#### PEARSON NEW INTERNATIONAL EDITION

Business Math Brief Cheryl Cleaves Margie Hobbs Jeffrey Noble Tenth Edition



# **Pearson New International Edition**

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Cheryl Cleaves Margie Hobbs
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- 9. The formula Yearly depreciation =  $\frac{\text{depreciable } \underline{V}\text{alue}}{\text{years of expected } \underline{L}\text{ife}}$  is used to find yearly depreciation using the straight line depreciation method. The formula can be written in symbols as  $Y = \frac{V}{L}$ . Solve the formula for V. See Example 5.
- **10.** Solve the formula  $Y = \frac{V}{L}$  for *L*. See Example 5.

- **11.** The formula Amount financed = Cash price Down payment is used to find the amount financed on a purchase that is paid in monthly payments. The formula can be written in symbols as A = C D. Solve the formula for D, the down payment. See Example 4.
- 12. The formula Finance charge = unpaid Balance  $\times$  monthly Rate is sometimes used to calculate the monthly finance charge on a credit card. The formula can be written in symbols as  $F = B \times R$ . Solve the formula for B, the unpaid balance. See Example 5.

## **SUMMARY**

### **Learning Outcomes**

#### Section 1

1

Solve equations using multiplication or division.

### What to Remember with Examples

- 1. Isolate the unknown value or variable:
  - (a) If the equation contains the *product* of the unknown value and a number, then *divide* both sides of the equation by the number.
  - **(b)** If the equation contains the *quotient* of the unknown value and the divisor, then *multiply* both sides of the equation by the divisor.
- **2.** Identify the solution: The solution is the number on the side opposite the isolated unknown-value letter.
- **3.** Check the solution: In the original equation, replace the unknown-value letter with the solution; perform the indicated operations; and verify that both sides of the equation are the same number.

Find the value of *A*.

$$4A = 36$$
 Divide both sides by 4. check:  $4(9) \stackrel{?}{=} 36$ 

$$=\frac{36}{4}$$
 36 = 36

$$A = 9$$

Find the value of B.

$$\frac{B}{7} = 6$$
 Multiply both sides by 7. check:  $\frac{42}{7} \stackrel{?}{=} 6$ 

$$\left(\frac{B}{7}\right)(7) = 6(7)$$

$$B = 42$$

$$6 = 6$$

- 2 Solve equations using addition or subtraction.
- 1. Isolate the unknown value or variable:
  - (a) If the equation contains the *sum* of the unknown value and a known value, then *subtract* the known value from both sides of the equation.
  - **(b)** If the equation contains the *difference* of the unknown value and a known value, then *add* the known value to both sides of the equation.
- **2.** Identify the solution: The solution is the number on the side opposite the isolated unknown-value letter.
- **3.** Check the solution: In the original equation, replace the unknown-value letter with the solution; perform the indicated operations; and verify that both sides of the equation are the same number.

Find the value of A.

Find the value of 
$$B$$
.

$$A - 7 = 12$$

Add 7 to both sides.

$$B + 5 = 32$$

Subtract 5 from both sides.

$$\frac{+7}{A} = \frac{+7}{19}$$

$$\frac{-5}{B} = \frac{-}{2}$$

- Solve equations using more than one operation.
- 1. Isolate the unknown value or variable:
  - (a) Add or subtract as necessary first.
  - (b) Multiply or divide as necessary second.
- **2.** Identify the solution: The solution is the number on the side opposite the isolated unknown-value letter.
- **3.** Check the solution: In the original equation, replace the unknown-value letter with the solution and perform the indicated operations.

#### Find the value of *A*.

$$4A + 4 = 20$$
 Undo addition first.  
 $\frac{-4}{4A} = \frac{-4}{16}$  Undo multiplication.  
 $\frac{4A}{4} = \frac{16}{4}$ 

$$\frac{B}{3} - 5 = 12 \quad \text{Undo subtraction first.}$$

$$\frac{+5}{B} = \frac{+5}{17} \quad \text{Undo division.}$$

$$\left(\frac{B}{3}\right)(3) = 17(3)$$

$$B = 51$$

# 4 Solve equations containing multiple unknown terms.

#### Solve an equation when the unknown value occurs in two or more addends.

- 1. Combine the unknown-value addends when the addends are on the same side of the equal sign:
  - (a) Add the numbers in each addend.
  - (b) Represent the multiplication of their sum by the unknown value.
- 2. Solve the resulting equation.

#### Find the value of A.

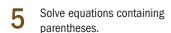
$$A-5+5A=25$$
 Combine addends on the same side of the equal sign that have unknown factors.  $A+5A=6A$ 

$$Add 5 \text{ to both sides.}$$

$$Add 5 \text{ to both sides.}$$

$$Add 5 \text{ to both sides by 6.}$$

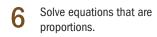
$$Add 6 = \frac{6A}{6} = \frac{30}{6}$$
Divide both sides by 6.



- **1.** Eliminate the parentheses:
  - (a) Multiply the number just outside the parentheses by each addend inside the parentheses.
  - (b) Show the resulting products as addition or subtraction as indicated.
- 2. Solve the resulting equation.

#### Find the value of A.

$$3(A + 4) = 27$$
 Eliminate parentheses first.  $3(A) = 3A$ ;  $3(4) = 12$   
 $3A + 12 = 27$  Subtract 12 from both sides.  
 $\frac{-12}{3A} = \frac{-12}{15}$  Divide both sides by 3.  
 $\frac{3A}{3} = \frac{15}{3}$ 



#### Verify that two fractions form a proportion.

- 1. Find the two cross products.
- 2. Compare the two cross products.
- 3. If the cross products are equal, the two fractions form a proportion.

