7th Grade Math

Mrs. Holmes

Hi Students! Hope you are well and safe.

I wanted to share with you a site called KHAN ACADEMY that may be helpful if you are having trouble understanding a math problem. This site teaches math concepts in a step-by-step lesson. You may find it to be very helpful.

I would love for you to spend this time off practicing those math facts! It is so important that you memorize multiplication facts. Practice the facts that you do not have memorized. Write them several times each, make flashcards, or have a family member quiz you on them. You will become a much better math student once you know your multiplication facts.

You worked so hard in my class preparing for the Spring test. Remember those things we learned; they will be very important as you move on to the 8th grade. Don't forget what you have learned! If you took your GO MATH textbook home with you spend some time reviewing those lessons, we worked on throughout the school year. If possible, go on-line and find fun math games to play.

I miss you all and pray that we will see each other again real soon!

Mrs. Holmes

Number Sense and Operations

The Ohio Achievement Test will . . . test your ability to work with place values, positive and negative exponents, rational and irrational numbers, and scientific notation. You will also need to know how to simplify numerical expressions using the order of operations and to add, subtract, divide, and multiply both positive and negative integers.

Examples 1–9: Read each question. Choose the best answer or write the answer to the question in the space you are given.

1 What is 10^4 in standard form?

   Ⓐ   100

   Ⓑ   1,000

   Ⓒ   100,000

   Ⓓ   10,000

Remember

When the base of an exponent is 10, the exponent tells you the number of zeroes in the number in standard form.

$$10^3 = 1,000$$

2 One day is about 0.00274 of a year. How is this number expressed in scientific notation?

   Ⓐ 2.74×10^3

   Ⓑ 2.74×10^{-2}

   Ⓒ 2.74×10^{-3}

   Ⓓ 2.74×10^{-4}

Think It Through

An *exponent* shows the number of times a number is multiplied by itself. To solve **example 1**, 10^4 may be written as $10 \times 10 \times 10 \times 10$. This may also be read as 10 to the 4th power. It is written as 10,000 in standard form. Choice Ⓐ is 10^2, choice Ⓑ is 10^3, and choice Ⓒ is 10^5.

To write the number in **example 2** in scientific notation, first move the decimal point to the right until you have created a number between 1 and 10.

$$0.00274$$

Next, count the number of places you moved the decimal point. This is the exponent on 10. The exponent is negative if the original decimal is less than 1.

$$0.00274 = 2.74 \times 10^{-3}$$

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3 $4^{-3} =$

Ⓐ 12

Ⓒ $\frac{1}{64}$

Ⓑ -12

Ⓓ $\frac{1}{4}$

📌 *Remember*

A number taken to the power of zero is always 1.

$$5^0 = 1 \qquad 3^0 = 1$$

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4 $-4 - (-3) =$

Ⓐ 1

Ⓒ 7

Ⓑ -1

Ⓓ -7

📌 *Remember*

When subtracting, it sometimes helps to rewrite a problem by **adding the opposite**. Review the following chart.

Subtraction	Adding the Opposite
$3 - 5 = -2$	$3 + (-5) = -2$
$-5 - 2 = -7$	$-5 + (-2) = -7$
$-5 - (-2) = -3$	$-5 + 2 = -3$

---

5 Which of the following is an irrational number?

Ⓐ $2\frac{1}{4}$

Ⓒ $\frac{1}{9}$

Ⓑ 0.125

Ⓓ $\sqrt{5}$

Think It Through

Example 3 is a problem involving a negative exponent. Negative exponents turn whole numbers into fractions. Follow this shortcut when dealing with negative exponents.

When b is any nonzero number and n is an integer—

$$b^{-n} = \frac{1}{b^n}$$

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

$$4^{-3} = \frac{1}{64}$$

The best way to solve **example 4** is to *add the opposite*.

$$-4 - (-3) =$$

$$-4 + 3 =$$

$$-4 + 3 = -1$$

For **example 5** you need to understand the difference between rational and irrational numbers.

A *rational number* is any number that can be written as a fraction. This includes whole numbers, integers, fractions, terminating decimals, and repeating decimals.

