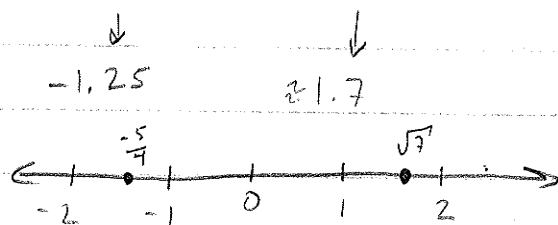


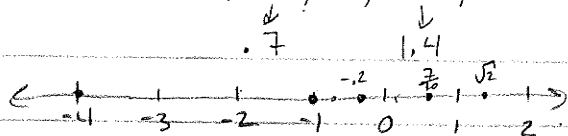
# 1.1 - Apply Properties of Real Numbers

## Example 1 - Graph real numbers on a number line

a)  $-\frac{5}{4}$  and  $\sqrt{3}$   $\rightarrow$  Change to decimals



b) Graph  $-0.2$ ,  $\frac{7}{10}$ ,  $-1$ ,  $\sqrt{2}$ , and  $-4$  on #line.



Write them in increasing order

$$-4, -1, -0.2, \frac{7}{10}, \sqrt{2}$$

Show Example 2 on screen

## Properties of Addition and Multiplication

Commutative  
or  
work

Commutative

Addition

$$a + b = b + a$$

Multiplication

$$ab = ba$$

(commute)

$$3 + 6 = 6 + 3$$

$$3 \cdot 6 = 6 \cdot 3$$

Associate  
or  
Your Group

Associative

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

$$(ab)c = a(bc)$$

(associate)

$$(3 + 6) + 2 = 3 + (6 + 2)$$

$$(3 \cdot 6)2 = 3(6 \cdot 2)$$

Doesn't change  
the number

Identity

$$a + 0 = a \text{ or } 0 + a = a$$

$$a \cdot 1 = a, 1 \cdot a = a$$

Inverse

$$a + (-a) = 0$$

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

Distributive

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

### Example 3 - Name that Property

a)  $7+4 = 4+7$

Commutative prop of add

b)  $13 \cdot \frac{1}{13} = 1$

inverse prop of mult

c)  $4(3+7) = 4 \cdot 3 + 4 \cdot 7$

distributive property

pg. 3-152

### Example 5 - Unit analysis

a) You work 12 hours & make \$138. What is your earning rate?

- Is in \$ per hr, or \$/hr

$$\frac{\$138}{12} = \$11.50/\text{hr} \quad \text{or} \quad \$11.50 \text{ per hr}$$

b) If you drive 3.5 hrs at 60 miles per hour, how far will you go?

$$3.5 \text{ hrs} \cdot \frac{60 \text{ miles}}{\text{hour}} = 210 \text{ miles}$$

c) 90 miles per hour is how many miles per minute?

- Change hours into minutes

- Know 60 minutes = 1 hour

$$\frac{90 \text{ miles}}{\text{hour}} \cdot \frac{1 \text{ hr}}{60 \text{ mins}} \quad \leftarrow \text{Line up hours so cancel/divide out.}$$

Think inverted - hrs on top

$$\frac{90 \cdot 1 \text{ miles}}{1 \cdot 60 \text{ mins}} = \frac{90}{60} = \frac{1.5 \text{ miles}}{\text{min}} \quad \text{or} \quad 1.5 \text{ miles per minute}$$

d) Convert 55 miles to kilometers ... 1 mile = 1.61 km

$$55 \text{ miles} \cdot \frac{1.61 \text{ km}}{\text{mile}} \quad \text{line up so miles are "inverted"}$$

Make into fraction

Cancel miles

$$\frac{55 \text{ miles}}{1} \cdot \frac{1.61 \text{ km}}{\text{mile}} \rightarrow 55 \cdot 1.61 \text{ km} = 88.55 \text{ or } \boxed{88.6 \text{ km}}$$

e) 70 miles per hour is how many feet per second?

- So must change miles to feet
- must change hours to seconds
- know 1 mile = 5280 ft

$$\begin{array}{l} 1 \text{ hr} = 60 \text{ min} \\ 1 \text{ min} = 60 \text{ sec} \end{array} \quad \left. \vphantom{\begin{array}{l} 1 \text{ hr} = 60 \text{ min} \\ 1 \text{ min} = 60 \text{ sec} \end{array}} \right\} \text{ or } 1 \text{ hr} = 3600 \text{ sec}$$

$$\frac{70 \text{ miles}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{70 \cdot 5280 \cdot 1 \cdot 1}{1 \cdot 1 \cdot 60 \cdot 60} \frac{\text{ft}}{\text{sec}}$$

Change miles into feet      Change hr to min      convert min to sec

= 102.67 ft/sec

or

$$\frac{70 \text{ miles}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}} = \frac{70 \cdot 5280}{1 \cdot 1 \cdot 3600} = \uparrow$$

Ob: 3-15 odd, 25-30, 31, 34-35, 39, 40, 43

$$3 \text{ ft} = 1 \text{ yd}$$

$$4 \text{ qt} = 1 \text{ gal}$$

$$1.6 \text{ km} = 1 \text{ mile}$$

$$2 \text{ cups} = 1 \text{ pint}$$