
MM1-270: Identifying Place Value in Decimal Numbers

The place values of decimal numbers are similar to the place values of whole numbers, but with a few important differences. A decimal number represents part of a whole. Examine the place value chart below and notice that the place to the right of the decimal is the tenths place. The place values after the decimal point end in “-ths.” After the decimal point, the place value pattern moves from left to right. This is the opposite of the numbers before the decimal point, where the place value pattern moves from right to left. In whole numbers, commas are used to separate place values; however, commas are not used to separate decimal place values. The whole number and decimal place values, when written, are separated by the word “and.” In standard form this is signified by a decimal point.

Tens	Ones	Tenths	Hundredths	Thousandths	Ten– Thousandths	Hundred– Thousandths	Millionths

Place Value

A system for writing numbers in which the position of the digit determines its value.

Example 1 Write the following decimal in word form: 42.08

Tens	Ones	Tenths	Hundredths
4	2	0	8

Step 1: Put the number in a place value chart and identify each digit’s place value.

Forty-two and...

Step 2: Write the whole number in words followed by “and.”

Forty-two and **eight hundredths**

Step 3: Write the decimal portion of the number by identifying the place value farthest to the right.

Answer: Forty-two and eight hundredths

Example 2 Identify the place value of the underlined digit: 57.568 $\overline{2}$

Tens	Ones	Tenths	Hundredths	Thousandths	Ten- Thousandths
5	7	<u>5</u>	6	8	2

Step 1: Put the number in a place value chart.

Thousandths

Step 2: Identify the place value of the underlined digit.

Answer: The underlined digit eight is in the thousandths place.

Example 3 Write “sixteen and twenty-five hundredths” as a decimal number.

Tens	Ones	Tenths	Hundredths
1	6		

Step 1: Put the whole number in the place value chart before the decimal.

Tens	Ones	Tenths	Hundredths
1	6	2	5

Step 2: Place the decimal portion in the chart starting with the last digit. Put the last digit in the place value position named in writing. The 5 must be in the hundredths place, so the 2 must be in the tenths place.

Answer: 16.25

Example 4 Write “twenty and four hundred six thousandths” as a decimal number.

Tens	Ones	Tenths	Hundredths	Thousandths
2	0			

Step 1: Put the whole number in the place value chart before the decimal.

Tens	Ones	Tenths	Hundredths	Thousandths
2	0	4	0	6

Step 2: Place the decimal portion in the chart starting with the last digit. Put the last digit in the place value position named in writing. The 6 must be in the thousandths place, so the 4 and 0 go in the two spots in front of the 6.

Answer: 20.406

Example 5

Write the following decimal in word form: 30.45041

Tens	Ones	Tenths	Hundredths	Thousandths	Ten— Thousandths	Hundred— Thousandths
3	0	4	5	0	4	1

Step 1: Put the number in the place value chart and identify each digit.

Thirty and

Step 2: Write the whole number in words followed by “and.”Thirty and **forty-five thousand forty-one hundred thousandths****Step 3:** Write the decimal portion of the number by identifying the place value farthest to the right.**Answer:** Thirty and forty-five thousand forty-one hundred thousandths.**Problem Set****Solve:**

- Write the following decimal number in word form:
34.2
- Write the following decimal number in word form:
98.6
- Write the following decimal number in word form:
57.92
- Write the following decimal number in word form:
6.58
- Write the following decimal number in word form:
43.01
- Identify the place value of the underlined digit:
12.5687
- Identify the place value of the underlined digit:
56.3789
- Identify the place value of the underlined digit:
6.3782
- Identify the place value of the underlined digit:
20.02
- Identify the place value of the underlined digit:
32.063
- Write “forty-eight and twenty-six hundredths” as a decimal number.
- Write “sixty-eight and two hundred fifty-six thousandths” as a decimal number.
- Write “sixteen and twelve hundredths” as a decimal number.
- Write “two hundred and two hundred six thousandths” as a decimal number.
- Write “twenty and thirty-eight thousandths” as a decimal number.
- Write “thirty-two and twelve thousandths” as a decimal number.
- Write the following decimal number in word form:
32.01548
- Write the following decimal number in word form:
12.52026
- Write the following decimal number in word form:
200.626032
- Write the following decimal number in word form:
85.62024

MM1-295: Rounding Decimals to the Nearest Tenth, Hundredth and Thousandth

Rounding decimals is a useful tool. The steps for rounding decimals are similar to the steps for rounding whole numbers.