An *irrational number* cannot be written as a fraction. For example, $\sqrt{2}$ is a decimal that continues forever with no repeating pattern.

Choices Ⓐ and Ⓒ are fractions, so they are rational numbers. Choice Ⓑ is also a rational number because it is a terminating decimal. Answer Ⓓ, $\sqrt{5}$, is a decimal that continues forever, so it is an irrational number.

GO ON ➤

6 Paul works at Jim's Electronics. He earns a 10% commission on each stereo and a 15% commission on each television he sells. In two weeks he sold 7 stereos that cost $249 each and 4 televisions that cost $374 each. How much commission did he earn on these items?

Answer: _____

Remember

Remember these common percents in their decimal and fraction forms.

Percent	Decimal	Fraction
10%	0.1	$\frac{1}{10}$
20%	0.2	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
50%	0.5	$\frac{1}{2}$
75%	0.75	$\frac{3}{4}$

7 Last winter, a record low of $-10°F$ was recorded. This winter the low temperature was 2 degrees warmer. What was the low temperature this winter?

Ⓐ 12°F   Ⓒ −12°F

Ⓑ −8°F   Ⓓ 8°F

8 Which problem has an incorrect product?

Ⓐ $-40 \times 7 = 280$

Ⓑ $-12 \times -10 = 120$

Ⓒ $60 \times 4 = 240$

Ⓓ $-15 \times 6 = -90$

Think It Through

For complex questions such as **example 6**, it helps to chart the information in a table and to make a plan to be sure you calculate in the right order.

Item	Price	Number Sold	Commission Rate
Stereos	$249	7	10%
TVs	$374	4	15%

Step 1: Find Paul's sales of both televisions and stereos by multiplying the number he sold of each by the price.

$$\$249 \times 7 = \$1,743 \text{ in stereo sales}$$

$$\$374 \times 4 = \$1,496 \text{ in television sales}$$

Step 2: Multiply each sales amount by the commission rate earned for the sale.

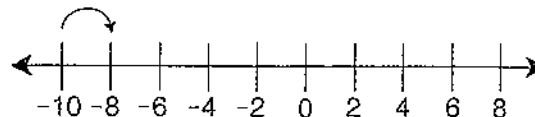$$\$1,743 \times 10\% = \$1,743 \times 0.10 = \$174.30$$

$$\$1,496 \times 15\% = \$1,496 \times 0.15 = \$224.40$$

Step 3: Add the two commissions to find the total commission Paul earned.

$$\$174.30 + \$224.40 = \$398.70$$

Paul earned $398.70 in commissions.

You can use a number line to solve **example 7.** Since the low temperature this year is 2 degrees warmer than last year, count 2 degrees (only one space) to the right from -10. This may also be shown by $-10 + 2 = -8$.

To solve **example 8**, remember if you multiply a positive by a negative number, the product will always be negative. When two negatives are multiplied, the product is always positive. Choice Ⓐ should have a product of -280, while choices Ⓑ, Ⓒ, and Ⓓ are correct.

9    $\dfrac{(18 + 12)}{3} + 9 =$

Ⓐ $2\frac{1}{2}$ Ⓒ $9\frac{2}{3}$

Ⓑ 13   Ⓓ 19

Order of Operations

Step 1: Do calculations within grouping symbols.

Step 2: Evaluate powers.

Step 3: Multiply and divide from left to right.

Step 4: Add and subtract from left to right.

Think It Through

For **example 9** you will need to use the correct order of operations.

First complete the addition inside the parentheses.

$$\dfrac{(18 + 12)}{3} + 9 =$$

$$\dfrac{30}{3} + 9 =$$

The fraction is a form of division. Divide before adding.

$$30 \div 3 + 9 =$$

$$10 + 9 = 19$$

Test-Taking Tips

1 Always double-check your work. If you don't have time to resolve a problem, use estimation to make sure your answer is reasonable.

2 There is often more than one way to solve a problem. When checking your work, try a method you didn't use the first time.

Go for it!

