1. **Using a two-column table** solve $12 = 3(-4x+1)$.

Build a two-column table

Oper	Inv
$x-4$	$\div -4$
$+1$	-1
$x3$	$\div 3$

Solve the equation. Show each step.

$$\frac{12}{3} = \frac{\cancel{3}(-4x+1)}{\cancel{3}}$$

$$4 = -4x + 1$$
$$-1 \qquad -1$$

$$\frac{3}{-4} = \frac{-4x}{-4}$$

$$-\frac{3}{4} = x$$

---

2. **Using a two-column table** solve $\frac{7x^2-3}{2} = 9$.

Build a two-column table

Oper	Inv
$\wedge 2$	$\pm\sqrt{}$
$x7$	$\div 7$
-3	$+3$
$\div 2$	$x2$

Solve the equation. Show each step.

$$\left(\frac{\cancel{2}}{1}\right)\left(\frac{7x^2-3}{\cancel{2}}\right) = 2(9)$$

$$7x^2 - 3 = 18$$
$$+3 \quad +3$$

$$\frac{7x^2}{7} = \frac{21}{7}$$

$$x^2 = 3$$

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

3. Solve $y^2 - \frac{1}{2}y - \frac{1}{8} = 0$ by **completing the square.** You **must** begin by completing the square.

$y^2 - \frac{1}{2}y = \frac{1}{8}$

$y^2 - \frac{1}{2}y + \quad = \frac{1}{8} +$

$\left(\frac{1}{2}\left(-\frac{1}{2}\right)\right)^2 = \left(-\frac{1}{4}\right)^2 = \frac{1}{16}$

$y^2 - \frac{1}{2}y + \frac{1}{16} = \frac{1}{8} + \frac{1}{16}$

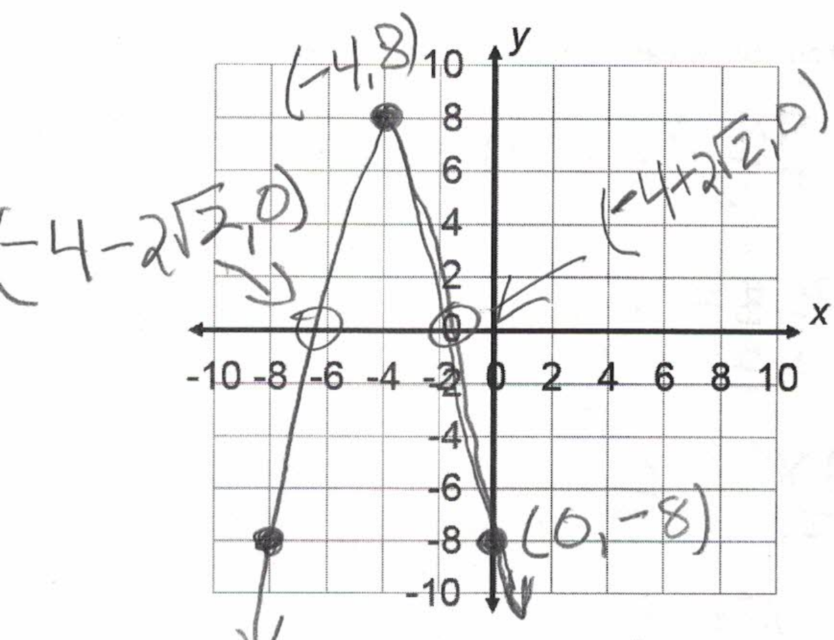
$\left(y - \frac{1}{4}\right)^2 = \frac{2}{16} + \frac{1}{16}$

$\left(y - \frac{1}{4}\right)^2 = \frac{3}{16}$

$y - \frac{1}{4} = \pm\sqrt{\frac{3}{16}} = \pm\frac{\sqrt{3}}{\sqrt{16}}$

$\boxed{y = \frac{1}{4} \pm \frac{\sqrt{3}}{4}}$

4. Graph $y = -(x+4)^2 + 8$ using the general procedure. **Make sure** to label the vertex and all intercepts with their ordered pairs. **Make sure** to simplify the *x*-intercepts in radical form and **do not** change them to "decimals".