Round 2.83425 to the nearest hundredths place.

Step 1: Look at the digit one place to the right of the place value to which you are rounding. If that digit is five or greater, add one to the place value you are rounding. If the digit is less than five, do not change the digit in the place value to which you are rounding.

$$\begin{array}{r} 2.83425 \\ \quad \updownarrow \end{array}$$

Step 2: Change the digits after the rounded digit to zeros. In a decimal number, zeros at the end may be dropped without changing the value of the number.

$$2.83425 \rightarrow 2.83000$$

Answer: $2.83425 \approx 2.83$

Example 1

Round 6.673 to the nearest tenths place.

$$\begin{array}{r} 6.673 \\ \quad \underline{} \end{array}$$

Step 1: Look at the digit one place to the right of the tenths place. There is a 6 in the tenths place and a 7 in the hundredths place.

$$\begin{array}{r} 6.673 \\ \quad \uparrow \end{array}$$

Step 2: If the digit is five or greater, then add one to the place value you are rounding. If the digit is less than five, keep it the same. The number 7 is greater than five, so add one to 6 in the tenths place to make it a 7.

$$\begin{array}{r} 6.700 \\ \quad \underline{} \end{array}$$

Step 3: Change all place values to the right of the tenths place to zeros. The zeros at the end are dropped.

Answer: 6.7

Example 2

Ben swam the 100-meter breaststroke in 42.317 seconds. What is Ben's time rounded to the nearest tenth of a second?

$$\begin{array}{r} 42.317 \\ \quad \underline{} \end{array}$$

Step 1: Look at the digit one place to the right of the tenths place. There is a 3 in the tenths place and a 1 in the hundredths place.

$$\begin{array}{r} 42.317 \\ \quad \uparrow \end{array}$$

Step 2: If the digit is five or greater, then add one to the place value you are rounding. If the digit is less than five, keep it the same. The number 1 is less than five, so the 3 in the tenths place remains a 3.

$$42.300$$

Step 3: Change all place values to the right of the tenths place to zeros. The zeros at the end are dropped.

Answer: Ben's time rounded to the nearest tenth of a second is 42.3 seconds.

Example 3 Round 8.6327 to the nearest hundredths place.

8.6327 **Step 1:** Look at the digit one place to the right of the hundredths place. There is a 3 in the hundredths place and a 2 in the thousandths place.

8.6327
 ↑
 3 **Step 2:** If the digit is five or greater, then add one to the place value you are rounding. If the digit is less than five, keep it the same. The number 2 is less than five, so the 3 in the hundredths place remains a 3.

8.6300 **Step 3:** Change all place values to the right of the hundredths place to zeros. The zeros at the end are dropped.

Answer: 8.63

Example 4 Sky Anne has a kitten that weighs 8.3481 pounds. What will the kitten weigh on a scale that is accurate to the nearest hundredth of a pound?

8.3481 **Step 1:** Look at the digit one place to the right of the hundredths place. There is a 4 in the hundredths place and an 8 in the thousandths place.

8.3481
 ↑
 8 **Step 2:** If that digit is five or greater, then add one to the place value you are rounding. If the digit is less than five, keep it the same. The number 8 is greater than five, so add one to the 4 in the hundredths place to make it a 5.

8.3500 **Step 3:** Change all place values to the right of the hundredths place to zeros. The zeros at the end are dropped.

Answer: The kitten will weigh 8.35 pounds on a scale that is accurate to the nearest hundredth of a pound.

Example 5 Round 5.93246 to the nearest thousandths place.

5.93246 **Step 1:** Look at the digit one place to the right of the thousandths place. There is a 2 in the thousandths place and a 4 in the ten-thousandths place.

5.93246
 ↑
 4 **Step 2:** If that digit is five or greater, then add one to the place value you are rounding. If the digit is less than five, keep it the same. The number 4 is less than five, so the 2 in the thousandths place remains a 2.

