# Number Sense and Operations



## Unit 1: Number Sense and Operations

You are surrounded by numbers. Whether paying bills, negotiating a car loan, budgeting for rent or groceries, depositing a check, or withdrawing money, you use basic math skills such as addition, subtraction, multiplication, and division to perform a variety of everyday tasks.

In the same way, number sense and operations play an important part on the GED® Mathematical Reasoning Test. In Unit 1, you will study whole numbers, operations, integers, fractions, ratios and proportions, decimals, and percent, all of which will help you prepare for the GED® Mathematical Reasoning Test.

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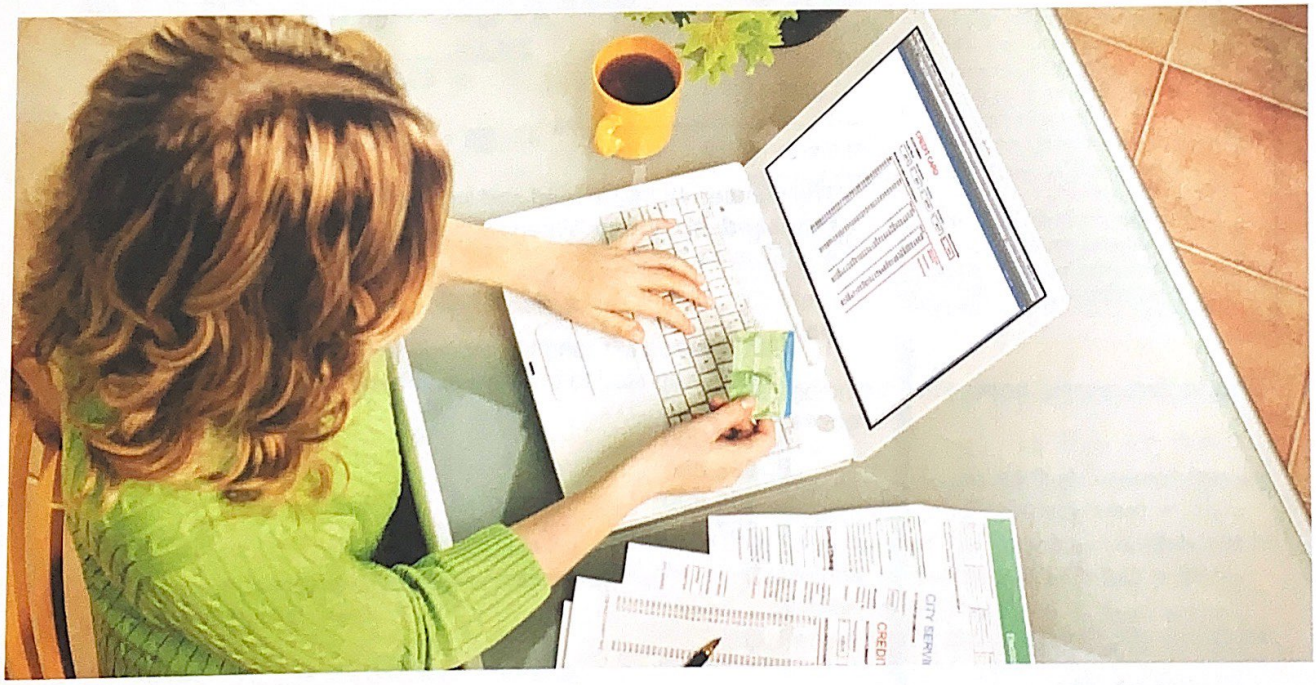


*People use essential math skills to complete everyday tasks such as budgeting, paying bills, and saving and investing money.*

LESSON 1

# Whole Numbers

MATH CONTENT TOPICS: Q.1.d, Q.6.c
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.e, MP.2.c, MP.5.c

UNIT 1

## 1 Learn the Skill

**Whole numbers** are written with the digits 0 through 9. The value of a digit in a whole number depends on its place. The value of a whole number is the sum of the values of its digits. When you write a whole number, place commas every three digits counting from the right.

Write a whole number in words just like you read it (for example, *two hundred twelve* would be written numerically as *212*). To compare and order whole numbers, compare digits that have the same place value. In some problems, you may need to round whole numbers to a certain place value.

## 2 Practice the Skill

To successfully solve problems on the GED® Mathematical Reasoning Test, you must understand place value, how to read and write whole numbers, how to compare and order whole numbers, and how to round whole numbers. Read the example and strategies below. Then answer the question that follows.

