

Pre-Algebra & Geometry

Self-Study Worksheet · 20 Questions

Part 1 · Pre-Algebra

[PA01] MEMORY KEY: ORDER OF OPS · PEMDAS

Q1. Evaluate: $3 + 4 \times 2 - 1$

■ *Watch out: many students add 3+4 first!*

Quick Example: $2 + 3 \times 5$

Wrong way: $(2+3) \times 5 = 25$

Right way: $2 + (3 \times 5) = 2 + 15 = 17$

PEMDAS: Multiply before you Add.

A) 12 B) 10

C) 13 D) 6

[PA02] MEMORY KEY: VARIABLE · ISOLATE THE UNKNOWN

Q2. Solve for x: $2x + 5 = 17$

Quick Example: $3x + 4 = 10$

Step 1: subtract 4 $\rightarrow 3x = 6$

Step 2: divide by 3 $\rightarrow x = 2$

KEY: Same operation on both sides.

A) $x = 4$ B) $x = 6$

C) $x = 11$ D) $x = 7$

[PA03] MEMORY KEY: INEQUALITY · FLIP THE SIGN

Q3. Solve: $-3x > 12$

■ *Danger zone: dividing by a negative!*

Quick Example: $-2x > 6$

Divide by $-2 \rightarrow$ FLIP the inequality!

$x < -3$

RULE: Divide by NEGATIVE \rightarrow flip $>$ to $<$

A) $x > -4$ B) $x < -4$

C) $x > 4$ D) $x < 4$

[PA04] MEMORY KEY: PROPORTION · CROSS MULTIPLY

Q4. If $x/5 = 12/20$, find x .

Quick Example: $3/4 = x/8$

Cross multiply: $3 \times 8 = 4 \times x \rightarrow 24 = 4x \rightarrow x = 6$

FORMULA: $a/b = c/d \rightarrow axd = bxc$

- A) $x = 2$ B) $x = 4$
C) $x = 3$ D) $x = 6$

[PA05] MEMORY KEY: EXPONENT · SAME BASE \rightarrow ADD POWERS

Q5. Simplify: $x^3 \times x^9$

Quick Example: $x^2 \times x^3 = x^{(2+3)} = x^5$

RULE: Same base, multiplying \rightarrow ADD exponents.

- A) x^{12} B) x^27
C) $2x^{12}$ D) x^3

[PA06] MEMORY KEY: PERCENT · CONVERT TO DECIMAL \times WHOLE

Q6. What is 35% of 80?

■ *Students often divide instead of multiply.*

Quick Example: 20% of 50?

$20\% = 0.20 \rightarrow 0.20 \times 50 = 10$

SHORTCUT: % of \rightarrow decimal \times number

- A) 24 B) 28
C) 32 D) 35

[PA07] MEMORY KEY: DISTRIBUTE · MULTIPLY EVERY TERM INSIDE

Q7. Expand: $3(2x - 4)$

■ *Don't forget to multiply the second term!*

Quick Example: $2(3x + 5) = 6x + 10$

Wrong: $2(3x+5) = 6x+5$ \leftarrow forgot to multiply 5!

DISTRIBUTE: outside \times every term inside

- A) $6x - 4$ B) $5x - 12$
C) $6x - 12$ D) $6x + 12$

[PA08] MEMORY KEY: RATIO · SIMPLIFY WITH GCF

Q8. A class has 12 boys and 18 girls.

What is the ratio of boys to total class, in simplest form?

Quick Example: 4 red, 6 blue \rightarrow total = 10

Ratio red:total = 4:10 = 2:5 (GCF = 2)

SIMPLIFY: divide both by GCF.

- A) 2:3 B) 2:5
C) 1:3 D) 3:5

[PA09] MEMORY KEY: NEGATIVE \times NEGATIVE = POSITIVE

Q9. Calculate: $-6 \times (-4) + (-3)$

Quick Example: $-2 \times (-5) = +10$

Same signs \rightarrow positive

Different signs \rightarrow negative

SIGN RULE applies to \times and \div

A) -27 B) 21

C) 27 D) -21

[PA10] MEMORY KEY: FUNCTION \cdot SUBSTITUTE INPUT FOR x

Q10. If $f(x) = 2x^2 - 3$, what is $f(-2)$?

■ *Warning:* $(-2)^2 = +4$, NOT -4 !

Quick Example: $f(x) = x^2 + 1$, find $f(3)$

$f(3) = (3)^2 + 1 = 9 + 1 = 10$

SUBSTITUTE: replace x with the given number.

A) -11 B) 5

C) -5 D) 11

Part 2 - Geometry

[GE01] MEMORY KEY: TRIANGLE AREA · $\frac{1}{2} \times \text{base} \times \text{height}$

**Q1. A triangle has a base of 10 cm and a height of 6 cm.
What is its area?**

■ *Don't forget the $\frac{1}{2}$ — that would give the rectangle area!*

Quick Example: base=8, height=5

$$A = \frac{1}{2} \times 8 \times 5 = 20$$

HEIGHT must be perpendicular to the base.

A) 60 cm² B) 30 cm²

C) 16 cm² D) 32 cm²

[GE02] MEMORY KEY: PYTHAGOREAN · $a^2 + b^2 = c^2$

**Q2. A right triangle has legs 6 and 8.
What is the length of the hypotenuse?**

■ *6-8-10 is the 3-4-5 triple doubled!*

Quick Example: legs 3, 4 → $9+16=25$ → $\sqrt{25} = 5$

Common triples: 3-4-5, 5-12-13, 6-8-10

HYPOTENUSE: always the longest side.

