Name _____ Date _____

Master 3.18

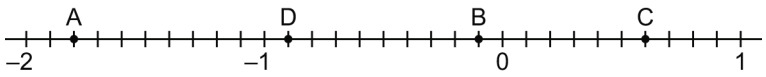
Extra Practice 1

Lesson 3.1: What Is a Rational Number?

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

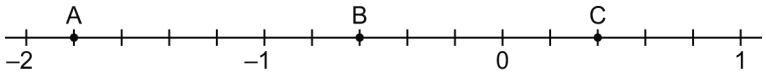
$\frac{4}{5}, -\frac{5}{4}, \frac{-4}{5}, \frac{-4}{-5}, -\frac{8}{10}$ _____

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



_____

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



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4. Sketch a number line and mark each rational number on it.
Order the numbers from greatest to least.

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

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.

Name _____ Date _____

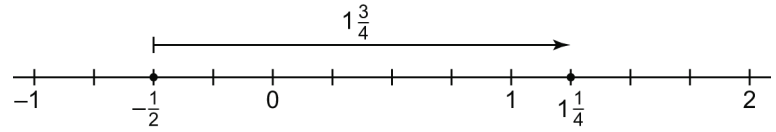
Master 3.19

Extra Practice 2

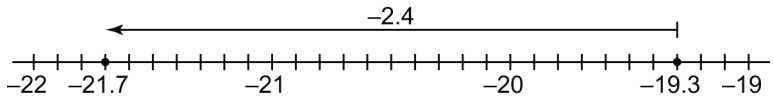
Lesson 3.2: Adding Rational Numbers

1. Write the addition statement that each number line represents.

a)



b)



2. 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. Use integers to estimate each sum. Then, determine each sum.

a) $-3.6+(-21.9)$

b) $-0.81+2.4$

c) $9.78+(-13.33)$

d) $4.88+(-12.26)$

Name _____ Date _____

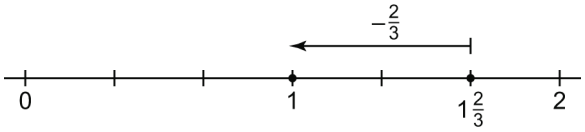
Master 3.20

Extra Practice 3

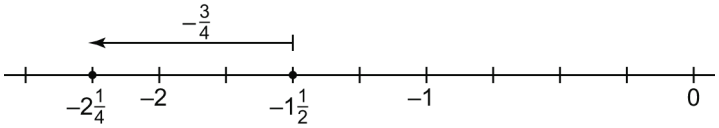
Lesson 3.3: Subtracting Rational Numbers

1. Write the subtraction statement that each number line represents.

a)



b)



2. Determine each difference. Describe the strategies you used.

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

3. 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.

4. Predict whether each difference is positive or negative. Determine each difference.

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

5. Use integers to estimate each difference. Then, 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)** $\square-\left(-\frac{3}{4}\right)=-2\frac{1}{2}$

Name _____ Date _____

Master 3.21

Extra Practice 4

Lesson 3.4: Multiplying Rational Numbers

1. Predict the sign of each product. Determine each product.

a) $(-1.2)\times 0.3$

b) $0.34\times(-0.5)$

c) $(-0.6)\times(-0.15)$

d) $0.9\times(-1.2)$

2. Predict the sign of each product. 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) $\left(-\frac{3}{4}\right)\times\left(-\frac{4}{5}\right)$

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?

