

Today we will be studying variables and expressions

Please gather your clicker, notebook and your pencil. You will also need a packet of algebra tiles. Open up the packet and sort out the pieces according to size.

Get ready for the warm-up questions.



Solve: $40 - 16 \div 2$

Text in your number answer now please.



$3 \times 5 + 12 \div 3$

Text in your
answer now
please.



$$2 \times (95 - 32)$$

(A) 63

(B) 126

(C) 58

(D) 65

Algebra

2-1 Variables and Expressions

What You'll Learn

To evaluate algebraic expressions

New Vocabulary numerical expression, variable, algebraic expression, evaluate

CONTENT STANDARDS

6.EE.2, 6.EE.2.c, 6.EE.6

Why Learn This?

You do not know how many people will attend a school fair. You can use a variable to represent the number of people.



A **numerical expression** is a mathematical phrase with only numbers and operation symbols (+, −, ×, ÷). An example of a numerical expression is $8 + 5 - 2$.

In the expressions below, n , d , b , and x are variables. A **variable** is a symbol that can represent one or more numbers. A mathematical expression with one or more variables is an **algebraic expression**.

$$n + 2$$

$$5d$$

$$7b - 2$$

$$12x \div 3$$

You can use algebra tiles to model algebraic expressions.

■ A yellow tile represents 1.

■ A green tile represents a variable.

EXAMPLE Modeling With Algebra Tiles

- 1 Model the expression $5x + 3$ with algebra tiles.



← 5 green tiles represent $5x$.
3 yellow tiles represent 3.

- 1 EXAMPLE Draw algebra tiles to model the expression $2x + 3$.



← 2 green tiles represent $2x$,
and 3 yellow tiles represent 3.

Quick Check

1. Draw algebra tiles to model the expression $x + 2$.

Now model $3x - 2$

Please put all of your tiles back in their bag, seal it, and put it back on the counter.

Now we are going to learn to evaluate algebraic expressions by replacing each variable with a number.



The title screen of a video game usually asks, “How many players?” The number of players is a variable. The game software uses your entry to set up the game.

To **evaluate** an algebraic expression, you replace each variable with a number. Then you use the order of operations to simplify the expression.

EXAMPLE Evaluating an Algebraic Expression

2 Evaluate $2x - 8$ for $x = 11$.

$$\begin{aligned} 2x - 8 &= 2(11) - 8 && \leftarrow \text{Replace } x \text{ with } 11. \\ &= 22 - 8 && \leftarrow \text{Multiply } 2 \text{ and } 11. \\ &= 14 && \leftarrow \text{Subtract.} \end{aligned}$$

2 EXAMPLE Evaluate $8x + 2$ for $x = 3$.

$$8x + 2 = 8(3) + 2 \quad \leftarrow \text{Replace } x \text{ with } 3.$$

$$= 24 + 2 \quad \leftarrow \text{Multiply } 8 \text{ and } 3.$$

$$= 26 \quad \leftarrow \text{Add } 24 \text{ and } 2.$$



Evaluate $3x + 15$ for $x = 7$

A 37

B 52

C 43

D 36



Evaluate $5x \div 7$ for $x = 7$

A 7

B 8.14

C 5

D 35



Evaluate $56 - 4x$ for $x = 7$

(A) 9

(B) 364

(C) 28

(D) 24

You can evaluate an expression using more than one value. Make a table to organize the different values.

EXAMPLE Application: Fundraising

- 3 You earn \$3 for each person who plays the game at your booth at the school fair. The expression $3p$ represents the amount of money you earn, where p is the number of people who play your game. Copy and complete the table for the given number of people.

School Fair Booth Earnings

Number of People	Process	Amount Earned
p	$3 \times p$	$3p$
15	$3 \times \blacksquare$	\blacksquare
40	$3 \times \blacksquare$	\blacksquare
65	$3 \times \blacksquare$	\blacksquare

← Substitute each number of people for p .

← $3 \times 15 = 45$

← $3 \times 40 = 120$

← $3 \times 65 = 195$

- 3 EXAMPLE The cost to rent a canoe at the lake is a \$6 basic fee plus \$4 for each hour h the canoe is rented. The expression for the total cost of a canoe rental is $\$6 + \$4h$. Copy and complete the table.

Hours	Total Cost
h	$6 + 4h$
1	$\underline{\quad ? \quad}$
2	$\underline{\quad ? \quad}$
3	$\underline{\quad ? \quad}$

Hours	Total Cost
h	$6 + 4h$
1	10
2	14
3	18

Substitute each number of hours for h .

← $6 + 4 \times 1$

← $6 + 4 \times 2$

← $6 + 4 \times 3$

Complete this table

x	$5x$
3	
6	
9	
12	
	75



Evaluate $x + 12$ for $x = 8$

Text your answer in.



Evaluate $80 \div x$ for $x = 8$

Text in your answer.



Evaluate $2x$ for $x = 8$

Text in your answer.



Evaluate $x - 3$ for $x = 8$

Text in your answer.

You can power down your clickers and put them away.

We have an assignment worksheet, and you have time to begin working on it now.

Practice 2-1 Variables and Expressions

Write an algebraic expression for each model. Squares represent ones.
Shaded rectangles represent variables.

1.  _____

2.  _____

3.  _____

Evaluate each expression.

- 4. $5b \div b$ for $b = 7$ _____
- 5. $3m$ for $m = 9$ _____
- 6. $2t - 8$ for $t = 21$ _____
- 7. $2(4e)$ for $e = 5$ _____
- 8. $3pq$ for $p = 3$ and $q = 5$ _____
- 9. $9r + 16$ for $r = 8$ _____
- 10. $24 - 4r$ for $r = 4$ _____
- 11. $3v + 5k$ for $v = 3$ and $k = 6$ _____

Copy and complete each table.

x	$x+7$
2	9
5	12
8	
11	
	21

x	$5x$
3	
6	
9	
12	
	75

x	$125 - x$
15	
30	
45	
60	
	50

- 15. A cellular phone company charges a \$49.99 monthly fee for 600 free minutes. Each additional minute costs \$.35. This month you used 750 minutes. How much do you owe?

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