Patterns Functions and Algebra

09 Recognize a variety of uses for variables: e.g. placeholder for an unknown quantity in an equation, generalization for pattern, and formula.

A formula is a rule showing relationships among quantities.

A variable is used to represent a quantity whose values may change or vary.

Letters are often used to represent variables.

Example: Area = length \times width
          \[ A = l \cdot w \]
Sometimes you know values of the variables in the formula. You can replace or substitute these variables with the values that you know.

Let \( b=15 \) and \( h=5 \).

\[
A = b \cdot h
\]

\[
A = 15 \cdot 5
\]

\[
A = 75 \text{ in}^2
\]

The formula for the cost of a tank of gas is

\[
C = p \cdot g
\]

where \( c = \text{cost} \), \( p = \text{price per gallon} \), and \( g = \text{the number of gallons} \).

Let \( p = \$1.70 \) and \( g = 12 \) gallons.

\[
C = 1.70 \cdot 12
\]

\[
C = 20.40
\]
To change fluid ounces to cups use the following formula. How many cups = 32 fluid ounces?

\[ C = \frac{f}{8} \]

\[ C = \frac{32}{8} \]

\[ C = 4 \text{ cups} \]

The formula for the average of two numbers is

\[ A = \frac{a + b}{2} \]

where the two numbers are \( a \) and \( b \), and the area is \( A \).

Find the average of 10 and 14.

\[ A = \frac{10 + 14}{2} \]

\[ A = 12 \]
The cost of a tune up \(c\), the hourly charge \(h\), and the number of hours of work \(n\) are related by the formula \(C = h \cdot n\). If the hourly charge is $40, find the cost of a tune up that takes 4 hours.

\[
C = h \cdot n
\]

\[
C = 40 \cdot 4
\]

\[
C = \$160
\]

Can you write a formula to find the number of quarts in a certain number of gallons? Let \(g = \text{gallons}\)

\[
Q = \frac{4}{9}g
\]

Can you write the formula to find the number of quarts if you know the number of gallons? Let \(q = \text{quarts}\)

\[
G = \frac{9}{4}q
\]
Can you write a formula to find the number of inches in a certain number of feet? Let \( f \) = feet

\[ I = 12 \cdot f \]

Now use the formula to find how many inches in 5 feet.

\[ I = 12 \cdot 5 \]
\[ I = 60 \text{ in.} \]

Formulas + Variables
Binder pg. 27
(1-14)
Show Formula Substitute Solution
On NB paper.

\[ A = \frac{1}{2} \cdot 8 \cdot 5 \]
\[ A = 20 \text{ in}^2 \]