

## **Curriculum Outcome**

**N1: Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers; solving problems that involve arithmetic operations on rational numbers.**

**Student Friendly:  
"BEDMAS with fractions and decimals"**



# Do we need a warm-up?



$$10 \times 3 - 6.5 \div 10 - 1.3$$

28.05

$$1\frac{5}{6} - \left(\frac{2}{3} \div \frac{5}{3}\right)^2$$

$$\frac{251}{150} \text{ or } 1\frac{101}{150}$$

BE DMAS

$$10 \times 3 - 6.5 \div 10 - 1.3$$

$$30 - 6.5 \div 10 - 1.3$$

$$30 - 0.65 - 1.3$$

$$= 28.05$$

$$1 \frac{5}{6} - \left( \frac{2}{3} \div \frac{5}{3} \right)^2$$

$$\frac{11}{6} - \left[ \frac{2}{3} \times \frac{3}{5} \right]^2$$

$$\frac{11}{6} - \left[ \frac{2}{1} \times \frac{1}{5} \right]^2$$

$$\frac{11}{6} - \left[ \frac{2}{5} \right]^2$$

$$\frac{11}{6} - \frac{4}{25}$$

$\xrightarrow{\times 25}$ 
 $\frac{275}{150} - \frac{24}{150}$ 
 $\xrightarrow{\times 6}$

$$= \frac{251}{150}$$

$$1 \frac{101}{150}$$

$$\begin{aligned}
 & 1\frac{5}{6} - \left( \frac{2}{3} \div \frac{3}{5} \right)^2 \\
 \rightarrow & \frac{11}{6} - \left( \frac{2}{\cancel{3}} \times \frac{5}{\cancel{3}} \right)^2 \\
 & \frac{11}{6} - \left( \frac{2}{1} \times \frac{5}{5} \right)^2 \\
 & \frac{11}{6} - \left( \frac{2}{5} \right)^2 \\
 & \frac{11}{6} - \left( \frac{4}{25} \right) \cdot 6 \\
 & \frac{275}{150} - \frac{24}{150} \\
 & \frac{251}{150} = 1\frac{101}{150}
 \end{aligned}
 \left\{ \begin{aligned}
 & \frac{11}{6} - \left( \frac{2}{3} \times \frac{3}{5} \right)^2 \\
 & \frac{11}{6} - \left( \frac{6}{15} \right)^2 \\
 & \frac{11}{6} - \frac{36}{225}
 \end{aligned} \right.$$

4.



$$\frac{\left(-\frac{1}{2}\right)^2 - \left(-\frac{2}{3}\right)}{\left[\frac{1}{3} + \left(-\frac{3}{12}\right)\right]}$$

Top :

$$\begin{aligned} &\left(-\frac{1}{2}\right)^2 - \left(-\frac{2}{3}\right) \\ &\left(\frac{1}{4}\right) - \left(-\frac{2}{3}\right) \\ &\frac{3}{12} + \left(\frac{+8}{12}\right) \\ &= \frac{11}{12} \end{aligned}$$

Bottom

$$\begin{aligned} &\frac{1}{3} + \frac{-3}{12} \\ &\frac{4}{12} + \frac{-3}{12} \\ &\frac{1}{12} \end{aligned}$$

$$\begin{aligned} \frac{\text{Top}}{\text{bottom}} &= \frac{\frac{11}{12}}{\frac{1}{12}} = \frac{11}{12} \div \frac{1}{12} \\ &= \frac{11}{12} \times \frac{12}{1} \\ &= \frac{11}{1} \\ &= 11 \end{aligned}$$

## Hints for TEST:

To list or compare decimals, remember to add a zero to the end of your decimal.

Example  $3.210$   $3.220$   
 $3.211$   $3.212$   $3.217$

To list or compare fractions, remember use common denominators.

