

# Math Practice Workbook

Pre-Algebra & Geometry · Grades 6–8 · Self-Study Edition

■ PEMDAS	■ ISOLATE $x$	■ RATIO = PART/WHOLE	■ $a^2 + b^2 = c^2$
■ FLIP ÷ NEGATIVE	■ 180° TRIANGLE	■ AREA ■ = $\frac{1}{2}bh$	■ CIRCLE $A = \pi r^2$

**Q 01**      **PRE-ALGEBRA**      **■ PEMDAS**

Order of Operations

**What is the value of  $3 + 4 \times 2 - 1$  ?**

**■ Quick Reminder**

Multiply/Divide BEFORE Add/Subtract.  
 $3 + 4 \times 2 - 1 \rightarrow$  Do  $4 \times 2 = 8$  first  $\rightarrow 3 + 8 - 1$

<b>(A)</b> 13	<b>(B)</b> 10
<b>(C)</b> 14	<b>(D)</b> 6

**Q 02**      **PRE-ALGEBRA**      **■ ISOLATE  $x$**

Solving One-Step Equations

Solve for  $x$  :

**$x - 7 = 12$**

**■ Key Move**

Use the inverse operation on BOTH sides.  
 $x - 7 = 12 \rightarrow$  Add 7 to both sides  $\rightarrow x = ?$

<b>(A)</b> 5	<b>(B)</b> 84
<b>(C)</b> 19	<b>(D)</b> -5

Q 03

PRE-ALGEBRA

■ RATIO = PART/WHOLE

Ratios &amp; Proportions

A bag has 6 red marbles and 9 blue marbles. What is the ratio of red to blue marbles in simplest form?

## ■ Simplify

Find GCF(6, 9) = 3. Divide both parts:  $6 \div 3 : 9 \div 3 = 2 : 3$

(A) 6 : 9

(B) 2 : 3

(C) 3 : 2

(D) 1 : 2

Q 04

PRE-ALGEBRA

■ NEGATIVE RULES

Integer Operations

A submarine is at  $-40$  m. It rises 15 m, then descends 30 m. What is the final depth?

$$-40 + 15 - 30 = ?$$

## ■ Number Line

Rise = add positive. Descend = subtract.

$$-40 + 15 = -25 \rightarrow -25 - 30 = ?$$

(A)  $-25$  m(B)  $-85$  m(C)  $-55$  m

(D) 55 m

Q 05

PRE-ALGEBRA

■ DISTRIBUTE then COMBINE

Distributive Property

**Simplify:  $3(x + 5) - 2x$**

$$3(x + 5) - 2x = ?$$

## ■ Two Steps

Step 1: Distribute  $\rightarrow 3x + 15 - 2x$

Step 2: Combine like terms  $\rightarrow x + 15$

(A)  $5x + 5$ (B)  $x + 15$ (C)  $x + 5$ (D)  $3x + 15$

Q 06

PRE-ALGEBRA

■ PERCENT = PART ÷ WHOLE × 100

Percentages

A jacket costs \$80. It is on sale at 25% off. How much do you pay?

## ■ Shortcut

25% off → You pay 75%.

$$0.75 \times \$80 = \$60$$

$$\text{OR: } 25\% \text{ of } 80 = 20 \rightarrow 80 - 20 = \$60$$

(A) \$55

(B) \$20

(C) \$60

(D) \$65

Q 07

PRE-ALGEBRA

■ CONSTANT RATE = PROPORTIONAL

Proportional Relationships

Jake earns \$9 per hour. Which equation shows how much he earns (y dollars) after x hours?

## ■ Rate Equation

Earnings = rate × time →  $y = 9x$

$y = x + 9$  means something different — watch out!