**a** Tables make information easier to compare by organizing it in labeled rows and columns. Most tables, including this one, present information from left to right and from top to bottom.

| Millions | | | Thousands | | | Units | | |
|---|---|---|---|---|---|---|---|---|
| hundreds | tens | ones | hundreds | tens | ones | hundreds | tens | ones |
| | | | | 4 (b) | 3 | 0 | 6 | 2 |

**b** The value of a whole number is the sum of the values of its digits. For example, the value of the *4* is actually *40,000* because it is in the ten thousands place.

$$\begin{aligned} 4 \times 10{,}000 &= 40{,}000 \\ 3 \times 1{,}000 &= 3{,}000 \\ 0 \times 100 &= 000 \\ 6 \times 10 &= 60 \\ 2 \times 1 &= 2 \\ &= \mathbf{43{,}062} \end{aligned}$$

**c** When you compare whole numbers, the number with the most digits is greater. If two numbers have the same number of digits, compare the digits from left to right. Understanding these symbols will aid in comparing whole numbers:
= means *equals*
> means *is greater than*
< means *is less than*

43,062 > 43,041

The number *43,062* is read and written in words as **forty-three thousand, sixty-two.** When rounded to the hundreds place, 43,062 is **43,100.**

### TEST-TAKING TIPS

Circle the digit you want to round. If the digit to the right of the circled digit is 5 or more, add 1 to the circled digit. If it is less than 5, do not change the circled digit.

1. Carrie needs to round her income to the thousands place. What is $56,832 rounded to the thousands place?

   A. $56,000
   B. $56,800
   C. $56,900
   D. $57,000

## 3 Apply the Skill

**DIRECTIONS:** Read each question, and choose the **best** answer.

2. Meredith wrote a check for $182 to pay a bill. How is 182 written in words?

   A. one hundred eight-two
   B. one hundred eighty-two
   C. one hundred and eighteen-two
   D. one-hundred eighty and two

3. Mr. Murphy rounds his students' test scores to the tens place. Jonathan's test score is 86. What is his test score rounded to the tens place?

   A. 80
   B. 86
   C. 90
   D. 100

4. Each book in a historical library is given a number. The books are arranged on shelves according to their numbers. The range of numbers for shelves I through L is shown below.

   Shelf I 1337–1420
   Shelf J 1421–1499
   Shelf K 1500–1622
   Shelf L 1623–1708

   On which shelf would you find a book numbered 1384?

   A. Shelf I
   B. Shelf J
   C. Shelf K
   D. Shelf L

5. Michael swam 2,450 yards on Monday, 2,700 yards on Tuesday, and 2,250 yards on Wednesday. What is the order of his daily swim yardage from least to greatest?

   A. 2,450; 2,700; 2,250
   B. 2,250; 2,700; 2,450
   C. 2,250; 2,450; 2,700
   D. 2,700; 2,450; 2,250

6. Michael swam an additional 2,500 yards on Thursday. Place his swim yardages in order by day from greatest to least.

   A. Monday, Tuesday, Wednesday, Thursday
   B. Tuesday, Thursday, Monday, Wednesday
   C. Wednesday, Monday, Thursday, Tuesday
   D. Tuesday, Thursday, Wednesday, Monday

7. A professional cyclist bicycled 22,755 miles in 2005; 20,564 miles in 2006; and 23,804 miles in 2007. If the three years are listed in order of the miles bicycled, from least to greatest, how would the years be listed?

   A. 2006, 2005, 2007
   B. 2006, 2007, 2005
   C. 2005, 2007, 2006
   D. 2007, 2005, 2006

**DIRECTIONS**: Study the information and table, read each question, and choose the **best** answer.

The table below shows a sporting goods store's monthly sales for the first six months of the year.

| Monthly Sales | |
|---|---|
| January | $155,987 |
| February | $150,403 |
| March | $139,605 |
| April | $144,299 |
| May | $149,355 |
| June | $148,260 |

8. Based on the table, in which month did the store have its highest promotion to increase sales?

   A. January
   B. February
   C. March
   D. May

9. In which month might the store want to run a special promotion to increase sales?

   A. March
   B. April
   C. May
   D. June

10. Based on the table, what sales trend can you determine?

    A. People purchased the most sporting goods equipment during early spring.
    B. Sales were at their highest in winter months.
    C. Monthly sales remained the same from January through June.
    D. People purchased more sporting goods as summer approached.

LESSON 2

# Operations

MATH CONTENT TOPICS: Q.1.b, Q.2.a, Q.2.e, Q.7.a
MATH PRACTICES: MP.1.a, MP.1.b, MP.2.c, MP.3.a, MP.4.a, MP.5.c

UNIT 1

## 1 Learn the Skill

The four basic math operations are addition, subtraction, multiplication, and division. Add quantities to find a **sum**, or total. Subtract to find the **difference** between two quantities.

Multiply quantities to find a **product** when you need to add a number many times. Divide when separating a quantity into equal groups. The **dividend** is the initial quantity. The **divisor** is the number by which you divide. The **quotient** is the answer.

**Factors** are numbers that can be multiplied together to get another number. Factors of a whole number refer to other whole numbers that divide into the original whole number with no remainder.

