Pre-Algebra & Geometry

Self-Study Worksheet · 20 Problems · Answer Key Included

Part 1 — Pre-Algebra

Q 01 · Variables & Expressions ■ Tricky

■ MEMORY POINT

SUBSTITUTE → SIMPLIFY → SOLVE

Replace the variable first, then calculate step by step.

■ EXAMPLE

If x = 4, find 3x + 5 → 3(4) + 5 = 12 + 5 = 17

If n = –3, what is the value of 2n² – n + 4?

(A) 25

(B) 19

(C) 13

(D) 7

Q 02 · Solving Equations

■ MEMORY POINT

INVERSE OPERATIONS

Whatever is done to x, undo it — same on both sides.

■ EXAMPLE

Solve: 3x – 7 = 14 → Add 7: 3x = 21 → Divide: x = 7

Solve for x: 5x – 3 = 2x + 12

(A) x = 3

(B) x = 5

(C) x = 7

(D) x = 9

Q 03 · Ratios & Proportions ■ Tricky

■ MEMORY POINT

CROSS-MULTIPLY → DIVIDE

a/b = c/d → a × d = b × c

■ EXAMPLE

Solve 3/4 = x/20 → Cross-multiply: 60 = 4x → x = 15

A recipe uses 3 cups of flour for every 2 cups of sugar. If you use 9 cups of flour, how many cups of sugar do you need?

(A) 4 cups
(B) 5 cups
(C) 6 cups
(D) 7 cups

Q 04 · Percentages

■ MEMORY POINT

IS / OF = % / 100

"What % of 80 is 20?" → 20/80 × 100

■ EXAMPLE

What is 30% of 60? → 0.30 × 60 = 18

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

(A) $55
(B) $60
(C) $65
(D) $70

Q 05 · Order of Operations ■ Tricky

■ MEMORY POINT

PEMDAS

Parentheses · Exponents · Multiply/Divide · Add/Subtract (left to right)

■ EXAMPLE

4 + 2 × 3² → Exponent: 9 → Multiply: 18 → Add: 22

Evaluate: 3 + 4 × (8 – 5)² ÷ 6

(A) 9
(B) 6
(C) 5
(D) 11

Q 06 · Inequalities

■ MEMORY POINT

FLIP when DIVIDE/MULTIPLY by NEGATIVE

–2x < 6 → x > –3 (the inequality sign flips!)

■ EXAMPLE

Solve: –3x < 9 → Divide by –3 and flip: x > –3

Which value of x is a solution to –2x + 5 > 11?

(A) x = –4

(B) x = 0

(C) x = 3

(D) x = 6

Q 07 · Fractions & Operations ■ Tricky

■ MEMORY POINT

LCD → SAME DENOMINATOR → ADD NUMERATORS

Never add denominators! Find LCD first, then add only numerators.

■ EXAMPLE

1/3 + 1/4 → LCD = 12 → 4/12 + 3/12 = 7/12

What is the value of 2/3 + 3/4 – 1/2?

(A) 5/12

(B) 11/12

(C) 7/12

(D) 3/4

Q 08 · Number Patterns

■ MEMORY POINT

FIND THE RULE: ADD? MULTIPLY? SQUARE?

Look at differences between terms first.

■ EXAMPLE

2, 5, 8, 11, ___ → Adding 3 each time → Next: 14

What is the next term in the pattern: 3, 6, 12, 24, ___?

(A) 36

(B) 40

(C) 48

(D) 42

Q 09 · Word → Equation ■ Tricky

■ MEMORY POINT

"MORE THAN" = ADD · "TIMES" = MULTIPLY · "IS" = EQUALS

Translate each word into a math symbol first.

■ EXAMPLE

"5 more than three times a number is 20" → 3x + 5 = 20 → x = 5

Tom has twice as many stickers as Emma. Together they have 42 stickers. How many does Tom have?

(A) 14

(B) 21

(C) 28

(D) 30

Q 10 · Integer Operations

■ MEMORY POINT

SAME SIGNS → ADD · DIFFERENT SIGNS → SUBTRACT

Keep the sign of the bigger absolute value number.

■ EXAMPLE

(–5) × (–3) = +15 · (–4) × (+2) = –8

What is the value of (–4) + (–7) × 2 – (–3)?

(A) –15

(B) –22

(C) –25

(D) –8

Part 2 — Geometry

Q G01 · Angles

■ MEMORY POINT

SUPPLEMENTARY = 180° · COMPLEMENTARY = 90°

Sup → Straight line. Com → Corner (right angle).

■ EXAMPLE

Supplementary: one angle is 65° → Other = 180° – 65° = 115°

Two angles are complementary. One angle measures 37°. What is the measure of the other angle?

