

SAMPLE PAGES FOR

SOUTH CAROLINA
7TH GRADE MATHEMATICS

CHALLENGE THE

PALMETTO **A**CHIEVEMENT **C**HALLENGE **T**EST

BY

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CHAPTER 14

EXPRESSIONS AND EQUATIONS

➤ *Writing Expressions*

In order to solve word problems, we must write an equation, then solve for the missing part. Let's first practice writing expressions.

EXAMPLES:

two more apples than Mary has

b = Mary's apples, because it is what we do not know.

"More than" means addition.

So, $b + 2$ is our expression.

three less points than another team

c = the points of the other team, because it is what we do not know.

"Less than" means subtraction.

So, $c - 3$ is our expression.

PRACTICE

Write an expression for each.

1. w decreased by 7 _____
2. 5 more than x _____
3. 17 less than y _____
4. 77 minus n _____
5. the sum of 6 and m _____
6. x increased by 86 _____
7. the quotient of 44 and r _____
8. 24 times x _____
9. the product of 17 and s _____
10. eleven feet farther than Mary ran _____
11. seven fewer bananas than Mark has _____
12. 10 years younger than Sandra _____
13. 2 dollars less than the coat _____
14. 18 cents more than the pencil _____
15. \$250 plus the tax _____

➤ *Evaluating Expressions*

Expressions can be evaluated by replacing variables with specific numbers.

EXAMPLES

Evaluate $14 + t + z$ if $t = 15$ and $z = 5$.

$$14 + t + z$$

Replace variables with given numbers.

$$14 + 15 + 5$$

Add the numbers.

$$34$$

Is this statement, $z + y = x + z$ true or false if $z = 0$, $y = 1$, and $x = 7$?

$$z + y = x + z$$

Replace variables with given numbers.

$$0 + 1 = 7 + 0$$

Add the numbers.

$$1 = 7$$

False

PRACTICE

Evaluate each expression if $c = 4$, $g = 3$, $m = 1$, and $y = 6$.

1. $c + g + m + 6$ _____

6. $y - m - g - c$ _____

2. $10 + g - 4 + m$ _____

7. $m - y + g$ _____

3. $8 - y + m - 3$ _____

8. $g + g + y + c$ _____

4. $y - m + g - 4$ _____

9. $50 + c - m + g$ _____

5. $c + 4 - 10 + y$ _____

10. $y + 41 - m + c$ _____

Evaluate each statement and write true or false.

$$d = 10, p = 4, h = 1$$

11. $d + p = p + d$ _____

16. $40 + p = d + h + 33$ _____

12. $p + h = d - 5$ _____

17. $d - h = p + 5$ _____

13. $p + d = 3 + p$ _____

18. $p + 10 = h + 11$ _____

14. $d + p + h = 16$ _____

19. $d + h + 13 = 20 + p$ _____

15. $d - p + h + p = 3$ _____

20. $h + 10 = p + 7$ _____

➤ Simplifying Expressions

Expressions are made up of terms. Terms are separated by either addition or subtraction signs.

$4a + 3a + 6$ has 3 terms. Two of these terms are called like terms, because they have the same variable (letter).

To simplify an expression, like terms must be combined.

EXAMPLES

$$5p - p = 4p$$

$$(5p - 1p = 4p)$$

Put like terms together by subtracting.

$$6w - 6 + 5w = 11w - 6$$

$$(6w + 5w - 6 = 11w - 6)$$

Put like terms together by adding.

PRACTICE

Simplify each expression.

1. $16 + 13x - 2x$ _____

11. $54 + 10b - 3.12 - b$ _____

2. $5y + 6x + 3y$ _____

12. $9s + 72 + 15s$ _____

3. $3m - m$ _____

13. $k + 3w + 31k$ _____

4. $w + 4 + 5 + 3w$ _____

14. $c + 12c$ _____

5. $7z + 6s + s$ _____

15. $a + b + 3a + 7b$ _____

6. $18d + 2d - 1 + 2d$ _____

16. $2g + 17e - g + 10$ _____

7. $8v + v - 4$ _____

17. $6p + 17p$ _____

8. $10b + 6b + 49$ _____

18. $2v - w + 5 + 6w$ _____

9. $8ab + 6ab - 9a$ _____

19. $18a + 3a + 17$ _____

10. $5y + q - 3y$ _____

20. $5.9 + 6b + 3c + b$ _____

➤ Modeling Equations

Sometimes models (Δ , \square , \circ) are used in place of variables (letters) and numbers in equations.