## 2 Practice the Skill

To successfully solve problems on the GED® Mathematical Reasoning Test, you must determine the correct operation(s) to perform and the proper order in which to perform them. Read the examples and strategies below. Then answer the question that follows.

**a** Add the numbers in each column, working from right to left. If the sum of a column of digits is greater than 9, regroup to the next column on the left.

**a Addition**

$$\begin{array}{r} {\scriptstyle 1\phantom{00}} \\ 482 \\ +\ 208 \\ \hline 690 \end{array}$$

**b** To subtract, align digits by place value. Subtract the numbers in each column, working from right to left. When a digit in the bottom number is greater than the digit in the top number, regroup.

**b Subtraction**

$$\begin{array}{r} {\scriptstyle 712} \\ 4\cancel{8}\cancel{2} \\ -\ 208 \\ \hline 274 \end{array}$$

**c Multiplication**

$$\begin{array}{r} {\scriptstyle 2\ 3\phantom{0}} \\ 482 \\ \times\ 34 \\ \hline 1{,}928 \\ \times\ 14{,}460 \\ \hline 16{,}388 \end{array}$$

**c** Multiply the ones digit of the bottom number by all the digits in the top number. Align each result, or partial product, under the digit by which you multiplied. Use zeros as placeholders. After you've multiplied digits in the top number by all the digits in the bottom number, add the partial products.

**d Division**

$$\begin{array}{r} 517\ \text{R}12 \\ 14\overline{)7250} \\ -70\phantom{00} \\ \hline 25\phantom{0} \\ -14\phantom{0} \\ \hline 110 \\ -98 \\ \hline 12 \end{array}$$

**d**

$$\begin{array}{r} 517\ \text{R}12 \\ 14\overline{)7250} \\ 14 \times 5 = -70\phantom{00} \\ \hline 25\phantom{0} \\ 14 \times 1 = -14\phantom{0} \\ \hline 110 \\ 14 \times 7 = -98 \\ \hline 12 \end{array}$$

**TEST-TAKING TECH**

Computer-based tests require mousing, clicking, and keyboarding skills. Fill-in items require placing the cursor in the answer box, clicking to activate, and then typing in the answer.

1. Shirley has $1,256 in her bank account. She withdraws $340. How much money is left in her bank account?

   A. $816
   B. $916
   C. $926
   D. $996

## 3 Apply the Skill

### Spotlighted Item: FILL-IN-THE-BLANK

**DIRECTIONS:** Read each question. Then write your answers in the boxes below.

2. Alex drove from Denver, Colorado, to Chicago, Illinois, in two days. The first day he drove 467 miles. The second day he drove 583 miles. What is the total distance that Alex drove?

3. During a word game, Alicia had 307 points. She was unable to use all of her letters, so she had to subtract 19 points at the end of the game. What was Alicia's final score?

4. Juan works 40 hours per week. He earns $9 per hour. How much does Juan earn in one week?

5. Carl pays $45 per month for car insurance. How much does he spend on car insurance in 1 year?

6. Four friends went out for pizza. The total cost for appetizers, pizza, and drinks was $64. If the friends split the cost equally, how much did each friend pay?

7. Not including 1 and 60, how many whole numbers are factors of the number 60?

8. Each month, Anna pays $630 in rent. How much rent does she pay over the course of 18 months?

9. The quarterback on Scott's favorite football team is closing in on a 4,000-yard passing season. He has thrown for 3,518 yards with two games remaining. How many yards would the quarterback need to average during the final two games to reach his goal of 4,000 yards?

10. Which whole number is the largest common factor of both the numbers 36 and 20?

11. What is the smallest whole number that has both 6 and 9 as factors?

**DIRECTIONS:** Study the diagram. Then write your answer in the box below.

504 sq ft

12. Claire is purchasing bags of mulch to cover her vegetable garden. One bag of mulch will cover 12 square feet. How many bags of mulch will Claire need?

LESSON 3

# Integers

MATH CONTENT TOPICS: Q.1.d, Q.2.a, Q.2.e, Q.6.c
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.c, MP.2.c, MP.3.a, MP.4.a

## 1 Learn the Skill

**Integers** include positive whole numbers (1, 2, 3, ...), their opposites, or negative numbers (−1, −2, −3, ...), and zero. Positive numbers show an increase and may be written with or without a plus sign. Negative numbers show a decrease and are written with a negative sign. Integers can be added, subtracted, multiplied, and divided. There are specific rules for adding, subtracting, multiplying, and dividing integers.

In some cases, you may need to determine an integer's **absolute value**, or its distance from 0. Absolute values are always greater than or equal to zero, never negative. So the absolute value of both 9 and −9 is 9.

## 2 Practice the Skill

Many mathematics problems relating to real-world situations use integers. You must understand and follow the rules for adding, subtracting, multiplying, and dividing integers to solve such problems on the GED® Mathematical Reasoning Test. Read the examples and strategies below. Then answer the question that follows.