4. Use integers to estimate each product then calculate each product.

a) $(1.19)(-13.2)$

b) $(-8.65)(-1.6)$

5. Determine each product.

a) $\left(\frac{10}{7}\right)\left(-\frac{13}{8}\right)$

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

Name _____ Date _____

Master 3.22

Extra Practice 5

Lesson 3.5: Dividing Rational Numbers

1. Determine each quotient.

a) i) $16 \div 2$ **ii)** $(-1.6) \div 0.2$

b) i) $60 \div 3$ **ii)** $(-0.6) \div (-3)$

2. Predict the sign of each quotient, then 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)** $\frac{5}{9} \div \left(-\frac{2}{3}\right)$

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

4. Use a calculator to determine each quotient. Round each answer to the nearest hundredth.

a) $16.4 \div (-5.5)$ **b)** $(-0.98) \div 12.4$

5. Determine each quotient.

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

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

a) $\square \times 2.5 = -1.6$ **b)** $(-5.7) \div \square = 1.5$

Name _____ Date _____

Master 3.23

Extra Practice 6

Lesson 3.6: Order of Operations with Rational Numbers

1. Evaluate. Do not use a calculator.

a) $4.5 + 5.1 \div 1.7$

b) $-5.8 - 3.1 \times 0.5$

2. Evaluate. Do not use a calculator.

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

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

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.

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

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

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

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

Name _____ Date _____

Master 3.24a

Extra Practice Sample Answers

Extra Practice 1 – Master 3.18

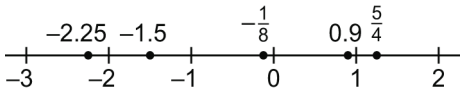
Lesson 3.1

1. $\frac{-4}{5}, -\frac{8}{10}$

2. A: –1.8, B: –0.1, C: 0.6, D: –0.9

3. A: $-1\frac{4}{5}$, B: $-\frac{3}{5}$, C: $\frac{2}{5}$

4.



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

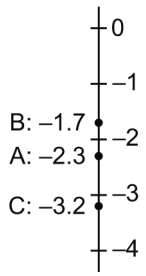
5. **a)** –7.2 is greater because it is to the right of –7.3 on a number line.

b) $\frac{5}{4}$ is greater because it is greater than 1 whereas $\frac{4}{5}$ is less than 1.

c) 1.2 is greater since it is positive.

d) One-eleventh is greater than one-thirteenth. So, $-\frac{10}{13}$ is closer to 0 than $-\frac{10}{11}$ on a number line. Since both numbers are negative, the number closer to 0, or farther to the right, is greater. So, $-\frac{10}{13}$ is greater.

6. **a)**



b) Diver C because she is farthest from 0 on the number line

Extra Practice 2 – Master 3.19

Lesson 3.2

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

b) $-19.3 + (-2.4) = -21.7$

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

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

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

d) $-\frac{3}{4} + \left(-\frac{1}{2}\right) = -\frac{3}{4} + \left(-\frac{2}{4}\right) = \frac{-3-2}{4} = \frac{-5}{4} = -\frac{5}{4} = -1\frac{1}{4}$

3. **a)** –40.25 + 17.50 = –22.75

b) Sarah now owes $22.75.

4. **a)** $2\frac{2}{5} + \left(-4\frac{1}{2}\right) = \frac{12}{5} + \left(-\frac{9}{2}\right)$

$= \frac{24}{10} + \left(-\frac{45}{10}\right) = \frac{24-45}{10} = \frac{-21}{10} = -2\frac{1}{10}$

b) $-6\frac{3}{8} + \left(-1\frac{1}{5}\right) = -\frac{51}{8} + \left(-\frac{6}{5}\right) = -\frac{255}{40} + \left(-\frac{48}{40}\right)$

$= \frac{-255-48}{40} = \frac{-303}{40} = -7\frac{23}{40}$

5. Estimates may vary.

a) –25.5

b) 1.59

c) –3.55

d) –7.38

Extra Practice 3 – Master 3.20

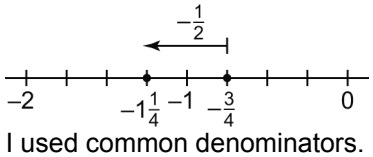
Lesson 3.3

1. **a)** $1\frac{2}{3} - \frac{2}{3} = 1$

b) $-1\frac{1}{2} - \frac{3}{4} = -2\frac{1}{4}$

2. **a)** I sketched a number line.