(A) 53°

(B) 63°

(C) 143°

(D) 73°

Q G02 · Area of Triangle ■ Tricky

■ MEMORY POINT

A = 1/2 × BASE × HEIGHT

HEIGHT must be perpendicular to the base — not the slanted side!

■ EXAMPLE

Triangle: base = 10, height = 6 → A = 1/2 × 10 × 6 = 30

A triangle has a base of 14 cm and a height of 9 cm. What is its area?

(A) 126 cm^2

(B) 63 cm^2

(C) 46 cm^2

(D) 72 cm^2

Q G03 · Pythagorean Theorem

■ MEMORY POINT

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

c = HYPOTENUSE (longest side, opposite the right angle)

■ EXAMPLE

a = 3, b = 4 → $c^2 = 9 + 16 = 25$ → c = 5

A right triangle has legs of 6 cm and 8 cm. What is the length of the hypotenuse?

(A) 10 cm

(B) 12 cm

(C) 14 cm

(D) 7 cm

Q G04 · Circle: Circumference ■ Tricky

■ MEMORY POINT

C = 2πr = πd

RADIUS = half of diameter. Don't mix them up!

■ EXAMPLE

Radius = 5: C = 2π(5) = 10π ≈ 31.4

A circle has a diameter of 14 cm. What is its circumference? (Use π ≈ 3.14)

(A) 43.96 cm

(B) 87.92 cm

(C) 21.98 cm

(D) 153.86 cm

Q G05 · Perimeter

■ MEMORY POINT

PERIMETER = ADD ALL SIDES

For rectangles: P = 2(length + width)

■ EXAMPLE

Rectangle l=8, w=3 → P = 2(8+3) = 22

A rectangular garden is 15 m long and 8 m wide. What is the total fencing needed to go around it?

(A) 23 m

(B) 120 m

(C) 46 m

(D) 30 m

Q G06 · Triangle Angles ■ Tricky

■ MEMORY POINT

ALL 3 ANGLES IN A TRIANGLE = 180°

Missing angle = 180° – (sum of the other two)

■ EXAMPLE

Angles: 90°, 40°, ? → 180° – 90° – 40° = 50°

In a triangle, two angles measure 48° and 73°. What is the third angle?

(A) 69°

(B) 59°

(C) 79°

(D) 49°

Q G07 · Area of Circle

■ MEMORY POINT

$A = \pi r^2$

Square the RADIUS, then multiply by π. (Not the diameter!)

■ EXAMPLE

r = 5 → A = π × 25 = 25π ≈ 78.5

A circular pond has a radius of 7 m. What is its area? (Use π ≈ 3.14)

(A) 43.96 m²

(B) 153.86 m²

(C) 307.72 m²

(D) 21.98 m²

Q G08 · Volume of Rectangular Prism ■ Tricky

■ MEMORY POINT

V = LENGTH × WIDTH × HEIGHT

Volume is 3D — multiply all THREE dimensions.

■ EXAMPLE

Box 4 × 3 × 5 = V = 60 cm³

A fish tank is 50 cm long, 30 cm wide, and 40 cm tall. How many cm³ of water can it hold?

(A) 60,000 cm³

(B) 1,500 cm³

(C) 6,000 cm³

(D) 120 cm³

Q G09 · Coordinate Geometry

■ MEMORY POINT

DISTANCE = sqrt[(x2−x1)² + (y2−y1)²]

Think Pythagorean theorem on a grid!

■ EXAMPLE

Points (0,0) and (3,4): d = sqrt(9+16) = sqrt(25) = 5

What is the distance between points A(1, 2) and B(5, 5)?

(A) 5

(B) 6

(C) 7

(D) 4

Q G10 · Similar Figures ■ Tricky

■ MEMORY POINT

SIMILAR = SAME SHAPE, DIFFERENT SIZE → RATIOS ARE EQUAL

Set up a proportion: side1/side2 = other side1/other side2

■ EXAMPLE

Similar triangles: sides 3 & 4 match to 6 & ? → 3/6 = 4/x → x = 8

Two similar rectangles: first has sides 4 cm and 6 cm. The second has a longer side of 9 cm. What is its shorter side?

(A) 5 cm

(B) 6 cm

(C) 7 cm

(D) 8 cm

Answer Key

Part 1 — Pre-Algebra

	Q	Ans	Q	Ans					
	Q04	B	Q05	A	Q06	A	Q07	B	

Part 2 — Geometry

	Q	Ans	Q	Ans					
	QG04	A	QG05	C	QG06	B	QG07	B	Q

Name: _____ **Date:** _____ **Score:** **/ 20**