

# Math Practice

## Pre-Algebra & Geometry

Self-Study Worksheet · 20 Problems · Answer Key Included

Topics: Variables & Expressions | Fractions & Ratios | Angles & Triangles | Circles & Area

<b>Difficulty Guide</b>	EASY — Straightforward application	WATCH OUT — Common mistakes possible	TRICKY — Requires careful thinking
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### PRE-ALGEBRA — Problems 01–10

Variables, Equations, Fractions, Ratios, Integers, Exponents

#### Q01 ORDER OF OPERATIONS [Tricky!]

What is the value of:  $3 + 4 \times 2^2 - (6 \div 3)$  ?

(A) 17	(B) 19
(C) 24	(D) 15

■ Memory Key: PEMDAS — Parentheses → Exponents → Multiply/Divide → Add/Subtract

**Answer: (A) 17**

Step 1 — Exponent:  $2^2 = 4$  | Step 2 — Parentheses:  $6 \div 3 = 2$   
Step 3 — Multiply:  $4 \times 4 = 16$  | Step 4 — Add/Subtract:  $3 + 16 - 2 = 17$

#### Q02 SOLVING ONE-STEP EQUATIONS [Easy]

If  $5x - 3 = 22$ , what is the value of  $x$ ?

(A) 3.8	(B) 4
(C) 5	(D) 19

■ Memory Key: ISOLATE — Undo operations in reverse PEMDAS order. Keep both sides balanced!

**Answer: (C) 5**

Add 3 to both sides:  $5x = 25$  | Divide by 5:  $x = 5$

#### Q03 FRACTIONS — ADDING UNLIKE DENOMINATORS [Tricky!]

What is  $\frac{3}{4} + \frac{5}{6}$  in simplest form?

- |                    |                     |
|--------------------|---------------------|
| (A) $\frac{8}{10}$ | (B) $\frac{19}{12}$ |
| (C) $\frac{4}{5}$  | (D) $\frac{3}{2}$   |

■ Memory Key: LCD — Find the Least Common Denominator, then convert each fraction before adding.

**Answer: (B)  $\frac{19}{12}$**

LCD of 4 and 6 = 12 |  $\frac{3}{4} = \frac{9}{12}$ ,  $\frac{5}{6} = \frac{10}{12}$   
 $\frac{9}{12} + \frac{10}{12} = \frac{19}{12}$  (GCF of 19 and 12 is 1, already simplest)

#### Q04 RATIOS & PROPORTIONS [Watch Out]

A recipe uses 2 cups of flour for every 3 cups of sugar.  
How many cups of flour are needed for 12 cups of sugar?

- |            |             |
|------------|-------------|
| (A) 6 cups | (B) 8 cups  |
| (C) 9 cups | (D) 18 cups |

■ Memory Key: CROSS-MULTIPLY — Set up  $\frac{a}{b} = \frac{c}{d}$ , then  $ad = bc$ . Match units on each side!

**Answer: (B) 8 cups**

Set up proportion:  $\frac{2}{3} = \frac{x}{12}$  | Cross-multiply:  $3x = 24$  |  $x = 8$

#### Q05 INTEGER OPERATIONS — NEGATIVES [Tricky!]

What is  $(-3) \times (-4) + (-6) \div 2$  ?

- |        |        |
|--------|--------|
| (A) 18 | (B) -9 |
| (C) 9  | (D) 6  |

■ Memory Key: SIGN RULES — Neg  $\times$  Neg = Positive, Pos  $\times$  Neg = Negative. Two negatives cancel!

**Answer: (C) 9**

$(-3) \times (-4) = +12$  (neg  $\times$  neg = pos) |  $(-6) \div 2 = -3$   
 $12 + (-3) = 9$

#### Q06 PERCENT PROBLEMS [Watch Out]

A jacket costs \$80. It goes on sale for 25% off.  
What is the sale price?

- |          |          |
|----------|----------|
| (A) \$20 | (B) \$55 |
| (C) \$60 | (D) \$65 |

■ Memory Key: PERCENT — Sale Price = Original  $\times$  (1 - rate). Multiply, don't just find the percent!

