Name _____ Date _____

Expressions and Equations

Modeled Instruction

DIRECTIONS: Read each question and choose the best answer. Use the answer sheet provided at the end of the workbook to record your answers. If the correct answer is not available, mark the letter for "Not Here."

1. The librarian placed 4^2 books on each of 5 shelves. How many books did the librarian place on the shelves altogether?

   A 80 books

   B 25 books

   C 20 books

   D 16 books

   Hint

   In the number 4^2, the exponent is 2 and 4 is the base. The exponent tells how many times a number is used as a factor. The base is the number being multiplied repeatedly.

   $4^2 = 4 \times 4 = \square$

   Find the number of books she placed on each shelf. Then multiply by 5 to find the total.

2. Which expression has a value of 4?

   F $7 + (2^2 - 3) + 4 \times 4$

   G $3 \times (7^2 - 4) \times 4 + 2$

   H $4^2 + 3 \times (7 - 2) + 4$

   J $2^2 \times 7 - (4 + 4) \times 3$

   Hint

   Remember to apply the Order of Operations when simplifying an expression.
   1) Parentheses
   2) Exponents
   3) Multiply and Divide from Left to Right
   4) Add and Subtract from Left to Right

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71. In what quadrant is the point $(-7, -2)$ located?

   A   Quadrant I

   B   Quadrant II

   C   Quadrant III

   D   Quadrant IV

72. Each unit on the coordinate plane represents 1 mile. How far is the grocery store from the dry cleaners?
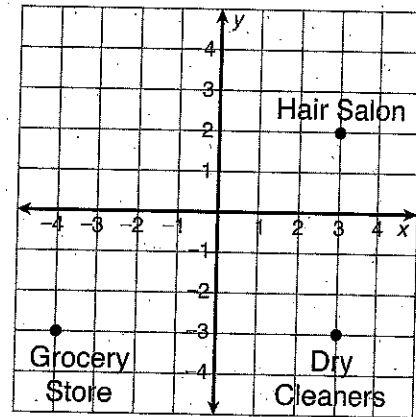
   F   5 miles

   G   7 miles

   H   8 miles

   J   14 miles

Number Sense
Higher Scores on Math, Grade 6

3. There are 16 ounces in 1 pound. Which expression gives the number of ounces in p pounds?

A $16p$

B $p \div 16$

C $16 + p$

D $16 - p$

Hint

In mathematics, it is assumed that the p actually means $1p$ and it is not necessary to write the 1. For this reason, we can write $16p$ and it means $16 \times 1p$. This formula allows you to multiply 16 times any number of pounds to find the number of ounces in that number of pounds.

4. The length of a swimming pool is 5 feet shorter than twice the width. Let n represent the width. Which expression gives the length of the swimming pool?

F $2n + 5$

G $2n - 5$

H $2(n - 5)$

J $2(n + 5)$

Hint

You know that n represents the width. The width is 2 times the width minus 5. Replace the word width with n to decide on the correct expression.

5. How many terms does this expression have?

$2e - f$

A 4

B 3

C 2

D 1

Hint

The terms of an expression are separated by a plus sign or a minus sign.

6. Which of the following describes a part in this expression?

$(12 \times 6) + (4 \times 8) - 7$

F the difference of 8 and 7

G the sum of 6 and 4

H the quotient of 4 and 8

J the product of 12 and 6

Hint

You must always work inside the parentheses before other operations. Once you have multiplied the factors inside the parentheses, then you can add and subtract from left to right.

7. What is the volume of a cube with a side length of $\frac{1}{2}$ in.?

A $\frac{1}{8}$ cubic inch

B $\frac{1}{8}$ inch

C $1\frac{1}{2}$ cubic centimeters

D $1\frac{1}{2}$ centimeters

Hint

You can use the formula $V = s^3$ to find the volume of a cube. This formula means $s \times s \times s$. You can use s^3 because all the faces of a cube have the same side length.

8. The expression $180(n - 2)$ gives the sum of the measures of the angles, in degrees, of a polygon with n sides. What is the sum of the measures of the angles in a polygon with 10 sides?

F   1,080 degrees

G   1,440 degrees

H   1,880 degrees

J   2,160 degrees

Hint

When a number is placed directly outside a set of parentheses, it means that you must multiply that number times the result in the parentheses.

9. Nicolás bought a pair of sandals for $27.00, four shirts, and a jacket for $54.00. To find the total cost in dollars, he wrote $27 + 4s + 54 = 27 + 54 + 4s$. Which property does the equation show?