**a** If integers have like signs, add and keep the common sign. If integers have different signs, find the difference. Then use the sign of the number with the greater absolute value.

**b** To subtract an integer, add its opposite. For example, the opposite of −5 is +5.

**c** For multiplying or dividing integers: if the signs are the same, the answer will be positive. If the signs are different, the answer will be negative.

### OPERATIONS WITH INTEGERS

**Add Integers**

(+4) + (+7) = +11
(−8) + (+4) = −4
(−5) + (−9) = −14
(−5) + (+12) = +7

**Subtract Integers**

(+8) − (−5) = (+8) + (+5) = 13
8 − 5 = 8 + (−5) = 3

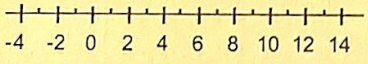
**Multiply and Divide Integers**

(4)(5) = +20
(−4)(−5) = 20
(−4)(5) = −20
(4)(−5) = −20

18 ÷ 9 = 2
(−18) ÷ (−9) = 2
(−18) ÷ 9 = −2
18 ÷ (−9) = −2

### TEST-TAKING TIPS

It may be helpful to use a number line when solving problems that involve integers. To solve 12−(−3), begin at −3 and count spaces to 12. You will see that the distance is +15.




1. In the morning, the temperature was −3°F. By mid-afternoon, the temperature was 12°F. What was the change in temperature between the morning and afternoon?

   A. −15°F
   B. −9°F
   C. 9°F
   D. 15°F

## 3 Apply the Skill

### Spotlighted Item: FILL-IN-THE-BLANK

**DIRECTIONS**: Read each question, and write your answer in the box below.

2. Uyen has a balance of $154 in her savings account. She withdraws $40 from a cash machine. What is her new balance?

3. In a board game, Dora moves forward 3 spaces, back 4 spaces, and forward again 8 spaces in one turn. What is her net gain or loss of spaces?

There were 3,342 students enrolled at a university. Of those students, 587 graduated in May. Over the summer, 32 students left the university, and 645 new students enrolled in the fall.

4. How many students were enrolled in the fall?

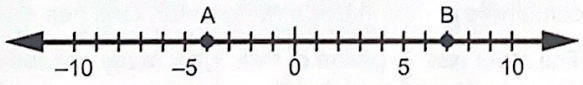
5. What is the change in the number of students enrolled between May and the following fall?

**DIRECTIONS:** Read the question, and choose the **best** answer.

6. Sasha's home is 212 feet above sea level. She participated in a scuba dive in which she descended to 80 feet below sea level. Which integer describes Sasha's change in position from her home to the lowest point of her dive?

A. −292
B. −132
C. 132
D. 292

**DIRECTIONS:** Study the number line, read the question, and choose the **best** answer.




7. The absolute value of the difference between two numbers is the distance between the two numbers on the number line. What is the absolute value of the difference between points *A* and *B*?

A. −11
B. −3
C. 3
D. 11

**DIRECTIONS:** Study the information and table, read each question, and choose the **best** answer.

Melanie played a game and kept track of her score. The table shows her points earned for each round.

**MELANIE'S POINTS SCORED**

| Round | Points Scored |
|---|---|
| 1 | 8 |
| 2 | −6 |
| 3 | −4 |
| 4 | 3 |
| 5 | 4 |

8. What was Melanie's score at the end of Round 5?

A. 25
B. 15
C. 7
D. 5

9. Melanie played a sixth round and scored −8 in that round. What was her overall score?

A. −13
B. −3
C. 13
D. 18

LESSON 4

# Fractions

MATH CONTENT TOPICS: Q.1.a, Q.1.b, Q.1.d, Q.2.a, Q.2.d, Q.2.e, Q.6.c
MATH PRACTICES: MP.1.a, MP.1.b, MP.2.c, MP.4.a

UNIT 1

## 1 Learn the Skill

A **fraction** shows part of a whole or part of a group by separating two numbers with a fraction bar. The bottom number is called the **denominator**. It tells the number of equal parts in a whole; if the denominator is 0, the fraction is undefined. The top part is called the **numerator**. It tells the number of equal parts being considered.

## 2 Practice the Skill

By practicing operations on proper fractions, improper fractions, and mixed numbers, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Study the examples and strategies below. Then answer the question that follows.

**a** A proper fraction shows a quantity less than 1, such as $\frac{4}{5}$. An improper fraction, such as $\frac{5}{4}$, is one where the numerator is larger than the denominator.

**b** To add or subtract fractions, find a common denominator (e.g., 8), rewrite the fractions so they have a common denominator, and write the result as the sum of the numerators over the common denominator. An improper fraction can be expressed as a mixed number.

