

TECHNIQUES OF ESTIMATION: ESTIMATION BY ROUNDING FRACTIONS*

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Abstract

This module is from Fundamentals of Mathematics by Denny Burzynski and Wade Ellis, Jr. This module discusses how to estimate by rounding fractions. By the end of the module students should be able to estimate the sum of two or more fractions using the technique of rounding fractions.

1 Section Overview

- Estimation by Rounding Fractions

Estimation by rounding fractions is a useful technique for estimating the result of a computation involving fractions. Fractions are commonly rounded to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 0, and 1. Remember that rounding may cause estimates to vary.

1.1 Sample Set A

Make each estimate remembering that results may vary.

Example 1

Estimate $\frac{3}{5} + \frac{5}{12}$.

Notice that $\frac{3}{5}$ is about $\frac{1}{2}$, and that $\frac{5}{12}$ is about $\frac{1}{2}$.

Thus, $\frac{3}{5} + \frac{5}{12}$ is about $\frac{1}{2} + \frac{1}{2} = 1$. In fact, $\frac{3}{5} + \frac{5}{12} = \frac{61}{60}$, a little more than 1.

Example 2

Estimate $5\frac{3}{8} + 4\frac{9}{10} + 11\frac{1}{5}$.

Adding the whole number parts, we get 20. Notice that $\frac{3}{8}$ is close to $\frac{1}{4}$, $\frac{9}{10}$ is close to 1, and $\frac{1}{5}$ is close to $\frac{1}{4}$. Then $\frac{3}{8} + \frac{9}{10} + \frac{1}{5}$ is close to $\frac{1}{4} + 1 + \frac{1}{4} = 1\frac{1}{2}$.

Thus, $5\frac{3}{8} + 4\frac{9}{10} + 11\frac{1}{5}$ is close to $20 + 1\frac{1}{2} = 21\frac{1}{2}$.

In fact, $5\frac{3}{8} + 4\frac{9}{10} + 11\frac{1}{5} = 21\frac{19}{40}$, a little less than $21\frac{1}{2}$.

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1.2 Practice Set A

Use the method of rounding fractions to estimate the result of each computation. Results may vary.

Exercise 1 *(Solution on p. 4.)*

$$\frac{5}{8} + \frac{5}{12}$$

Exercise 2 *(Solution on p. 4.)*

$$\frac{7}{9} + \frac{3}{5}$$

Exercise 3 *(Solution on p. 4.)*

$$8\frac{4}{15} + 3\frac{7}{10}$$

Exercise 4 *(Solution on p. 4.)*

$$16\frac{1}{20} + 4\frac{7}{8}$$

2 Exercises

Estimate each sum or difference using the method of rounding. After you have made an estimate, find the exact value of the sum or difference and compare this result to the estimated value. Result may vary.