5.93200 **Step 3:** Change all place values to the right of the thousandths place to zeros. The zeros at the end are dropped.

Answer: 5.932

Problem Set

Solve:

1. Round 0.145 to the nearest tenths place. Write the answer as a decimal number.
2. Round 97.083 to the nearest tenths place. Write the answer as a decimal number.
3. Round 9.09 to the nearest tenths place. Write the answer as a decimal number.
4. Round 85.91 to the nearest tenths place. Write the answer as a decimal number.
5. Round 8.651 to the nearest tenths place. Write the answer as a decimal number.
6. Joy's surfboard measures 6.854 feet in length. What is the length of Joy's surfboard rounded to the nearest tenth of a foot? Write the answer as a decimal number.
7. Jill swam 50 meters in 30.745 seconds. What is Jill's time rounded to the nearest tenth of a second? Write the answer as a decimal number.
8. Jake ran a mile in 4.29 minutes. Round Jake's time to the nearest tenth of a minute. Write the answer as a decimal number.
9. The Tiger-banded moth has a wingspread of 2.43 inches. Round the moth's wingspread to the nearest tenth of an inch. Write the answer as a decimal number.
10. It took Melton 48.119 seconds to eat the pie in the school pie-eating contest. Round Melton's time to the nearest tenth of a second. Write the answer as a decimal number.
11. Round 9.7327 to the nearest hundredths place. Write the answer as a decimal number.
12. Round 0.0918 to the nearest hundredths place. Write the answer as a decimal number.
13. Round 69.197 to the nearest hundredths place. Write the answer as a decimal number.
14. Jason weighs 119.457 pounds. What will Jason weigh on a scale that is accurate to the nearest hundredth of a pound? Write the answer as a decimal number.
15. Rick's dog weighs 37.0142 pounds. What will the dog weigh on a scale that is accurate to the nearest hundredth of a pound? Write the answer as a decimal number.
16. Tamara's dog weighs 28.7158 pounds. What will the dog weigh on a scale that is accurate to the nearest hundredth of a pound? Write the answer as a decimal number.
17. Round 183.7497 to the nearest thousandths place. Write the answer as a decimal number.
18. Round 212.1238 to the nearest thousandths place. Write the answer as a decimal number.
19. Round 4.2574 to the nearest thousandths place. Write the answer as a decimal number.
20. Round 1.8997 to the nearest thousandths place. Write the answer as a decimal number.

MM1-115: Writing Fractions in Simplest Form

Simplest Form

A fraction is in simplest form when the Greatest Common Factor (GCF) of the numerator and denominator is 1.

The fraction $\frac{2}{5}$ is in simplest form because the factors of 2 are 1 and 2; the factors of 5 are 1 and 5; and the GCF of the numerator and denominator is 1.

The fraction $\frac{6}{8}$ is not in simplest form because the factors of 6 are 1, 2, 3 and 6; the factors of 8 are 1, 2, 4 and 8; and 2 is the greatest common factor of both.

To write the fraction $\frac{6}{8}$ in simplest form, divide the numerator and denominator by their GCF, which is 2.

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

So, $\frac{6}{8}$ in simplest form is $\frac{3}{4}$.

Equivalent Fraction

Equivalent fractions are two fractions that are equal in value.

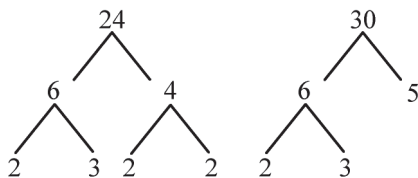
To write $\frac{12}{18}$ in simplest form, divide the numerator and denominator by their GCF, which is 6.

$$\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$$

$\frac{12}{18}$ and $\frac{2}{3}$ are **equivalent fractions**, and $\frac{12}{18}$ in simplest form is $\frac{2}{3}$.

Another way to write a fraction in simplest form is to write the numerator and denominator in prime factorization form. A factor tree will help you see all the common factors to divide both the numerator and denominator.

To write $\frac{24}{30}$ in simplest form, completely factor 24 and 30.



$$\frac{24}{30} = \frac{\cancel{2} \times 2 \times 2 \times \cancel{3}}{\cancel{2} \times \cancel{3} \times 5} = \frac{2 \times 2}{5} = \frac{4}{5}$$

$\frac{24}{30}$ in simplest form is $\frac{4}{5}$.

