

Name Key

Date _____

Completely simplify each of the following radical expressions:

1) $3\sqrt{72x^3y^4c}$

$$\begin{array}{r} 72 \\ 1 \overline{) 72} \\ \underline{72} \\ 0 \end{array} \quad \begin{array}{r} 3 \cdot 6 \cdot x \cdot y^2 \sqrt{2xc} \\ \underline{36} \\ 18xy^2\sqrt{2xc} \end{array}$$

2) $5\sqrt{8} - 6\sqrt{2} + \sqrt{32}$

$$\begin{array}{r} \sqrt{8} \\ 2 \overline{) 8} \\ \underline{4} \\ 4 \end{array} \quad \begin{array}{r} \sqrt{32} \\ 2 \overline{) 32} \\ \underline{16} \\ 16 \end{array}$$

$$5 \cdot 2\sqrt{2} - 6\sqrt{2} + 4\sqrt{2} = \boxed{8\sqrt{2}}$$

3) $2\sqrt{3}(\sqrt{6} + 9)$

$$\begin{array}{r} 2\sqrt{18} + 18\sqrt{3} \\ \sqrt{18} \\ 2 \overline{) 18} \\ \underline{12} \\ 6 \end{array}$$

$$2 \cdot 3\sqrt{2} + 18\sqrt{3}$$

$$\boxed{6\sqrt{2} + 18\sqrt{3}}$$

4) $x\sqrt{12} + 4\sqrt{5} - \sqrt{3x^2}$

$$\begin{array}{r} \sqrt{12} \\ 2 \overline{) 12} \\ \underline{6} \\ 6 \end{array}$$

$$2x\sqrt{3} + 4\sqrt{5} - x\sqrt{3}$$

$$\boxed{x\sqrt{3} + 4\sqrt{5}}$$

5) Solve by **Factoring**:

$$3x^2 - 11x - 20 = 0$$

$$(3x + 4)(x - 5) = 0$$

$$3x + 4 = 0 \quad x - 5 = 0$$

$$3x = -4$$

$$\boxed{x = -\frac{4}{3} \quad x = 5}$$

6) Solve by **Square Roots**:

$$(x + 5)^2 + 18 = 90$$

$$\begin{array}{r} -18 \quad -18 \\ \sqrt{(x+5)^2} = \sqrt{72} \end{array}$$

$$x + 5 = \pm 6\sqrt{2}$$

$$\boxed{x = -5 \pm 6\sqrt{2}}$$

7) Solve by **Quadratic Formula**:

$$3x^2 + 4x = 2$$

$$\begin{array}{r} -2 \quad -2 \\ 3x^2 + 4x - 2 = 0 \end{array}$$

a = 3
b = 4
c = -2

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(3)(-2)}}{2(3)}$$

$$x = \frac{-4 \pm \sqrt{40}}{6}$$

$$x = \frac{-4}{6} \pm \frac{\sqrt{40}}{6}$$

$$x = \frac{-2}{3} \pm \frac{2\sqrt{10}}{6} = \boxed{\frac{-2}{3} \pm \frac{\sqrt{10}}{3}}$$

8) Solve by **Completing the Square**:

$$4x^2 + 24x - 156 = 0$$

$$\begin{array}{r} \frac{4x^2}{4} + \frac{24x}{4} - \frac{156}{4} = 0 \\ x^2 + 6x - 39 = 0 \end{array}$$

$$x^2 + 6x = 39$$

$$x^2 + 6x + 9 = 39 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{48}$$

$$x + 3 = \pm 4\sqrt{3}$$

$$x = -3 \pm 4\sqrt{3}$$

Solve by the method of your choice. Show your work!

9) $x^2 - 48 = 2x$

$x^2 - 2x - 48 = 0$

$(x+6)(x-8) = 0$

$x+6=0$; $x-8=0$

$x = -6$; $x = 8$

10) $\frac{3x^2}{3} + \frac{21x}{3} - \frac{48}{3} = 0$

$x^2 + 7x - 16 = 0$

$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(-16)}}{2(1)}$

$x = \frac{-7 \pm \sqrt{113}}{2}$

$x = \frac{-7}{2} \pm \frac{\sqrt{113}}{2}$

An object is projected into the air with a path described by the quadratic function:

$h(t) = -16t^2 + 32t + 108$ where h is the height above the ground in feet and t is the time in seconds since the object started along the path.

11) At what time does the object hit the ground? $= 0$

$0 = -16t^2 + 32t + 108$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(4)(-27)}}{2(4)}$

$16t^2 - 32t - 108 = 0$

$4t^2 - 8t - 27 = 0$ $x = \frac{8 \pm \sqrt{496}}{8}$

$x = 3.78$ seconds

12) At what time is the object at 48 feet?

$48 = -16t^2 + 32t + 108$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(4)(-15)}}{2(4)}$

$16t^2 - 32t - 60 = 0$

$4t^2 - 8t - 15 = 0$ $x = \frac{8 \pm \sqrt{304}}{8}$

$x = 3.18$ seconds

13) If $x^2 - 2x - 35 = 0$ and $x > 0$, then what is $x - 4$?

$(x-7)(x+5) = 0$ $x > 0$, so we
 $x-7=0$; $x+5=0$ can't use
 $x=7$; $x=-5$ $x=-5$

$x-4$
 $7-4 = 3$

14)

Domain $(-\infty, \infty)$ Range $(-\infty, \infty)$

Rate of change over $[-6, 3]$ $\frac{-2 - (-8)}{3 - (-6)} = \frac{6}{9} = \frac{2}{3}$

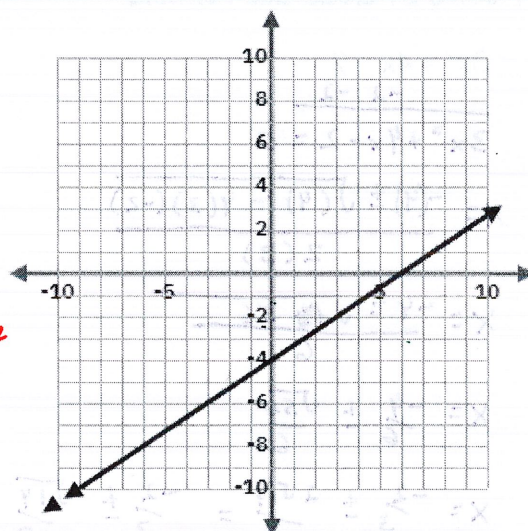
x -intercept in function notation $f(6) = 0$

y -intercept in function notation $f(0) = -4$

Interval of Increase $(-\infty, \infty)$ Decrease ~~∅~~, NA, None

Find $f(15) = 6$ Root(s) $x = 6$

End behavior $x \rightarrow -\infty$ $f(x) \rightarrow -\infty$
 $x \rightarrow \infty$ $f(x) \rightarrow \infty$



$y = \frac{2}{3}x - 4$
 $6 = \frac{2}{3}x - 4$
 $10 = \frac{2}{3}x$
 $30 = 2x$
 $15 = x$