Exercise 5 *(Solution on p. 4.)*

$$\frac{5}{6} + \frac{7}{8}$$

Exercise 6

$$\frac{3}{8} + \frac{11}{12}$$

Exercise 7 *(Solution on p. 4.)*

$$\frac{9}{10} + \frac{3}{5}$$

Exercise 8

$$\frac{13}{15} + \frac{1}{20}$$

Exercise 9 *(Solution on p. 4.)*

$$\frac{3}{20} + \frac{6}{25}$$

Exercise 10

$$\frac{1}{12} + \frac{4}{5}$$

Exercise 11 *(Solution on p. 4.)*

$$\frac{15}{16} + \frac{1}{12}$$

Exercise 12

$$\frac{29}{30} + \frac{11}{20}$$

Exercise 13 *(Solution on p. 4.)*

$$\frac{5}{12} + 6\frac{4}{11}$$

Exercise 14

$$\frac{3}{7} + 8\frac{4}{15}$$

Exercise 15 *(Solution on p. 4.)*

$$\frac{9}{10} + 2\frac{3}{8}$$

Exercise 16

$$\frac{19}{20} + 15\frac{5}{9}$$

Exercise 17 *(Solution on p. 4.)*

$$8\frac{3}{5} + 4\frac{1}{20}$$

Exercise 18

$$5\frac{3}{20} + 2\frac{8}{15}$$

Exercise 19

$$9\frac{1}{15} + 6\frac{4}{5}$$

*(Solution on p. 4.)***Exercise 20**

$$7\frac{5}{12} + 10\frac{1}{16}$$

Exercise 21

$$3\frac{11}{20} + 2\frac{13}{25} + 1\frac{7}{8}$$

*(Solution on p. 4.)***Exercise 22**

$$6\frac{1}{12} + 1\frac{1}{10} + 5\frac{5}{6}$$

Exercise 23

$$\frac{15}{16} - \frac{7}{8}$$

*(Solution on p. 4.)***Exercise 24**

$$\frac{12}{25} - \frac{9}{20}$$

2.1 Exercises for Review**Exercise 25**

(here¹) The fact that
(a first number · a second number) · a third number = a first number · (a second number · a third number)
is an example of which property of multiplication?

*(Solution on p. 4.)***Exercise 26**

(here²) Find the quotient: $\frac{14}{15} \div \frac{4}{45}$.

Exercise 27

(here³) Find the difference: $3\frac{5}{9} - 2\frac{2}{3}$.

*(Solution on p. 4.)***Exercise 28**

(here⁴) Find the quotient: $4.6 \div 0.11$.

Exercise 29

(here⁵) Use the distributive property to compute the product: $25 \cdot 37$.

(Solution on p. 4.)

¹"Multiplication and Division of Whole Numbers: Properties of Multiplication" <<http://cnx.org/content/m34867/latest/>>

²"Introduction to Fractions and Multiplication and Division of Fractions: Division of Fractions"
<<http://cnx.org/content/m34929/latest/>>

³"Addition and Subtraction of Fractions, Comparing Fractions, and Complex Fractions: Addition and Subtraction of Mixed Numbers" <<http://cnx.org/content/m34936/latest/>>

⁴"Decimals: Nonterminating Divisions" <<http://cnx.org/content/m34969/latest/>>

⁵"Techniques of Estimation: Mental Arithmetic- Using the Distributive Property"
<<http://cnx.org/content/m35013/latest/>>

Solutions to Exercises in this Module

Solution to Exercise (p. 2)

Results may vary. $\frac{1}{2} + \frac{1}{2} = 1$. In fact, $\frac{5}{8} + \frac{5}{12} = \frac{25}{24} = 1\frac{1}{24}$

Solution to Exercise (p. 2)

Results may vary. $1 + \frac{1}{2} = 1\frac{1}{2}$. In fact, $\frac{7}{9} + \frac{3}{5} = 1\frac{17}{45}$

Solution to Exercise (p. 2)

Results may vary. $8\frac{1}{4} + 3\frac{3}{4} = 11 + 1 = 12$. In fact, $8\frac{4}{15} + 3\frac{7}{10} = 11\frac{29}{30}$

Solution to Exercise (p. 2)

Results may vary. $(16 + 0) + (4 + 1) = 16 + 5 = 21$. In fact, $16\frac{1}{20} + 4\frac{7}{8} = 20\frac{37}{40}$

Solution to Exercise (p. 2)

$1 + 1 = 2$ ($1\frac{17}{24}$)

Solution to Exercise (p. 2)

$1 + \frac{1}{2} = 1\frac{1}{2}$ ($1\frac{1}{2}$)

Solution to Exercise (p. 2)

$\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ ($\frac{39}{100}$)

Solution to Exercise (p. 2)

$1 + 0 = 1$ ($1\frac{1}{48}$)

Solution to Exercise (p. 2)

$\frac{1}{2} + 6\frac{1}{2} = 7$ ($6\frac{103}{132}$)

Solution to Exercise (p. 2)

$1 + 2\frac{1}{2} = 3\frac{1}{2}$ ($3\frac{11}{40}$)

Solution to Exercise (p. 2)

$8\frac{1}{2} + 4 = 12\frac{1}{2}$ ($12\frac{13}{20}$)

Solution to Exercise (p. 3)

$9 + 7 = 16$ ($15\frac{13}{15}$)

Solution to Exercise (p. 3)

$3\frac{1}{2} + 2\frac{1}{2} + 2 = 8$ ($7\frac{189}{200}$)

Solution to Exercise (p. 3)

$1 - 1 = 0$ ($\frac{1}{16}$)

Solution to Exercise (p. 3)

associative

Solution to Exercise (p. 3)

$\frac{8}{9}$

Solution to Exercise (p. 3)

$25(40 - 3) = 1000 - 75 = 925$