Write $\frac{18}{54}$ in simplest form.

$$\frac{18}{54} = \frac{\cancel{2} \times \cancel{3} \times \cancel{3}}{\cancel{2} \times \cancel{3} \times \cancel{3} \times 3} = \frac{1}{3}$$

$\frac{18}{54}$ in simplest form is $\frac{1}{3}$.

Example 1 Find the greatest common factor (GCF) needed to reduce $\frac{10}{14}$ to simplest form.

The factors of 10 are 1, 2, 5.

Step 1: Factor the numerator.

The factors of 14 are 1, 2, 7.

Step 2: Factor the denominator.

The GCF is 2.

Step 3: Find the GCF.

Answer: 2

Example 2 Write $\frac{6}{10}$ in simplest form.

$$6 = 2 \times 3$$

Step 1: Factor the numerator.

$$10 = 2 \times 5$$

Step 2: Factor the denominator.

The GCF is 2.

Step 3: Find the GCF.

$$\frac{6}{10} = \frac{6 \div 2}{10 \div 2} = \frac{3}{5}$$

Step 4: Divide numerator and denominator by the GCF.

Answer: $\frac{3}{5}$

Example 3 Write $\frac{8}{24}$ in simplest form.

$$8 = 2 \times 2 \times 2$$

Step 1: Factor the numerator.

$$24 = 2 \times 2 \times 2 \times 3$$

Step 2: Factor the denominator.

$$\begin{array}{l} 8 = \cancel{2} \times \cancel{2} \times \cancel{2} \\ 24 = \cancel{2} \times \cancel{2} \times \cancel{2} \times 3 \end{array}$$

Step 3: Find the common factors of the numerator and denominator.

The GCF is $2 \times 2 \times 2 = 8$.

Step 4: Find the GCF.

$$\frac{8}{24} = \frac{8 \div 8}{24 \div 8} = \frac{1}{3}$$

Step 5: Divide the numerator and denominator by the GCF.

Answer: $\frac{1}{3}$

Example 4 Write $\frac{25}{150}$ in simplest form.

$$25 = 5 \times 5$$

Step 1: Factor the numerator.

$$150 = 2 \times 3 \times 5 \times 5$$

Step 2: Factor the denominator.

$$\frac{25}{150} = \frac{\cancel{5} \times \cancel{5}}{2 \times 3 \times \cancel{5} \times \cancel{5}} = \frac{1}{2 \times 3}$$

Step 3: Divide all common factors.

$$\frac{1}{2 \times 3} = \frac{1}{6}$$

Step 4: Multiply the remaining factors in the numerator and denominator.

Answer: $\frac{1}{6}$

Example 5 Find the fraction that is not in simplest form.

$$\frac{2}{7}, \frac{3}{5}, \frac{5}{12}, \frac{7}{28}$$

$\frac{2}{7}$ is in simplest form.

Step 1: Both numerator and denominator are prime.

$\frac{3}{5}$ is in simplest form.

Step 2: Both numerator and denominator are prime.

$\frac{5}{12}$ is in simplest form.

Step 3: The numerator is prime and is not a factor of the denominator.

$\frac{7}{28}$ is not in simplest form.

Step 4: Both numerator and denominator are divisible by 7.

Answer: $\frac{7}{28}$

Problem Set

Solve:

- Find the greatest common factor (GCF) needed to reduce $\frac{4}{6}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{8}{10}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{5}{20}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{4}{14}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{15}{25}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{14}{28}$ to simplest form.
- Find the greatest common factor (GCF) needed to reduce $\frac{2}{6}$ to simplest form.
- Write $\frac{6}{8}$ in simplest form.
- Write $\frac{4}{10}$ in simplest form.
- Write $\frac{14}{35}$ in simplest form.
- Write $\frac{24}{72}$ in simplest form.
- Write $\frac{24}{90}$ in simplest form.
- Write $\frac{50}{90}$ in simplest form.
- Write $\frac{25}{95}$ in simplest form.
- Write $\frac{48}{100}$ in simplest form.
- Write $\frac{52}{64}$ in simplest form.
- Find the fraction that is not in simplest form:
 $\frac{2}{9}, \frac{3}{12}, \frac{4}{7}, \frac{5}{9}$
- Find the fraction that is not in simplest form:
 $\frac{4}{5}, \frac{3}{8}, \frac{2}{5}, \frac{4}{8}$
- Find the fraction that is not in simplest form:
 $\frac{13}{16}, \frac{15}{18}, \frac{14}{19}, \frac{15}{22}$
- Find the fraction that is not in simplest form:
 $\frac{2}{9}, \frac{3}{9}, \frac{5}{7}, \frac{4}{9}$

