

**PAlg4: Algebra and Functions 1**  
**4.1 Writing and Evaluating Algebraic Expressions**

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**MULTIPLE CHOICE**

1. Write the following as an algebraic expression:

“a number increased by 16”

- a. 16
- b.  $n - 16$

- c.  $n + 16$
- d.  $n = +16$

ANS: C

“a number increased ” means  $n +$

“a number increased by 16” means  $n + 16$

	Feedback
A	You need an expression with a variable.
B	“Increased” means addition.
C	Correct!
D	There is no “is” so no “equals”.

PTS: 1

DIF: Grade 6

REF: 6AF.1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results.

OBJ: 6AF1.2 Write and evaluate an algebraic expression for a given situation, using up to three variables. TOP: Algebra & Functions MSC: LFS & DP-432

2. Write as a mathematical expression: 4 less than  $J$ .

a.  $J - 4$

c.  $4 > J$

b.  $J + 4$

d.  $4 < J$

ANS: A

'4 less than  $J$ ' means we subtract 4 from  $J$ .

So, 4 less than  $J$  means  $J - 4$ .

	Feedback
A	Correct!
B	Wrong sign between 4 and $J$ .
C	Incorrect - you need an expression!
D	Incorrect - you need an expression!

PTS: 1

DIF: Grade 7

REF: 7AF.1.0 Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:

OBJ: 7AF.1.1 Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description.

TOP: Algebra & Functions

MSC: LFS & EJ-415

3. Write the following as an algebraic expression:

"the product of a number and  $(-16)$ "

a.  $-16 + n$

c.  $-16n$

b.  $-16 = n$

d.  $16n$

ANS: C

"the product of a number and  $(-16)$ " means  $n \cdot (-16)$  and  $n \cdot (-16) = -16n$ .

	Feedback
A	"Product" means multiplication.
B	There is no "is" so no "equals".
C	Correct!
D	You forgot the sign.

PTS: 1

DIF: Grade 6

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4. Write the following as an algebraic expression:

“59 decreased by some number”

a.  $59 - n$

c.  $59 + n$

b.  $n = -59$

d.  $n - 59$

ANS: A

“59 decreased” means  $59 -$

“59 decreased by some number” means  $59 - n$

	Feedback
A	Correct!
B	There is no “is” so no “equals”.
C	“Decreased” means subtraction, not addition
D	Opposite order - start with 59.

PTS: 1

DIF: Grade 6

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5. Write the following as an algebraic expression:

“some number squared divided by 43”

a.  $n^2 = \frac{1}{43}$

c.  $n^2 + 43$

b.  $\frac{n^2}{43}$

d.  $(\frac{n}{43})^2$

ANS: B

“some number squared” means  $n^2$

“divided by 43” means  $\frac{n^2}{43}$

	Feedback
A	There is no “is” - so no “equals”.
B	Correct!
C	You need to divide not add.
D	Only the “number” is squared - not 43.

PTS: 1

DIF: Grade 6

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6. A number  $y$  is twelve times greater than three added to a number  $x$ . Write an equation for  $y$  in terms of  $x$ .

a.  $y = 12(x + 3)$

c.  $y = 12x + 3$

b.  $y = 3(x + 12)$

d.  $y = 12 + (x + 3)$

ANS: A

“three added to a number  $x$ ” means  $x + 3$ . Put this in parenthesis:  $(x + 3)$ .

“twelve times greater” means “multiply by 12”.

We get  $y = 12(x + 3)$ .

	Feedback
A	Correct!
B	You changed the places of 3 and 12.
C	You forgot to put parenthesis: $(x + 3)$
D	“twelve times greater” means “multiply by 12”.

PTS: 1

DIF: Grade 5

REF: 5AF.1.0 Students use variables in simple expressions, compute the value of the expression for specific values of the variable, and plot and interpret the results.

OBJ: 5AF.1.2 Students use a letter to represent an unknown number; write and evaluate simple algebraic expressions in one variable by substitution.