Example  $-\frac{1}{3}$   $-\frac{3}{5}$   
 $-\frac{5}{15}$   $-\frac{9}{15}$   $-5$  is bigger than  $-9$

### Mixed to Improper

$$-3 \frac{1}{6} = \frac{-(3 \times 6) + 1}{6} = \frac{-19}{6}$$

### Improper to Mixed

$$\frac{36}{5} = (36 \div 5) = 7.? = 7 \frac{1}{5}$$

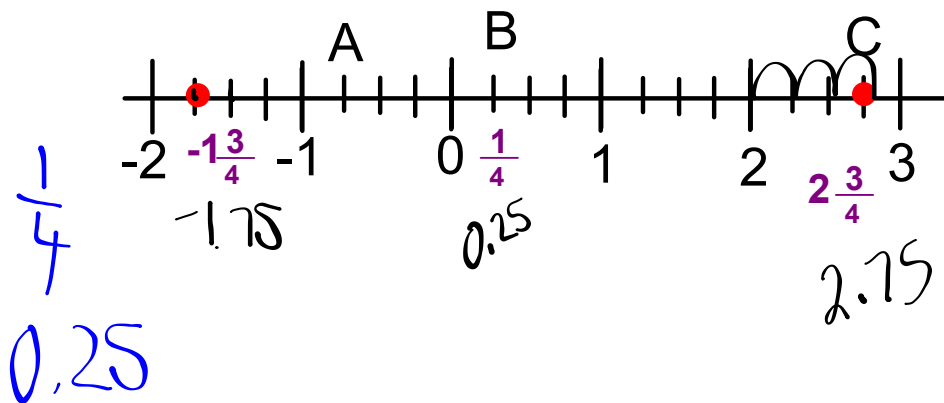
$$(7 \times 5) = 35 + (1) = 36$$

## Number line

- Determine the last integer you passed to get to the whole number in front of the fraction

-Count the number of bumps in between integers to get the denominator of the fraction

-To get the numerator count how far away you are from the last integer you passed.



## Hints for TEST:

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### Subtracting a Negative

$$\begin{aligned} \text{-add the opposite } & -8 - (-5) \\ & = -8 + 5 \\ & = -3 \end{aligned}$$


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To add and subtract fractions you need common denominators

$$\begin{aligned} 1) \quad & \frac{-1}{4} + \frac{5}{7} \\ & = \frac{-7}{28} + \frac{20}{28} \\ & = \frac{13}{28} \end{aligned}$$

\*\*\*ALWAYS REDUCE  
WHEN POSSIBLE\*\*\*

$$\begin{aligned} 2) \quad & -2\frac{1}{3} - 3\frac{2}{5} \\ & = \frac{-7}{3} - \frac{17}{5} \\ & = \frac{-35}{15} - \frac{51}{15} \\ & = \frac{-86}{15} \\ & = -5\frac{11}{15} \end{aligned}$$



## Hints for TEST:

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To Multiply fractions:

top x top

bottom x bottom

DO NOT use  
COMMON  
DENOMINATORS

$$1) \quad \frac{-1}{3} \times \frac{6}{5}$$

$$= \frac{(-1 \times \cancel{6})}{(\cancel{3} \times 5)} \quad \text{Simplify}$$

$$= \frac{(-1 \times 2)}{(1 \times 5)}$$

$$= \frac{-2}{5}$$

$$2) \quad 2\frac{1}{3} \times -2\frac{2}{5}$$

$$= \frac{7}{\cancel{3}} \times \frac{-12}{5} \quad \text{Simplify}$$

$$= \frac{(7 \times -4)}{(1 \times 5)}$$

$$= \frac{-28}{5}$$

Question was in mixed so  
answer should be in mixed

\*\*\*ALWAYS REDUCE  
WHEN POSSIBLE\*\*\*

$$= -5 \frac{3}{5}$$

Solve for unknowns: (Hint:  $3 \times \boxed{4} = 12$ )