11. $\frac{5}{3}$ 13. 5 : 6 15. 5 : 4 17. 2 to 11 19. 4 to 11

MM1-210: Identifying and Writing Equal Ratios

1. 4 3. 7 5. 12 7. $\frac{40}{90} = \frac{4}{9}$ 9. $\frac{64}{70} = \frac{32}{35}$
11. $\frac{7}{15} = \frac{21}{45}$ 13. 12 : 24 15. 24 : 26 17. 2 : 7 19. 2:8, 4:16, 5:20

MM1-215: Identifying a Rate to Solve Problems

1. 100 miles 3. 24 pints 5. 30 feet 7. $\frac{8}{1}$ 9. $\frac{2}{1}$
11. 5 13. 6 15. 8 17. Store B 19. Store D

MM1-220: Writing and Forming Proportions

1. 210 3. 18 5. 10 7. Dolly 9. $\frac{40}{32} = \frac{50}{40}$
11. $\frac{3}{4} = \frac{15}{20}$ 13. $\frac{40}{16} = \frac{50}{20}$ 15. $\frac{44}{24} = \frac{11}{6}$ 17. 190 19. 3

MM1-225: Solving Proportions

1. $\frac{6}{2} = \frac{?}{25}$ 3. $\frac{6}{2} = \frac{?}{8}$ 5. $\frac{3}{20} = \frac{?}{60}$ 7. 48 9. 50
11. 35 13. 15 15. 72 17. 60 gallons 19. 150 meatballs

MM1-230: Finding the Probability of Simple Events

1. $\frac{1}{2}$ 3. $\frac{1}{4}$ 5. $\frac{3}{5}$ 7. $\frac{1}{6}$ 9. $\frac{1}{2}$ 11. $\frac{1}{12}$ 13. $\frac{5}{16}$ 15. $\frac{1}{15}$ 17. $\frac{5}{12}$ 19. $\frac{13}{28}$

MM1-235: Finding Experimental Probability

1. $\frac{1}{10}$ 3. $\frac{1}{5}$ 5. $\frac{2}{15}$ 7. $\frac{1}{3}$ 9. $\frac{3}{5}$ 11. 35 13. 39 15. $\frac{1}{2}$ 17. $\frac{3}{8}$ 19. $\frac{3}{4}$

MM1-270: Identifying Place Value in Decimal Numbers

1. thirty-four and two tenths 3. fifty-seven and ninety-two hundredths
5. forty-three and one hundredth 7. hundredths
9. hundredths 11. 48.26
13. 16.12 15. 20.038

17. thirty-two and one thousand five hundred forty-eight hundred thousandths

19. two hundred and six hundred twenty-six thousand thirty-two millionths

MM1-275: Comparing Decimal Numbers

1. 0.6301 3. 0.3945 5. 83.04 7. < 9. <

11. 19.57 13. 18.15 15. Ruby A 17. Ruby A and Ruby B 19. Swimming Pool A and Swimming Pool D

MM1-280: Identifying and Writing Decimals to the Hundredths and Thousandths

1. 23.14 3. 29.13 5. 34.32 7. seven and twenty-eight hundredths 9. one and forty-six hundredth

