MATH MASTERY

Pre-Algebra & Geometry

Self-Study Worksheet · Grades 6–9

Name: _____ Date: _____ Score: _____ / 20

Section 1 — Pre-Algebra

MEMORY: PEMDAS — Parentheses, Exponents, Multiply/Divide, Add/Subtract

Question 01 · Order of Operations (PEMDAS)

Evaluate: $3 + 4 \times (2^2 - 1) \div 5$

■ *Tricky: Many students add 3+4 first. Remember PEMDAS — multiply and divide before add/subtract.*

Worked Example

Example: $2 + 6 \times (3^2 - 3) \div 6$

Step 1 Parentheses: $3^2=9$, $9–3=6$

Step 2 Multiply: $6×6=36$

Step 3 Divide: $36÷6=6$

Step 4 Add: $2+6 = 8$

A) 2.4	B) 7
C) 5.4	D) 5.0

MEMORY: LIKE TERMS = same variable, same power → combine coefficients only

Question 02 · Combining Like Terms

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

■ *Tricky: x^2 and x are NOT like terms — never combine them!*

Worked Example

Example: $4a^2 + 2a - a^2 + 5 - 3a$

Group: $(4a^2–a^2) + (2a–3a) + 5 = 3a^2 – a + 5$

A) $3x^2 + 2x + 5$	B) $3x^2 + 2x + 7$
C) $5x^2 + 7$	D) $3x^2 - 2x + 7$

MEMORY: EQUATION = balance the scale → same operation on BOTH sides

Question 03 · One-Step Equations

Solve for x: -3x = 21

■ *Tricky: Dividing by a negative flips the sign of the answer!*

Worked Example
Example: -5y = 30 → divide both sides by -5
y = 30 ÷ (-5) = -6

A) 63	B) 7
C) -7	D) -63

MEMORY: TWO-STEP — undo Addition/Subtraction FIRST, then Multiplication/Division

Question 04 · Two-Step Equations

Solve: 2x + 5 = -3

■ *Tricky: Subtract the constant 5 first — not the coefficient 2!*

Worked Example
Example: 3y - 4 = 11
Step 1: +4 both sides → 3y = 15
Step 2: ÷3 → y = 5

A) x = 1	B) x = 4
C) x = -4	D) x = -1

MEMORY: FLIP the inequality sign when multiplying or dividing by a NEGATIVE number

Question 05 · Inequalities

Solve: -4x + 1 > 13

■ *Most missed: dividing by -4 flips > to <*

Worked Example
Example: -2x + 3 > 7
-2x > 4 → divide by -2 (FLIP!) → x < -2
Open circle at -2, arrow pointing LEFT

A) x > -3	B) x < -3
C) x ≤ -3	D) x < -3.5

MEMORY: CROSS-MULTIPLY → a/b = c/d means a×d = b×c

Question 06 · Ratios & Proportions

If 5 pencils cost $2.75, how much do 8 pencils cost?

■ *Tricky: Set up the proportion correctly — same units in numerators and denominators.*

Worked Example
Example: 3 apples = $1.50, find cost of 7 apples
3/1.50 = 7/x → 3x = 10.50 → x = $3.50

A) $3.60	B) $4.40
C) $4.00	D) $5.00

MEMORY: IS/OF = PERCENT/100 → 'is' = part, 'of' = whole

Question 07 · Percent Problems

A jacket costs $80. It is on sale for 35% off. What is the sale price?

■ *Tricky: 35% of $80 = $28 is the DISCOUNT, not the price! Subtract from original.*

Worked Example
Example: Original $60, discount 25%
Discount = 0.25×60 = $15
Sale price = 60 – 15 = $45

A) $28	B) $48
C) $52	D) $55

MEMORY: x^a × x^b = x^(a+b) | (x^a)^b = x^(a×b) | x^a ÷ x^b = x^(a-b)

Question 08 · Exponent Rules

Simplify: $(x^3)^2 \times x^{-1}$

■ *Tricky: (x³)² = x■ (MULTIPLY exponents in a power of power, not add).*

Worked Example
Example: (y²)³ × y■² = y■ × y■² = y^(6-2) = y■

A) x^4	B) x^5
C) x^6	D) x^3

MEMORY: SLOPE = rise/run = (y■-y■)/(x■-x■) → subtract in the SAME order

Question 09 · Slope of a Line

Find the slope through (2, -1) and (-4, 5).

■ *Tricky: Watch the sign of the denominator when x goes negative.*

Worked Example
Example: Points (1,3) and (4,9)
m = (9-3)/(4-1) = 6/3 = 2

A) -6	B) 1

C) -1	D) 6

MEMORY: a(b+c) = ab+ac → distribute to EVERY term inside the parentheses

Question 10 · Distributive Property

Expand: -3(2x - 5) + 4x

■ *Most missed: -3 × (-5) = +15 (negative × negative = positive!)*

Worked Example

Example: -2(3a - 4) + 5a

= -6a + 8 + 5a = -a + 8

A) -2x - 15	B) -2x + 15
C) 10x + 15	D) 2x + 15

Section 2 — Geometry

MEMORY: All 3 angles of a triangle = EXACTLY 180° (not 360°!)

Question 01 · Triangle Angle Sum

A triangle has angles of 47° and 83°. What is the third angle?

