

Math Mastery

Pre-Algebra & Geometry · Self-Study Worksheet

Name: _____ Date: _____ Score: _____ / 20

SECTION A — PRE-ALGEBRA

Q1 Order of Operations

[Easy]

$$3 + 4 \times 2^2 - 6 \div 3 = ?$$

■ *Add before multiply is WRONG — always follow PEMDAS!*

■ **MEMORY POINT** PEMDAS: Parentheses → Exponents → Multiply/Divide → Add/Subtract

(A) 16

(C) 17

(B) 20

(D) 23

Q2 Integers & Negative Numbers

[Easy]

Which expression has the GREATEST value? (A) $-3 \times (-4)$ (B) $-12 \div (-2)$ (C) -5×3 (D) $20 \div (-4)$

■ *Negative \times negative = POSITIVE — don't forget!*

■ **MEMORY POINT** SIGN RULE: Same signs → Positive | Different signs → Negative

(A) $-3 \times (-4) = 12$

(C) $-5 \times 3 = -15$

(B) $-12 \div (-2) = 6$

(D) $20 \div (-4) = -5$

Q3 One-Step Equations

[Easy]

Solve for x: $5x - 8 = 22$

■ *Move constant FIRST, then divide — don't skip steps!*

■ **MEMORY POINT** ISOLATE x: ① Add/subtract constants ② Divide by coefficient

(A) $x = 2.8$

(C) $x = 3$

(B) $x = 6$

(D) $x = 4.5$

Q4 Fractions & Ratios

[Medium]

A recipe needs $\frac{3}{4}$ cup sugar for 12 cookies. Cups needed for 36 cookies?

■ Find the scale factor first — don't just multiply by 36!

■ **MEMORY POINT** SCALE FACTOR = new \div original. Then: original amount \times scale factor

(A) $1\frac{1}{2}$ cups(C) $2\frac{1}{4}$ cups

(B) 2 cups

(D) 3 cups

Q5 Percentages

[Easy]

A shirt costs \$80. It is 30% off. What is the sale price?

■ 30% off \neq final price is 30%! The sale price = 70% of original.

■ **MEMORY POINT** DISCOUNT: Sale Price = Original \times (1 - rate). 30% off $\rightarrow \times 0.70$

(A) \$24

(C) \$48

(B) \$56

(D) \$60

Q6 Inequalities

[Medium]

Solve: $-2x + 5 > 11$

■ FLIP the inequality sign when dividing by a negative number!

■ **MEMORY POINT** FLIP the sign: Always flip when multiplying or dividing by negative

(A) $x > -3$ (C) $x \geq -3$ (B) $x > 3$ (D) $x < -3$ **Q7** Exponents

[Medium]

Simplify: $(2^3 \times 2^4) \div 2^5$

■ Multiply bases \rightarrow ADD exponents. Divide \rightarrow SUBTRACT. Never multiply!

■ **MEMORY POINT** SAME BASE: $\times \rightarrow$ add exponents | $\div \rightarrow$ subtract exponents

(A) 2^{60}

(C) 4

(B) 8

(D) 2

Q8 Variables & Substitution

[Easy]

If $a = -2$ and $b = 5$, find: $a^2 - 3b + 1$ ■ $(-2)^2 = +4$, not -4 . Squaring always gives a positive result!■ **MEMORY POINT** SUBSTITUTION: Replace variable with value in parentheses: $(-2)^2 = 4$ (A) -18 (C) -14 (B) 20 (D) -10 **Q9** Word Problems

[Medium]

Taxi: \$2.50 base + \$1.75/mile. Maria paid \$15.75. How many miles?

■ Set up an equation — don't guess! Identify fixed + variable costs.

■ **MEMORY POINT** EQUATION SETUP: Total = base + (rate \times miles) \rightarrow solve for unknown

(A) 5 miles

(C) ~ 7.6 miles

(B) 9 miles

(D) 8 miles

Q10 Slope & Linear Equations

[Medium]

A line passes through (1, 3) and (4, 9). What is its equation?

■ Slope = $\Delta y \div \Delta x$ — NOT $\Delta x \div \Delta y$. Rise OVER Run!■ **MEMORY POINT** SLOPE = $(y_2 - y_1) \div (x_2 - x_1)$ then $y = mx + b$ (plug in a point to find b)(A) $y = 3x$ (C) $y = 2x - 1$ (B) $y = 2x + 1$ (D) $y = x + 2$

SECTION B — GEOMETRY

Q1 Pythagorean Theorem

[Easy]

A right triangle has legs 6 cm and 8 cm. Find the hypotenuse.