11. 88.062 13. 20.003 15. three and two hundredths 17. 45.033 19. 54.07

MM1-285: Ordering Decimals According to the Tenths, Hundredths and Thousandths

1. 0.58, 0.35, 0.008

3. 0.59, 0.46, 0.002

5. 0.014, 0.69, 0.92

7. 4.021, 4.201, 4.241

9. 4.991, 4.901, 4.091

11. 2.525, 25.025, 25.725, 25.809

13. 45.802, 45.724, 45.024, 4.524

15. 0.533, 0.525, 0.526, 0.529

17. Sprinter F

19. Dog 6

MM1-290: Rounding Decimals to the Nearest Whole Number

1. 246 3. 762 5. 486 7. 69 9. 73 11. 20 13. 40 15. 0 17. 77 19. 29

MM1-295: Rounding Decimals to the Nearest Tenth, Hundredth and Thousandth

1. 0.1 3. 9.1 5. 8.7 7. 30.7 9. 2.4

11. 9.73 13. 69.2 15. 37.01 17. 183.75 19. 4.257

MM1-300: Adding and Subtracting Decimals

1. 5.91 3. 11.71 5. 14.51 7. 1.43 9. 2.48

11. 15.01 13. 14.81 15. 1.36 17. 15.79 19. 23.46

MM1-305: Estimating Products by Rounding to the Nearest Whole Number

1. 15 3. 200 5. 75 7. \$40 9. \$60 11. \$56 13. \$50 15. 200 17. \$60 19. 600

MM1-075: Dividing with Remainders and Zeros in the Quotient

1. 102 3. 201 5. 404 7. 300 9. 800r4
 11. 10r9 13. 209r1 15. 400 miles per hour 17. 2,004r5 19. 1,008r10

MM1-080: Identifying Order of Operations Using Multiplication, Addition and Subtraction

1. 13 3. 38 5. 355 7. 10 9. 24
 11. 31 13. 92 15. 6 17. $2 \times 8 + 1 = 17$ 19. $7 \times 7 - 5 + 8 = 52$

MM1-085: Identifying Order of Operations for Multiplication, Addition and Subtraction Using Parentheses and Exponents

1. 100 3. 108 5. 2 7. 25 9. 67 11. 14 13. 72 15. 80 17. 132 19. 16

MM1-090: Identifying Prime and Composite Numbers

1. prime 3. prime 5. composite 7. 1 and 17 9. 1 and 23
 11. 29 13. 127 15. composite 17. 53 and 3 19. 11 and 19

MM1-095: Expressing a Number as a Product of Prime Numbers

1. 3×7 3. 2×3^3 5. $2 \times 3 \times 7$ 7. $2^3 \times 3^2$ 9. 23 11. 2^4 13. 29 15. 5×17 17. 45

MM1-105: Identifying the Greatest Common Factor and the Least Common Multiple

1. 3 3. 4 5. 2 7. 24 9. 10 11. 6 13. 6 15. 18 17. 3 19. 320

MM1-110: Comparing and Ordering Fractions with Like Denominators

1. = 3. = 5. < 7. $\frac{2}{4}, \frac{3}{4}, \frac{4}{4}$ 9. $\frac{3}{9}, \frac{4}{9}, \frac{7}{9}$
 11. $\frac{10}{12}, \frac{8}{12}, \frac{4}{12}, \frac{3}{12}$ 13. $\frac{9}{88}, \frac{13}{88}, \frac{20}{88}, \frac{55}{88}, \frac{66}{88}$ 15. $\frac{8}{32}, \frac{14}{32}, \frac{25}{32}, \frac{28}{32}, \frac{31}{32}$ 17. $\frac{6}{8}, \frac{5}{8}, \frac{3}{8}, \frac{2}{8}, \frac{1}{8}$ 19. $\frac{4}{3}, \frac{7}{3}, \frac{8}{3}, \frac{13}{3}, \frac{15}{3}$

MM1-115: Writing Fractions in Simplest Form

1. 2 3. 5 5. 5 7. 2 9. $\frac{2}{5}$ 11. $\frac{1}{3}$ 13. $\frac{5}{9}$ 15. $\frac{12}{25}$ 17. $\frac{3}{12}$ 19. $\frac{15}{18}$

MM1-120: Identifying Proper and Improper Fractions

1. $\frac{9}{16}$ 3. $\frac{5}{8}$ 5. $\frac{10}{12}$ 7. $\frac{15}{20}$ 9. $\frac{9}{6}$ 11. $\frac{19}{7}$ 13. $\frac{13}{9}$ 15. $2\frac{4}{5}$ 17. $2\frac{7}{8}$ 19. $5\frac{5}{8}$

MPA-030: Finding Least Common Multiple of Two or More Numbers

To find the multiples of a number, start multiplying the number by 1, 2, 3, 4, and so on. The answers you find from this process are called the **multiples** of that number. In this lesson, you'll learn how to find the **least common multiple** of two numbers.

