

Warm Up:

1. Write a line that is perpendicular to $y = \frac{1}{2}x - 3$ and passes through the point $(1, -2)$

New $m = -2$

$$y - y_1 = m(x - x_1)$$

$$y + 2 = -2(x - 1)$$

$$y + 2 = -2x + 2$$

$$y = -2x$$

2/ Given $f(x) = 2x - 5$, evaluate each.

a) Evaluate $f(4)$

$$f(x) = 2(4) - 5 = 3$$

$$b) f(x-4) = 2(x-4) - 5$$

$$= 2x - 8 - 5$$

$$= 2x - 13$$

$$c) f(m+7) = 2(m+7) - 5$$

$$= 2m + 14 - 5$$

$$= 2m + 9$$

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Quiz Answers

$$① \quad 3x + 2(x+5) = -5(x-6) + 1 + x$$

$$3x + 2x + 10 = -5x + 30 + 1 + x$$

$$5x + 10 = -4x + 31$$

$$+4x \quad +4x$$

$$9x + 10 = 31$$

$$\frac{9x}{9} = \frac{21}{9}$$

$$x = 2.33$$

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#2

$$-3x + 3y = 3 \rightarrow ①$$

$$-5x + y = 13 \rightarrow ②$$

$$-3x + 3y = 3$$

$$+5x \quad +3x$$

$$2y = 3x + 3$$

$$y = x + 1.5 \rightarrow ③$$

Substitute y value from eq ③ into eq ②

$$-5x + y = 13$$

$$-5x + x + 1.5 = 13$$

$$-4x + 1.5 = 13$$

$$-4x = 11.5$$

$$x = -2.875$$

$$y = x + 1.5$$

$$y = -2.875 + 1.5 = -1.375$$

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$$\#4 \quad (-3, 3) \quad (6, 9)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 3}{6 - (-3)} = \frac{6}{9} = \frac{2}{3}$$

$$m = \frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{2}{3}(x - (-3))$$

$$y - 3 = \frac{2}{3}x + \frac{2}{3}(3)$$

$$y - 3 = \frac{2}{3}x + 2$$

$$y = \frac{2}{3}x + 5$$

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#7 graph $y = -\frac{1}{2}x + 4$

$$y = -\frac{1}{2}(0) + 4$$

$$y = 4$$

$$(0, 4)$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

$$y = 4$$

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$$y = 4$$

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$$\#9 \quad (4n^3)^3 = 4^3 n^9 = 64n^9$$

$$\#10 \quad \frac{6x^3y^6}{24x^5y^2} = \frac{x^3y^4}{4x^2y^2} = \frac{xy^2}{4}$$

$$\#11 \quad \frac{(x^3)^4 x^4}{2x^3} = \frac{x^{12} x^4}{2x^3} = \frac{x^{16}}{2x^3} = \frac{x^{13}}{2}$$

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Simplifying Radicals

Definition of $b^{1/n}$: For any real number b and for any integer $n > 1$, $b^{1/n} = \sqrt[n]{b}$

Express each rational exponent in radical form:

1) $36^{\frac{1}{2}} = \sqrt{36}$

2) $64^{\frac{1}{3}} = \sqrt[3]{64}$

$b^{\frac{1}{n}} = \sqrt[n]{b}$

$\sqrt{\quad} = \sqrt[2]{\quad}$

$4 \rightarrow 4^2 = 4 \times 4 = 16$

$\textcircled{2} \rightarrow 4^{\frac{1}{2}} = \sqrt{4} = \textcircled{2}$

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The order of a Radical is represent the Number of repeating Units

$\sqrt{\quad} = \sqrt[2]{\quad} = \text{Repeat 2 time}$

$\sqrt[3]{\quad} = \text{Repeat 3 time}$

$\sqrt[4]{\quad} =$

$\sqrt{X^2} = \sqrt{X \cdot X} = X$

$= (X^{\frac{2}{2}}) = X^1 = X = X$

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$\sqrt[3]{X^3} = \sqrt[3]{X \cdot X \cdot X} = X$

other way

$(X^{\frac{3}{3}})^{\frac{1}{3}} = X^1 = X = X = X$

$\sqrt[3]{8} = ? = \sqrt[3]{2 \cdot 2 \cdot 2} = 2$

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Simplifying Radicals

Definition of $b^{m/n}$: For any real number b and for any integer $n > 1$, $b^{m/n} = \sqrt[n]{b^m}$

Express each rational exponent in radical form:

1) $x^{\frac{5}{7}} = \sqrt[7]{x^5}$

2) $2^{\frac{1}{4}} y^{\frac{1}{4}} z^{\frac{3}{4}} = \sqrt[4]{2yz^3}$

3) $2^{\frac{1}{2}} y^{\frac{1}{3}} z^{\frac{2}{3}} = \sqrt[6]{2^3 y^2 z^4} = \sqrt[6]{8y^2 z^4}$

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Express in exponential form:

1) $\sqrt[3]{21} = 21^{\frac{1}{3}}$

2) $\sqrt[3]{7ab} = (7ab)^{\frac{1}{3}} = 7^{\frac{1}{3}} a^{\frac{1}{3}} b^{\frac{1}{3}}$

3) $\sqrt[3]{6x^2} = (6x^2)^{\frac{1}{3}} = 6^{\frac{1}{3}} x^{\frac{2}{3}}$

4) $\sqrt[10]{x^4} = x^{\frac{4}{10}} = x^{\frac{2}{5}}$

$\sqrt[3]{21} \Rightarrow 21^{\frac{1}{3}}$

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An expression that contains a radical sign ($\sqrt{\quad}$) is a **radical expression**.

The expression under a radical sign is a **radicand**.

$\sqrt{\quad}$

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Simplest form of a square root expression:

An expression containing square roots is in simplest form when:

1. The radicand has no perfect square factors other than 1. ~~$\sqrt{25x}$~~
2. The radicand has no fractions. $\sqrt{\frac{9}{b}}$
3. There are no square roots in any denominator. $\frac{\sqrt{2}}{\sqrt{2}}$

$$\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2} = \frac{1}{2}\sqrt{2}$$

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Simplify:

1. $\sqrt{24}$ $\begin{matrix} 24 \\ \swarrow \searrow \\ 6 \cdot 4 \\ \swarrow \searrow \swarrow \searrow \\ 2 \cdot 3 \cdot 2 \cdot 2 \end{matrix}$ $\begin{matrix} 24 \\ \swarrow \searrow \\ 4 \cdot 6 \\ \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 3 \end{matrix}$ $\sqrt{2 \cdot 2 \cdot 2 \cdot 3} = 2\sqrt{6}$

2. $\sqrt{x^3 y^4}$ $\begin{matrix} x^3 y^4 \\ \swarrow \searrow \\ x^2 y^2 \cdot x y^2 \end{matrix}$ $\sqrt{x^2 y^2 \cdot x y^2} = xy\sqrt{xy}$

3. $\sqrt{48a^2 b}$ $\begin{matrix} 48 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \end{matrix}$ $\begin{matrix} 48 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \end{matrix}$ $\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot a^2 \cdot b} = 4a\sqrt{3b}$

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3) $\sqrt{48a^2 b}$ $\begin{matrix} 48 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \end{matrix}$ $\begin{matrix} 48 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \end{matrix}$ $\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot a^2 \cdot b} = 4a\sqrt{3b}$

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Simplify.

4) $3\sqrt{54}$ $\begin{matrix} 54 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 6 \cdot 9 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 3 \cdot 3 \cdot 3 \end{matrix}$ $\begin{matrix} 54 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 3 \cdot 3 \cdot 3 \end{matrix}$ $3\sqrt{2 \cdot 3 \cdot 3 \cdot 3} = 9\sqrt{6}$

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5) $\sqrt[3]{8x^4 y^5 z}$ $\begin{matrix} 8 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \end{matrix}$ $\begin{matrix} 8 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 2 \end{matrix}$ $\sqrt[3]{2 \cdot 2 \cdot 2 \cdot x^3 \cdot y^3 \cdot y^2 \cdot z} = 2xy\sqrt[3]{xy^2 z}$

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6) $\sqrt[4]{12x^2 y^5}$ $\begin{matrix} 12 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 3 \end{matrix}$ $\begin{matrix} 12 \\ \swarrow \searrow \swarrow \searrow \swarrow \searrow \\ 2 \cdot 2 \cdot 3 \end{matrix}$ $\sqrt[4]{2 \cdot 2 \cdot 3 \cdot x^2 \cdot y^4} = y\sqrt[4]{12x^2 y}$

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⑦ $-2\sqrt{120a^4b^3}$

$= -2\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot \underbrace{a \cdot a \cdot a \cdot a}_a \cdot \underbrace{b \cdot b \cdot b}_b}$

$= -4a^2b\sqrt{30b}$

Prime factorization tree for 120:

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    120
   /  \
  20   6
 /  \  /  \
2  10 2  3
 /  \
2  5
  
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