(A)  $y = x + 9$ (B)  $y = 9 + x$ (C)  $y = 9x$ (D)  $x = 9y$ 

Q 08

PRE-ALGEBRA

■ TWO-STEP: UNDO ADD/SUB FIRST

Two-Step Equations

Solve for n :

$$2n + 6 = 18$$

## ■ Two Steps

Step 1: Subtract 6 from both sides →  $2n = 12$

Step 2: Divide both sides by 2 →  $n = 6$

(A) 9

(B) 6

(C) 12

(D) 3

Q 09

PRE-ALGEBRA

■ INEQUALITY: FLIP when  $\div$  NEGATIVE

Inequalities

Which value of  $x$  is a solution to:  $-3x < 12$ 

$$-3x < 12 \rightarrow x > -4$$

## ■ FLIP Rule

Dividing by a negative  $\rightarrow$  FLIP the sign!

$$-3x < 12 \rightarrow x > -4$$

Which answer is greater than  $-4$ ?(A)  $x = -5$ (B)  $x = -4$ (C)  $x = -3$ (D)  $x = -10$ 

Q 10

PRE-ALGEBRA

■ SLOPE = RISE  $\div$  RUN

Introduction to Slope

A line passes through  $(0, 2)$  and  $(4, 10)$ . What is the slope?

$$\text{slope} = (y_2 - y_1) \div (x_2 - x_1)$$

## ■ Plug In

$$(10 - 2) \div (4 - 0) = 8 \div 4 = 2$$

(A) 4

(B) 2

(C)  $\frac{1}{2}$ 

(D) 8

## GEOMETRY

Angles · Area · Triangles · Circles · Pythagorean Theorem · Transformations

Q 11

GEOMETRY

■ SUPPLEMENTARY =  $180^\circ$ 

Angle Relationships

Two angles are supplementary. One angle measures  $63^\circ$ . What is the other angle?

## ■ Memory Hook

Supplementary  $\rightarrow$  S  $\rightarrow$  Straight line =  $180^\circ$ 

$$180^\circ - 63^\circ = 117^\circ$$

(A)  $27^\circ$ (B)  $63^\circ$ (C)  $117^\circ$ (D)  $297^\circ$

Q 12

GEOMETRY

■ TRIANGLE: 180° TOTAL

Triangle Angle Sum

A triangle has angles of 47° and 85°. What is the third angle?

$$\angle A + \angle B + \angle C = 180^\circ$$

## ■ Shortcut

Add known angles:  $47 + 85 = 132$

Third angle =  $180 - 132 = 48^\circ$

(A) 58°

(B) 48°

(C) 90°

(D) 38°

Q 13

GEOMETRY

■ AREA ■ =  $\frac{1}{2} \times b \times h$ 

Area of Triangles

A triangle has a base of 10 cm and a height of 6 cm. What is its area?

$$A = \frac{1}{2} \times b \times h$$

## ■ Watch Out!

$A = \frac{1}{2} \times 10 \times 6 = 30 \text{ cm}^2$

Don't forget the  $\frac{1}{2}$  — most common error!

(A) 60 cm<sup>2</sup>(B) 30 cm<sup>2</sup>(C) 16 cm<sup>2</sup>(D) 15 cm<sup>2</sup>

Q 14

GEOMETRY

■  $a^2 + b^2 = c^2$ 

Pythagorean Theorem

A right triangle has legs of 3 and 4. What is the hypotenuse?

$$a^2 + b^2 = c^2$$

## ■ Classic Triple: 3-4-5

$3^2 + 4^2 = 9 + 16 = 25 \rightarrow c = \sqrt{25} = 5$

Memorize: (3,4,5) and (5,12,13) are Pythagorean triples!

(A) 6

(B) 7

(C) 5

(D) 25

Q 15

GEOMETRY

■ CIRCLE  $A = \pi r^2$ 

Circles — Area

A circle has a diameter of 10 cm. What is its area? ( $\pi \approx 3.14$ )

$$A = \pi r^2$$

## ■ Watch Out!

Diameter = 10 → radius = 5 (always halve!)

$$A = 3.14 \times 5^2 = 3.14 \times 25 = 78.5 \text{ cm}^2$$

(A) 314 cm<sup>2</sup>(B) 78.5 cm<sup>2</sup>(C) 31.4 cm<sup>2</sup>(D) 50 cm<sup>2</sup>

Q 16

GEOMETRY

■ PERIMETER = ADD ALL SIDES

Perimeter

A rectangle has length 12 m and width 5 m. What is its perimeter?

$$P = 2(l + w)$$

## ■ Formula

$$P = 2(12 + 5) = 2 \times 17 = 34 \text{ m}$$

A rectangle has 2 lengths + 2 widths — not just 1 of each!

