

**Key Terms**

- **rational number:** any number that can be written in fraction form. In decimal form, a rational number is a decimal that either terminates or repeats.
- **irrational number:** a number that cannot be written in fraction form. In decimal form, an irrational number does not terminate and does not repeat. Example:  $\pi$  and  $\sqrt{2}$ .
- **terminating decimal:** a decimal with a certain number of digits after the decimal point; for example,  $\frac{1}{8} = 0.125$ .
- **repeating decimal:** a decimal with a repeating pattern in the digits to the right of the decimal point; it is written with a bar above the repeating digits; for example,  $\frac{2}{3} = 0.\bar{6}$
- **improper fraction:** a fraction with the numerator greater than the denominator; for example, both  $\frac{6}{5}$  and  $\frac{5}{3}$  are improper fractions.
- **mixed number:** a number consisting of a whole number and a fraction; for example,  $1\frac{2}{3}$  is a mixed number.

**Operations with Fractions**

- **Adding and Subtracting Fractions:** Before you can add or subtract fractions, you must have a common denominator for all fractions involved. Once there's a common denominator, the numerators can be added or subtracted, and the final fraction can be reduced as much as possible. If the original question contains fractions in the mixed number form, change them to improper fractions first, and then solve.
- **Multiplying Fractions:** Multiply the numerators (across the top) and the denominators (across the bottom). Reduce the final fraction as much as possible. If the original question contains fractions in the mixed number form, change them to improper fractions first, and then solve.
- **Divide Fractions:** Before you can divide fractions, you must change the division sign to a multiplication sign and then flip the second fraction. Then you will multiply the fractions as normal.

**Example Problems**

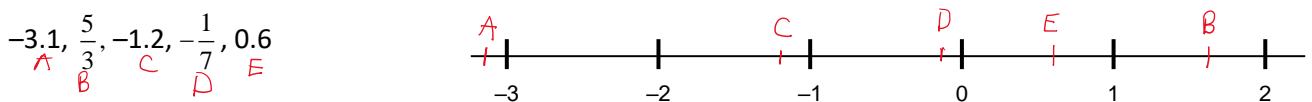
1. Label the following numbers as rational or irrational:

- a.  $\frac{1}{4}$  - Rational
- b.  $0.\bar{6}$  - Rational
- c. 0.154548... - Irrational
- d.  $\pi$  - Irrational

2. Which of the following rational numbers are equal to  $-\frac{5}{4}$ ? (May be more than one answer.)

$\left(\frac{-5}{4}\right), \frac{-5}{-4}, \frac{10}{8}, \left(\frac{5}{-4}\right)$   $\frac{-5}{4} = \frac{5}{-4} = -\frac{5}{4}$  but not  $\frac{-5}{-4}$

3. Mark each rational number on the number line provided.



4. In each pair, which number is greater? Explain your answer.

- a)  $-\frac{6}{5}$  vs  $-\frac{5}{6}$ .  $-\frac{5}{6}$  is closer to zero on the negative scale.
- b)  $-3.3\bar{2}$  vs  $-3.32$ .  $-3.32$  terminates and is closer to zero on the negative scale.

5. Write the following fractions as decimals without the use of a calculator:

- a.  $\frac{1}{3} = 0.\bar{3}$
- b.  $\frac{7}{9} = 0.\bar{7}$
- c.  $\frac{4}{5} = 0.8$

6. Convert the following into improper fractions:

- a.  $3\frac{2}{3} = \frac{11}{3}$  ( $3 \times 3 + 2$ )
- b.  $-2\frac{1}{2} = -\frac{5}{2}$  ( $2 \times 2 + 1$ )

7. Convert the following into mixed numbers:

- a.  $\frac{7}{6} = 1\frac{1}{6}$
- b.  $\frac{35}{8} = 4\frac{3}{8}$
- c.  $\frac{-9}{7} = -1\frac{2}{7}$

8. Find the sum:

- a.  $(-4) + (-8) = -12$
- b.  $(5) + (-7) = -2$
- c.  $(5.3) + (2.2) = 7.5$

9. Find the difference:

- a.  $(8) - (12) = -4$
- b.  $(-6) - (4) = -10$  or  $-6 + -4$
- c.  $(5) - (-3) = 8$  or  $5 + (+3)$

10. Find the product:

- a.  $(-5) \times (-3) = +15$
- b.  $(+9) \times (-5) = -45$

Same signs = + answer  
Different signs = - answer

11. Find the quotient:

- a.  $(+25) \div (+5) = +5$
- b.  $(+35) \div (-7) = -5$

12. Determine each sum or difference.

a)  $-\frac{3}{5} + \left(-\frac{2}{3}\right)$   
 $-\frac{9}{15} + \frac{-10}{15} = \frac{-19}{15}$  OR  $-\frac{19}{15}$

b)  $2\frac{3}{8} - \left(-1\frac{1}{4}\right)$   
 $\frac{19}{8} - \left(\frac{-5}{4}\right) \times 2$   
 $\frac{19}{8} - \left(\frac{-10}{8}\right) = \frac{19}{8} + \frac{10}{8} = \frac{29}{8}$  OR  $3\frac{5}{8}$   
*Add opposite*

c)  $\frac{8}{12} + \frac{6}{12} = \frac{14}{12} = \frac{7}{6}$  OR  $1\frac{1}{6}$   
*Already has a common denominator*

d)  $\frac{15}{20} - \frac{5}{20} = \frac{10}{20} = \frac{1}{2}$   
*Already has a common denominator.*

13. Evaluate.

a)  $-\frac{1}{4} \times \left(-\frac{3}{5}\right) = \frac{3}{20}$

b)  $\frac{5}{6} \div \left(-\frac{2}{3}\right)$   
 $= \frac{5}{6} \times \frac{-3}{2} = \frac{-15}{12} = \frac{-5}{4}$  OR  $-\frac{1}{4}$

14. Evaluate. *BEDMAS*

a.  $(15 - 3) \div 3$   
 $= 12 \div 3$   
 $= 4$

b.  $(5 + 3 - 2^2) \times 4 - 1$   
 $(5 + 3 - 4) \times 4 - 1$   
 $(8 - 4) \times 4 - 1$   
 $(4) \times 4 - 1$   
 $16 - 1 = 15$

15. This table shows the money earned and spent by Kelsey in the first month of operating her home-based computer business.

Item	Income	Spending
New computer		\$760
Additional software		\$65
Contract No. 1	\$490	
Contract No. 2	\$390	
Miscellaneous expenses		\$260

a) Write an addition statement to show Kelsey's income and spending.

$-760 - 65 + 490 + 390 - 260 =$

b) Did Kelsey make a profit in her business?

**No. She lost \$205**

16. At a harbour, the effect of the tide changed the water level by 14.3 m in 5.5 h. About how much did the water level change per hour?

$14.3 \div 5.5 = 2.6$

*The water changed 2.6m per hour.*

17. A student has \$1298 in her savings account. She withdraws \$95 each week. Determine the amount of money remaining in her account after 13 weeks.

$1298 - (95 \times 13)$   
 $1298 - 1235$   
 $63$

*She only has \$63 left in her account after 13 weeks.*