TOP: Algebra and Functions

MSC: LFS-448

7. Write as a mathematical expression:

$\frac{4}{5}$  as large as the width, where the *width* =  $W$

a.  $\frac{4}{5} + W$

c.  $\frac{4}{5} W$

b.  $\frac{4}{5} \leq W$

d.  $\frac{4}{5} > W$

ANS: C

'as large as' means multiplication so ' $\frac{4}{5}$  as large as the width' means  $\frac{4}{5} W$ .

	Feedback
A	'as large as' means multiplication; 'more than' means addition.
B	Wrong mathematical symbol and this is not an expression.
C	Correct!
D	Wrong mathematical symbol and this is not an expression.

PTS: 1 DIF: Grade 7

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TOP: Algebra & Functions

MSC: LFS & EJ-415

8. Write as a mathematical expression:

4 times smaller than  $Z$

a.  $\frac{Z}{4}$

c.  $4 - Z$

b.  $4Z$

d.  $4 > Z$

ANS: A

'4 times smaller' means 'divide by 4' so '4 times smaller than  $Z$ ' means  $\frac{Z}{4}$ .

	Feedback
A	Correct!
B	This is '4 times' or '4 times bigger'.
C	'times smaller' means division.
D	This is not an expression.

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9. Write as a mathematical equation:  
A is 5 more than 2 times the value of  $P$

a.  $5A = 2P$

c.  $A = 2P + 5$

b.  $A + 5 = 2P$

d.  $A > 2P + 5$

ANS: C

'A is ' means 'A ='

'2 the size of P' means '2  $P$ '

'5 more than 2 times the value of  $P$ ' means '5 more than 2  $P$ ' which means ' $2P + 5$ '.

So, A is 5 less than  $\frac{2}{??}$  the value of  $P$  means:  $A = 2P + 5$ .

	Feedback
A	'5 more' means addition (and on the other side of the equation).
B	This makes $A$ smaller. The sentence says that $A$ is bigger.
C	Correct!
D	Incorrect mathematical symbol.

PTS: 1

DIF: Grade 7

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10. Write as a mathematical equation:

A is 1 less than  $\frac{9}{5}$  the value of  $K$ .

a.  $1A = 5K$

c.  $1A < \frac{9}{5}K$

b.  $A = \frac{9}{5}K - 1$

d.  $A = 9K - 1$

ANS: B

'A is' means 'A ='

' $\frac{9}{5}$  the size of  $K$ ' means ' $\frac{9}{5}K$ '

'1 less than  $\frac{9}{5}$  the value of  $K$ ' means '1 less than  $\frac{9}{5}K$ ' which means ' $\frac{9}{5}K - 1$ '.

So, A is 1 less than  $\frac{9}{5}$  the value of  $K$  means:  $A = \frac{9}{5}K - 1$ .

	Feedback
A	Incorrect.
B	Correct!
C	Look again on the left side.
D	You are missing something here.

PTS: 1

DIF: Grade 7

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11. Write as a mathematical equation:

Z is less than 9 times the value of  $\frac{7}{5}$  the circumference, where  $C = \text{circumference}$ .

a.  $Z < 9 - \frac{7}{5}C$

c.  $Z > 9(\frac{7}{5}C)$

b.  $Z < 9(\frac{7}{5}C)$

d.  $Z < 9 + \frac{7}{5}C$

ANS: B

'Z is less than' means 'Z <'

'9 times the value of ' means '9.'

' $\frac{7}{5}$  the size of circumference' means ' $\frac{7}{5}C$ '

So, Z is less than 9 times the value of  $\frac{7}{5}$  the circumference means:  $Z < 9(\frac{7}{5}C)$ .

	Feedback
A	Wrong mathematical operation.
B	Correct!
C	Wrong mathematical symbol.
D	Wrong mathematical operation.