**Answer: (C) \$60**

Discount:  $80 \times 0.25 = \$20$  | Sale price:  $80 - 20 = \$60$   
Shortcut:  $80 \times 0.75 = \$60$

**Q07 COMBINING LIKE TERMS [Tricky!]**

Simplify:  $3x^2 + 2x - 5 + x^2 - 4x + 7$

- |                     |                     |
|---------------------|---------------------|
| (A) $4x^2 + 6x + 2$ | (B) $4x^2 - 2x + 2$ |
| (C) $4x^2 + 2x - 2$ | (D) $4x^2 - 2x - 2$ |

■ Memory Key: LIKE TERMS — Only combine same variable AND same exponent.  $x^2$  and  $x$  are NOT like terms!

**Answer: (B)  $4x^2 - 2x + 2$**

$x^2$  terms:  $3x^2 + x^2 = 4x^2$  |  $x$  terms:  $2x - 4x = -2x$   
Constants:  $-5 + 7 = +2$  | Result:  $4x^2 - 2x + 2$

**Q08 INEQUALITIES [Watch Out]**

Solve:  $-2x + 5 > 11$ . Which answer is correct?

- |              |             |
|--------------|-------------|
| (A) $x > -3$ | (B) $x > 3$ |
| (C) $x < -3$ | (D) $x < 3$ |

■ Memory Key: FLIP THE SIGN — Multiply or divide by a NEGATIVE number  $\Rightarrow$  inequality flips!

**Answer: (C)  $x < -3$**

$-2x + 5 > 11 \rightarrow -2x > 6 \rightarrow$  Divide by  $-2 \rightarrow$  FLIP the sign!  
 $x < -3$  (Common mistake: forgetting to flip when dividing by a negative)

**Q09 WORD PROBLEM — LINEAR EQUATIONS [Watch Out]**

Sarah earns \$12 per hour plus a \$30 bonus.  
She wants to earn at least \$150. Minimum hours to work?

- |              |              |
|--------------|--------------|
| (A) 8 hours  | (B) 9 hours  |
| (C) 10 hours | (D) 12 hours |

■ Memory Key: TRANSLATE — "at least" =  $\geq$ , "at most" =  $\leq$ . Write the equation first, then solve!

**Answer: (C) 10 hours**

$12h + 30 \geq 150 \rightarrow 12h \geq 120 \rightarrow h \geq 10$   
Minimum = 10 hours

**Q10 EXPONENTS — NEGATIVE & ZERO [Tricky!]**

What is the value of  $2^0 + 3^{-1} + 4^{-2}$  ?

- |       |                             |
|-------|-----------------------------|
| (A) 0 | (B) $1 + 1/3 + 1/4 = 19/12$ |
|-------|-----------------------------|

$$(C) 1 + 1/3 + 1/16 = 67/48$$

$$(D) 3$$

■ Memory Key: ZERO & NEGATIVE EXPONENTS — Any number<sup>0</sup> = 1. Number<sup>-1</sup> = 1 ÷ (number). Never 0!

**Answer: (C)  $1 + 1/3 + 1/16 = 67/48$**

$$2^0 = 1 \mid 3^{-1} = 1/3 \mid 4^{-2} = 1/16$$

$$\text{LCD} = 48: 48/48 + 16/48 + 3/48 = 67/48$$

Trap: Option B uses  $4^{-1} = 1/4$  instead of  $4^{-2} = 1/16$

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## GEOMETRY — Problems 11–20

Angles, Triangles, Area, Circles, Surface Area, Coordinate Plane

### Q11 ANGLE TYPES — SUPPLEMENTARY [Easy]

Two angles are supplementary. One measures  $73^\circ$ .

What is the other angle?

$$(A) 17^\circ$$

$$(B) 107^\circ$$

$$(C) 253^\circ$$

$$(D) 90^\circ$$

■ Memory Key: C & S — Complementary =  $90^\circ$  (Corner), Supplementary =  $180^\circ$  (Straight line).

**Answer: (B)  $107^\circ$**

Supplementary angles add up to  $180^\circ$

$$180^\circ - 73^\circ = 107^\circ$$

### Q12 TRIANGLE — MISSING ANGLE [Easy]

A triangle has angles measuring  $45^\circ$  and  $80^\circ$ .

