

Operations for Rational Numbers

Directions: Make sure you read the heading to understand what you need to do in order to complete each problem. Show all your work for each problem. Leave all answers in simplest form.

OPERATIONS WITH FRACTIONS:**Adding rational numbers**

1. $\frac{5}{16} + -\left(\frac{5}{6}\right) =$

2. $-\left(\frac{7}{8}\right) + \frac{2}{4} =$

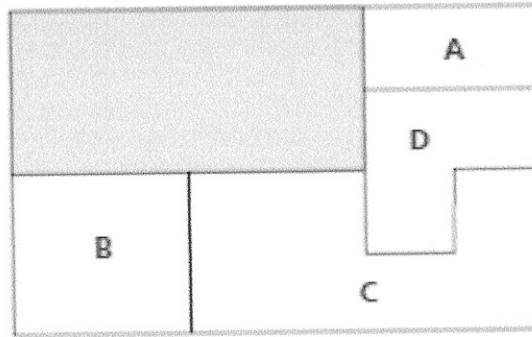
3. $-\left(\frac{6}{7}\right) + -\left(\frac{2}{9}\right) =$

4. $-\left(\frac{10}{12}\right) + -\left(\frac{4}{5}\right) =$

5. $3.10 + (-2.35) =$

6. $-(6.45) + (-8.25) =$

7. The shaded region represents one whole unit.



- a. What fraction of the whole is each of the other four regions A, B, C, D?
- b. Based on your answers to part (a), find the area of each of the following:
- region A + region B
 - region C + region D
 - region B - region D
 - region C - region A
- c. If the entire outer rectangle is considered the whole, what fraction of the whole would the shaded gray area be? Explain your reasoning.

Subtracting rational numbers

8. $\frac{8}{9} - \left(\frac{2}{3}\right) =$

9. $-\left(\frac{5}{8}\right) - \left(\frac{5}{6}\right) =$

10. $-\left(\frac{13}{16}\right) - \frac{4}{5} =$

11. $-\left(\frac{7}{10}\right) - \left(\frac{1}{6}\right) =$

12. $8.4 - (-6.67) =$

13. $-(7.24) - 11.51 =$

Adding and Subtracting mixed numbers

14. $8\frac{1}{5} +^{-} \left(2\frac{3}{5}\right) =$

15. $- \left(3\frac{7}{9}\right) +^{-} \left(6\frac{6}{12}\right) =$

16. $- \left(2\frac{3}{4}\right) -^{-} \left(2\frac{4}{5}\right) =$

17. $8\frac{5}{8} -^{-} \left(4\frac{7}{24}\right) =$

Multiplying rational numbers

18. $- \left(\frac{2}{3}\right) \times - \left(\frac{9}{10}\right) =$

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

20. $- (0.4) \times - (.3) =$

21. $- (2.24) \times (.55) =$

22. $- \left(4\frac{2}{7}\right) \times 2\frac{2}{6} =$

23. $- \left(3\frac{1}{3}\right) \times - \left(3\frac{3}{10}\right) =$

24. Jack and Helen are making cookies. The recipe says to combine $\frac{1}{2}$ cup of butter with $\frac{3}{4}$ cup chocolate chips and $\frac{3}{8}$ cup chopped nuts.
- When these three ingredients are mixed together, how many cups of the mixture will Jack and Helen have? Show your work.
 - Jack and Helen decide to triple the recipe.
 - How many cups of butter will be needed?
 - How many cups of chocolate chips will be needed?
 - How many cups of chopped nuts will be needed?
 - When the ingredients for the tripled recipe are combined, how many cups of the mixture will Jack and Helen have?

Divide fractions and write the quotient in simplest form.

25. $-\left(\frac{3}{4}\right) \div -\left(\frac{3}{2}\right) =$

26. $-\left(\frac{11}{12}\right) \div \frac{3}{4} =$

27. $3\frac{2}{5} \div -\left(1\frac{1}{2}\right) =$

28. $-\left(8\frac{5}{9}\right) \div -\left(1\frac{4}{7}\right) =$

29. $-(8.42) \div -(2.22) =$

30. $-(12.42) \div 4.8 =$

Extra Credit

A. Simplifying the following expression:

$$3x + 5 + 3 + 9x$$

B. Evaluate

$$6x + 2y, \text{ when } x = -3 \text{ and } y = 5.$$

Answer Key

Adding rational numbers

$$1. \quad \frac{5}{16} + ^{-}\left(\frac{5}{6}\right) = -\frac{25}{48}$$

$$2. \quad -\left(\frac{7}{8}\right) + \frac{2}{4} = -\frac{3}{8}$$

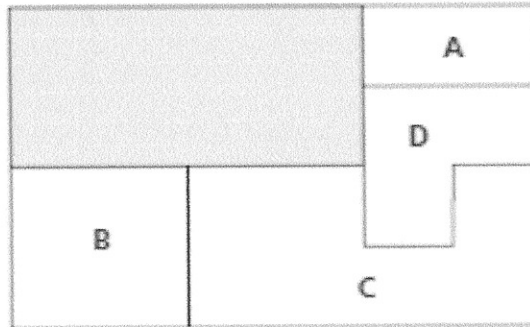
$$3. \quad -\left(\frac{6}{7}\right) + ^{-}\left(\frac{2}{9}\right) = -\frac{68}{63} = -1\frac{5}{63}$$

$$4. \quad -\left(\frac{10}{12}\right) + ^{-}\left(\frac{4}{5}\right) = -\frac{49}{30} = -1\frac{19}{30}$$

$$5. \quad 3.10 + (-2.35) = 0.75$$

$$6. \quad -(6.45) + (-8.25) = -14.7$$

7. The shaded region represents one whole unit.



- a. What fraction of the whole is each of the other four regions A, B, C, D?