Test Practice 1: Number Sense and Operations

Estimated time: 30 minutes

Directions: Read each question. Choose the best answer or write the answer to the question in the space you are given.

1   What is the value of the expression $2(4 + 72) - 6$?

    Answer: _____

2   The population of the United States is approximately 300 million people. Which of the following is equal to 300 million?

    Ⓐ 3×10^7 Ⓒ 300×10^8
    Ⓑ 3×10^8 Ⓓ 30×10^9

3   What is the value of $(7.00 - 3 \times 1.50) \div 5$?

    Ⓐ 1.20   Ⓒ 0.50
    Ⓑ 6.10   Ⓓ 0.75

4   Which of the following sentences is a false statement?

    Ⓐ Some square roots are irrational numbers.
    Ⓑ Some fractions are rational numbers.
    Ⓒ All nonrepeating decimals are irrational numbers.
    Ⓓ All square roots are rational numbers.

5   In a single day 565,161,000 shares of a stock sold on the New York Stock Exchange. Express this number in scientific notation.

    Answer: _____

6   A submarine was cruising at 200 feet below the surface of the ocean. The captain ordered the crew to bring the submarine up 120 feet. How far below the surface was the submarine after the captain's orders were carried out?

    Answer: _____

7   Joanne said that $\frac{1}{7}$ is a rational number. Explain why this is true or false.

    Ⓐ True, because it is a fraction.
    Ⓑ False, because it results in a nonrepeating decimal.
    Ⓒ True, because it results in a terminating decimal.
    Ⓓ False, because it has a smaller numerator than denominator.

8   Which of the following statements is true?

    Ⓐ Dividing a negative number by a negative number results in a positive quotient.
    Ⓑ Multiplying a negative number by a negative number results in a negative product.
    Ⓒ Multiplying a negative number by a positive number results in a positive product.
    Ⓓ Dividing a negative number by a positive number results in a positive quotient.

18

9 Which one of the following statements results in an answer of 56?

Ⓐ 7×-8

Ⓑ $-448 \div -8$

Ⓒ $448 \div -8$

Ⓓ -8×7

10 It takes the planet Mercury 2.4×10^{-1} years to make one revolution around the sun. How long does it take Mercury to complete a revolution?

Ⓐ 0.24 years

Ⓑ 2.4 years

Ⓒ 0.024 years

Ⓓ 24 years

11 Which set contains one or more irrational number(s)?

Ⓐ $\{\frac{1}{5}, \sqrt{17}, 0.450, 10\}$

Ⓑ $\{\sqrt{36}, \frac{1}{8}, 15, 0.660\}$

Ⓒ $\{13, \sqrt{100}, \frac{1}{7}, \frac{1}{2}\}$

Ⓓ $\{19, \frac{1}{23}, \sqrt{81}, 0.535\}$

12 Carlos spends a total of 50 hours a week at school and studying at the library. He goes to school for 6 hours each day from Monday to Friday. Which expression can be used to find the number of hours Carlos studies at the library?

Ⓐ $50 - (6 \times 5)$

Ⓑ $(50 - 5) \times 6$

Ⓒ $6 \times 5 - 50$

Ⓓ $50 + (6 \times 5)$

13 $3^{-3} =$

Ⓐ $\frac{1}{27}$ Ⓒ $\frac{1}{3}$

Ⓑ $-\frac{1}{27}$ Ⓓ -9

14 $8 - (-5) =$

Answer: _____

15 Lucy bought 3 packages of hot dogs for $3.95 each. Each package had 8 hot dogs. She also bought 4 packages of hot dog buns for $1.29 each. Each package had 6 buns. How much did it cost Lucy for one hot dog and one bun, not including tax? Round to the nearest cent.

Show your work in the space below. Write your answer on the line. (4 points)

Cost of one hot dog and one bun:

_____

If Lucy decides to sell a hot dog and a bun for $1.50, what will her total profit be if she sells all of her hot dogs and buns?

Total profit: _____

STOP

Number Correct/Total = _____/18

Computation

The Ohio Achievement Test will . . . ask you to simplify expressions and use fractions, decimals, and percent to solve real-life problems. You will also be expected to understand problems involving absolute value, exponents, and square roots.