A   Identity Property of 1

B   Distributive Property of Multiplication over Addition

C   Associative Property of Addition

D   Commutative Property of Addition

Hint

The Commutative Property of Addition states that changing the order of the addends does not change the sum. The Associative Property of Addition states that moving the grouping symbols of an addition express does not change the sum.

10. An artist bought p large tubes of paint for $25.00 each and p small tubes of paint for $15.00 each. The expression $p \times 25 + p \times 15$ gives the total cost, in dollars, of the tubes of paint. Which shows another way to write this expression?

F $p(25 + 15)$

G $p(25 \times 15)$

H $p(25 \times p) + 15$

J $p(25 + p)15$

Hint

The letter p represents the number of each item that was bought. You can see that p is to be multiplied by both 25 and 15. You can write a simpler problem by applying the Distributive Property of Multiplication over Addition.

Expressions and Equations
Higher Scores on Math

11. Which equation uses the Distributive Property to express the sum of 45 and 54 as a product?

A $(9 \times 5) \times (9 \times 6)$

B $(4 + 5) \times (5 + 4)$

C $5(9 + 6)$

D $9(5 + 6)$

Hint

Think of a common factor of both 45 and 54. Place that common factor outside the parentheses. Then think of the other two factors and place them as a sum inside the parentheses.

12. Which expression is equivalent to $3(h + 2) - h$?

F $h + 6$

G $2h + 6$

H $h + 2$

J $2h + 2$

Hint

Begin simplifying by multiplying 3 times both h and 2. Then subtract h. Since the last h is separated by a minus sign, subtracting it will be the last step.

13. After spending $5.25 on a magazine, Terry has $16.75 left. The equation $m - 5.25 = 16.75$ can be used to find the amount of money, m, Terry had before purchasing the magazine. Which amount is a solution of the equation?

A $m = \$22.00$

B $m = \$11.50$

C $m = \$9.00$

D $m = \$8.25$

Hint

Think about working backward. Start with the money Terry had left and add the amount she spent. Check your answer by subtracting $5.25 to see if $16.75 is the amount left.

14. Motorists must travel at a speed no more than 25 miles per hour in a school zone. The inequality $s \leq 25$ represents the permitted speeds. Which number is NOT a solution of the inequality?

F $s = 15$

G $s = 20$

H $s = 25$

J $s = 30$

Hint

The symbol $\leq$ means "less than or equal to." This means the driving speed allowed is 25 miles per hour or less.

15. Bill must score at least 85 points on his final test to get a B in social studies. The inequality $p \geq 85$ represents the possible number of points, p, that he can score. Which number is a solution of the inequality?

A $p = 92$

B $p = 84$

C $p = 80$

D $p = 75$

Hint

The symbol $\geq$ means "greater than or equal to." This means the score Bill makes must be equal to 85 or greater.

16. A builder needs 3 bolts to install each door. The expression $3d$ gives the number of bolts needed to install d doors. Which best describes the value of the variable d?

F a single unknown number

G any positive number

H any positive counting number

J any integer

Hint

Think about what is included in each number description.
- A single unknown number includes negative numbers or fractions and decimals.
- Any positive number includes whole numbers, fractions, and decimals.
- Any positive counting number includes whole numbers only.
- Any integer includes negative numbers.

17. Don wrote the expression 54 less than the product of m and 15. What algebraic expression did he write? What is the value of the expression for $m = 7$?

A $54m + 15$; 393

B $15m + 54$; 159

C $15m - 54$; 51

D $54m - 15$; 363

Hint

54 less than a product means subtract 54 from a product.

The product of m and 15 means multiply the two terms.

When you multiply m and 15, the result is a product.

18. A driver travels 150 miles in h hours. Which best describes the value of h?

F a single unknown number

G any nonnegative number

H any whole number

J any integer

Hint

Since hours is a unit of measure, it can be measured in whole numbers, decimals, or fractions. However, it cannot be measured in negative numbers.

19. Kendra was born in 1990. Her cousin Melody was born 11 years after Kendra. Which equation could be used to find the year in which Melody was born?

A $y \times 11 = 1990$

B $y \div 11 = 1990$

C $y + 11 = 1990$

D $y - 11 = 1990$

Hint

The most straightforward way to solve this is 1990 + 11 = Melody's birth year. But that is not one of the answer choices. You know that addition and subtraction are inverse operations. Thinking about that will help you find the correct option.

