

Master 3.18

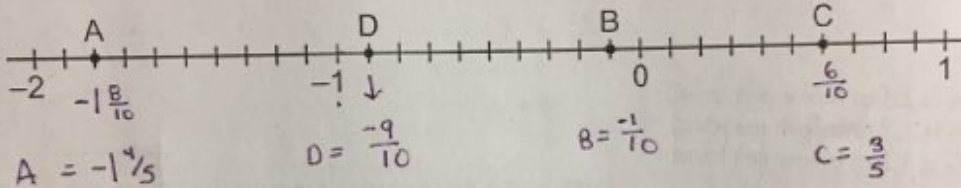
Extra Practice 1

Lesson 3.1: What Is a Rational Number?

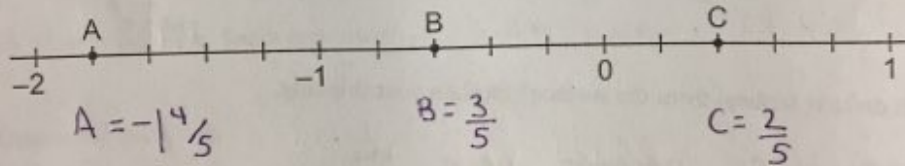
1. Which of the following numbers are equal to $-\frac{4}{5}$?

$\frac{4}{5}, -\frac{5}{4}, \left(\frac{-4}{5}\right), \left(-\frac{4}{-5}\right), \left(-\frac{8}{10}\right)$

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)

$-2.25, \frac{5}{4}, -1.5, -\frac{1}{8}, 0.9$
 \downarrow \downarrow
 1.25 -0.125

Answer:

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

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

a) $-7.30 < -7.20$

$-7.30 < -7.20$

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

$0.8 < 1.25$

c) $1.2 > -1.3$

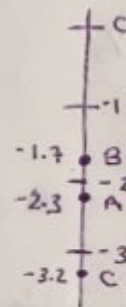
$1.2 > -1.3$

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

$-0.76923 > -0.90$

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.

Diver C because he is the farthest from 0

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Extra Practice 2

Lesson 3.2: Adding Rational Numbers

1. Determine each sum.

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

$$\frac{-3}{4} + \frac{2}{4}$$

$$= \frac{-1}{4}$$

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

$$\frac{3}{4} + \frac{2}{4} = \frac{5}{4}$$

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

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

$$= \frac{1}{4}$$

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

$$-\frac{3}{4} + \frac{-2}{4}$$

$$= \frac{-5}{4} = -1\frac{1}{4}$$

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. $-40.25 + 17.50 = -22.75$

b) How much does Sarah now owe? Sarah owes \$22.75

4. Determine each sum.

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

$$\frac{12}{5} + \left(\frac{-9}{2}\right)$$

$$\frac{24}{10} + \frac{-45}{10}$$

$$= -2\frac{1}{10}$$

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

$$-\frac{51}{8} + \frac{-6}{5}$$

$$-\frac{255}{40} + \frac{-48}{40}$$

$$= -3\frac{3}{10}$$

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5. Determine each sum.

a) $-3.6 + (-21.9)$

$= -25.5$

b) $-0.81 + 2.4$

$= 1.59$

c) $9.78 + (-13.33)$

$= -3.55$

d) $4.88 + (-12.26)$

$= -7.38$

Lesson 3.3: Subtracting Rational Numbers

1. Determine each difference.

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

$-\frac{3}{4} - \frac{2}{4}$

$= -\frac{5}{4} = \boxed{-1\frac{1}{4}}$

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

$\frac{18}{5} - (-\frac{11}{2})$

$\frac{36}{10} - (-\frac{55}{10}) = \frac{91}{10} = \boxed{9\frac{1}{10}}$

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

$\frac{23}{7} - \frac{23}{5} = \frac{115}{35} - \frac{161}{35} = \frac{46}{35} = \boxed{1\frac{11}{35}}$

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

$\frac{13}{4} - (-\frac{8}{3}) = \frac{39}{12} - (-\frac{32}{12}) = \frac{71}{12} = \boxed{5\frac{11}{12}}$

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.