EXAMPLES

If $\square = \star + 3$, then $3\square + 3 = \underline{\hspace{2cm}}$.

$$3\square = \star + 3$$

$$\star + 3 = 3\star + 9$$

$$\star + 3$$

So, $(3\square) + 3 = (3\star + 9) + 3 = 3\star + 12$.

If $\star = y + 1$ and $\bullet = x + 3$, then $\star + 4\bullet = \underline{\hspace{2cm}}$.

$$\star = y + 1$$

$$4\bullet = x + 3$$

$$x + 3 = 4x + 12$$

$$x + 3$$

$$x + 3$$

So, $\star + (4\bullet) = y + 1 + (4x + 12) = 4x + y + 13$.

PRACTICE

Write the equation that represents each of the following if:

$$\Delta = x - 1$$

$$\star = y + 2$$

$$\bullet = x + 4$$

- | | |
|---|---|
| 1. $3\Delta = \underline{\hspace{2cm}}$ | 11. $3\star + 9 = \underline{\hspace{2cm}}$ |
| 2. $4\star = \underline{\hspace{2cm}}$ | 12. $15 + \bullet = \underline{\hspace{2cm}}$ |
| 3. $2\bullet = \underline{\hspace{2cm}}$ | 13. $\star + 14 + \bullet = \underline{\hspace{2cm}}$ |
| 4. $\Delta + 2\star = \underline{\hspace{2cm}}$ | 14. $\Delta + 5 + \star = \underline{\hspace{2cm}}$ |
| 5. $3\bullet + \star = \underline{\hspace{2cm}}$ | 15. $\bullet + 2\star - 3 = \underline{\hspace{2cm}}$ |
| 6. $\star + 2\Delta = \underline{\hspace{2cm}}$ | 16. $\star + 2\bullet = \underline{\hspace{2cm}}$ |
| 7. $\bullet + \Delta = \underline{\hspace{2cm}}$ | 17. $\bullet + \bullet + \Delta = \underline{\hspace{2cm}}$ |
| 8. $3\bullet + \Delta = \underline{\hspace{2cm}}$ | 18. $6\star = \underline{\hspace{2cm}}$ |
| 9. $2\star + 2\bullet = \underline{\hspace{2cm}}$ | 19. $3\Delta + 1 = \underline{\hspace{2cm}}$ |
| 10. $\star + \bullet + \Delta = \underline{\hspace{2cm}}$ | 20. $4\bullet - 3 = \underline{\hspace{2cm}}$ |

➤ Solving Equations - Word Problems

EXAMPLES

Matthew is 3 years older than Mark. If Matthew is 12, how old is Mark?

Write an equation. $x + 3 = 12$

(Mark) (Matthew)

$$x + 3 = 12$$

Now solve.

$$\begin{array}{r} x + 3 = 12 \\ -3 \quad -3 \\ \hline x = 9 \end{array}$$

Subtract 3 from each side to get x alone.

Mark is 9 years old.

Mary scored 10 points less than Janet. If Mary scored 25 points, how many points did Janet score?

Write an equation. $x - 10 = 25$

(Janet) (Mary)

$$x - 10 = 25$$

Now solve.

$$\begin{array}{r} x - 10 = 25 \\ +10 \quad +10 \\ \hline x = 35 \end{array}$$

Add 10 to each side to get x alone.

Janet scored 35 points.

PRACTICE

Write an equation and solve.

- Carolyn walked 20 minutes less than Sarah. Carolyn walked 45 minutes. How many minutes did Sarah walk?
- There were 9,175 more people in the stadium on Saturday than on Sunday. If there were 11,000 people on Saturday, how many people were in the stadium on Sunday?
- Seventy-four dollars is needed to buy a coat. Joe has \$37.50. How much more money does he need?
- Jake and Bob scored a total of 75 points in the basketball game. Jake scored 38 points. How many points did Bob score?

