Pre-Algebra & Geometry

Self-Study Worksheet | 20 Questions

PRE-ALGEBRA

Q1. Order of Operations

Evaluate: 3 + 4 × 2 – 1

■ MEMORY KEY

PEMDAS — Multiply BEFORE Add. Left to right for same level.

PEMDAS | Multiply BEFORE Add | Left → Right

■ WORKED EXAMPLE

Simplify 2 + 3 × 4

Step 1: Multiply first: 3 × 4 = 12

Step 2: Then add: 2 + 12 = 14

■■ Wrong: (2+3)×4 = 20 ✗

A) 9	B) 10
C) 13	D) 14

Q2. Solving One-Step Equations

Solve for x: x + 7 = 15

■ MEMORY KEY

Undo the operation with its INVERSE on both sides.

INVERSE OPERATION | BALANCE | ISOLATE x

■ WORKED EXAMPLE

Solve x + 5 = 12

Subtract 5 from both sides: x = 7

Check: 7+5=12 ✓

A) 6	B) 7
C) 8	D) 22

Q3. Two-Step Equations

Solve: 2x – 5 = 11

■ MEMORY KEY

Undo ADD/SUBTRACT first, then undo MULTIPLY/DIVIDE.

ADD/SUB FIRST | THEN DIVIDE

■ WORKED EXAMPLE

Solve 3x + 2 = 14

Step 1: Subtract 2 → 3x = 12

Step 2: Divide by 3 → x = 4

A) 3	B) 6
C) 7	D) 8

Q4. Ratios & Proportions

A recipe uses 2 cups of flour for every 3 cups of milk.

If you use 8 cups of flour, how many cups of milk do you need?

■ **MEMORY KEY**

Cross-multiply to solve a proportion.

CROSS-MULTIPLY | EQUAL RATIOS

■ **WORKED EXAMPLE**

Setup: 2/3 = 8/x

Cross-multiply: 2x = 24

Divide: x = 12

A) 10	B) 11
C) 12	D) 16

Q5. Percentages

A shirt costs $40. It is on sale for 25% off.

What is the sale price?

■ **MEMORY KEY**

"Percent" = Per hundred. Sale = Original – Discount.

% ÷ 100 | DISCOUNT = % × ORIGINAL | SALE = ORIGINAL – DISCOUNT

■ **WORKED EXAMPLE**

30% off $50: Discount = 0.30×50 = $15

Sale price = $50–$15 = $35

A) $10	B) $25
C) $30	D) $35

Q6. Negative Numbers

Temperature was –3°C in the morning and rose by 9°C.

What was the temperature at noon?

■ **MEMORY KEY**

Adding a positive = moving RIGHT on the number line.

NUMBER LINE | NEGATIVE + POSITIVE

■ **WORKED EXAMPLE**

–5 + 7 = ?

Start at –5, move 7 right → land on 2

A) –12°C	B) 6°C
C) 9°C	D) 12°C

Q7. Distributive Property

Expand and simplify: 3(2x + 4) – 6

■ MEMORY KEY

Multiply the OUTSIDE by EVERY term inside parentheses.

DISTRIBUTE | a(b+c) = ab+ac

■ WORKED EXAMPLE

Expand 4(x+3)–5

= 4x + 12 – 5 = 4x + 7

A) 6x + 6	B) 6x + 4
C) 6x + 12	D) 6x + 18

Q8. Writing Algebraic Expressions

Jake has n apples. Maria has 5 more than twice as many apples as Jake.

Which expression represents Maria's apples?

■ MEMORY KEY

"More than" = add. "Times as many" = multiply. Order matters!

MORE THAN = + | TIMES = × | TRANSLATE CAREFULLY

A) 5n + 2	B) 2n + 5
C) 2(n + 5)	D) n + 10

Q9. Inequalities

Solve: 2x + 3 > 11

Which value of x is a solution?

■ MEMORY KEY

FLIP the inequality sign when multiplying/dividing by NEGATIVE.

FLIP SIGN when ÷ NEGATIVE | OPEN circle = not included | CLOSED = included

■ WORKED EXAMPLE

Solve 3x–1 > 8

Add 1: 3x > 9

Divide: x > 3 (open circle at 3, shade right)

A) x = 3	B) x = 4
C) x = 5	D) x = –2

Q10. Word Problem — Rate

A car travels at 60 miles per hour.

How long will it take to travel 150 miles?

■ MEMORY KEY

Distance = Rate × Time. Rearrange to find what you need.

D = R × T | T = D ÷ R | R = D ÷ T

■ WORKED EXAMPLE

Bike at 15 mph for 45 miles:

T = 45 ÷ 15 = 3 hours

A) 2 hours	B) 2.5 hours
C) 3 hours	D) 4 hours

GEOMETRY

Q11. Area of a Rectangle

A rectangle has a length of 9 cm and a width of 5 cm.

What is its area?

■ MEMORY KEY

Area = l × w. Always write units SQUARED.

A = l × w | cm² m² ft²

A) 28 cm²	B) 40 cm²
C) 45 cm²	D) 54 cm²

Q12. Perimeter vs. Area

A square has a perimeter of 24 cm.

What is its area?

■ MEMORY KEY

Perimeter = around outside (1D). Area = inside space (2D). Find side first!

P = 4s | A = s² | FIND s FIRST

■ WORKED EXAMPLE

Perimeter = 20 cm → s = 20÷4 = 5 cm

Area = 5² = 25 cm²

A) 24 cm²	B) 36 cm²
C) 48 cm²	D) 144 cm²

Q13. Area of a Triangle

A triangle has a base of 10 cm and a height of 6 cm.