**c** To multiply fractions, multiply the numerators first, and then multiply the denominators. To divide two fractions, multiply the dividend by the reciprocal of the divisor. Always write answers in lowest terms (e.g., $\frac{15}{18} \rightarrow \frac{5}{6}$).

**Add** $\frac{3}{4} + \frac{5}{8} \rightarrow \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$ $\quad \frac{6}{8} + \frac{5}{8} = \frac{11}{8} = 1\frac{3}{8}$

**Subtract** $\frac{3}{4} - \frac{5}{8} \rightarrow \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$ $\quad \frac{6}{8} - \frac{5}{8} = \frac{1}{8}$

**Multiply** $\frac{3}{4} \times \frac{5}{8} \rightarrow \frac{3}{4} \times \frac{5}{8} = \frac{15}{32}$

**Divide** $\frac{5}{9} \div \frac{2}{3} \rightarrow \frac{5}{9} \div \frac{2}{3} = \frac{5}{9} \times \frac{3}{2} = \frac{15}{18} = \frac{5}{6}$

**Add** $4\frac{5}{6} + 2\frac{1}{4}$

$4\frac{5}{6} + 2\frac{1}{4} = 4\frac{5 \times 2}{6 \times 2} + 2\frac{1 \times 3}{4 \times 3} = 4\frac{10}{12} + 2\frac{3}{12} = 6\frac{13}{12} = 7\frac{1}{12}$

**d** To add mixed numbers, first find a common denominator. Then add the fractions. If the sum is an improper fraction, change it to a mixed number. Then add the whole number and the sum of the fractions to the sum of the whole numbers. To multiply and divide mixed numbers, first express the mixed numbers as improper fractions.

**TEST-TAKING TIPS**

*If you struggle to find the lowest common denominator, find a common denominator by multiplying the denominators by one another.*

1. There are two containers of milk in Eric's refrigerator. One has $\frac{3}{5}$ gallon of milk. The other has $\frac{3}{4}$ gallon of milk. How many gallons of milk are in Eric's refrigerator?

   A. $\frac{9}{20}$

   B. $\frac{6}{11}$

   C. $1\frac{7}{20}$

   D. $1\frac{9}{20}$

## 3 Apply the Skill

### Spotlighted Item: DRAG-AND-DROP

**DIRECTIONS:** Examine the information and table. Then read each question and use the drag-and-drop options to complete each answer.

In a water relay race, each team must fill a cup of water, race over to a bowl, and pour the water from the cup into the bowl. The relay is over when one team has filled its bowl to the top. The table below shows the results of the race.

**WATER RELAY RESULTS**

| Team | Bowl Capacity |
|---|---|
| Team 1 | $\frac{1}{2}$ |
| Team 2 | $\frac{1}{1}$ |
| Team 3 | $\frac{3}{5}$ |
| Team 4 | $\frac{1}{3}$ |
| Team 5 | $\frac{4}{5}$ |

2. Starting with the first-place team, list the order in which the various teams finished.

Team ☐, Team ☐, Team ☐,
Team ☐, Team ☐

1 2 3 4 5

3. If one poured the contents of Team 4's bowl into Team 1's bowl, what arithmetic equation expresses the combined amount?

$\frac{1}{3} + \frac{1}{2} = \frac{\square}{\square}$

1 2 3 4 5 6

**DIRECTIONS:** Read each question. Then use the drag-and-drop options to complete each answer.

4. Jenny needs to add $2\frac{3}{4}$ and $1\frac{5}{8}$.

She must find a common denominator. What improper fractions, expressed in terms of the lowest common denominator, correspond to the two numbers?

$\frac{\square}{\square}, \frac{13}{\square}$

3 4 5 8 11 22

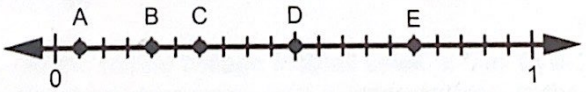
5. Clark is baking cookies. He needs $2\frac{1}{2}$ cups of flour. What arithmetic equation properly expresses the number of times he needs to fill his $\frac{1}{2}$ cup measuring cup to equal $2\frac{1}{2}$ cups?

$2\frac{1}{2}$ cups $\div \frac{1}{2}$ cups $= \frac{\square}{2} \times \frac{\square}{\square} = \square$

1 2 3 4 5

**DIRECTIONS:** Examine the information and number line. Then read the question and use the drag-and-drop options to complete the answer.

The following number line shows the interval from 0 to 1, divided into 20 equal segments.




6. In increasing order, list the fractional values of the points shown, reduced to lowest terms.

$\frac{1}{\square}, \frac{1}{5}, \frac{\square}{\square}, \frac{1}{\square}, \frac{3}{4}$

2 3 4 5 10 20

LESSON 5

# Ratios and Proportions

MATH CONTENT TOPICS: Q.2.a, Q.2.e, Q.3.a, Q.3.c
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.e, MP.2.c, MP.4.a

## 1 Learn the Skill

A **ratio** is a comparison of two numbers. You can write a ratio as a fraction, using the word *to*, or with a colon (:). A **proportion** is an equation with a ratio on each side. The ratios are equal. You can use proportions to solve problems involving equal ratios.

