

- Without the aid of a calculator arrange the following radicals in descending order:

$\sqrt{18}$ ,  $\sqrt[3]{13}$ ,  $\sqrt{18}$ ,  $\sqrt{9}$ ,  $\sqrt[4]{27}$ ,  $\sqrt[3]{-5}$

(Handwritten annotations above the radicals:  $2.2$  above  $\sqrt[3]{13}$ ,  $4.1$  above  $\sqrt{18}$ ,  $3$  above  $\sqrt{9}$ ,  $2.7$  above  $\sqrt[4]{27}$ , and Negative above  $\sqrt[3]{-5}$ )

$\sqrt{18}$ ,  $\sqrt{9}$ ,  $\sqrt[3]{13}$ ,  $\sqrt[4]{27}$ ,  $\sqrt[3]{-5}$

(Handwritten annotations below the radicals:  $2.351$  below  $\sqrt[3]{13}$  and  $2.279$  below  $\sqrt[4]{27}$ )

- What strategies were used?

Pre-requisite skill... .

Solve this inequation:

$$4x + 5 > 9x - 10$$

Handwritten solution steps:

$$\begin{aligned} & \cancel{4}x - 9x > -10 - 5 \\ & \frac{-5x}{-5} > \frac{-15}{-5} \\ & x < 3 \end{aligned}$$

Number line diagram:

A vertical dashed line is drawn at  $x = 3$ . To the right of this line, there is a bracket labeled  $x > 3$ . A checkmark is placed to the right of the line.

Another number line diagram shows the interval  $-6 > -14$  with a checkmark. Above the number line, the values  $x = 2$  and  $x = -2$  are marked with double underlines. A bracket between these two points is labeled  $3 < 7$ .

Let's revisit restrictions...

State any restrictions on the following radicals:

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

$$3x+5 \geq 0$$

$$\frac{3x}{3} \geq \frac{-5}{3}$$

$$x \geq \frac{-5}{3}$$

$$\sqrt[12]{5-3x}$$

$$5-3x \geq 0$$

$$\frac{-3x}{-3} \geq \frac{-5}{-3}$$

$$x \leq \frac{5}{3}$$

odd  
Index

$$\sqrt[5]{4-x}$$

None

$$\sqrt[6]{4x^8}$$

$$4x^8 \geq 0$$

$$x^8 \geq 0$$

$$x \in \mathbb{R}$$

$$\sqrt[2]{-9}$$

$$\sqrt[3]{-8} = -2$$

$$\sqrt[24]{(+)}$$

## • Simplifying Radicals

Required prior knowledge:

- Expressing radicals as exponents

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

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

$$\begin{aligned} \sqrt[5]{x^7} &= (x^7)^{\frac{1}{5}} \\ &= x^{7/5} \end{aligned}$$

$$m^{\frac{3}{4}} = \left(\sqrt[4]{m}\right)^3$$

$$\begin{aligned} 8^{\frac{4}{3}} &= \left(\sqrt[3]{8}\right)^4 \\ &= (2)^4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 9^{3/2} &= \left(\sqrt{9}\right)^3 \\ &= 27 \end{aligned}$$

$$16^{\frac{1}{2}} = 4$$

$$4^{-5/2} = \frac{1}{32}$$

$$\left(\frac{2}{5}\right)^2 = \frac{25}{4}$$

$$\frac{1}{4^{5/2}}$$

$$\frac{\cancel{2^{-2}}}{5^{\downarrow}} = \frac{1}{5 \cdot 2^2} = \frac{1}{20}$$

## Exponents and Exponentials:

Evaluate the following.:

$$\begin{aligned} & -2^4 + \left(\frac{1}{3}\right)^{-2} - 64^{-\frac{2}{3}} + 4w^0 + (-3)^2 + \frac{2^{-2}}{2^3 \cdot 4} \\ & -16 + 9 - \frac{1}{\cancel{16}} + 4 + 9 + \frac{1}{\cancel{16}} \\ & = 6 \end{aligned}$$

- Converting radicals between forms ( Mixed  $\leftrightarrow$  Entire )

$$9\sqrt{50} \quad \sqrt{18} = \sqrt{9 \times 2} \quad \sqrt{72}$$
$$9\sqrt{25 \cdot 2} \quad 3\sqrt{2} = 3\sqrt{2}$$

$$9(\sqrt{25} \cdot \sqrt{2}) \quad \sqrt{12} = 2\sqrt{3}$$
$$9(5\sqrt{2})$$
$$45\sqrt{2} \quad \sqrt{8} = 2\sqrt{2} \quad 2^5\sqrt{96}$$

$$\sqrt[3]{40} \quad \sqrt{32} =$$

Mixed

Entire

$$3\sqrt{2} \rightarrow \sqrt{3^2 \cdot 2} = \sqrt{18}$$

$$2\sqrt{5} \rightarrow \sqrt{20}$$

$$2\sqrt[3]{5} \rightarrow \sqrt[3]{40}$$

$$\sqrt[3]{2 \cdot 5}$$

$$3\sqrt[4]{10} = \sqrt[4]{810}$$



$$-\sqrt{200}$$

$$-\sqrt{100 \cdot 2}$$

$$-10\sqrt{2}$$

$$5\sqrt{45}$$

$$5\sqrt{9 \times 5}$$

$$5(3\sqrt{5})$$

$$15\sqrt{5}$$

$$\begin{array}{l} \sqrt[5]{64} \\ \sqrt[5]{32 \cdot 2} \\ \sqrt[5]{2^5 \cdot 2} \\ 2\sqrt[5]{2} \end{array}$$

$$\sqrt[3]{56}$$

$$\begin{array}{l} \sqrt[3]{8 \cdot 7} \\ 2\sqrt[3]{7} \end{array}$$

$$2^5 = \underline{\underline{32}}$$

4	64
9	81
16	100
25	121
36	144
49	

8
27
64
125

Perfect Cubes