$$A = \frac{1}{4}, B = \frac{1}{2}, C = \frac{7}{8}, \text{ and } D = \frac{3}{8}$$

- b. Based on your answers to part (a), find the area of each of the following:

i. region A + region B

$$\frac{2}{8} + \frac{4}{8} = \frac{6}{8} = \frac{3}{4}$$

iii. region B - region D

$$\frac{4}{8} - \frac{3}{8} = \frac{1}{8}$$

ii. region C + region D

$$\frac{7}{8} + \frac{3}{8} = \frac{10}{8} = 1\frac{1}{4}$$

iv. region C - region A

$$\frac{7}{8} - \frac{2}{8} = \frac{5}{8}$$

- c. If the entire outer rectangle is considered the whole, what fraction of the whole would the shaded grey area be? Explain your reasoning.

The shaded box be $\frac{4}{12}$ or $\frac{1}{3}$. I saw I could divide the box into thirds, which was same size as region A. Thus, $\frac{4}{12}$ would be the area of the shaded grey.

Subtracting rational numbers

$$8. \quad \frac{8}{9} - -\left(\frac{2}{3}\right) = \frac{14}{9} = 1\frac{5}{9}$$

$$10. \quad -\left(\frac{13}{16}\right) - \frac{4}{5} = -\frac{129}{80} = -1\frac{49}{80}$$

$$12. \quad 8.4 - (-6.67) = 15.07$$

$$9. \quad -\left(\frac{5}{8}\right) - -\left(\frac{5}{6}\right) = \frac{5}{24}$$

$$11. \quad -\left(\frac{7}{10}\right) - -\left(\frac{1}{6}\right) = -\frac{8}{15}$$

$$13. \quad -(7.24) - 11.51 = -18.75$$

Adding and Subtracting mixed numbers

$$14. \quad 8\frac{1}{5} + -\left(2\frac{3}{5}\right) = 5\frac{3}{5}$$

$$16. \quad -\left(2\frac{3}{4}\right) - -\left(2\frac{4}{5}\right) = \frac{1}{20}$$

$$15. \quad -\left(3\frac{7}{9}\right) + -\left(6\frac{6}{12}\right) = \frac{49}{18} = 2\frac{13}{18}$$

$$17. \quad 8\frac{5}{8} - -\left(4\frac{7}{24}\right) = \frac{155}{12} = 12\frac{11}{12}$$

Multiplying rational numbers

$$18. \quad -\left(\frac{2}{3}\right) \times -\left(\frac{9}{10}\right) = \frac{3}{5}$$

$$20. \quad -(0.4) \times -(0.3) = -0.12$$

$$22. \quad -\left(4\frac{2}{7}\right) \times 2\frac{2}{6} = -\frac{29}{3} = -9\frac{2}{3}$$

$$19. \quad -\left(\frac{1}{4}\right) \times \frac{3}{5} = -\frac{3}{20}$$

$$21. \quad -(2.24) \times (.55) = -1.232$$

$$23. \quad -\left(3\frac{1}{3}\right) \times -\left(3\frac{3}{10}\right) = 11$$

24. Jack and Helen are making cookies. The recipe says to combine $\frac{1}{2}$ cup of butter with $\frac{3}{4}$ cup chocolate chips and $\frac{3}{8}$ cup chopped nuts.

a. When these three ingredients are mixed together, how many cups of the mixture will Jack and Helen have? Show your work.

$$\frac{4}{8} + \frac{6}{8} + \frac{3}{8} = \frac{13}{8} = 1\frac{5}{8}$$

b. Jack and Helen decide to triple the recipe.

i. How many cups of butter will be needed?

$$3 * \frac{1}{2} = 3\frac{1}{2} \text{ cups}$$

ii. How many cups of chocolate chips will be needed?

$$3 * \frac{3}{4} = \frac{15}{4} = 1\frac{3}{4} \text{ cups}$$

iii. How many cups of chopped nuts will be needed?

$$3 * \frac{3}{8} = \frac{27}{8} = 3\frac{3}{8} \text{ cups}$$

c. When the ingredients for the tripled recipe are combined, how many cups of the mixture will Jack and Helen have?

$$\frac{7}{2} + \frac{15}{4} + \frac{27}{8} = \frac{85}{8} = 10\frac{5}{8} \text{ cups}$$

Divide fractions and write the quotient in simplest form.

25. $-\left(\frac{3}{4}\right) \div -\left(\frac{3}{2}\right) = \frac{1}{2}$

26. $-\left(\frac{11}{12}\right) \div \frac{3}{4} = -\frac{11}{9} = -1\frac{2}{9}$

27. $3\frac{2}{5} \div -\left(1\frac{1}{2}\right) = -\frac{34}{15} = -2\frac{4}{15}$

28. $-\left(8\frac{5}{9}\right) \div -\left(1\frac{4}{7}\right) = \frac{49}{9} = 5\frac{4}{9}$

29. $-(8.42) \div -(2.22) = 3.\overline{7927}$

30. $-(12.42) \div 4.8 = -2.5875$

Extra Credit

A. Simplifying the following expression:

$$3x + 5 + 3 + 9x = 11x + 8$$

B. Evaluate

$$6x + 2y, \text{ when } x = -3 \text{ and } y = 5.$$

$$6(-3) + 2(5) = -18 + 10 = -8$$