## 2 Practice the Skill

By practicing the skill of solving ratios and proportions, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Study the information below. Then answer the question that follows.

**a** A ratio is different from a fraction. The bottom or second number of a ratio does not necessarily represent a whole. Therefore, you do not need to rename improper fractions as mixed numbers. However, ratios still should be simplified.

**b** A **unit rate** is a ratio with the denominator of 1. It can be expressed using the word *per*.

**c** In a proportion, the cross products are equal. Use cross products to solve proportions. If one of the four terms is missing, cross-multiply and divide the product by the third number (the number uninvolved in the cross-product) to find the missing number.

**Ratio**

Jonathan earns $10 in 1 hour.

The ratio of dollars earned to hours is $\frac{10}{1}$, 10 to 1, or 10:1.

This also can be written as $10 per hour.

**Proportion**

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

$4 \times 6 = 8 \times 3$
$24 = 24$

$\frac{9}{12} = \frac{3}{x}$ ⟶

$9x = 12 \times 3$
$9x = 36$
$x = 4$

### USING LOGIC

When you write a proportion to solve a problem, the terms in both ratios need to be written in the same order. In problem 1, the top numbers can represent gallons and the bottom numbers can represent cost.

1. Carleen bought 3 gallons of milk for $12. How much would 4 gallons of milk cost?

   A. $9
   B. $12
   C. $16
   D. $18

## 3 Apply the Skill

**DIRECTIONS:** Read each question, and choose the **best** answer.

2. Sam averages 65 miles per hour on a road trip. How many hours will it take him to drive 260 miles?

   A. 3
   B. 4
   C. 5
   D. 6

3. The Jammers basketball team had a win-to-loss ratio of 5:1 during their season. They won 25 games. How many games did they lose?

   A. 5
   B. 6
   C. 7
   D. 8

4. A store sold 92 pairs of pants and 64 shirts. What is the ratio of the number of pants sold to the number of shirts sold?

   A. 23:16
   B. 16:23
   C. 64:92
   D. 16:92

5. Amanda traveled 558 miles in 9 hours. What is the unit rate that describes her travel?

   A. 52 miles per hour
   B. 61 miles per hour
   C. 62 miles per hour
   D. 71 miles per hour

6. Jill mixed 2 cups of sugar with 10 cups of water to make lemonade. What ratio of sugar to water did she use?

   A. $\frac{1}{5}$
   B. $\frac{2}{10}$
   C. $\frac{5}{1}$
   D. $\frac{10}{2}$

**DIRECTIONS:** Read each question, and choose the **best** answer.

7. The GED® preparation class has a teacher-to-student ratio of 1:12. If there are 36 students in the class, how many teachers are present?

   A. 2
   B. 3
   C. 4
   D. 6

8. Sarah can ride 4 miles in 20 minutes on her bike. How many miles can she bike in 120 minutes?

   A. 12
   B. 15
   C. 24
   D. 480

9. The ratio of adults to children on a field trip is 2:7. If there are 14 adults on the trip, how many children are there?

   A. 1
   B. 7
   C. 28
   D. 49

10. The ratio of cars to trucks at an auto dealership is $\frac{3}{2}$. If there are 144 cars at the dealership, how many trucks are there?

    A. 288
    B. 240
    C. 216
    D. 96

11. In the recent college football season, Max threw 32 touchdowns and only 12 interceptions. In the most simplified form, what was his ratio of touchdowns to interceptions thrown?

    A. 16:6
    B. 8:3
    C. 8:2
    D. 4:1

LESSON 6

# Decimals

MATH CONTENT TOPICS: Q.1.a, Q.2.a, Q.2.e, Q.6.c
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.e, MP.2.c, MP.3.c, MP.4.a

UNIT 1

## 1 Learn the Skill

A **decimal** is another way to write a fraction. It uses the base-ten place value system. You can compare and order decimals using place value. Decimals include place values such as tenths, hundredths, and thousandths. Decimals can represent amounts much smaller than 1. You can round decimals as you do whole numbers.

As with fractions, you can add, subtract, multiply, and divide decimal numbers. When you perform operations with decimals, you must pay close attention to the placement of the decimal point. For example, when you add or subtract, write the numbers so that the place values and decimal points align.

## 2 Practice the Skill

By practicing the skill of operations with decimals, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Study the table and information below. Then answer the question that follows.

**a** Whole numbers are to the left of the decimal point, and decimals are to the right. Each place in a decimal is worth 10 times as much as the place to its right and one-tenth as much as the place to its left. Compare decimals as you would compare whole numbers, place by place, from left to right.