OP	INV
+4	−4
^2	±√
x−1	÷−1
+8	−8

Vertex $(-4, 8)$

y-int $y = -(0+4)^2 + 8$

$y = -8$

$(0, -8)$

x-int $0 = -(x+4)^2 + 8$

$\frac{-8}{-1} = \frac{-(x+4)^2}{-1}$

$8 = (x+4)^2$

$\pm\sqrt{8} = x + 4$

$-4 \qquad -4$

$\boxed{-4 \pm 2\sqrt{2} = x}$

5. From 2000 until 2018 the function $C(t) = -25(x-21)^2 + 15{,}000$ gave a good approximation of the cost for one year of tuition and fees (in dollars) at the University of Minnesota Twin Cities Campus. **Make sure to answer the following questions using English sentences.**

a) Answer the question $C(0)$ is asking.

$C(0) = -25(0-21)^2 + 15{,}000$

$= -25(-21)^2 + 15{,}000$

$= 3{,}975$

The cost in 2000 was \$3,975.

b) Answer the question $C(t) = 12{,}500$ is asking.

$12{,}500 = -25(X-21)^2 + 15{,}000$

$-15{,}000 \qquad -15{,}000$

$\frac{-25{,}000}{-25} = \frac{-25(X-21)^2}{-25}$

$100 = (X-21)^2$

$\pm\sqrt{100} = X-21$

$\pm 10 = X-21$

$X = 21 \pm 10$

$X = 31$ or $X = 11$

OP	INV
-21	$+21$
^{2}	$\pm\sqrt{\ }$
$X -25$	$\div -25$
$+15{,}000$	$-15{,}000$

(you don't have to build the 2-column table)

The cost is \$12,500 in 2011 and 2031.

c) The function implies that at some future date the cost of tuition will reach a maximum and then begin to drop from the cost of the previous year. (This hasn't happened in the past and probably won't happen in the future either.) Find the year the cost of tuition will be at a maximum and what that maximum amount will be.

VERTEX is at (h, k)

$(21, 15{,}000)$

The cost will reach a maximum in 2021 and the maximum amount will be \$15,000.

6. Simplify $(\sqrt{6}+\sqrt{15})^2$.

$(\sqrt{6}+\sqrt{15})(\sqrt{6}+\sqrt{15})$

$\sqrt{36}+\sqrt{90}+\sqrt{90}+\sqrt{225}$

$6+3\sqrt{10}+3\sqrt{10}+15$

$21+6\sqrt{10}$

7. Simplify $\left(\frac{6\sqrt{3}}{\sqrt{3x}}\right)\left(\frac{\sqrt{3x}}{\sqrt{3x}}\right) = \frac{6\sqrt{9x}}{\sqrt{9x^2}} = \frac{6(\cancel{3})\sqrt{x}}{\cancel{3}x} = \frac{6\sqrt{x}}{x}$

8. Simplify $\sqrt[4]{48x^7y^{12}}$.

48

4 12

2 2 2·6

2·2·2·2·3

$\sqrt[4]{2^4 \cdot 3x^7y^{12}}$

$2xy^3\sqrt[4]{3x^3}$

9. Simplify $\sqrt[3]{\frac{x^6y^9}{-8}}$. $= \frac{\sqrt[3]{x^6y^9}}{\sqrt[3]{(-2)^3}} = \frac{x^2y^3}{-2}$

10. Simplify $\sqrt[3]{54x}+6\sqrt[3]{2x}-5\sqrt[3]{16x}$.

$\sqrt[3]{27 \cdot 2x}+6\sqrt[3]{2x}-5\sqrt[3]{2^4x}$

$3\sqrt[3]{2x}+6\sqrt[3]{2x}-5(2)\sqrt[3]{2x}$

$3\sqrt[3]{2x}+6\sqrt[3]{2x}-10\sqrt[3]{2x}$

$-\sqrt[3]{2x}$

11. Simplify $\left(\sqrt[4]{a^3}-\sqrt[4]{9}\right)\left(\sqrt[4]{a^3}+\sqrt[4]{9}\right)$. $\sqrt[4]{a^6}+\cancel{\sqrt[4]{9a^3}}-\cancel{\sqrt[4]{9a^3}}-\sqrt[4]{81}$

$\sqrt[4]{a^6}-\sqrt[4]{3^4}$

$a\sqrt[4]{a^2}-3$