What is the third angle?

$$(A) 45^\circ$$

$$(B) 65^\circ$$

$$(C) 55^\circ$$

$$(D) 90^\circ$$

■ Memory Key: TRIANGLE SUM =  $180^\circ$  — The three interior angles of ANY triangle always total  $180^\circ$ .

**Answer: (C)  $55^\circ$**

Triangle angle sum =  $180^\circ$

$$180^\circ - 45^\circ - 80^\circ = 55^\circ$$

### Q13 AREA — TRAPEZOID [Tricky!]

A trapezoid has parallel sides of 6 cm and 10 cm, height 5 cm.

What is its area? Formula:  $A = \frac{1}{2} \times (b_1 + b_2) \times h$

$$(A) 80 \text{ cm}^2$$

$$(B) 30 \text{ cm}^2$$

(C) 40 cm<sup>2</sup>

(D) 50 cm<sup>2</sup>

■ Memory Key: TRAP = AVERAGE BASES × HEIGHT — Add two bases, divide by 2, multiply by height.

**Answer: (C) 40 cm<sup>2</sup>**

$$A = \frac{1}{2} \times (6 + 10) \times 5 = \frac{1}{2} \times 16 \times 5 = \frac{1}{2} \times 80 = 40 \text{ cm}^2$$

#### Q14 PYTHAGOREAN THEOREM [Watch Out]

A right triangle has legs of 6 and 8.

What is the length of the hypotenuse? Formula:  $a^2 + b^2 = c^2$

(A)  $\sqrt{48}$

(B) 14

(C) 10

(D)  $\sqrt{28}$

■ Memory Key: 3-4-5 FAMILY — Memorize triples: 3-4-5, 5-12-13, 6-8-10. Instant answers!

**Answer: (C) 10**

$$c^2 = 6^2 + 8^2 = 36 + 64 = 100 \rightarrow c = \sqrt{100} = 10$$

Tip: 6-8-10 is a 3-4-5 Pythagorean triple scaled by 2!

#### Q15 CIRCLE — CIRCUMFERENCE [Tricky!]

A circle has a diameter of 14 cm. What is its circumference?

(Use  $\pi \approx 3.14$ ) Formula:  $C = \pi d$

(A) 21.98 cm

(B) 153.86 cm

(C) 43.96 cm

(D) 28 cm

■ Memory Key: DIAMETER vs RADIUS —  $d = 2r$ . If given diameter, use  $C = \pi d$  directly.

**Answer: (C) 43.96 cm**

$$C = \pi \times d = 3.14 \times 14 = 43.96 \text{ cm}$$

Trap: Using radius (7) instead of diameter (14) gives 21.98 — exactly half!

#### Q16 VERTICAL ANGLES [Easy]

Two lines intersect. One angle is 65°.

What are the other three angles?

(A) 65°, 65°, 65°

(B) 65°, 115°, 115°

(C) 65°, 90°, 90°

(D) 115°, 115°, 130°

■ Memory Key: VERTICAL = EQUAL — Opposite angles are equal. Adjacent angles are supplementary (180°).

**Answer: (B) 65°, 115°, 115°**

Vertical angle =  $65^\circ$  (opposite, equal)  
Adjacent angles =  $180^\circ - 65^\circ = 115^\circ$  each  
Check:  $65 + 115 + 65 + 115 = 360^\circ$  ✓

**Q17 SURFACE AREA — RECTANGULAR PRISM [Tricky!]**

A box: length = 5 cm, width = 3 cm, height = 4 cm.

What is the total surface area? Formula:  $SA = 2(lw + lh + wh)$

- |                       |                        |
|-----------------------|------------------------|
| (A) $60 \text{ cm}^2$ | (B) $47 \text{ cm}^2$  |
| (C) $94 \text{ cm}^2$ | (D) $120 \text{ cm}^2$ |

■ Memory Key: 3 PAIRS — A box has 3 pairs of faces: Top/Bottom + Front/Back + Left/Right. Double each!

**Answer: (C)  $94 \text{ cm}^2$**

$lw = 15$ ,  $lh = 20$ ,  $wh = 12$   
 $SA = 2(15 + 20 + 12) = 2 \times 47 = 94 \text{ cm}^2$

**Q18 COORDINATE PLANE — DISTANCE [Watch Out]**

What is the distance between A(1, 2) and B(4, 6)?