Least Common Multiple (LCM)

The smallest non-zero number that is common between the multiples or products of two or more numbers.

Two methods will help you find the least common multiple (LCM) of numbers. The first is listing the multiples. To find the LCM by listing the multiples:

- Write the multiples of the numbers in a list.
- List the multiples until you find a multiple common to the lists.

Find the LCM in the following problems by listing the multiples.

Example 1 Find the LCM of 6 and 8.

6 → 6, 12, 18, **24**, 30, 36, 42, 48

Step 1: List the multiples of 6.

8 → 8, 16, **24**

Step 2: List the multiples of 8 until you find a common multiple.

Answer: The LCM is 24.

Example 2 Find the LCM of 7 and 9.

7 → 7, 14, 21, 28, 35, 42, 49, 56, **63**

Step 1: List the multiples of 7.

9 → 9, 18, 27, 36, 45, 54, **63**

Step 2: List the multiples of 9 until you find a multiple common to both.

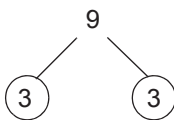
Answer: The LCM is 63.

The second method of finding the LCM is to factor the numbers into primes. To find the LCM using factors:

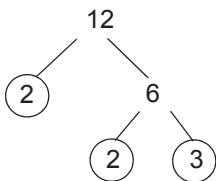
- Create a factor tree to find the prime factorization of the numbers. Be careful that you do not confuse finding the least common multiple with finding the greatest common factor (GCF).
- Multiply all the unique factors and one of each of the common factors.

In the following examples, you'll use factoring trees to find the LCM.

Example 3 Find the LCM of 9 and 12.



Step 1: Find the prime factorization of 9.



Step 2: Find the prime factorization of 12.

$$9 = 3 \times 3$$

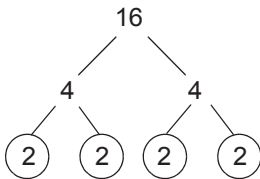
$$12 = 2 \times 2 \times 3$$

$$2 \times 2 \times 3 \times 3 = 36$$

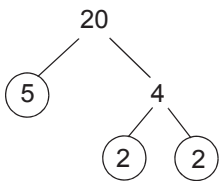
Step 3: Multiply all the factors except those that occur in both lists. The factors that occur in both lists should only be used once.

Answer: The LCM is 36.

Example 4 Find the LCM of 16 and 20.



Step 1: Find the prime factorization of 16.



Step 2: Find the prime factorization of 20.

$$16 = 2 \times 2 \times 2 \times 2$$

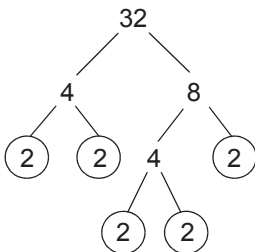
$$20 = 2 \times 2 \times 5$$

$$2 \times 2 \times 2 \times 2 \times 5 = 80$$

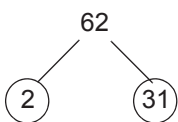
Step 3: Multiply all the factors except those that occur in both lists. Use those only once.

Answer: The LCM is 80.

Example 5 Find the LCM of 32 and 62.



Step 1: Find the prime factorization of 32.



Step 2: Find the prime factorization of 62.

$$32 = 2 \times 2 \times 2 \times 2 \times 2$$

$$62 = 2 \times 31$$

$$2 \times 2 \times 2 \times 2 \times 2 \times 31 = 992$$

Step 3: Multiply all the factors except those that occur in both lists. Use those only once.

Answer: The LCM is 992.