(A) 17 m

(B) 60 m

(C) 34 m

(D) 24 m

Q 17

GEOMETRY

■ VOLUME BOX =  $l \times w \times h$ 

Volume of Rectangular Prisms

A box is 4 cm long, 3 cm wide, and 5 cm tall. What is its volume?

$$V = l \times w \times h$$

## ■ Multiply All Three

$$V = 4 \times 3 \times 5 = 60 \text{ cm}^3$$

Volume is always in cubic units (cm<sup>3</sup>)!(A) 24 cm<sup>3</sup>(B) 47 cm<sup>3</sup>(C) 60 cm<sup>3</sup>(D) 12 cm<sup>3</sup>

Q 18

GEOMETRY

■ SIMILAR: SAME SHAPE, DIFFERENT SIZE

Similar Triangles &amp; Scale

Two similar triangles: smaller has sides 3, 4, 5. Larger triangle's shortest side = 9. What is the scale factor?

## ■ Scale Factor

Scale factor = Larger  $\div$  Smaller corresponding side  
 $9 \div 3 = 3 \rightarrow$  Every side of the larger triangle is 3 $\times$  the smaller!

(A) 2

(B) 3

(C) 4

(D) 9

Q 19

GEOMETRY

■ REFLECTION: FLIP over line

Transformations — Reflection

Point A is at (3, -2). It is reflected over the x-axis. What are the new coordinates?

$$(x, y) \rightarrow (x, -y)$$

## ■ Rule

Reflect over x-axis  $\rightarrow$  y changes sign, x stays the same.  
 $(3, -2) \rightarrow (3, -(-2)) = (3, 2)$

(A) (-3, -2)

(B) (-3, 2)

(C) (3, 2)

(D) (2, 3)

Q 20

GEOMETRY

■ CIRCUMFERENCE =  $\pi \times d$ 

Circles — Circumference

A circular wheel has a radius of 7 cm. How far does it travel in one full rotation? ( $\pi \approx 3.14$ )

$$C = 2\pi r$$

## ■ One Rotation = Circumference

$C = 2 \times 3.14 \times 7 = 43.96$  cm  
 Using only radius without  $\times 2$  is a common error!

(A) 21.98 cm

(B) 153.86 cm

(C) 43.96 cm

(D) 14 cm

## ANSWER KEY

Q#	Ans	Value	Q#	Ans	Value	Q#	Ans	Value	Q#	Ans	Value
18	(B)	3	19	(C)	(3, 2)	20	(C)	43.96 cm			

<b>1</b>	<b>B</b>	10	<b>2</b>	<b>C</b>	19	<b>3</b>	<b>B</b>	2 : 3	<b>4</b>	<b>C</b>	-55 m
<b>5</b>	<b>B</b>	$x + 15$	<b>6</b>	<b>C</b>	\$60	<b>7</b>	<b>C</b>	$y = 9x$	<b>8</b>	<b>B</b>	6
<b>9</b>	<b>C</b>	$x = -3$	<b>10</b>	<b>B</b>	2	<b>11</b>	<b>C</b>	$117^\circ$	<b>12</b>	<b>B</b>	$48^\circ$
<b>13</b>	<b>B</b>	$30 \text{ cm}^2$	<b>14</b>	<b>C</b>	5	<b>15</b>	<b>B</b>	$78.5 \text{ cm}^2$	<b>16</b>	<b>C</b>	34 m
<b>17</b>	<b>C</b>	$60 \text{ cm}^3$	<b>18</b>	<b>B</b>	3	<b>19</b>	<b>C</b>	(3, 2)	<b>20</b>	<b>C</b>	43.96 cm