PEARSON NEW INTERNATIONAL EDITION

Business Math Brief

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Tenth Edition

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9. The formula Yearly depreciation $= \dfrac{\text{depreciable Value}}{\text{years of expected Life}}$ is used to find yearly depreciation using the straight line depreciation method. The formula can be written in symbols as $Y = \dfrac{V}{L}$. Solve the formula for V. *See Example 5*.

10. Solve the formula $Y = \dfrac{V}{L}$ 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.

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

$A = 9$

check: $4(9) \stackrel{?}{=} 36$

$36 = 36$

Find the value of B.

$\frac{B}{7} = 6$ Multiply both sides by 7.

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

$B = 42$

check: $\frac{42}{7} \stackrel{?}{=} 6$

$6 = 6$

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.

$A - 7 = 12$ Add 7 to both sides.

$+7 \quad +7$

$A = 19$

Find the value of B.

$B + 5 = 32$ Subtract 5 from both sides.

$-5 \quad -5$

$B = 27$

3 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.

$$\begin{aligned} 4A + 4 &= 20 && \text{Undo addition first.} \\ -4 &\quad -4 \\ \hline 4A &= 16 && \text{Undo multiplication.} \\ \frac{4A}{4} &= \frac{16}{4} \\ A &= 4 \end{aligned}$$

Find the value of B.

$$\begin{aligned} \frac{B}{3} - 5 &= 12 && \text{Undo subtraction first.} \\ +5 &\quad +5 \\ \hline \frac{B}{3} &= 17 && \text{Undo division.} \\ \left(\frac{B}{3}\right)(3) &= 17(3) \\ B &= 51 \end{aligned}$$

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.

$$\begin{aligned} A - 5 + 5A &= 25 && \text{Combine addends on the same side of the equal sign that have unknown factors. } A + 5A = 6A \\ 6A - 5 &= 25 && \text{Add 5 to both sides.} \\ +5 &\quad +5 \\ \hline 6A &= 30 && \text{Divide both sides by 6.} \\ \frac{6A}{6} &= \frac{30}{6} \\ A &= 5 \end{aligned}$$

5 Solve equations containing parentheses.

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.

$$\begin{aligned} 3(A + 4) &= 27 && \text{Eliminate parentheses first. } 3(A) = 3A;\ 3(4) = 12 \\ 3A + 12 &= 27 && \text{Subtract 12 from both sides.} \\ -12 &\quad -12 \\ \hline 3A &= 15 && \text{Divide both sides by 3.} \\ \frac{3A}{3} &= \frac{15}{3} \\ A &= 5 \end{aligned}$$

6 Solve equations that are proportions.

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.

$$\begin{aligned} 5(36) &\stackrel{?}{=} 12(15) && \text{Find the cross products.} \\ 180 &= 180 && \text{Since the cross products are equal } \frac{5}{12} = \frac{15}{36} \text{ is a proportion.} \end{aligned}$$

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

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

Keywords and what they generally imply in word problems.

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

Use the five-step problem-solving approach.

What You Know	Known or given facts
What You Are Looking For	Unknown or missing amounts
Solution Plan	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	$\frac{\text{4 cartridges}}{\text{\$56.80}} = \frac{\text{7 cartridges}}{\text{\$}N}$ Pair 1 Pair 2

Solution

$\frac{4}{\$56.80} = \frac{7}{N}$ Cross multiply.

$4N = \$56.80(7)$ Multiply.

$4N = \$397.60$ Divide.

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

$N = \$99.40$

Conclusion

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.
$\frac{D}{R} = \frac{RT}{R}$	Simplify. $\frac{R}{R} = 1$; $1(T) = T$.
$\frac{D}{R} = T$	Interchange the sides of the equation.
$T = \frac{D}{R}$	Formula variation.

NAME _____ DATE _____

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. $2(x - 3) = 8$

7. $3(x - 1) = 30$

8. $8A - 3A = 40$

9. $4X - X = 21$

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

11. Solve the proportion for N: $\frac{5}{12} = \frac{35}{N}$

12. Solve the proportion for 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?