■ *Hypotenuse is ALWAYS the longest side — opposite the right angle.*

■ **MEMORY POINT** PYTHAGOREAN THEOREM: $a^2 + b^2 = c^2$ Common triple: 3-4-5 → 6-8-10

(A) 7 cm

(C) 12 cm

(B) 10 cm

(D) 14 cm

Q2 Composite Figures

[Medium]

Rectangle (6x4) topped with a semicircle (diameter = 6). Total area? ($\pi \approx 3.14$)

■ *Semicircle = HALF a circle. Don't use full circle formula!*

■ **MEMORY POINT** COMPOSITE: Break into shapes → calculate each → add them together

(A) 52.26 cm²

(C) 24.00 cm²

(B) 38.13 cm²

(D) 42.27 cm²

Q3 Parallel Lines & Angles

[Easy]

Two parallel lines cut by a transversal. One angle = 65°. Find the co-interior angle.

■ *Co-interior = SUPPLEMENTARY (sums to 180°), NOT equal!*

■ **MEMORY POINT** ANGLE PAIRS: Alternate interior → equal | Co-interior → 180° | Corresponding → equal

(A) 65°

(C) 125°

(B) 90°

(D) 115°

Q4 Volume — Cylinder

[Easy]

Cylinder: radius = 5 cm, height = 12 cm. Find the volume. ($\pi \approx 3.14$)

■ *Use the RADIUS (5), not the diameter! Then square it.*

■ **MEMORY POINT** CYLINDER VOLUME = $\pi \times r^2 \times h$ (circle area x height)

(A) 471 cm³

(C) 942 cm³

(B) 1,884 cm³

(D) 376.8 cm³

Q5 Triangle Properties

[Medium]

Triangle angles: 47° and 83° . What is the EXTERIOR angle at the third vertex?

■ Exterior angle = sum of the 2 remote interior angles (not adjacent one).

■ **MEMORY POINT** EXTERIOR ANGLE THEOREM: Exterior = sum of 2 non-adjacent interior angles

- (A) 50° (C) 180°
(B) 130° (D) 100°

Q6 Circles — Sector Area

[Medium]

Circle radius = 9 cm. Sector central angle = 120° . Find sector area. ($\pi \approx 3.14$)

■ Sector is a FRACTION of full circle — divide angle by 360 first!

■ **MEMORY POINT** SECTOR AREA = $(\text{angle} \div 360) \times \pi \times r^2$ $120^\circ = 1/3$ of circle

- (A) 127.17 cm^2 (C) 254.34 cm^2
(B) 84.78 cm^2 (D) 169.56 cm^2

Q7 Similar Triangles

[Medium]

Triangle ABC ~ Triangle DEF. AB = 8, BC = 12, DE = 6. Find EF.

■ Match CORRESPONDING sides — order in the name tells you the pairs!

■ **MEMORY POINT** SIMILAR TRIANGLES: $AB/DE = BC/EF = AC/DF \rightarrow$ set up proportion, solve

- (A) 8 (C) 9
(B) 16 (D) 6

Q8 Surface Area

[Medium]

Rectangular prism: length = 5 cm, width = 3 cm, height = 4 cm. Surface area?

■ A box has 6 faces = 3 PAIRS. Don't forget to multiply by 2!

■ **MEMORY POINT** SURFACE AREA = $2(lw + lh + wh)$ Box has 3 pairs of rectangles

- (A) 60 cm^2 (C) 94 cm^2
(B) 47 cm^2 (D) 120 cm^2

Q9 Coordinate Geometry

[Easy]

Find the distance between A(1, 2) and B(7, 10).

■ *Distance formula IS Pythagorean theorem — Δx and Δy are the legs!*

■ **MEMORY POINT** DISTANCE = $\sqrt{[(x_2-x_1)^2 + (y_2-y_1)^2]}$ "Pythagoras in disguise!"

(A) 12

(C) 10

(B) 14

(D) 8

Q10 Transformations

[Medium]

P(3, -2) is reflected over y-axis, then rotated 180° about origin. Final coordinates?

■ *Do transformations IN ORDER — apply each rule to the NEW point!*

■ **MEMORY POINT** y-axis reflection: $(x,y) \rightarrow (-x,y)$ | 180° rotation: $(x,y) \rightarrow (-x,-y)$

(A) (3, 2)

(C) (-3, 2)

(B) (-3, -2)

(D) (3, -2)

ANSWER KEY

Pre-Algebra	#	Answer	Value	#	Answer	Value
	A1	C	17	A6	D	$x < -3$
	A2	A	$-3 \times (-4) = 12$	A7	C	4
	A3	B	$x = 6$	A8	D	-10
	A4	C	2¼ cups	A9	C	~7.6 miles
	A5	B	\$56	A10	B	$y = 2x + 1$

Geometry	#	Answer	Value	#	Answer	Value
	B1	B	10 cm	B6	B	84.78 cm ²
	B2	B	38.13 cm ²	B7	C	9
	B3	D	115°	B8	C	94 cm ²
	B4	C	942 cm ³	B9	C	10
	B5	B	130°	B10	A	(3, 2)

Scoring Guide

Score	Range	Message
18-20	Excellent!	Outstanding mastery. Ready for the next level.
14-17	Good	Solid understanding. Review missed topics.
10-13	Developing	Keep practicing. Focus on memory points.
0-9	Needs Review	Re-study the memory points and try again.