## 1-1 Variables and Expressions

**Write a verbal expression for each algebraic expression.**

11. $4q$

*SOLUTION:*

Because 4 and $q$ are written next to each other, they are being multiplied. So, the verbal expression *four times a number q* can be used to describe the algebraic expression $4q$.

13. $15 + r$

*SOLUTION:*

The expression shows the sum of two terms. So, the verbal expression *15 plus r* can be used to describe the algebraic expression $15 + r$.

14. $w - 24$

*SOLUTION:*

The expression shows the difference of two terms. So, the verbal expression *w minus 24* can be used to describe the algebraic expression $w - 24$.

17. $2a + 6$

*SOLUTION:*

The expression shows the sum of two terms. The term $2a$ represents the product of 2 and $a$. So, the verbal expression *6 more than the product 2 times a* can be used to describe the algebraic expression $2a + 6$.

**Write an algebraic expression for each verbal expression.**

20. a number less 35

*SOLUTION:*

Let $n$ represent a number. The word *less* suggests subtraction. So, the verbal expression *a number less 35* can be represented by the algebraic expression $n - 35$.

22. one third of a number

*SOLUTION:*

Let $n$ represent a number. The words *one third of a number* suggest multiplication. So, the verbal expression *one third of a number* can be represented by the algebraic expression $\frac{1}{3}n$.

24. the quotient of 45 and $r$

*SOLUTION:*

The word *quotient* suggests division. So, the verbal expression *the quotient of 45 and r* can be represented by the algebraic expression $\frac{45}{r}$.

26. 18 decreased by 3 times $d$

*SOLUTION:*

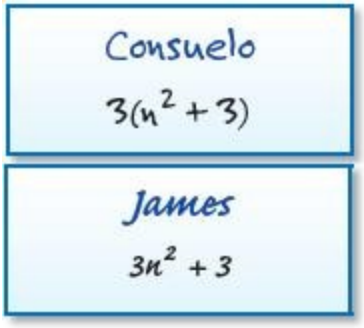
The word *decreased* suggests subtraction, and the word *times* suggests multiplication. So, the verbal expression *18 decreased by 3 times d* can be represented by the algebraic expression $18 - 3d$.

28. 20 divided by *t* to the fifth power

*SOLUTION:*

The words *divided by* suggest division. So, the verbal expression *20 divided by t to the fifth power* can be represented by the algebraic expression $\frac{20}{t^5}$.

40. **ERROR ANALYSIS** Consuelo and James are writing an algebraic expression for the verbal expression *three times the sum of n squared and 3*. Is either of them correct? Explain your reasoning.

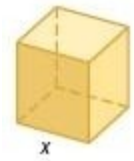



*SOLUTION:*

Consuelo is correct. The verbal expression says that the sum of *n* squared and 3 is multiplied by 3. So, parentheses are necessary. James left out the parentheses around $n^2 + 3$.

## 1-1 Variables and Expressions

41. **ORGANIZE IDEAS** For the cube, $x$ represents a positive whole number. Find the value of $x$ such that the volume of the cube and 6 times the area of one of its faces have the same value.




*SOLUTION:*

The volume of a cube can be found by multiplying the length times the width times the height. Because the sides of a cube all have the same length, $V = x \cdot x \cdot x$, or $x^3$. The area of one of the faces of the cube can be found by multiplying the length times the width. So, $A = x \cdot x$, or $x^2$.

To find the value of $x$ such that the volume of the cube and 6 times the area of one of its faces have the same value, find a value for $x$ such that $x^3 = 6x^2$.

| $x$ | $x^3 = 6x^2$ | Yes/No |
|---|---|---|
| 4 | $x^3 = 6x^2$<br>$4^3 \stackrel{?}{=} 6(4^2)$<br>$64 \neq 96$ | No |
| 6 | $x^3 = 6x^2$<br>$6^3 \stackrel{?}{=} 6(6^2)$<br>$216 = 216$ | Yes |

So, the sides must have a length of 6 for the volume of the cube and 6 times the area of one of its faces to have the same value.

43. What is an equation for "five more than the product of 7 and a number $t$ is 10?"

**A** $5 > 7t + 10$
**B** $7t + 5 = 10$
**C** $5t + 7 = 10$
**D** $5 \cdot 7t + 10$

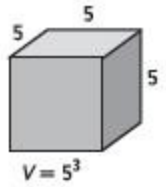
*SOLUTION:*

First look at "the product of 7 and a number $t$." Product means to multiply, so "the product of 7 and a number $t$" is $7 \cdot t$ or $7t$.

Then look at "five more than." More than means to add, so "five more than" means to add 5 making the left side of the equation is $7t + 5$.

Next look at "is 10." Is means equals, so "is 10" means the expression is equal to 10 making the equation $7t + 5 = 10$. So, choice B is the correct answer.

44. The volume of this cube can be expressed as $5^3$.




Which equation can be used to find the volume of a cube with edges that are $x$ units shorter?

**F** $V = (x - 5)^3$
**G** $V = 5^3 - x^3$
**H** $V = (5 - x)^3$
**J** $5 - x$

*SOLUTION:*

To find the volume of a cube, raise the side length to the third power. If the side length is $x$ units shorter than 5, the expression for the side length is $5 - x$. To raise $5 - x$ to the third power, make sure to raise the entire expression to the third power. So the equation for the volume would be $V = (5 - x)^3$.

The correct answer is choice H.

45. Elsie buys a pizza for $16 and several bottles of water for $2 each. Let $C$ represent the total amount of money that Elsie spends and let $w$ represent how many bottles of water she buys. Which equation best represents this situation?

**A** $C = 2 + 16w$
**B** $C = 16 + 2 + w$
**C** $C = 16 + 2w$
**D** $C = 2(w + 16)$

*SOLUTION:*

Let $C$ represent the total cost and $w$ represent the number of bottles of water. If Elsie buys a $16 pizza and some $2 bottles of water, add $2w$ to 16 to find the total amount of money she spends. $C = 16 + 2w$

So, the correct answer is choice C.

46. Which equation best describes the data in the table?

| $x$ | 8 | 4 | 2 |
|---|---|---|---|
| $y$ | 2 | −2 | −4 |

**F** $y = x \div 2$
**G** $y = -0.5x$
**H** $y = x + 6$
**J** $y = x - 6$

*SOLUTION:*

Try each equation to see if it fits with all of the data points in the table.

| $x$ | 8 | 4 | 2 |
|---|---|---|---|
| $x \div 2$ | 4 | 2 | 1 |

This equation does not work for any of the data points. So it is not the correct answer.

| $x$ | 8 | 4 | 2 |
|---|---|---|---|
| $-0.5x$ | −4 | −2 | −1 |

This equation only works for the second data point. So it is not the correct answer.

| $x$ | 8 | 4 | 2 |
|---|---|---|---|
| $x + 6$ | 14 | 10 | 8 |

This equation does not work for any of the data points. So it is not the correct answer.

| $x$ | 8 | 4 | 2 |
|---|---|---|---|
| $x - 6$ | 2 | −2 | −4 |

This equation works for all of the data points. So choice J is the correct answer.