$20.4 - (-35.4) = 55.8$

The climbers are 55.8 m apart

3. Determine each difference.

a) $-4.7 - 5.9$

$= -10.6$

b) $0.94 - 1.35$

$= -0.41$

c) $-43.91 - (-9.44)$

$= -34.47$

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

$5 - 2 = 3$

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

$-\frac{2}{3} - \square = \frac{23}{6}$

$-\frac{4}{6} - \square = \frac{23}{6}$

$-\frac{4}{6} + (\frac{27}{6}) = \frac{23}{6}$

b) $\square - (-\frac{3}{4}) = -2\frac{1}{2} \rightarrow -\frac{5}{2}$

$x + (\frac{3}{4}) = -\frac{10}{4}$

$x = -\frac{13}{4}$

$\sqrt{-\frac{13}{4}}$

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Extra Practice

Lesson 3.4: Multiplying Rational Numbers

1. Determine each product.

- a) $(-1.2) \times 0.3 = -0.36$ b) $0.34 \times (-0.5) = -0.17$ c) $(-0.6) \times (-0.15) = 0.09$ d) $0.9 \times (-1.2) = -1.08$
- e) $(1.19)(-13.2) = 15.708$ f) $(-8.65)(-1.6) = 13.84$

2. Determine each product.

- a) $\frac{2}{5} \times \left(-\frac{1}{2}\right) = \left(-\frac{1}{5}\right)$ b) $\left(-\frac{3}{2}\right) \times \left(\frac{1}{7}\right) = -\frac{3}{14}$ c) $\left(\frac{3}{14}\right) \times \left(-\frac{4}{5}\right) = \left(-\frac{3}{5}\right)$

c) $\left(\frac{10}{7}\right) \times \left(\frac{13}{18}\right)$

$= \frac{-65}{28}$

$= -2 \frac{9}{28}$

d) $\left(-4\frac{3}{5}\right) \times \left(-2\frac{5}{12}\right)$

$\left(-\frac{23}{5}\right) \times \left(-\frac{29}{12}\right)$

$= \frac{667}{60} = 11 \frac{7}{60}$

3. From November 12th to November 21st, the temperature in Burnaby, B.C. dropped an average of 1.7°C each day. Suppose the temperature on the morning of November 12th was 11.4°C . What was the temperature on the morning of November 21st?

$11.4 + [9 \times (-1.7)]$

Lesson 3.5: Dividing Rational Numbers

1. Determine each quotient.

$$\begin{array}{llll} \text{a)} & (-1.6) \div 0.2 & \text{b)} & (-0.6) \div (-3) & \text{c)} & 16.4 \div (-5.5) & \text{d)} & (-0.98) \div 12.4 \\ & = 8 & & = 0.2 & & = 2.98 \overline{10} & & = 0.079 \dots \end{array}$$

2. Calculate each quotient.

$$\begin{array}{llll} \text{a)} & \frac{1}{5} \div \left(-\frac{2}{5}\right) & \text{b)} & \left(-\frac{2}{3}\right) \div \left(\frac{5}{6}\right) & \text{c)} & \left(-\frac{3}{4}\right) \div \left(-\frac{5}{2}\right) & \text{d)} & \frac{5}{9} \div \left(-\frac{2}{3}\right) \\ & \frac{1}{5} \times -\frac{5}{2} & & = -\frac{2}{3} \times \frac{6}{5} & & -\frac{3}{4} \times -\frac{2}{5} & & \frac{5}{9} \times -\frac{3}{2} \\ & \boxed{-\frac{1}{2}} & & = -\frac{2}{1} \times \frac{2}{5} = \boxed{-\frac{4}{5}} & & = -\frac{3}{2} \times -\frac{1}{5} = \boxed{\frac{3}{10}} & & = \frac{5}{3} \times -\frac{1}{2} \\ & & & & & & & = \boxed{-\frac{5}{6}} \end{array}$$

$$\begin{array}{ll} \text{c)} & 3\frac{1}{2} \div \left(-2\frac{1}{6}\right) \\ & \frac{7}{2} \div -\frac{13}{6} \\ & \frac{7}{2} \times -\frac{6}{13} \\ & \frac{7}{1} \times -\frac{3}{13} \\ & = -\frac{21}{13} = \boxed{-1\frac{8}{13}} \end{array} \quad \begin{array}{l} \text{d)} & \left(-2\frac{1}{5}\right) \div \left(-4\frac{3}{4}\right) \\ & -\frac{11}{5} \div -\frac{19}{4} \\ & = -\frac{11}{5} \times -\frac{4}{19} \\ & = \boxed{\frac{44}{95}} \end{array}$$

