

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$$

Review: Given that

$$A = \left\{ \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \underline{1}, \underline{2}, \underline{4}, \underline{8} \right\} \quad B = \{ \pi, \sqrt{2} \}$$

$$C = \{ \text{all irrational numbers} \}$$

Find:

$$A \cap \mathbb{Q} = A \quad A \cap \mathbb{N} = \{1, 2, 4, 8\} \quad B \cap C = B$$

$$A \cup \mathbb{Q} = \mathbb{Q} \quad B \cup \mathbb{R} = \mathbb{R} \quad C \cap \emptyset = \emptyset$$

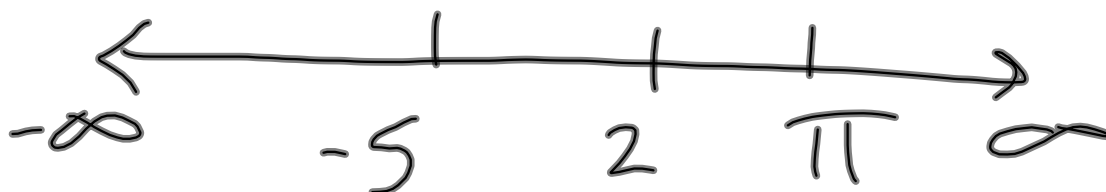
$$C \cap \mathbb{Q} = \emptyset \quad C \cap \mathbb{R} = C \quad A \cup \emptyset = A$$

$(-\infty, ]$

$(, \infty)$

~~$(2, 5)$~~

$(-5, 2)$



Additive Identity     0

$$a + 0 = a, \quad 0 + a = a$$

Additive Inverse      $-a$

$$a + (-a) = 0, \quad (-a) + a = 0$$

Subtraction

$$a - b = a + (-b)$$

Multiplication

$$2 \cdot 3 = 6 \quad ; \quad 2(-3) = -6$$

$$(-2)(-3) = 6 \quad ;$$

Division

$$a \div b = \frac{a}{1} \cdot \frac{1}{b}, \quad b \neq 0$$

$$\frac{0}{a} = 0, \quad a \neq 0$$

$$\frac{a}{a} = 1, \quad a \neq 0$$

$$\frac{a}{1} = a$$

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$$

$$\begin{aligned}\frac{a}{b} + \frac{c}{d} &= \frac{a}{b} \cdot \frac{d}{d} + \frac{c}{d} \cdot \frac{b}{b} \\ &= \frac{ad}{bd} + \frac{cb}{bd} = \frac{ad+cb}{bd}\end{aligned}$$

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$$

$$a^n = \underbrace{a \cdot a \cdot \dots \cdot a}_{n \text{ times}}$$

## Order of Operations

**P** **E** **M** **D** **A** **S**  
 (brackets, abs. value)   
 exponents   
 multiplication   
 division   
 addition   
 subtract

1.2 simplify.

$$34. \quad -9 - |-7 - (-15)|$$

$$= -9 - |-7 + 15|$$

$$= -9 - |8| = -9 - 8$$

$$= \boxed{-17}$$

$$\begin{aligned} 90. & \quad -3(-2)^2(-5) \\ & \quad = -3 \cdot 4(-5) \\ & \quad = 60 \end{aligned}$$

$$\begin{aligned} \text{III.} \quad & \frac{1}{2} - \frac{\frac{17}{25}}{4 - \frac{3}{5}} + \frac{1}{5} \\ & \quad \quad \quad \text{5} \cdot \frac{1}{1} \\ & = \frac{1}{2} - \frac{\frac{17}{25}}{\frac{17}{5}} + \frac{1}{5} = \frac{1}{2} - \frac{\cancel{17}}{\cancel{25}} \cdot \frac{\cancel{5}}{\cancel{17}} + \frac{1}{5} \\ & \quad \quad \quad \text{5} \quad \quad \quad \text{5} \\ & = \frac{1}{2} - \frac{1}{5} + \frac{1}{5} = \boxed{\frac{1}{2}} \end{aligned}$$



$$106. 25 \div 5 \left( \frac{16+8}{-2^2+8} \right) - 5$$

$$25 \div 5 \left( \frac{24}{4} \right) - 5 = 25 \div 5 (6) - 5$$

$$= \cancel{25}^5 \cdot \cancel{1}^1 \cdot 6 - 5 = 30 - 5 = \boxed{25}$$

$$114. \frac{3}{4} \div \left[ \frac{5}{8} - \frac{5}{12} \right] + 2$$

$$\frac{3}{4} \div \left[ \frac{5}{8} \cdot \frac{3}{3} - \frac{5}{12} \cdot \frac{2}{2} \right] + 2 =$$

$$= \frac{3}{4} \div \left( \frac{5}{24} \right) + 2 = \frac{3}{4} \cdot \frac{24}{5} + 2$$

$$= \frac{18}{5} + \frac{2 \cdot 5}{1 \cdot 5} = \frac{18}{5} + \frac{10}{5} = \boxed{\frac{28}{5}}$$

## Properties of Real Numbers <sup>(1.3)</sup>

Commutativity:

$$a+b=b+a \quad ; \quad ab=ba$$

Associativity:

$$(a+b)+c = a+(b+c) \quad ; \quad (ab)c = a(bc)$$

Zero:

$$a+0=a \quad ; \quad a \cdot 0=0$$

$$a \cdot 1 = a \quad \left( \begin{array}{l} \text{multiplicative} \\ \text{identity} \end{array} \right)$$

$$(-a)+a=0 \quad \begin{array}{l} \text{additive} \\ \text{inverse} \end{array}$$

$$a \cdot \frac{1}{a} = 1 \quad \begin{array}{l} \text{multiplicative} \\ \text{inverse} \end{array} \quad a \neq 0$$

Distributive Property

$$a(b+c) = ab+ac$$

$$(a+b)c = ac+bc$$

1.3 simplify.

$$100. \quad 3x - 2 \left[ y - 2 \left( x + 3 \left[ 2x + 3y \right] \right) \right]$$

$$= 3x - 2 \left[ y - 2 \left( x + 6x + 9y \right) \right]$$

$$= 3x - 2 \left[ y - 2 \left( 7x + 9y \right) \right]$$

$$= 3x - 2 \left[ y - 14x - 18y \right]$$

$$= 3x - 2 \left[ -14x - 17y \right]$$

$$= 3x + 28x + 34y$$

$$= \boxed{31x + 34y}$$

$$\begin{array}{r} 1.2 \\ \hline 21-28, 14 \\ 103-114 \end{array}$$

10 minutes  
of  
Khan Academy

$$\begin{array}{r} 1.3 \\ \hline 38-53 \\ 98-103 \end{array}$$