5. Katherine scored 73 on her science test. The average score was 87. How many points under the average was she?
6. Ed can run 3 miles in 25 minutes. Harold runs the same distance in 2 minutes less time. How long does it take Harold to run 3 miles?
7. Team B won 6 more games than Team A. If Team A won 10 games, how many games did Team B win?
8. The Blues had eight more fouls than the Greens. If the Greens had 15 fouls, how many fouls did the Blues have?
9. Jeremy jumped 2 feet farther than Walter. If Walter jumped 8 feet, how many feet did Jeremy jump?
10. The Sparks lost 4 less games than the Speeds. If the Speeds lost 11 games, how many games did the Sparks lose?
11. Twenty-seven less than a number is 36. What is the number?
12. Twelve more than a number is 49. What is the number?
13. A number divided by 7 is 23. What is the number?
14. The product of a number and 15 is 90. What is the number?
15. Frank eats 5 hamburgers. This is 2 more than he usually eats. How many hamburgers does Frank usually eat?

➤ Review

- Which expression would you write for “six more than s ”?
 - $s - 6$
 - $s + 6$
 - $s \div 6$
 - $6s$
- The sum of 18 and 19 written as an expression is _____.
 - $19 - 18$
 - $19 \cdot 18$
 - $18 + 19$
 - $19 \div 18$
- Twenty minus r is _____.
 - $r - 20$
 - $20 + r$
 - $20 \cdot r$
 - $20 - r$
- Evaluate $c + 4 + d + q$ if $c = 1$, $d = 0$, and $q = 9$.
 - 59
 - 9
 - 16
 - 14
- Evaluate $3 + m + w + 25$ if $m = 15$ and $w = 9$.
 - 4
 - 79
 - 52
 - 349
- True or false. $c + g = h + c$ if $c = 10$, $g = 0$, $h = -1$.
 - true
 - false
- True or false. $9 + p + b = 18$ if $p = 10$ and $b = -1$.
 - true
 - false
- The difference of x and 17 is 29. What is x ?
 - 493
 - 17
 - 12
 - 46
- 50 is the product of 10 and y . What is y ?
 - 5
 - 500
 - 60
 - $\frac{1}{5}$
- x increased by 17 is 49. What is x ?
 - 2.9
 - 66
 - 833
 - 32
- James earned \$50 more than John. If John earned \$70 dollars, how much did James earn?
 - \$20
 - \$130
 - \$120
 - \$350

12. Marsha can make a hat in 45 minutes. Her sister Mary can make the same hat in 10 minutes less. What equation would you use to solve this problem?
- $45 - 10 = x$
 - $x \cdot 10 = 45$
 - $\frac{x}{45} = 10$
 - $x - 10 = 45$
13. Denzil needs 30 more points to win a game. If the winning score is 100, what equation would you use to find the number of points Denzil has now?
- $100 + x = 30$
 - $x - 30 = 100$
 - $x + 30 = 100$
 - $\frac{100}{30} = x$
14. Jasmine and Miguel scored 48 points together. If Jasmine scored 21 points, how many did Miguel score?
- 69
 - 24
 - 1,008
 - 27
15. Cathy had \$35 less to spend than Harry. If Harry had \$78, how much money did Cathy have to spend?
- \$27.30
 - \$31.03
 - \$113
 - \$43
16. Eddie has 24 less marbles than Fred. If Fred has 157, how many marbles does Eddie have?
- 181
 - 397
 - 167
 - 133
17. What expression would you use to find Kelly's salary if her salary plus a \$500 bonus is equal to \$21,000?
- $\$21,000 + x = \500
 - $\$21,000 + \$500 = x$
 - $x + \$500 = \$21,000$
 - $x - \$500 = \$21,000$
18. Martin's age divided by four is six. What is Martin's age?
- 64
 - $\frac{4}{6} = \frac{2}{3}$
 - 10
 - 24
19. What is the correct equation for "twice a number is 18"?
- $2 + x = 18$
 - $2 - x = 18$
 - $2x = 18$
 - $2 \div x = 18$
20. The Hawks lost 83 games. They won 14 more than they lost. How many games did they win?
- 69
 - 97
 - 71
 - $\frac{83}{14}$

21. Simplify $8b + 2c + b$.

- a. $11bc$
- b. $9b^2 + 2c$
- c. $9b + 2c$
- d. $8b + b + 2c$

22. If $\star = z + 1$, then $5\star =$ _____.

- a. $5z + 1$
- b. $5z + 5$
- c. $z + 5$
- d. $z + 6$

23. Simplify $10y - y + 3 \cdot 6$.

- a. $72y$
- b. $9y + 3 \cdot 6$
- c. $10y - y + 18$
- d. $9y + 18$

24. If $\Delta = w - 3$, then $\Delta + 15 =$ _____.

- a. $w + 12$
- b. $w - 12$
- c. $w + 18$
- d. $w - 18$