$-\frac{3}{4} - \frac{1}{2} = -1\frac{1}{4}$



b) I used common denominators.

$3\frac{3}{5} - \left(-5\frac{1}{2}\right) = \frac{18}{5} - \left(-\frac{11}{2}\right) = \frac{36}{10} - \left(-\frac{55}{10}\right)$

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

Name _____ Date _____

Master 3.24b

Extra Practice Sample Answers continued

3. 20.4 – (–35.4) = 55.8; the distance between the climbers is 55.8 m.

4. **a)** Negative

$$3\frac{2}{7}-4\frac{3}{5}=\frac{23}{7}-\frac{23}{5}=\frac{115}{35}-\frac{161}{35}$$
$$=\frac{115-161}{35}=-\frac{46}{35}=-1\frac{11}{35}$$

b) Positive

$$3\frac{1}{4}-\left(-2\frac{2}{3}\right)=\frac{13}{4}-\left(-\frac{8}{3}\right)=\frac{39}{12}-\left(-\frac{32}{12}\right)$$
$$=\frac{39-(-32)}{12}=\frac{39+32}{12}=\frac{71}{12}=5\frac{11}{12}$$

5. **a)** Estimate: –11; Calculate: –10.6
b) Estimate: 0; Calculate: –0.41
c) Estimate: –35; Calculate: –34.47

6. **a)** $-\frac{2}{3}-3\frac{1}{6}=-3\frac{5}{6}$

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

Extra Practice 4 – Master 3.21

Lesson 3.4

1. **a)** Negative
(–1.2) × 0.3 = –0.36
b) Negative
0.34 × (–0.5) = –0.17
c) Positive
(–0.6) × (–0.15) = 0.09
d) Negative
0.9 × (–1.2) = –1.08

2. **a)** Negative

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

b) Negative

$$\left(-\frac{3}{2}\right)\times\frac{1}{7}=-\frac{3}{14}$$

c) Positive

$$\left(-\frac{3}{4}\right)\times\left(-\frac{4}{5}\right)=\frac{3}{5}$$

3. $11.4+[9\times(-1.7)]=-3.9$
It was –3.9°C on the morning of Nov. 21.

4. **a)** Estimate: (1)(–13) = –13
Calculate: (1.19)(–13.2) = –15.708
b) Estimate: (–9)(–2) = 18
Calculate: (–8.65)(–1.6) = 13.84

5. **a)** $\left(\frac{10}{7}\right)\left(-\frac{13}{8}\right)=\left(-\frac{130}{56}\right)=-\frac{65}{28}=-2\frac{9}{28}$

b) $\left(-4\frac{3}{5}\right)\left(-2\frac{5}{12}\right)=\left(-\frac{23}{5}\right)\left(-\frac{29}{12}\right)=\frac{667}{60}=11\frac{7}{60}$

Extra Practice 5 – Master 3.22

Lesson 3.5

1. **a)** **i)** 8
ii) –8
b) **i)** 20
ii) 0.2

2. **a)** Negative

$$\frac{1}{5}\div\left(-\frac{2}{5}\right)=-\frac{1}{2}$$

b) Negative

$$\left(-\frac{2}{3}\right)\div\left(\frac{5}{6}\right)=\left(-\frac{2}{3}\right)\times\left(\frac{6}{5}\right)=-\frac{12}{15}=-\frac{4}{5}$$

c) Positive

$$\left(-\frac{3}{4}\right)\div\left(-\frac{5}{2}\right)=-\frac{3}{4}\times\left(-\frac{4}{10}\right)=\frac{-3}{-10}=\frac{3}{10}$$

d) Negative

$$\frac{5}{9}\div\left(-\frac{2}{3}\right)=\frac{5}{9}\times\left(-\frac{3}{2}\right)=-\frac{15}{18}=-\frac{5}{6}$$

3. $(-3.2)\div 5=-0.64$; So, the average rate of descent is 0.64 m/min.