■ *Tricky: 360° is for quadrilaterals. Triangles always sum to 180°.*

Worked Example

Example: Two angles = 55° and 75°

Third angle = 180° - 55° - 75° = 50°

A) 130°	B) 50°
C) 230°	D) 36°

MEMORY: $a^2 + b^2 = c^2 \rightarrow$ c is the HYPOTENUSE (longest side, opposite right angle)

Question 02 · Pythagorean Theorem

A right triangle has legs of 9 cm and 12 cm. Find the hypotenuse.

■ *Tricky: $c^2 = 225$ is NOT the answer. Take the square root: $\sqrt{225} = 15$.*

Worked Example

Example: Legs 3 and 4

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

A) 225 cm	B) 21 cm
C) 15 cm	D) $\sqrt{21}$ cm

MEMORY: Area = πr^2 | Circumference = $2\pi r \rightarrow$ r = RADIUS (= diameter ÷ 2)

Question 03 · Circle: Area & Circumference

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

■ *Most common mistake: using diameter (10) instead of radius (5) in the formula!*

Worked Example

Example: Diameter = 8 cm $\rightarrow$ r = 4

Area = $3.14 \times 4^2 = 3.14 \times 16 = 50.24$ cm²

A) 314 m²	B) 31.4 m²
C) 78.5 m²	D) 25 m²

MEMORY: COMPLEMENTARY = 90° | SUPPLEMENTARY = 180° (C comes before S, 90 before 180)

Question 04 · Complementary & Supplementary Angles

Angle A and Angle B are supplementary. Angle A = 67°. Find Angle B.

■ *Tricky: Supplementary $\rightarrow$ 180°. Don't subtract from 90° (that is complementary).*

Worked Example

Example: Supplementary, X = 45°

Y = 180° - 45° = 135°

A) 23°	B) 113°
C) 67°	D) 247°

MEMORY: Area of triangle = ½ × base × height (don't forget the ½!)

Question 05 · Area of Triangle

A triangle has base 14 cm and height 9 cm. Find its area.

■ *Most missed: students compute 14×9=126 and forget to multiply by ½.*

Worked Example

Example: Base = 10, Height = 6

Area = ½ × 10 × 6 = 30 cm²

A) 126 cm²	B) 63 cm²
C) 46 cm²	D) 31.5 cm²

MEMORY: Alternate interior angles = EQUAL | Co-interior (same-side) = 180°

Question 06 · Parallel Lines & Transversals

Two parallel lines are cut by a transversal. One angle is 125°. Find its alternate interior angle.

■ *Tricky: Alternate interior = equal (not supplementary). Don't subtract from 180°.*

Worked Example

Example: Alternate interior angles are equal.

If one = 70°, the other = 70°

A) 55°	B) 125°
C) 235°	D) 90°

MEMORY: Volume = length × width × height (use all THREE dimensions)

Question 07 · Volume of a Rectangular Prism

A box is 8 cm long, 5 cm wide, 3 cm tall. Find its volume.

■ *Tricky: 8×5=40 is the base area only. Multiply by height: 40×3=120.*

Worked Example

Example: 4 × 6 × 2 = 48 cm³

A) 40 cm³	B) 16 cm³

C) 120 cm^3	D) 240 cm^3

MEMORY: SIMILAR = same shape, proportional sides → set up a ratio and cross-multiply

Question 08 · Similar Triangles

Two similar triangles have sides in ratio 3:5. Smaller triangle has a side of 9 cm. Find the corresponding side of the larger triangle.

■ *Tricky: Set up 3/5 = 9/x then cross-multiply. Don't just add 2 to 9!*

Worked Example

Example: Ratio 2:7, smaller side = 6

2/7 = 6/x → 2x = 42 → x = 21

A) 12 cm	B) 15 cm
C) 14 cm	D) 45 cm

MEMORY: EXTERIOR angle = sum of the two NON-adjacent interior angles

Question 09 · Exterior Angle Theorem

A triangle has interior angles 42° and 61°. Find the exterior angle at the third vertex.

■ *Tricky: Exterior angle = 42°+61°. Don't find the third interior angle (77°) and stop there!*

Worked Example

Example: Interior angles 35° and 80°

Exterior angle = 35° + 80° = 115°

A) 77°	B) 180°
C) 103°	D) 19°

MEMORY: Surface Area of cube = $6s^2$ (6 identical square faces) | Volume = s^3

Question 10 · Surface Area of a Cube

A cube has a side length of 7 cm. Find its total surface area.

■ *Tricky: One face = 7^2=49. A cube has 6 faces: 6×49=294. Don't stop at 49!*

Worked Example

Example: Side = 4 cm

One face = 16, Surface area = 6×16 = 96 cm^2

A) 343 cm^2	B) 49 cm^2
C) 294 cm^2	D) 42 cm^2

ANSWER KEY

Section 1 · Pre-Algebra

Q	Topic	Answer
1	Order of Operations (PEMDAS)	**C**
2	Combining Like Terms	**B**
3	One-Step Equations	**C**
4	Two-Step Equations	**C**
5	Inequalities	**B**
6	Ratios & Proportions	**B**
7	Percent Problems	**C**
8	Exponent Rules	**B**
9	Slope of a Line	**C**
10	Distributive Property	**B**

Section 2 · Geometry

Q	Topic	Answer
1	Triangle Angle Sum	**B**
2	Pythagorean Theorem	**C**
3	Circle: Area & Circumference	**C**
4	Complementary & Supplementary Angles	**B**
5	Area of Triangle	**B**
6	Parallel Lines & Transversals	**B**
7	Volume of a Rectangular Prism	**C**
8	Similar Triangles	**B**
9	Exterior Angle Theorem	**C**
10	Surface Area of a Cube	**C**