Write Verbal Expressions  An algebraic expression consists of one or more numbers and variables along with one or more arithmetic operations. In algebra, variables are symbols used to represent unspecified numbers or values. Any letter may be used as a variable.

Example Write a verbal expression for each algebraic expression.

a. \(6n^2\)  
   the product of 6 and \(n\) squared

b. \(n^3 - 12m\)  
   the difference of \(n\) cubed and twelve times \(m\)

Exercises Write a verbal expression for each algebraic expression.

1. \(w - 1\)  
2. \(\frac{1}{3}a^3\)

3. \(81 + 2x\)  
4. \(12d\)

5. \(8^4\)  
6. \(6^2\)

7. \(2n^2 + 4\)  
8. \(a^3 \cdot b^3\)

9. \(2x^3 - 3\)  
10. \(\frac{6k^3}{5}\)

11. \(\frac{1}{4}b^2\)  
12. \(7n^5\)

13. \(3x + 4\)  
14. \(\frac{2}{3}k^5\)

15. \(3b^2 + 2a^3\)  
16. \(4(n^2 + 1)\)
Write Algebraic Expressions  Translating verbal expressions into algebraic expressions is an important algebraic skill.

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

a. four more than a number $n$
   The words *more than* imply addition.
   four more than a number $n$
   $n + 4$
   The algebraic expression is $n + 4$.

b. the difference of a number squared and 8
   The expression *difference of* implies subtraction.
   the difference of a number squared and 8
   $n^2 - 8$
   The algebraic expression is $n^2 - 8$.

**Exercises**

Write an algebraic expression for each verbal expression.

1. a number decreased by 8

2. a number divided by 8

3. a number squared

4. four times a number

5. a number divided by 6

6. a number multiplied by 37

7. the sum of 9 and a number

8. 3 less than 5 times a number

9. twice the sum of 15 and a number

10. one-half the square of b

11. 7 more than the product of 6 and a number

12. 30 increased by 3 times the square of a number
1-1 Practice

Variables and Expressions

Write a verbal expression for each algebraic expression.

1. $23f$
2. $7^3$

3. $5m^2 + 2$
4. $4d^3 - 10$

5. $x^3 \cdot y^4$
6. $b^2 - 3c^3$

7. $\frac{k^5}{6}$
8. $\frac{4n^2}{7}$

Write an algebraic expression for each verbal expression.

9. the difference of 10 and $u$
10. the sum of 18 and a number

11. the product of 33 and $j$
12. 74 increased by 3 times $y$

13. 15 decreased by twice a number
14. 91 more than the square of a number

15. three fourths the square of $b$
16. two fifths the cube of a number

17. BOOKS A used bookstore sells paperback fiction books in excellent condition for $2.50 and in fair condition for $0.50. Write an expression for the cost of buying $x$ excellent-condition paperbacks and $f$ fair-condition paperbacks.

18. GEOMETRY The surface area of the side of a right cylinder can be found by multiplying twice the number $\pi$ by the radius times the height. If a circular cylinder has radius $r$ and height $h$, write an expression that represents the surface area of its side.
1. SOLAR SYSTEM  It takes Earth about 365 days to orbit the sun. It takes Uranus about 85 times as long. Write a numerical expression to describe the number of days it takes Uranus to orbit the sun.

2. TECHNOLOGY  There are 1024 bytes in a kilobyte. Write an expression that describes the number of bytes in a computer chip with $n$ kilobytes.

3. THEATER  Howard Hughes, Professor Emeritus of Texas Wesleyan College, reportedly attended a record 6136 theatrical shows. Write an expression to represent the average number of theater shows attended if he accumulated the record over $y$ years.

4. BLOCKS  A toy manufacturer produces a set of blocks that can be used by children to build play structures. The product packaging team is analyzing different arrangements for packaging their blocks. One idea they have is to arrange the blocks in the shape of a cube, with $b$ blocks along one edge.
   
   a. Write an expression representing the total number of blocks packaged in a cube measuring $b$ blocks on one edge.

   b. The packaging team decides to take one layer of blocks off the top of this package. Write an expression representing the number of blocks in the top layer of the package.

   c. The team finally decides that their favorite package arrangement is to take 2 layers of blocks off the top of a cube measuring $b$ blocks along one edge. Write an expression representing the number of blocks left behind after the top two layers are removed.