4. **a)** 16.4 ÷ (–5.5) ≐ –2.98
b) (–0.98) ÷ 12.4 ≐ –0.08

5. **a)** $3\frac{1}{2}\div\left(-2\frac{1}{6}\right)=\frac{7}{2}\div\left(-\frac{13}{6}\right)$
$$=\frac{21}{6}\div\left(-\frac{13}{6}\right)=-\frac{21}{13}=-1\frac{8}{13}$$

b) $\left(-2\frac{1}{5}\right)\div\left(-4\frac{3}{4}\right)=\left(-\frac{11}{5}\right)\div\left(-\frac{19}{4}\right)$
$$=\left(-\frac{11}{5}\right)\times\left(-\frac{4}{19}\right)=\frac{44}{95}$$

6. **a)** (–0.64) × 2.5 = –1.6
b) $(-5.7)\div(-3.8)=1.5$

Name _____ Date _____

Master 3.24c

Extra Practice and Activating Prior Knowledge Sample Answers

Extra Practice 6 – Master 3.23

Lesson 3.6

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

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

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

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

$= \frac{3}{8} - \frac{9}{4} \div \left[-\frac{25}{20} - \frac{2}{10}\right]$

$= \frac{3}{8} - \frac{9}{4} \div \left[-\frac{27}{20}\right]$

$= \frac{3}{8} - \frac{9}{4} \times \left[-\frac{20}{27}\right]$

$= \frac{3}{8} + \frac{5}{3}$

$= \frac{9}{24} + \frac{40}{24}$

$= \frac{49}{24} = 2\frac{1}{24}$

3. Substitute.

$A = 3.5\left(\frac{5.7 + 8.1}{2}\right) = 3.5\left(\frac{13.8}{2}\right) = 3.5(6.9) = 24.15$

The area of the trapezoid is 24.15 cm^2.

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

$= -\frac{14}{3} \div \left[\left(-\frac{1}{3}\right) + \frac{25}{6}\right] + \left(-\frac{17}{5}\right)$

$= -\frac{14}{3} \div \left[\left(-\frac{2}{6}\right) + \frac{25}{6}\right] + \left(-\frac{17}{5}\right)$

$= -\frac{14}{3} \div \frac{23}{6} + \left(-\frac{17}{5}\right)$

$= -\frac{28}{6} \div \frac{23}{6} + \left(-\frac{17}{5}\right)$

$= -\frac{28}{23} + \left(-\frac{17}{5}\right) = -\frac{531}{115} = -4\frac{71}{115}$

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

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \left[\frac{17}{4} + \left(-\frac{7}{2}\right)\right]^2 \div \frac{2}{5}$

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \left[\frac{17}{4} + \left(-\frac{14}{4}\right)\right]^2 \div \frac{2}{5}$

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \left(\frac{3}{4}\right)^2 \div \frac{2}{5}$

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \frac{9}{16} \div \frac{2}{5}$

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \frac{9}{16} \times \frac{5}{2}$

$= \frac{14}{9} - \left(-\frac{13}{6}\right) + \frac{45}{32}$

$= \frac{1477}{288} = 5\frac{37}{288}$

5. $\frac{9.6 \times 12.6 - 5.1 \div (-7.4) - 0.6}{(-2.9) \div 1.3 - (-6.5)} \doteq 28.35$

Activating Prior Knowledge Master 3.25a

1. a) $\frac{7}{9}$ **b)** $\frac{5}{6}$ **c)** $\frac{1}{3}$

d) $\frac{15}{8} = 1\frac{7}{8}$ **e)** $\frac{79}{42} = 1\frac{37}{42}$ **f)** $\frac{103}{30} = 3\frac{13}{30}$