Problem Set

- Find the LCM of 5 and 7 by listing the multiples of each number.
- LCM stands for:
Least Common Multiple
Least Common Mean
Least Common Factor
Greatest Common Factor
- Use prime factorization to find the LCM of 9 and 6.
- Use prime factorization to find the LCM of 9 and 81.
- Use prime factorization to find the LCM of 12, 18 and 36.
- Find the LCM of 6, 10 and 15 by listing the multiples of each number.
- Find the LCM of 2, 5 and 8. (Use any method.)
- Albert and Milton love to jog laps at the park. Albert makes a lap in 8 minutes and Milton makes one in 6 minutes. If they start at the same time, how many minutes will it take for them to meet up?
- Michelle, Robert, and Danny are running a race. Michelle takes 20 seconds to complete one lap, Robert takes 40 seconds, and Danny takes 60 seconds. If Michelle and Danny start at the same time, in how many seconds will they cross the starting line together?
- It takes Tom 45 seconds to complete one lap of the track. Brad takes 55 seconds. How many seconds will pass before they finally meet up?
- Raymond's toy car takes 15 seconds to complete one lap. Sergio's car takes 25 seconds to complete the same lap. How many seconds will it take for the two cars to be side by side?
- Jack, Jill, and Fred are running a race. It takes Jack 12 minutes to lap the track. Jill takes 16 minutes. Fred completes the lap in 18 minutes. After how many minutes will Jack and Fred first meet on the track?
- Alexis was asked to subtract $\frac{1}{10}$ from $\frac{7}{12}$. In order to do this, she needed to find the least common multiple of the denominators for 10 and 12. What is the LCM for 10 and 12?
- The LCM of 2 given numbers is the smallest number that the 2 given numbers will divide into evenly.
False True
- Find the LCM of 3 and 7 by listing the multiples of each number.
- Find the LCM of 4 and 13. (Use any method.)

MPA-027: Finding the Greatest Common Factor

1. 12 3. 3 5. 3 7. 10 9. 2 11. 7 13. 9 pieces of bread 15. 12 pads

MPA-028: Reducing Fractions to Lowest Terms / Simplest Form

1. $\frac{1}{2}$ 3. $\frac{1}{4}$ 5. $\frac{1}{7}$ 7. $\frac{2}{7}$ 9. $\frac{1}{3}$ 11. $\frac{12}{16}$ 13. $\frac{1}{2}$ 15. $\frac{18}{19}$ 17. $\frac{1}{5}$ 19. $\frac{4}{12}$

MPA-029: Converting Fractions and Decimals

1. 0.17 3. 0.7 5. $\frac{12}{25}$ 7. 0.875 9. 0.75
 11. 0.25 13. $\frac{21}{100}$ 15. $\frac{51}{200}$ 17. $\frac{69}{100}$ 19. $\frac{3}{15}$

MPA-030: Finding Least Common Multiple of Two or More Numbers

1. 35 3. 18 5. 36 7. 40 9. 60 seconds 11. 75 seconds 13. 60 15. 21

MPA-031: Comparing and Ordering Fractions and Decimals

1. < 3. > 5. < 7. < 9. $\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}$
 11. $\frac{1}{4}, \frac{2}{6}, \frac{5}{12}, \frac{6}{8}$ 13. Tabitha 15. Plant A, B, D, C 17. $\frac{1}{3}, \frac{4}{9}, \frac{3}{6}, \frac{13}{18}$ 19. Stone's Discount Store

MPA-032: Converting Improper Fractions and Mixed Numbers

1. $\frac{7}{5}$ 3. 6 5. $4\frac{3}{4}$ 7. $\frac{12}{1}$ 9. proper fraction 11. < 13. $9\frac{2}{5}$ 15. $\frac{31}{8}$ 17. $5\frac{1}{4}$ 19. >

MPA-033: Estimating Computations with Fractions and Mixed Numbers

1. $1\frac{1}{2}$ 3. 18 5. 9 7. 9 9. 32 11. 7 13. 65 15. 39 17. No 19. 33

MPA-034: Adding and Subtracting Fractions

1. $\frac{6}{7}$ 3. $1\frac{1}{2}$ 5. $1\frac{2}{25}$ 7. $\frac{21}{22}$ 9. $\frac{1}{11}$ 11. $\frac{43}{60}$ 13. $\frac{1}{2}$ cup 15. $1\frac{1}{8}$ 17. $\frac{7}{8}$ 19. $\frac{31}{40}$