$$\boxed{\phantom{00}} = 12 \div 3$$

Example

$$\boxed{\phantom{00}} \times \frac{1}{2} = \frac{4}{3}$$

$$\boxed{\phantom{00}} = \frac{4}{3} \div \frac{1}{2}$$

$$\boxed{\phantom{00}} = \frac{4}{3} \times \frac{2}{1}$$

$$\boxed{\phantom{00}} = \frac{8}{3}$$

To DIVIDING fractions: **FLIP AND MULTIPLY**

DO NOT use  
COMMON  
DENOMINATORS

$$\begin{aligned}
 1) \quad & \frac{-2}{7} \div \frac{3}{10} \\
 & = \frac{-2}{7} \times \frac{10}{3} \\
 & = \frac{(-2 \times 10)}{(7 \times 3)} \\
 & = \frac{-20}{21}
 \end{aligned}$$

FLIP

Simplify if possible

\*\*\*ALWAYS REDUCE  
WHEN POSSIBLE\*\*\*

$$\begin{aligned}
 2) \quad & 5\frac{1}{4} \div -1\frac{2}{3} \\
 & = \frac{21}{4} \div \frac{-5}{3} \\
 & = \frac{21}{4} \times \frac{-3}{5} \\
 & = \frac{(21 \times -3)}{(4 \times 5)} \\
 & = \frac{-63}{20} \\
 & = -3\frac{3}{20}
 \end{aligned}$$

FLIP

Simplify if possible

Question was in mixed so  
answer should be in mixed

Solve for unknowns:

(Hint:  $\boxed{15} \div 3 = 5$ )

$$\boxed{\phantom{00}} = 3 \times 5$$

Example

$$\boxed{\phantom{00}} \div \frac{2}{3} = \frac{1}{5}$$

$$\boxed{\phantom{00}} = \frac{2}{3} \times \frac{1}{5}$$

$$\boxed{\phantom{00}} = \frac{2}{15}$$

(Hint:  $15 \div \boxed{3} = 5$ )

$$\boxed{\phantom{00}} = 15 \div 5$$

Example

$$\frac{2}{15} \div \boxed{\phantom{00}} = \frac{1}{5}$$

$$\boxed{\phantom{00}} = \frac{2}{15} \div \frac{1}{5}$$

$$\boxed{\phantom{00}} = \frac{2}{15} \times \frac{5}{1}$$

$$\boxed{\phantom{00}} = \frac{2}{3} \times \frac{1}{1}$$

$$\boxed{\phantom{00}} = \frac{2}{3}$$

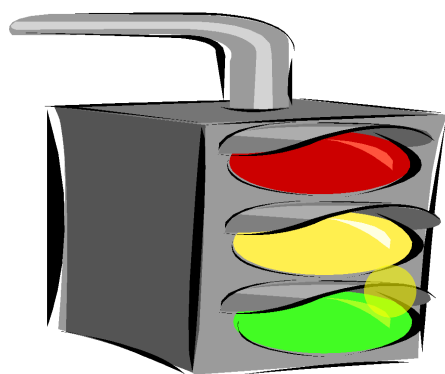
## Hints for TEST:

\*as they appear\*

B	E	D	M	A	S
r	x	i	u	d	u
a	p	v	l	d	b
c	o	s	t		t
k	n	i	i		r
e	e	d	p		a
t	n	e	l		c
	t		y		t

## Example

$$\begin{aligned}
 & \left(\frac{2}{5}\right)^2 \div \left(\frac{2}{3} + \frac{4}{5}\right) \\
 &= \left(\frac{2}{5}\right)^2 \div \left(\frac{10}{15} + \frac{12}{15}\right) \\
 &= \left(\frac{2}{5}\right)^2 \div \left(\frac{22}{15}\right) \\
 &= \left(\frac{4}{25}\right) \div \left(\frac{22}{15}\right) \\
 &= \left(\frac{4}{25}\right) \times \left(\frac{15}{22}\right) \quad \text{Simplify} \\
 &= \left(\frac{2}{5}\right) \times \left(\frac{3}{11}\right) \\
 &= \left(\frac{6}{55}\right)
 \end{aligned}$$



