the restrictions in mind, solve the equation.

$\frac{5}{x} - \frac{5}{3x} = \frac{19}{6} - \frac{18}{6}$

$\frac{15-5}{3x} = \frac{1}{6}$

$3x = 60$

$x = 20$

11. Rationalize the denominator. Simplify the answer.

$\frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{2} \cdot \sqrt{3}}{3} = \frac{\sqrt{6}}{3}$

$= \frac{\sqrt{2} \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$

12. Factor the given polynomial.

$x^2 + 8x + 15$

$= (x+3)(x+5)$

13. Solve the inequality and determine the graph of the solution set. Express the solution set using interval notation.

$-6 < 2x + 2 < 4$
$-2 \quad -2 \quad -2$
$-8 < 2x < 2$
$-4 < x < 1$

14. Factor the expression completely, or state that the polynomial is prime.

$\underbrace{x^3 + 8x^2} \underbrace{- 9x - 72}$
$= x^2(x+8) - 9(x+8)$
$= (x+8)(x-3)(x+3)$

15. Solve the absolute value inequality.

$8 + \left|6 - \frac{x}{6}\right| \geq 18$

$\left|6 - \frac{x}{6}\right| \geq 10$

$6 - \frac{x}{6} \geq 10$ or $6 - \frac{x}{6} \leq -10$

$-\frac{x}{6} \geq 4$ $\qquad -\frac{x}{6} \leq -16$

$-x \geq 24$ $\quad x \leq -24$ $\qquad x \geq 16 \times 6 = 96$

16. Factor the expression completely or state that the polynomial is prime.

$3x^3 - 3x$

$= 3x(x^2-1)$

$= 3x(x+1)(x-1)$

17. Solve the equation by the method of your choice.

$(7x-3)^2 = 9$

$7x-3=3 \qquad 7x-3=-3$

$7x=6 \qquad 7x=0$

$x=\frac{6}{7} \qquad x=0$

18. Simplify the exponential expression.

$\left(\frac{6a^{-5}b^4}{11a^4b^{-6}}\right)^0 = 1 \qquad a^0 = 1$

19. Factor the perfect square.

$x^2 + 18x + 81$

$= (x+9)^2$

20. Solve by the method of your choice.

$\begin{cases} 4x - 2y = 10 & (1) \\ 5x + y = 23 & (2) \end{cases}$

$(2) \times 2 + (1)$

$4x - \cancel{2y} + 10x + \cancel{2y} = 10+46$

$14x = 56$

$x = 4$

$\therefore$ sub $x=4$ to (1)

$4\times4 - 2y = 10$

$-2y = -6$

$y = 3$