**b** When adding or subtracting, align decimal points. Then add or subtract as you do with whole numbers.

**c** Multiply as you do with whole numbers. The number of decimal places in the product is the sum of the numbers of decimal places in the factors. Divide as you do with whole numbers, but first move the decimal points in the divisor and dividend the same number of places to make the divisor a whole number.

**Compare Decimals**

Compare the following decimals by using the > or < signs.

0.285 > 0.231
0.458 < 0.559
14.359 < 14.374
17.117 < 17.329

**Operations with Decimals**

**Addition**

$$\begin{array}{r} 3.234 \\ +\ 5.631 \\ \hline 8.865 \end{array}$$

**Subtraction**

$$\begin{array}{r} 25.952 \\ -\ 3.711 \\ \hline 22.241 \end{array}$$

**Division**

$$8\overline{)98.264} = 12.283$$

$$\begin{array}{r} -8 \\ 18 \\ -16 \\ 22 \\ -16 \\ 66 \\ -64 \\ 24 \end{array}$$

**Multiplication**

$$\begin{array}{r} {}^{1}5.61 \\ \times\ 3.8 \\ \hline {}^{1}{}^{1}4488 \\ +\ 16830 \\ \hline 21.318 \end{array}$$

← 2 decimal places
← 1 decimal place
← 3 decimal places

1. Molly bought coffee for $2.95 and a muffin for $1.29. She paid with a $5 bill. How much change did she receive?

A. $0.76
B. $0.86
C. $2.05
D. $4.24

**TEST-TAKING TIPS**

To multiply by 10, move the decimal one place to the right. To divide by 100, move the decimal two places to the left. The number of zeros shows the amount of spaces to move.

## 3 Apply the Skill

**DIRECTIONS:** Study the information and table, read each question, and choose the **best** answer.

Coach Steve needed to purchase new soccer equipment for the upcoming season.

| Equipment | Price | Quantity |
|---|---|---|
| Soccer ball | $12.95 | 6 |
| Shin guards | $10.95 | 12 |
| Knee pads | $8.95 | 12 |
| Uniforms | $17.00 | 12 |

2. How much will Coach Steve spend on uniforms and soccer balls?

   A. $47.95
   B. $97.80
   C. $211.77
   D. $281.70

3. How much more will Coach Steve spend on shin guards than knee pads?

   A. $16.00
   B. $24.00
   C. $36.00
   D. $48.00

**DIRECTIONS:** Study the information and table, read each question, and choose the **best** answer.

Sliced deli meat is sold by the pound. Shana bought four different meats at the deli.

| Deli Meat | Weight |
|---|---|
| Chicken | 1.59 pounds |
| Turkey | 2.07 pounds |
| Ham | 1.76 pounds |
| Roast beef | 2.15 pounds |

4. Which package of deli meat weighed the least?

   A. Chicken
   B. Turkey
   C. Ham
   D. Roast beef

5. How many packages of deli meat weighed less than 2.25 pounds?

   A. 1
   B. 2
   C. 3
   D. 4

**DIRECTIONS:** Read the question, and choose the **best** answer.

6. Paper Plus sells reams of paper for $5.25 each. Discount Paper sells the same reams of paper for $3.99 each. How much would you save by purchasing 15 reams of paper at Discount Paper instead of at Paper Plus?

   A. $1.26
   B. $18.90
   C. $78.75
   D. $138.60

**DIRECTIONS:** Study the information and table, read each question, and choose the **best** answer.

The Warriors softball team had five players competing for the league's batting title.

| Player | Batting Average |
|---|---|
| Jennifer | .3278 |
| Ellen | .3292 |
| Krysten | .3304 |
| Marti | .3289 |

7. Marti believes that if the season were to end today, she would have the highest batting average. Which explains the error in her reasoning?

   A. She found the lowest batting average.
   B. She compared digits in the tenths place.
   C. She rounded all batting averages to the nearest thousandth.
   D. She compared the digits moving right to left.

8. Which player had the highest batting average?

   A. Jennifer
   B. Ellen
   C. Krysten
   D. Marti

LESSON 7

# Percent

MATH CONTENT TOPICS: Q.2.a, Q.2.e, Q.3.c, Q.3.d
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.e, MP.2.c, MP.4.a

## 1 Learn the Skill

As with fractions and decimals, **percents** show part of a whole. Recall that, with fractions, a whole can be divided into any number of equal parts. With a decimal, the number of equal parts must be a power of 10. Percent always compares amounts to 100. The percent sign, %, means "out of 100."

There are three main parts of a percent problem—the base, the part, and the rate. The **base** is the whole amount. The **part** is a piece of the whole or base. The **rate** tells how the base and whole are related. The rate is always followed by a percent sign. You can use proportions to solve percent problems.

## 2 Practice the Skill

By practicing the skills of finding percents and solving percent problems, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Study the table and information below. Then answer the question that follows.