## Worksheets

Lesson 3.1 (all questions)

Lesson 3.2 (all questions)

Lesson 3.3 (all questions)

Lesson 3.4 (all questions)

Lesson 3.5 (all questions)

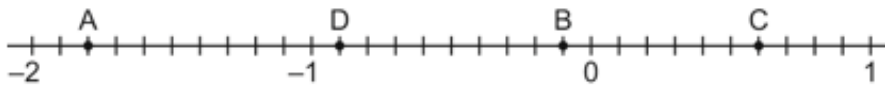
Lesson 3.6 (all questions)

### Lesson 3.1: What Is a Rational Number?

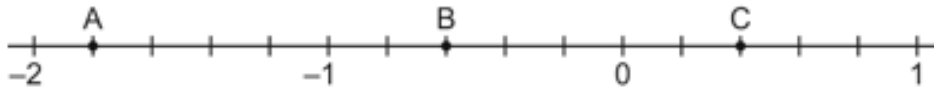
1. Which of the following numbers are equal to  $-\frac{4}{5}$ ?

$$\frac{4}{5}, -\frac{5}{4}, -\frac{4}{5}, -\frac{4}{-5}, -\frac{8}{10} \quad \underline{\hspace{10em}}$$

2. Write the rational number represented by each letter as a decimal.



3. Write the rational number represented by each letter as a fraction.



4. Order the numbers from greatest to least. (Explain how you know)

$$-2.25, \frac{5}{4}, -1.5, -\frac{1}{8}, 0.9$$

5. In each pair, which rational number is greater? Explain how you know.

a)  $-7.3$ ,  $-7.2$

b)  $\frac{4}{5}$ ,  $\frac{5}{4}$

c)  $1.2$ ,  $-1.3$

d)  $-\frac{10}{13}$ ,  $-\frac{10}{11}$

6. Diver A is 2.3 m below sea level.  
Diver B is 1.7 m below sea level.  
Diver C is 3.2 m below sea level.

a) Draw a vertical number line to show the location of the divers.

b) Which diver is farthest from the surface? Explain your thinking.

**Lesson 3.2: Adding Rational Numbers**

1. Determine each sum.

a)  $-\frac{3}{4} + \frac{1}{2}$

b)  $\frac{3}{4} + \frac{1}{2}$

c)  $\frac{3}{4} + \left(-\frac{1}{2}\right)$

d)  $-\frac{3}{4} + \left(-\frac{1}{2}\right)$

3. Sarah borrowed \$40.25 from her parents for a new sweater. She earns \$17.50 for a night of baby-sitting and gives this to her parents.

a) Write an addition statement to represent this situation. \_\_\_\_\_

b) How much does Sarah now owe? \_\_\_\_\_

4. Determine each sum.

a)  $2\frac{2}{5} + \left(-4\frac{1}{2}\right)$

b)  $-6\frac{3}{8} + \left(-1\frac{1}{5}\right)$

5. Determine each sum.

a)  $-3.6 + (-21.9)$

b)  $-0.81 + 2.4$

c)  $9.78 + (-13.33)$

d)  $4.88 + (-12.26)$



**Lesson 3.3: Subtracting Rational Numbers**

1. Determine each difference.

a)  $-\frac{3}{4} - \frac{1}{2}$

b)  $3\frac{3}{5} - \left(-5\frac{1}{2}\right)$

c)  $3\frac{2}{7} - 4\frac{3}{5}$

d)  $3\frac{1}{4} - \left(-2\frac{2}{3}\right)$

2. Two climbers leave base camp at the same time. Climber A ascends 20.4 m, while climber B descends 35.4 m. How far apart are the climbers? Write a subtraction statement using rational numbers to solve the problem.