Examples 1–7: Read each question. Choose the best answer or write the answer to the question in the space you are given.

1 Which expression can be used to solve the following problem?

A restaurant charges $55 per person for dinner and a show. To reserve the restaurant for a private party you will pay an additional charge of $60 per hour. What is the total cost for a private group of 20 people to eat dinner and see the show if the group stays for 6 hours?

Ⓐ $6 \times 60 + 55 + 20$
Ⓑ $6 \times 60 + 55 \times 20$
Ⓒ $6 \times 55 + 20 \times 60$
Ⓓ $6 \times 55 + 20 + 60$

2 Mr. Jones's 4 grandchildren bought him a chair for his birthday. The chair cost $440 plus sales tax of 6%. The grandchildren divided the cost evenly among themselves. How much did each grandchild spend? Write your answer on the line.

Answer: _____

Think It Through

To solve **example 1**, first multiply $55 × 20, which equals $1,100. Next, multiply the hourly charge of $60 × 6 hours, which equals $360. When the products are added together, the total cost is $1,460. The expression shown in choice Ⓑ will give that result. Choices Ⓐ, Ⓒ, and Ⓓ will yield different answers.

When asked to show your work, use labels to make it easier to follow your thinking. For **example 2** first set up a formula to find the amount each grandchild spent.

$$\frac{cost}{grandchild} = \$440 \times 1.06 \div 4$$

Then show each step.

$$chair + tax = \$440 \times 1.06 = \$466.40$$

$$\frac{cost}{grandchild} = \$466.40 \div 4 = \$116.60$$

Tip

Use this quick way to figure cost with tax.

cost × (1 + % tax as decimal)

$10 item with 6% tax

$$10 \times 1.06 = \$10.60$$

3 There is a special sale at Clothing World. You can take $\frac{1}{3}$ off each shirt that usually sells at $30 and $\frac{1}{2}$ off each pair of pants that is normally $50. Which of the following purchases could you make with exactly $130?

Ⓐ 5 shirts, 1 pair of pants
Ⓑ 3 shirts, 3 pairs of pants
Ⓒ 4 shirts, 2 pairs of pants
Ⓓ 2 shirts, 4 pairs of pants

4 Jamal took out a $950 loan to buy a used car. The loan had an annual simple interest rate of 6.24%. If he paid off the loan in 6 months, which expression can be used to find the total amount of interest he paid on the loan?

Ⓐ $950 - 0.0624 \times 0.5$
Ⓑ $950 \times 0.0624 \times 6$
Ⓒ $950 \times 0.0624 \times 0.5$
Ⓓ $950 \times 6.24 \times 6$