PTS: 1

DIF: Grade 7

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12. Express mathematically:

$L$  is  $\frac{2}{3}$  the size of  $A$

a.  $L \leq \frac{2}{3}A$

c.  $L = \frac{2}{3}A$

b.  $L \neq \frac{2}{3}A$

d.  $\frac{2}{3}L = A$

ANS: C

' $L$  is' means ' $L =$ '

' $\frac{2}{3}$  the size of  $A$ ' means ' $\frac{2}{3}A$ '

So,  $L$  is  $\frac{2}{3}$  the size of  $A$  means:  $L = \frac{2}{3}A$ .

	Feedback
A	Wrong mathematical symbol.
B	Wrong mathematical symbol.
C	Correct!
D	Wrong place of $\frac{3}{4}$ .

PTS: 1

DIF: Grade 7

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16. 7AF1.1 c. If  $D$  is  $\frac{5}{9}$  the size of  $Q$  and  $Q$  is 3 times the size of  $C$ , then write an expression for  $D$  in terms of  $C$ .

a.  $\frac{5}{3}D = C$

c.  $D = \frac{5}{3}Q$

b.  $D = \frac{5}{9}Q + 3C$

d.  $D = \frac{5}{3}C$

ANS: D

$D = \frac{5}{9}Q$  and  $Q = 3C$  so  $D = \frac{5}{9} \cdot 3C$ .

That is,  $D = \frac{5}{3}C$ .

	Feedback
A	Wrong place of $\frac{5}{3}$ .
B	Wrong mathematical symbol.
C	Wrong variable on the right.
D	Correct!

PTS: 1

DIF: Grade 7

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19.  $x = 3(p - 7)$ , what is  $x$  if  $p = 8$ ?

- a. 3
- b. 17
- c. 5
- d. 21

ANS: A

We substitute  $p = 8$  into the equation  $x = 3(p - 7)$  and solve for  $x$ .

Since this is an equation = sentence, we write every step on a new line!

$$x = 3(p - 7)$$

$$x = 3(8 - 7)$$

$$x = 3 \cdot 1$$

$$x = 3$$

	Feedback
A	Correct!
B	You need to do the operation in the parenthesis first or use the distributive rule.
C	You have calculated incorrectly. Check your addition and multiplication.
D	You are guessing.

PTS: 1

DIF: Grade 5

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22. If  $x = (a - b) - c$  and  $a$  is 15,  $b$  is 1 and  $c$  is 7, what is the value of  $x$  ?

- a. 9
- b. 7
- c. 105
- d. 23

ANS: B

$$x = (15 - 1) - 7$$

$$x = 14 - 7$$

$$x = 7$$

	Feedback
A	You need to subtract the second and third number from the first number.
B	Correct!
C	This is the product of the three numbers - you need to subtract.
D	This is the sum of the three numbers - you need to subtract.

PTS: 1

DIF: Grade 4

REF: 4AF.1.0 Students use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences.

OBJ: 4AF.1.2 Interpret and evaluate mathematical expressions that now use parentheses.

TOP: Algebra and Functions

MSC: LFS-462

23. Area = length  $\times$  width.

The length of a rectangle is 9 meters. The width is 9 meters. What is the area?

a.  $36 \text{ m}^2$

c.  $81 \text{ m}^2$

b.  $162 \text{ m}^2$

d.  $18 \text{ m}^2$

ANS: C

We substitute into the equation:

$$A = 9 \text{ m} \times 9 \text{ m}$$

$$A = 81 \text{ m}^2$$

	Feedback
A	This is the value of the perimeter.
B	Don't multiply by 2.
C	Correct!
D	This is a sum of length and width.

PTS: 1                      DIF: Grade 4

REF: 4AF.1.0 Students use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences.

OBJ: 4AF.1.4 Use and interpret formulas (e.g., area = length  $\times$  width or  $A = lw$ ) to answer questions about quantities and their relationships

TOP: Algebra and Functions

MSC: LFS-462