Verify that 
$$\frac{5}{12} = \frac{15}{36}$$
 is a proportion.  
 $5(36) \stackrel{?}{=} 12(15)$  Find the cross products.  
 $180 = 180$  Since the cross products are equal  $\frac{5}{12} = \frac{15}{36}$  is a proportion.

### Solve a proportion.

- 1. Find the cross products.
- 2. Isolate the unknown by undoing the multiplication.

Solve the proportion 
$$\frac{5}{x} = \frac{7}{12}$$
.

$$\frac{5}{x} = \frac{7}{12}$$

Cross multiply.

$$7x = 5(12)$$

Multiply.

$$7x = 60$$

Divide.

$$\frac{7x}{7} = \frac{60}{7}$$

Convert  $\frac{60}{7}$  to a mixed number.

$$x = 8\frac{4}{7}$$

#### Section 2

Use the problem-solving approach to analyze and solve word problems.

### Keywords and what they generally imply in word problems.

Addition The sum of Plus/total Increased by More/more than Added to Exceeds Expands Greater than Gain/profit Longer Older Heavier	Subtraction Less than Decreased by Subtracted from Difference between Diminished by Take away Reduced by Less/minus Loss Lower Shrinks Smaller than	Multiplication Times Multiplied by Of The product of Twice (two times) Double (two times) Triple (three times) Half of $(\frac{1}{2}$ times) Third of	Division Divide(s) Divided by Divided into Half of (divided by two) Third of (divide by 3) Per	Equality Equals Is/was/are Is equal to The result is What is left What remains The same as Gives/giving Makes Leaves
		' <u>L</u>		

#### Use the five-step problem-solving approach.

What You Know

Known or given facts

What You Are Looking For

**Solution Plan** 

Unknown or missing amounts

Equation or relationship among the known and unknown facts

**Solution** 

Solving the equation

Conclusion

Solution interpreted within the context of the problem

If 4 printer cartridges cost \$56.80, how much would 7 cartridges cost?

What You Know	What You Are Looking For	Solution Plan
4 cartridges cost \$56.80 Pair 1	7 cartridges cost \$N Pair 2	$\frac{4 \text{ cartridges}}{\$56.80} = \frac{7 \text{ cartridges}}{\$N}$ Pair 1 Pair 2

$$\frac{4}{\$56.80} = \frac{7}{N}$$

Cross multiply.

4N = \$56.80(7)4N = \$397.60

Multiply. Divide.

$$\frac{\cancel{4}N}{\cancel{4}} = \frac{\$397.60}{4}$$

N = \$99.40

7 cartridges cost \$99.40.

#### **Section 3**

1

Evaluate a formula.

- 1. Write the formula.
- 2. Rewrite the formula substituting known values for the letters of the formula.
- **3.** Solve the equation for the unknown letter or perform the indicated operations, applying the order of operations.
- **4.** Interpret the solution within the context of the formula.

Find the unit price of a snack cake that is available in a package of 6 cakes for \$1.98. Use the formula  $U = \frac{P}{N}$ , where U is the unit price of a specified amount of a product, P is the total price of the product, and N is the number of specified units contained in the product.

$$U = \frac{P}{N}$$

Substitute known values.

$$U = \frac{\$1.98}{6}$$

Divide.

$$U = \$0.33$$

Cost per cake

2 Find an equivalent formula by rearranging the formula.

- 1. Determine which variable of the formula is to be isolated (solved for).
- 2. Highlight or mentally locate all instances of the variable to be isolated.
- **3.** Treat all other variables of the formula as you would treat a number in an equation, and perform the normal steps for solving an equation.
- **4.** If the isolated variable is on the right side of the equation, interchange the sides so that it appears on the left side.

The distance formula is D = RT, where D is the distance traveled, R is the rate or speed traveled, and T is the time traveled. Find a variation of the distance formula that is solved for the time traveled.

$$D = RT$$

Isolate T. Divide both sides of the equation by R.

$$\frac{D}{}=\frac{R'}{}$$

Simplify.  $\frac{R}{R} = 1$ ; 1(T) = T.

$$\frac{D}{R} = T$$

Interchange the sides of the equation.

$$T = \frac{D}{R}$$

Formula variation.

# **EXERCISES SET A**

*Find the value of the variable:* 

1. 
$$5N = 35$$

2. 
$$\frac{A}{6} = 2$$

3. 
$$N-5=12$$

**4.** 
$$2N + 4 = 12$$

5. 
$$\frac{A}{3} + 4 = 12$$

**6.** 
$$2(x-3)=8$$

**6.** 
$$2(x-3)=8$$
 **7.**  $3(x-1)=30$ 

8. 
$$8A - 3A = 40$$

**9.** 
$$4X - X = 21$$

**10.** 
$$12N + 5 - 7N = 45$$

$$\frac{5}{12} = \frac{35}{N}$$

$$\frac{7}{18} = \frac{N}{9}$$

- 13. Ace Motors sold a total of 15 cars and trucks during one promotion sale. Six of the vehicles sold were trucks. What is the number of cars that were sold?
- 14. Bottletree Bakery and Card Shop ordered an equal number of 12 different cards. If a total of 60 cards were ordered, how many of each type of card were ordered?
- 15. An electrician pays  $\frac{2}{5}$  of the amount he charges for a job for supplies. If he was paid \$240 for a certain job, how much did he spend on supplies?
- 16. An inventory clerk is expected to have 2,000 fan belts in stock. If the current count is 1,584 fan belts, how many more should be ordered?