A) 10 B) 14

C) 7 D) 12

[GE03] MEMORY KEY: CIRCLE AREA · πr^2

Q3. A circle has radius 5 cm. What is its area? ($\pi \approx 3.14$)

■ *If given diameter, divide by 2 first!*

Quick Example: $r=3$ → $A = \pi \times 9 \approx 28.26$

RADIUS = diameter \div 2

Area uses r^2 , Circumference uses r (or d)

A) 15.7 cm² B) 78.5 cm²

C) 31.4 cm² D) 25π cm

[GE04] MEMORY KEY: SUPPLEMENTARY · ADDS TO 180°

**Q4. Two angles are supplementary. One angle is 67°.
What is the other angle?**

■ *Supplementary=180°, Complementary=90°. Don't mix them up!*

Memory trick: Supplementary → Straight line → 180°

Complementary → Corner (right angle) → 90°

A) 23° B) 113°

C) 133° D) 103°

[GE05] MEMORY KEY: PARALLEL LINES · ALTERNATE INTERIOR = EQUAL

Q5. Two parallel lines cut by a transversal.

If one alternate interior angle is 55° , find the other.

Alternate interior angles (Z-shape): EQUAL

Co-interior/same-side angles: sum = 180°

Corresponding angles (F-shape): EQUAL

A) 125° B) 35°

C) 55° D) 90°

[GE06] MEMORY KEY: TRIANGLE ANGLES · SUM = 180°

Q6. A triangle has angles 45° , 75° , and x° . Find x .

■ *All three must add to exactly 180° !*

Quick Example: $30^\circ + 90^\circ + x = 180^\circ \rightarrow x = 60^\circ$

FACT: Every triangle's interior angles sum to 180° .

A) 70° B) 80°

C) 60° D) 50°

[GE07] MEMORY KEY: PERIMETER RECTANGLE · $2(l + w)$

Q7. A rectangle has length 9 m and width 4 m.

What is its perimeter?

■ *Don't forget to multiply by 2!*

Quick Example: $L=7, W=3 \rightarrow P = 2(7+3) = 20$

PERIMETER: total distance around the outside.

A) 13 m B) 26 m

C) 36 m D) 52 m

[GE08] MEMORY KEY: CUBE VOLUME · s^3 (side \times side \times side)

Q8. A cube has side length 4 cm. What is its volume?

■ *Don't confuse with surface area = $6s^2$*

Quick Example: side=3 $\rightarrow V = 3^3 = 27 \text{ cm}^3$

CUBE: all sides equal $\rightarrow \text{Volume} = s \times s \times s$

A) 12 cm^3 B) 16 cm^3

C) 64 cm^3 D) 48 cm^3

[GE09] MEMORY KEY: DISTANCE FORMULA · $\sqrt{[(\Delta x)^2+(\Delta y)^2]}$

Q9. What is the distance between A(1, 2) and B(4, 6)?

■ *It's the Pythagorean theorem on a coordinate grid!*

Quick Example: (0,0) to (3,4)

$$d = \sqrt{(3^2+4^2)} = \sqrt{25} = 5$$

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

- A) 3 B) 7
C) 5 D) 6

[GE10] MEMORY KEY: SIMILAR TRIANGLES · EQUAL RATIOS

Q10. Two similar triangles have sides 3,4,5 and ?,8,10.

Find the missing side.

Quick Example: Scale factor = $8 \div 4 = 2$

ALL corresponding sides \times same factor

SIMILAR: same shape, different size.

- A) 5 B) 4
C) 6 D) 3

Answer Key

#	Answer	Key Concept
PA01	B) 10	Multiply first: $4 \times 2 = 8$, then $3 + 8 - 1 = 10$
PA02	B) $x = 6$	$2x = 12 \rightarrow x = 6$
PA03	B) $x < -4$	Divide by -3 , flip the sign: $x < -4$
PA04	C) $x = 3$	$20x = 60 \rightarrow x = 3$
PA05	B) x^7	Add exponents: $3 + 4 = 7 \rightarrow x^7$
PA06	B) 28	$0.35 \times 80 = 28$
PA07	C) $6x - 12$	$3 \times 2x = 6x$ and $3 \times (-4) = -12$
PA08	B) 2:5	Total=30, $12:30 \div 6 = 2:5$
PA09	B) 21	$-6 \times (-4) = +24$, then $24 + (-3) = 21$
PA10	B) 5	$2 \times (-2)^2 - 3 = 2 \times 4 - 3 = 8 - 3 = 5$
GE01	B) 30 cm^2	$\frac{1}{2} \times 10 \times 6 = 30 \text{ cm}^2$
GE02	A) 10	$36 + 64 = 100 \rightarrow \sqrt{100} = 10$
GE03	B) 78.5 cm^2	$\pi \times 5^2 = 3.14 \times 25 = 78.5 \text{ cm}^2$
GE04	B) 113°	$180^\circ - 67^\circ = 113^\circ$
GE05	C) 55°	Alternate interior angles are equal: 55°
GE06	C) 60°	$45 + 75 + x = 180 \rightarrow x = 60^\circ$
GE07	B) 26 m	$2(9 + 4) = 2 \times 13 = 26 \text{ m}$
GE08	C) 64 cm^3	$4^3 = 4 \times 4 \times 4 = 64 \text{ cm}^3$
GE09	C) 5	$\sqrt{(3^2 + 4^2)} = \sqrt{(9 + 16)} = \sqrt{25} = 5$
GE10	C) 6	Scale factor = 2, so $3 \times 2 = 6$