2. a) $\frac{9}{4} = 2\frac{1}{4}$ **b)** $\frac{3}{2} = 1\frac{1}{2}$ **c)** $\frac{13}{9} = 1\frac{4}{9}$

d) $\frac{1}{5}$ **e)** $\frac{13}{24}$ **f)** $\frac{11}{15}$

3. a) $7\frac{7}{12}$ **b)** $3\frac{4}{15}$ **c)** $7\frac{11}{40}$

d) $2\frac{11}{20}$ **e)** $1\frac{11}{30}$ **f)** $2\frac{17}{18}$

Activating Prior Knowledge Master 3.25b

1. a) Negative
b) Positive
c) Negative

2. a) –24 **b)** 50 **c)** –7

d) –7 **e)** –300 **f)** 1275

Name _____ Date _____

Master 3.25a

Activating Prior Knowledge

Adding and Subtracting Fractions

To add or subtract fractions, use equivalent fractions with common denominators.

Example
Evaluate.

a) $\frac{5}{12}+\frac{5}{6}$

b) $3\frac{1}{5}-1\frac{3}{4}$

Solution

a) $\frac{5}{12}+\frac{5}{6}=\frac{5}{12}+\frac{10}{12}$
$=\frac{15}{12}$
$=\frac{5}{4}$
$=1\frac{1}{4}$

b) $3\frac{1}{5}-1\frac{3}{4}=\frac{16}{5}-\frac{7}{4}$
$=\frac{64}{20}-\frac{35}{20}$
$=\frac{29}{20}$
$=1\frac{9}{20}$

Check

1. Add.
   a) $\frac{4}{9}+\frac{1}{3}$ b) $\frac{2}{3}+\frac{1}{6}$ c) $\frac{1}{12}+\frac{1}{4}$
   d) $\frac{3}{8}+\frac{3}{2}$ e) $\frac{7}{6}+\frac{5}{7}$ f) $\frac{8}{5}+\frac{11}{6}$

2. Subtract.
   a) $\frac{7}{2}-\frac{5}{4}$ b) $\frac{13}{6}-\frac{8}{12}$ c) $\frac{5}{3}-\frac{2}{9}$
   d) $\frac{7}{10}-\frac{1}{2}$ e) $\frac{7}{8}-\frac{1}{3}$ f) $\frac{7}{5}-\frac{2}{3}$

3. Evaluate.
   a) $3\frac{1}{3}+4\frac{1}{4}$ b) $2\frac{3}{5}+\frac{2}{3}$ c) $5\frac{2}{5}+1\frac{7}{8}$
   d) $3\frac{3}{4}-1\frac{1}{5}$ e) $3\frac{7}{10}-2\frac{1}{3}$ f) $4\frac{1}{6}-1\frac{2}{9}$

Name _____ Date _____

Master 3.25b

Activating Prior Knowledge

Multiplying and Dividing Integers

When two integers have the same sign, their product or quotient is positive.
When two integers have different signs, their product or quotient is negative.

Example
Evaluate.

a) $(-25)\times 5$ b) $(-25)\times(-5)$

c) $(-25)\div(-5)$ d) $(25)\div(-5)$

Solution

a) The integers have different signs, so their product is negative.
So, $(-25)\times(+5)=-125$

b) The integers have the same sign, so their product is positive.
So, $(-25)\times(-5)=125$

c) The integers have the same sign, so their quotient is positive.
So, $(-25)\div(-5)=5$

d) The integers have different signs, so their quotient is negative.
So, $(+25)\div(-5)=-5$

Check

1. State whether each product or quotient is positive or negative.
   a) $6\times(-3)$ b) $(-9)\times(-4)$ c) $(15)\div(-3)$

2. Determine each product or quotient
   a) $(8)\times(-3)$ b) $(-10)\times(-5)$ c) $(-21)\div(3)$
   d) $(56)\div(-8)$ e) $(25)\times(-12)$ f) $(-51)(-25)$