What is its area?

■ MEMORY KEY

A triangle is HALF of a rectangle with the same base and height.

A = ½ × b × h | HALF of b×h

A) 16 cm²	B) 30 cm²
C) 60 cm²	D) 120 cm²

Q14. Circumference of a Circle

A circle has a diameter of 10 cm.

What is its circumference? (Use $\pi \approx 3.14$)

■ **MEMORY KEY**

"Cherry Pie Delicious" → $C = \pi d$

$C = \pi d$ | $C = 2\pi r$ | $d = 2r$

■ **WORKED EXAMPLE**

Diameter = 7 cm

C = 3.14 × 7 = 21.98 cm

A) 15.7 cm	B) 31.4 cm
C) 62.8 cm	D) 78.5 cm

Q15. Pythagorean Theorem

A right triangle has legs of 3 cm and 4 cm.

What is the length of the hypotenuse?

■ **MEMORY KEY**

The hypotenuse is ALWAYS opposite the right angle (longest side).

$a^2 + b^2 = c^2$ | 3-4-5 TRIPLE | c = HYPOTENUSE

■ **WORKED EXAMPLE**

Legs: 5 and 12

$5^2+12^2 = 25+144 = 169$

$c = \sqrt{169} = 13$ cm

A) 5 cm	B) 6 cm
C) 7 cm	D) 25 cm

Q16. Angles in a Triangle

A triangle has angles measuring 45° and 85°.

What is the third angle?

■ **MEMORY KEY**

Triangle angles always add to exactly 180°.

$\angle A + \angle B + \angle C = 180°$ | TRIANGLE SUM

A) 40°	B) 50°
C) 55°	D) 130°

Q17. Volume of a Rectangular Prism

A box is 5 cm long, 4 cm wide, and 3 cm tall.

What is its volume?

■ **MEMORY KEY**

Volume = three dimensions multiplied. Units are CUBED.

$V = l \times w \times h$ | cm^3 m^3 ft^3

A) 12 cm^3	B) 47 cm^3
C) 60 cm^3	D) 120 cm^3

Q18. Supplementary & Complementary Angles

Two angles are supplementary. One angle measures 112°.

What is the other angle?

■ MEMORY KEY

"C" before "S" → Complementary (90°) < Supplementary (180°)

COMPLEMENTARY = 90° | SUPPLEMENTARY = 180° | S = Straight line

A) 22°	B) 68°
C) 78°	D) 248°

Q19. Area of a Circle

A circle has a radius of 5 cm.

What is its area? (Use $\pi \approx 3.14$)

■ MEMORY KEY

"Apple Pie R-Squared" → $A = \pi r^2$. Square the radius FIRST!

$A = \pi r^2$ | RADIUS = d ÷ 2 | SQUARE the RADIUS

■ WORKED EXAMPLE

r = 3 cm

$A = 3.14 \times 3^2 = 3.14 \times 9 = 28.26$ cm²

■■ 3.14×3 = 9.42 ✗ (forgot to square!)

A) 15.7 cm²	B) 31.4 cm²
C) 78.5 cm²	D) 157 cm²

Q20. Similar Figures & Scale Factor

Two similar triangles have sides in ratio 1 : 3.

The smaller triangle has area 4 cm².

What is the area of the larger triangle?

■ MEMORY KEY

If sides scale by k, AREA scales by k^2. This trips everyone up!

AREA RATIO = k^2 | VOLUME RATIO = k^3 | SIDE RATIO = k

■ WORKED EXAMPLE

Sides ratio = 1:2, small area = 5 cm²

Area ratio = $1^2:2^2 = 1:4$

Large area = $5 \times 4 = 20$ cm²

A) 12 cm²	B) 36 cm²
C) 64 cm²	D) 144 cm²

ANSWER KEY

#	Answer	Quick Explanation	#	Answer	Quick Explanation
1	B) 10	4×2=8 first, then 3+8–11=10	2	C) 8	x = 15–7 = 8. Check: 8+7=15 ✓
3	D) 8	Add 5: 2x=16, divide by 2: x=8	4	C) 12	2/3 = 8/x → 2x=24 → x=12 cups

5	C) $30	Discount = 0.25×40 = $10. Sale = 40–10 = $30	6	B) 6°C	–3 + 9 = 6°C
7	A) 6x + 6	3·2x + 3·4 – 6 = 6x+12–6 = 6x+6	8	B) 2n + 5	twice = 2n, then 5 more = 2n+5
9	C) x = 5	2x>8 → x>4. Only x=5 works.	10	B) 2.5 hours	T = 150 ÷ 60 = 2.5 hours
11	C) 45 cm²	9 × 5 = 45 cm²	12	B) 36 cm²	s = 24÷4 = 6, Area = 6² = 36 cm²
13	B) 30 cm²	½ × 10 × 6 = 30 cm²	14	B) 31.4 cm	C = 3.14 × 10 = 31.4 cm
15	A) 5 cm	3²+4² = 9+16 = 25, c = 5 cm	16	B) 50°	180 – 45 – 85 = 50°
17	C) 60 cm³	5 × 4 × 3 = 60 cm³	18	B) 68°	180 – 112 = 68°
19	C) 78.5 cm²	3.14 × 5² = 3.14 × 25 = 78.5 cm²	20	B) 36 cm²	Area ratio = 3² = 9. 4 × 9 = 36 cm²