20. Deena adds $1\frac{2}{3}$ cups of oats to some flour to make $4\frac{3}{4}$ cups of baking mix. She solves the equation $f + 1\frac{2}{3} = 4\frac{3}{4}$ to find the amount of flour, f, in the baking mix. How much flour is in the baking mix?

F $1\frac{2}{3}$ cups   H $3\frac{1}{12}$ cups

G $2\frac{1}{3}$ cups   J $6\frac{5}{12}$ cups

Hint

The given addition equation is the situation equation. It matches the structure of the problem. Think about how you can use an inverse operation to solve the problem.

$$f + 1\frac{2}{3} = 4\frac{3}{4}$$
$$4\frac{3}{4} - 1\frac{2}{3} = f$$

21. During a school fundraiser, Dominic sold tumblers for $12.00 each and earned a total of $324.00. Which equation could be used to find the number of tumblers, t, Dominic sold?

A $t \times 12 = 324$

B $t \div 12 = 324$

C $t + 12 = 324$

D $t - 12 = 324$

Hint

Use the information in the problem to write a word equation.

number of tumblers $\times$ $12.00 = total amount

22. A freight car can carry no more than 125 tons of cargo. Which inequality represents the number of tons, t, that the freight car can carry?
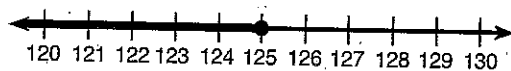
F $t < 125$

G $t > 125$

H $t \leq 125$

J $t \geq 125$

Hint

You can think of a number line.

No more than 125 tons means 125 tons or any amount less than 125 tons.

As you move to the left on a number line, the numbers get smaller.

23. At least 10 people have to be registered for art classes at the community center, or the art classes are cancelled. Which inequality shows this situation?

A $r > 10$

B $r \geq 10$

C $r < 10$

D $r \leq 10$

Hint

At least 10 people means 10 people or more. Which symbol means equal to or greater than?

Expressions and Equations
Higher Scores on Math, Grade 6

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The graph below shows the cost of buying comic books from an online retailer. The shipping charge is always the same no matter how many comic books are purchased. Use the graph for questions 24 and 25.

Number of Comic Books
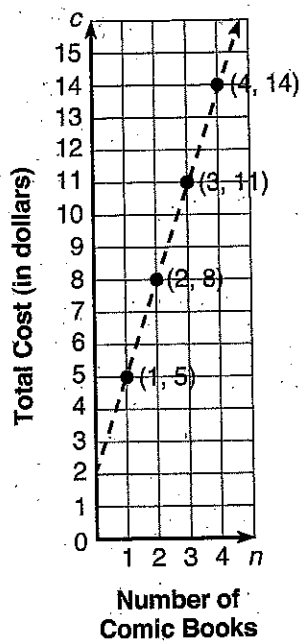
24. What is the shipping cost?

     F $5.00

     G $3.00

     H $2.00

     J $1.00

Hint

You can see that the y-axis represents all costs. The line starts at $2.00 because the shipping cost is always the same.

25. Which equation represents the total cost in dollars, c, for n comic books?

     A $c = 3n + 2$

     B $c = 2n + 3$

     C $c = 3n$

     D $c = 2n$

Hint

The graph shows that 1 comic book with shipping costs $5.00. You can subtract the shipping cost to find the cost of 1 comic book. To find the total cost, you can write a word equation.

Total cost = Cost of 1 comic book $\times$ n (total number of comic books) + shipping cost

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Expressions and Equations

Independent Practice

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26. Kris sends an e-mail to 5 people, and each of those people will send the e-mail to 5 more people, and so on. Which expression shows the number of people who will have received the e-mail at the end of the third round?

   F 5×3

   G 3^5

   H 5^3

   J 3×5

27. Which expression has a value of 24?

   A $4 + 2^2$

   B $4^2 + 2^3$

   C $(4 + 2)^2$

   D $4^2 - 2^2$

28. What is the value of $6^2 - (9 - 5) \div 4$?

   F 8

   G 35

   H 39

   J 42

29. Express $10 \times 10 \times 10 \times 10$ in exponential form.

   A 4^{10}

   B 10,000

   C 10×4^4

   D 10^4

30. A store clerk placed 4^2 plates into each of 8 boxes. How many plates did she put in boxes in all?

   F 16 plates

   G 32 plates

   H 128 plates

   J 256 plates

31. Hendrick makes birdhouses. It takes him 35 minutes to make a birdhouse. What is an expression that shows how long it takes him to make t birdhouses?

   A $35 + t$

   B $35t$

   C $35 - t$

   D $35 \div t$