5 Which point on the number line best represents $\sqrt{5}$?

```
        W X        Y     Z
  ◄─────•─•────────•─────•────○──►
        2 2.24     3   3.48   4
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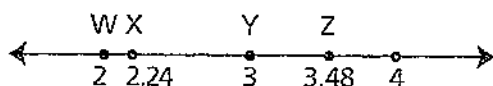
Ⓐ W
Ⓑ X
Ⓒ Y
Ⓓ Z

Think It Through

For **example 3**, multiply $30 \times \frac{1}{3}$ to find you save $10 per shirt, or that each shirt will cost $20. Multiply $50 \times \frac{1}{2}$ to determine that there is a $25 discount on each pair of pants, or that each pair of pants will cost $25. Replace these amounts in each answer choice. Only answer choice Ⓒ shows that you will spend $130.

$$4 \times \$20 + 2 \times \$25 = \$130$$

To find interest in **example 4**, use the interest formula below.

$I = prt$
principle (p) $= 950$
interest rate (r) $= 6.24\% = 0.0624$
time (t) in years $= \frac{6}{12} = \frac{1}{2} = 0.5$

$950 \times 0.0624 \times 0.5$ will compute the interest on Jamal's loan.

For **example 5**, approximate the value of $\sqrt{5}$ by using perfect squares and multiplication.

Start by squaring whole numbers on the number line.

$\left. \begin{array}{l} 2 \times 2 = 4 \\ 3 \times 3 = 9 \end{array} \right\}$ 4 and 9 are perfect squares

Notice that when you square 2 and 3 you get a perfect square that is less than 5 and a perfect square that is greater than 5.

$$\sqrt{4} < \sqrt{5} < \sqrt{9}$$
$$2 < \sqrt{5} < 3$$

$\sqrt{5}$ is between 2 and 3. On the number line, there's one point between 2 and 3. This point, 2.24, best represents $\sqrt{5}$.

6 The table below shows the record cold temperature in several states. Which choice shows the states in order by the absolute value of their record temperatures from least to greatest?

Location	Temperature F
Alaska	$-80°$
Hawaii	$12°$
Colorado	$-61°$
Florida	$-2°$

Ⓐ Florida, Hawaii, Colorado, Alaska
Ⓑ Alaska, Colorado, Hawaii, Florida
Ⓒ Hawaii, Florida, Colorado, Alaska
Ⓓ Florida, Colorado, Hawaii, Alaska

7 The table below shows the population of four U.S. cities in the 1850s.

City	Population
Boston, MA	$9{,}375 \times 2^4$
Albany, NY	5×10^4
New Orleans, LA	10^5
New York, NY	$5{,}000 \times 5^2 \times 2^2$

Put the cities in order from least to greatest population.

Answer: _____

Think It Through

In solving **example 6**, remember that absolute value is the distance of an integer from zero. Absolute is always expressed as a positive value integer. The locations in order from least to greatest distance from zero are Florida (2), Hawaii (12), Colorado (61), and Alaska (80).

Remember

The absolute value of a number is its distance from zero. Use | | to show absolute value.

$$|-7| = 7$$

To solve **example 7**, evaluate each of the expressions.

Boston = $9{,}375 \times 2^4 = 150{,}000$

Albany = $5 \times 10^4 = 5 \times 10{,}000 = 50{,}000$

New Orleans = $10^5 = 100{,}000$

New York = $5{,}000 \times 25 \times 4 = 500{,}000$

After evaluating each expression you can easily order the cities.

Albany, New Orleans, Boston, New York

Test-Taking Tips

1 Many problems will require the use of a formula. Check your test booklet for a sheet of formulas. (See the inside back cover of this booklet for a similar chart.)

2 Before taking the test, review how to add, subtract, multiply, and divide all forms of numbers—integers, decimals, percents, and fractions.
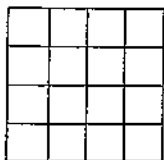
Go for it!
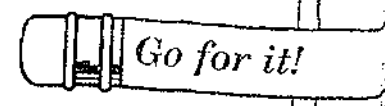
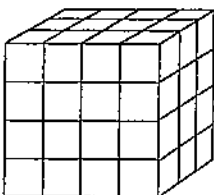# Test Practice 2: Computation

Estimated time: **30** minutes

Directions: Read each question. Choose the best answer or write the answer to the question in the space you are given.

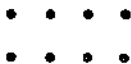**1** Which of these best represents 4^2?