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

$$(-3.2) \div 5 = -0.64$$

So the average rate is 0.64 m/min

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

$$\square \times 4 = 12$$

$$15 \div \square = 5$$

$$\text{a)} \quad \square \times 25 = -1.6$$

$$\text{b)} \quad (-5.7) \div \square = 1.5$$

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Extra Practice 6

Lesson 3.6: Order of Operations with Rational Numbers BED MAS

1. Evaluate.

a) $4.5 + 5.1 \div 1.7$
 $= 4.5 + 3$
 $= 7.5$

b) $-5.8 - 3.1 \times 0.5$
 $= -5.8 - 1.55$
 $= -7.35$

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

d) $\frac{3}{8} - \frac{9}{4} \div \left[\left(-\frac{5}{4}\right) + \left(-\frac{1}{10}\right)\right]$
 $\frac{3}{8} - \frac{9}{4} \div \left[\frac{-25}{20} + \frac{-2}{20}\right]$
 $\frac{3}{8} - \frac{9}{4} \div \frac{-27}{20}$
 $\frac{3}{8} - \frac{9}{4} \times \frac{20}{-27}$
 $\frac{3}{8} - \frac{1}{1} \times \frac{5}{3} \Rightarrow \frac{3}{8} - \left(-\frac{5}{3}\right) \Rightarrow -\frac{9}{24} + \frac{40}{24} = \frac{49}{24}$
 $= \boxed{2\frac{1}{24}}$

e) $-4\frac{2}{3} \div \left[\left(-\frac{1}{3}\right) + 4\frac{1}{6}\right] + \left(-3\frac{2}{5}\right)$
 $\left[-\frac{1}{3} + \frac{13}{6}\right]$
 $\left[\frac{-2}{6} + \frac{13}{6}\right]$
 $-4\frac{2}{3} \div \left[\frac{11}{6}\right] + \left(-\frac{17}{5}\right)$
 $-\frac{14}{3} \div \left[\frac{11}{6}\right] + \left(-\frac{17}{5}\right)$
 $-\frac{14}{3} \times \frac{6}{11} + \left(-\frac{17}{5}\right)$
 $-\frac{14}{1} \times \frac{2}{11} + \left(-\frac{17}{5}\right)$
 $-\frac{28}{11} + \left(-\frac{17}{5}\right)$

f) $1\frac{5}{9} - \left(-2\frac{1}{6}\right) + \left[4\frac{1}{4} + \left(-3\frac{1}{2}\right)\right] \div \frac{2}{5}$
 $\frac{14}{9} - \left(-\frac{13}{6}\right) + \left[\frac{17}{4} + \left(-\frac{7}{2}\right)\right] \div \frac{2}{5}$
 $\frac{14}{9} - \left(-\frac{13}{6}\right) + \left[\frac{17}{4} + \left(-\frac{14}{4}\right)\right] \div \frac{2}{5}$
 $\frac{14}{9} - \left(-\frac{13}{6}\right) + \left[\frac{3}{4}\right] \div \frac{2}{5}$
 $\frac{14}{9} - \left(-\frac{13}{6}\right) + \frac{9}{16} \div \frac{2}{5}$
 $\frac{14}{9} - \left(-\frac{13}{6}\right) + \frac{45}{32}$
 $\frac{28}{18} - \left(-\frac{39}{18}\right)$

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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.

$$\begin{aligned}
 A &= a \left(\frac{b+c}{2} \right) = 3.5 \left(\frac{5.7+8.1}{2} \right) \\
 &= 3.5 \left(\frac{13.8}{2} \right) \\
 &= 3.5 (6.9) \\
 &= 24.15
 \end{aligned}$$

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

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

Top:

$$\begin{aligned}
 &9.6 \times 12.6 - 5.1 \div (-7.4) - 0.6 \\
 &120.96 - 5.1 \div (-7.4) - 0.6 \\
 &120.96 - (-0.6892) - 0.6 \\
 &120.2708 - 0.6 \\
 &= 121.05
 \end{aligned}$$

Bottom:

$$\begin{aligned}
 &(2.9) \div 1.3 - (-6.5) \\
 &-2.23 - (-6.5) \\
 &= 4.27
 \end{aligned}$$

$$\begin{aligned}
 \text{Top} \div \text{bottom} &= \frac{121.05}{4.27} \\
 &\doteq 28.3
 \end{aligned}$$