**a** To convert a fraction to a decimal, divide the numerator by the denominator. To convert a decimal to a fraction, write the decimal digits as the numerator and the place value of the last digit as the denominator. Simplify. To write a decimal as a percent, multiply by 100. Do the reverse to write a percent as a decimal. To write a percent as a fraction, write the percent as the numerator of a fraction with denominator 100, then simplify.

| Fraction | Decimal | Percent |
|---|---|---|
| $\frac{1}{5}$ → | $1 \div 5 = 0.2$ → | $0.2 \times 100 = 20$ → 20% |
| $\frac{1}{4} = \frac{25}{100}$ ← | $25 \div 100 = 0.25$ ← | 25% |
| $\frac{1}{2} = \frac{50}{100}$ ← | | 50% |

**b** To find a percent of change, subtract the original amount from the new amount to find the amount of change. Divide the difference by the original amount. Convert the decimal to a percent. To compute interest ($I$), multiply the amount borrowed ($p$) by the rate ($r$), written as a decimal, and the time ($t$), written in years.

**Use a Proportion**

Zach answered 86% of the questions on a math exam correctly. If there were 50 questions, how many questions did Zach answer correctly?

$\frac{\text{Part}}{\text{Base}} = \frac{\text{Rate}}{100}$ $\frac{?}{50} = \frac{86}{100}$ $50 \times 86 = 4300 \rightarrow 4300 \div 100 =$ **43 questions**

**Find Percent Increase or Decrease**

Last year, Kareem paid $750 a month in rent. This year he pays $820 a month. What's the percent increase?

$\$820 - \$750 = \$70.00$
$\$70.00 \div \$750 = 0.09$
$0.09 \times 100 =$ **9%**

**Interest Problems**

Kelly took out a $20,000 loan for 4 years at 3% interest. How much interest ($I$) will she pay?

$I = prt$
$I = \$20{,}000 \times 0.03 \times 4$
$I =$ **$2,400**

**USING LOGIC**

*Recall that a fraction is a ratio of part to whole. A percent is a ratio with a denominator of 100. When using a proportion, set the rate over 100 to equal the part over the base.*

1. In a neighborhood, 27 of the 45 children are in elementary school. What percent of children in the neighborhood are in elementary school?

   A. 20%
   B. 40%
   C. 60%
   D. 166%

## 3 Apply the Skill

### Spotlighted Item: DROP-DOWN

**DIRECTIONS:** Read each situation, and choose the option that **best** completes each sentence.

2. Shelly's Boutique is advertising 25% off all merchandise.

   Customers will save [Drop-down] off the original price during the sale.

   A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $\frac{2}{3}$ D. $\frac{3}{4}$

3. City Electric provides electricity for $\frac{1}{8}$ of the homes in Center City.

   City Electric provides electricity for [Drop-down] % of homes.

   A. 8 B. 10.5 C. 12.5 D. 80

4. In a survey, 0.22 of the respondents answered "Yes" to the question, "Would you consider voting for a candidate from a third party?"

   [Drop-down] of respondents answered "No."

   A. $\frac{11}{50}$ B. $\frac{39}{50}$ C. $\frac{78}{10}$ D. $\frac{22}{100}$

5. The Strikers girls soccer team won 9 of its 13 games.

   The Strikers won approximately [Drop-down] % of the games.

   A. 61.5 B. 66.7 C. 69.2 D. 76.9

6. At Bright Minds Learning, 75% of employees work as instructors. There are 300 employees at Bright Minds Learning.

   [Drop-down] employees work as instructors.

   A. 150
   B. 175
   C. 200
   D. 225

**DIRECTIONS:** Read each situation, and choose the option that **best** completes each sentence.

7. Tia earns $552 per week. Of this amount, 12% is deducted for taxes.

   $ [Drop-down] is deducted each week.

   A. 6.62 B. 55.20 C. 66.24 D. 485.76

8. Andrew received a raise from $24,580.00 per year to $25,317.40 per year.

   He received a raise of [Drop-down] %.

   A. 2 B. 3 C. 7.4 D. 29

9. Isabelle paid $425 plus 6% sales tax for a new bicycle.

   She paid a total of $ [Drop-down].

   A. 25.50 B. 27.50 C. 450.50 D. 457.50

10. A sofa is regularly priced at $659 but is on sale for 20% off.

    The sale price of the sofa is $ [Drop-down].

    A. 639.00 B. 527.20 C. 450.80 D. 131.80

11. A computer company received 420 customer service calls in one day. Forty-five percent of the calls were about software issues.

    [Drop-down] of the calls were about software.

    A. 19 B. 189 C. 229 D. 231

12. Daria invested $5,000 in an account that earns 5% interest annually.

    She will earn $ [Drop-down] in interest over nine months.

    A. 5,250.00
    B. 1,875.00
    C. 250.00
    D. 187.50