Ⓐ

Ⓑ

Ⓒ

Ⓓ
  • • • •
  • • • •

2 Jenna bought 2 bags of cups and 6 packets of lemonade for a total of $6.03. Each bag of cups cost $1.29 including tax. Which expression can be used to find the total cost of 1 packet of lemonade, including tax?

Ⓐ ($1.29 × 2) + $6.03

Ⓑ $6.03 − (6 × $1.29)

Ⓒ ($6.03 − 2 × $1.29) ÷ 6

Ⓓ ($6.03 − $1.29) ÷ 6

3 Gwen studied the average daily high temperatures for her town. She found that the average daily high in April is about 1.8 times the average daily high in December. Given a, the average daily high temperature in April, which equation can be used to find d, the average daily high temperature in December?

Ⓐ $d = 1.8a$

Ⓑ $d = 1.8 \div a$

Ⓒ $d = a + 1.8$

Ⓓ $d = a \div 1.8$

4 Write the expression that can be used to find the maximum number of 0.3-foot pieces of wood that can be cut from a 4.5-foot length of lumber. How many pieces could be cut?

Expression: _____

Answer: _____

5 Vern is about 2.1 times as tall as his little brother. Given b, the height of Vern's little brother, write an equation that can be used to find v, Vern's height.

Answer: _____

GO ON →

6 Dennis baby-sits for two families. Because the Reeds have more children than the Jacobs, he earns about 1.7 times as much baby-sitting for the Reeds than the Jacobs. Given j, the amount of money Dennis earns sitting for the Jacobs, which equation can be used to find r, the amount of money Dennis earns sitting for the Reeds?

   Ⓐ $r = 1.7j$

   Ⓑ $r = 1.7 \div j$

   Ⓒ $r = 1.7 + j$

   Ⓓ $r = 1.7 - j$

7 Jackie is buying food for her class party. A $3\frac{1}{2}$-pound bag of peanuts costs $7.50. Bags of candy are sold at a price of 3 bags for $5.00. If Jackie buys 7 pounds of peanuts and 9 bags of candy, how much will she spend?

Show your work in the space below. Write your answer on the line. (2 points)

Answer: _____

8 The bookstore is selling used hardcover books at 2 for $8 and used paperbacks at 4 for $7. Jason bought 6 hardcover books and 9 paperbacks. If the store offers a 20% discount for all orders over $35, how much did Jason pay?

   Ⓐ $33.20   Ⓒ $20.70

   Ⓑ $39.75   Ⓓ $31.80

9 Carlos mows lawns for $10 per lawn. If Carlos mowed 3 lawns in 3 days, what was the total amount of money he earned?

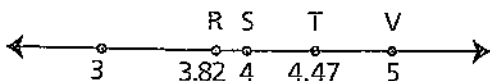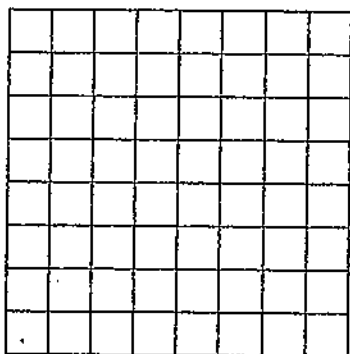Answer: _____

10 Solve.

$$12 + |-5|$$

   Ⓐ 7   Ⓒ 17

   Ⓑ −7   Ⓓ −17

11 Which point on the number line best represents $\sqrt{20}$?

$$\begin{array}{cccc} & R\ S & T & V \\ \longleftarrow\!\!\!-\!\!\!\circ\!\!\!-\!\!\!\circ\!\!\circ\!\!-\!\!\!-\!\!\!\circ\!\!\!-\!\!\!-\!\!\!\circ\!\!\!-\!\!\!\longrightarrow \\ 3 & 3.82\ \ 4 & 4.47 & 5 \end{array}$$

Ⓐ R   Ⓒ T

Ⓑ S   Ⓓ V

12 The model below shows $\sqrt{64} = 8$.

How can you show $\sqrt{256}$?

Ⓐ 16 rows of 16 squares

Ⓑ 8 rows of 32 squares

Ⓒ 4 rows of 64 squares

Ⓓ Not here

13 Maria deposited $250 to a CD account. The account had an annual simple interest rate of 5.6%. If she leaves the money in the account for 9 months, which expression can be used to find the total amount of interest she will earn?

Ⓐ $250 - 0.056 \times 0.75$

Ⓑ $250 \times 0.056 \times 9$

Ⓒ $250 \times 0.056 \times 0.75$

Ⓓ $250 \times 5.6 \times 6$

14 Andy and Joan decided to start on a diet together. The table shows their weight loss after six months. Interestingly, they both lost a proportional amount of weight.

Name	Original Weight (w)	After Diet (d)
Andy	180	162
Joan	140	126

Which formula can be used to show the amount of weight each of them lost?

Ⓐ $d = w \times 1.26$

Ⓑ $d = w \times 0.9$

Ⓒ $d = w - 0.9$

Ⓓ $d = w + 0.9$

Number Correct/Total = _____/15