Formula:  $d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$

- |       |                |
|-------|----------------|
| (A) 3 | (B) 7          |
| (C) 5 | (D) $\sqrt{7}$ |

■ Memory Key: PYTHAGOREAN IN DISGUISE — Horizontal change = leg a, vertical change = leg b, distance = c.

**Answer: (C) 5**

$\Delta x = 4 - 1 = 3$  |  $\Delta y = 6 - 2 = 4$   
 $d = \sqrt{(3^2 + 4^2)} = \sqrt{(9 + 16)} = \sqrt{25} = 5$

**Q19 CIRCLE — AREA FROM CIRCUMFERENCE [Tricky!]**

A circle has a circumference of  $20\pi$  cm.

What is its area?

- |                           |                          |
|---------------------------|--------------------------|
| (A) $400\pi \text{ cm}^2$ | (B) $40\pi \text{ cm}^2$ |
| (C) $100\pi \text{ cm}^2$ | (D) $20\pi \text{ cm}^2$ |

■ Memory Key: FIND r FIRST — Get radius from  $C = 2\pi r$ , then use  $A = \pi r^2$ . Always radius, never diameter!

**Answer: (C)  $100\pi \text{ cm}^2$**

From  $C = 2\pi r$ :  $2\pi r = 20\pi \rightarrow r = 10 \text{ cm}$   
Area =  $\pi \times 10^2 = 100\pi \text{ cm}^2$   
Trap: using  $d = 20$  in area formula gives  $400\pi$  (4x too large!)

**Q20 EXTERIOR ANGLE THEOREM [Tricky!]**

An exterior angle of a triangle is  $120^\circ$ .

The two non-adjacent interior angles are  $x$  and  $2x$ . Find  $x$ .

Formula: Exterior Angle = sum of two non-adjacent interior angles

(A) $60^\circ$	(B) $40^\circ$
(C) $30^\circ$	(D) $20^\circ$

■ Memory Key: EAT = SUM — Exterior Angle of Triangle = sum of the two NON-ADJACENT interior angles.

**Answer: (B)  $40^\circ$**

$$x + 2x = 120^\circ \rightarrow 3x = 120^\circ \rightarrow x = 40^\circ$$

$$\text{Check: } 40 + 80 + 60 = 180^\circ \checkmark$$

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## QUICK ANSWER KEY

Q#	Answer	Topic	Q#	Answer	Topic
Q01	<b>(A) 17</b>	Order of Operations	Q11	<b>(B) <math>107^\circ</math></b>	Angle Types — Supplementary
Q02	<b>(C) 5</b>	Solving One-Step Equations	Q12	<b>(C) <math>55^\circ</math></b>	Triangle — Missing Angle
Q03	<b>(B) <math>19/12</math></b>	Fractions — Adding Unlike Denominators	Q13	<b>(C) <math>40 \text{ cm}^2</math></b>	Area — Trapezoid
Q04	<b>(B) 8 cups</b>	Ratios & Proportions	Q14	<b>(C) 10</b>	Pythagorean Theorem
Q05	<b>(C) 9</b>	Integer Operations — Negatives	Q15	<b>(C) <math>43.96 \text{ cm}</math></b>	Circle — Circumference
Q06	<b>(C) \$60</b>	Percent Problems	Q16	<b>(B) <math>65^\circ, 115^\circ, 115^\circ</math></b>	Vertical Angles
Q07	<b>(B) <math>4x^2 - 2x + 2</math></b>	Combining Like Terms	Q17	<b>(C) <math>94 \text{ cm}^2</math></b>	Surface Area — Rectangular Prism
Q08	<b>(C) <math>x &lt; -3</math></b>	Inequalities	Q18	<b>(C) 5</b>	Coordinate Plane — Distance
Q09	<b>(C) 10 hours</b>	Word Problem — Linear Equations	Q19	<b>(C) <math>100\pi \text{ cm}^2</math></b>	Circle — Area from Circumference
Q10	<b>(C) <math>1 + 1/3 + 1/16 = 67/48</math></b>	Exponents — Negative & Zero	Q20	<b>(B) <math>40^\circ</math></b>	Exterior Angle Theorem