3. Determine each difference.

a)  $-4.7 - 5.9$

b)  $0.94 - 1.35$

c)  $-43.91 - (-9.44)$

6. Determine the missing rational number in each addition statement.

a)  $-\frac{2}{3} - \square = 3\frac{5}{6}$

b)  $\square - \left(-\frac{3}{4}\right) = -2\frac{1}{2}$

**Lesson 3.4: Multiplying Rational Numbers**

1. Determine each product.

a)  $(-1.2) \times 0.3$     b)  $0.34 \times (-0.5)$     c)  $(-0.6) \times (-0.15)$     d)  $0.9 \times (-1.2)$

e)  $(1.19)(-13.2)$     f)  $(-8.65)(-1.6)$

2. Determine each product.

a)  $\frac{2}{5} \times \left(-\frac{1}{2}\right)$     b)  $\left(-\frac{3}{2}\right) \times \left(\frac{1}{7}\right)$     c)  $\left(-\frac{3}{4}\right) \times \left(-\frac{4}{5}\right)$

c)  $\left(\frac{10}{7}\right)\left(-\frac{13}{8}\right)$     d)  $\left(-4\frac{3}{5}\right)\left(-2\frac{5}{12}\right)$

3. From November 12th to November 21st, the temperature in Burnaby, B.C. dropped an average of  $1.7^{\circ}\text{C}$  each day. Suppose the temperature on the morning of November 12th was  $11.4^{\circ}\text{C}$ . What was the temperature on the morning of November 21st?

**Lesson 3.5: Dividing Rational Numbers**

1. Determine each quotient.

a)  $(-1.6) \div 0.2$       b)  $(-0.6) \div (-3)$       c)  $16.4 \div (-5.5)$       d)  $(-0.98) \div 12.4$

2. Calculate each quotient.

a)  $\frac{1}{5} \div \left(-\frac{2}{5}\right)$       b)  $\left(-\frac{2}{3}\right) \div \left(\frac{5}{6}\right)$       c)  $\left(-\frac{3}{4}\right) \div \left(-\frac{5}{2}\right)$       d)  $\frac{5}{9} \div \left(-\frac{2}{3}\right)$

c)  $3\frac{1}{2} \div \left(-2\frac{1}{6}\right)$       d)  $\left(-2\frac{1}{5}\right) \div \left(-4\frac{3}{4}\right)$

3. A diver descends 3.2 m in 5 min. What was his average rate of descent in metres per minute?

6. Replace each  $\square$  with a rational number to make each equation true.

a)  $\square \times 2.5 = -1.6$

b)  $(-5.7) \div \square = 1.5$

3. A formula for the area of a trapezoid is  $A = a \left( \frac{b+c}{2} \right)$  where  $b$  and  $c$  are the lengths of the parallel sides and  $a$  is the perpendicular distance between these sides. Use the formula to determine the area of a trapezoid with:  $a = 3.5$  cm,  $b = 5.7$  cm,  $c = 8.1$  cm.

4. Evaluate this expression. Round the answer to the nearest hundredth.

$$\frac{9.6 \times 12.6 - 5.1 \div (-7.4) - 0.6}{(-2.9) \div 1.3 - (-6.5)}$$

**Lesson 3.6: Order of Operations with Rational Numbers**

1. Evaluate.

a)  $4.5 + 5.1 \div 1.7$

b)  $-5.8 - 3.1 \times 0.5$

c)  $\frac{2}{3} \times \left(-\frac{1}{2}\right) + \frac{5}{6}$

d)  $\frac{3}{8} - \frac{9}{4} \div \left[\left(-\frac{5}{4}\right) + \left(-\frac{1}{10}\right)\right]$

e)  $-4\frac{2}{3} \div \left[\left(-\frac{1}{3}\right) + 4\frac{1}{6}\right] + \left(-3\frac{2}{5}\right)$

f)  $1\frac{5}{9} - \left(-2\frac{1}{6}\right) + \left[4\frac{1}{4} + \left(-3\frac{1}{2}\right)\right]^2 \div \frac{2}{5}$