ALGEBRA 1 & GEOMETRY 1

Core Problems · Self-Study Workbook

Most Commonly Missed Topics · Memory Keys Included

ALGEBRA 1 — Core Problems

01 Solving Equations — One-Step

■ MEMORY KEY

BALANCE: same operation both sides · ISOLATE: get x alone

EXAMPLE

Solve x + 7 = 15 → subtract 7 both sides → x = 8

Practice: Solve for x: x – 4 = 11

02 Solving Equations — Two-Step

■ MEMORY KEY

ORDER: Add/Subtract first → then Multiply/Divide

EXAMPLE

Solve 3x + 5 = 20 → 3x = 15 → x = 5

Practice: Solve for x: 2x – 6 = 10

03 Inequalities — Sign Flip Rule

■ MEMORY KEY

FLIP the inequality sign when ÷ or × by a NEGATIVE number

EXAMPLE

Solve –3x > 12 → divide by –3, FLIP → x < –4

Practice: Solve: –2x ≤ 8 (state the direction: greater or less?)

04 Linear Functions — Slope Formula

■ MEMORY KEY

SLOPE = RISE / RUN = (y■ – y■) / (x■ – x■) y on top, x on bottom

EXAMPLE

Slope through (1,2) and (3,8) → (8–2)/(3–1) = 6/2 = 3

Practice: Find slope through (2, 5) and (6, 13)

05 **Linear Functions — Slope-Intercept Form**

■ MEMORY KEY

y = mx + b m = slope (Mountain) b = y-intercept (Beginning)

EXAMPLE

y = 3x – 2 → slope = 3, y-intercept = –2

Practice: In y = –4x + 7, what is the y-intercept?

06 **Systems of Equations — Substitution**

■ MEMORY KEY

PLUG IN → SOLVE → PLUG BACK → find both x AND y

EXAMPLE

y=2x and x+y=9 → x+2x=9 → x=3 → y=6

Practice: Solve: y = x+1 and 2x + y = 7 → What is x?

07 **Polynomials — Distributing Negatives**

■ MEMORY KEY

–(a + b) = –a – b Negative hits EVERY term inside

EXAMPLE

5 – (2x – 3) → 5 – 2x + 3 → 8 – 2x

Practice: Simplify: 10 – (3x – 4) → What is the constant term?

08 **Exponent Rules — Product & Power**

■ MEMORY KEY

x^a · x^b = x^(a+b) [same base ×, ADD] (x^a)^b = x^(a×b) [power of power, MULTIPLY]

EXAMPLE

$x^3 \cdot x■ = x■$ $(x^3)■ = x^{12}$

Practice: Simplify: $x^2 \cdot x■$ → What is the exponent?

09 **Factoring — GCF**

■ MEMORY KEY

GCF = Greatest Common Factor → FIND → DIVIDE → WRITE as product

EXAMPLE

$6x^2 + 9x$ → GCF = 3x → 3x(2x + 3)

Practice: Factor: $4x^2 + 8x$ → What is the GCF?

10

Functions — Evaluating f(x)

■ MEMORY KEY

f(a) = replace EVERY x with a → f(2) means put 2 everywhere x appears

EXAMPLE

f(x) = 2x+3, f(4) = 2(4)+3 = 11

Practice: If f(x) = 3x – 1, find f(5)

GEOMETRY 1 — Core Problems

G1 Angles — Complementary vs. Supplementary

■ MEMORY KEY

C before S in alphabet → Complementary=90°, Supplementary=180°

EXAMPLE

Complement of 35°: 90°–35° = 55°

Practice: Angle B = 52°. What is its supplement?

G2 Triangles — Angle Sum

■ MEMORY KEY

All 3 angles of any triangle add to 180°

EXAMPLE

Angles 60°, 80°, x → 60+80+x=180 → x=40°

Practice: Triangle has angles 55° and 75°. Find the third angle.

G3 Pythagorean Theorem

■ MEMORY KEY

$a^2 + b^2 = c^2$ c = hypotenuse = longest side = opposite the right angle

EXAMPLE

Legs 3, 4: 9+16=25 → c=5

Practice: Right triangle legs = 5 and 12. Find the hypotenuse.

G4 Area — Triangle

■ MEMORY KEY

A = ½ × base × height Triangle is HALF a rectangle

EXAMPLE

Base=8, Height=5 → A = ½×8×5 = 20

Practice: Triangle: base = 10, height = 6. Find the area.

G5 Circles — Circumference

■ MEMORY KEY

$C = 2\pi r$ (around) $A = \pi r^2$ (inside) C has no square

EXAMPLE

r=7: $C = 2\pi(7) = 14\pi$

Practice: Find circumference of a circle with radius 5. (Use π)

G6 **Parallel Lines — Alternate Interior Angles**

■ MEMORY KEY

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

EXAMPLE

Alternate interior angle = 65° → other = 65°

Practice: One alternate interior angle is 73°. Find the other.

G7 **Polygons — Sum of Interior Angles**

■ MEMORY KEY

Sum = (n – 2) × 180° where n = number of sides

EXAMPLE

Pentagon (n=5): (5–2)×180 = 540°

Practice: Sum of interior angles of a hexagon (6 sides)?

G8 **Area — Trapezoid**

■ MEMORY KEY

A = ½(b■ + b■) × h Average the two bases, then × height

EXAMPLE

b■=6, b■=10, h=4: A = ½(16)(4) = 32

Practice: Trapezoid: bases 5 and 9, height 6. Find area.

G9 **Congruence Shortcuts**

■ MEMORY KEY

Valid: SSS · SAS · ASA · AAS · HL NOT valid: SSA or AAA

EXAMPLE

Two sides + included angle equal → SAS

Practice: All three pairs of sides are equal. Which shortcut?

G10 **Volume — Rectangular Prism**

■ MEMORY KEY

V = l × w × h (3D needs 3 measurements) Area is flat, Volume is deep

EXAMPLE

l=4, w=3, h=5: V = 4×3×5 = 60

Practice: Box: length 6, width 4, height 3. Find volume.

ANSWER KEY

ALGEBRA 1 ANSWERS

#	Question (Short)	Answer
01	Solve for x: x – 4 = 11	**x = 15**
02	Solve for x: 2x – 6 = 10	**x = 8**
03	Solve: –2x ≤ 8 (state the direction: greater or less?...	**greater (x ≥ –4)**
04	Find slope through (2, 5) and (6, 13)	**m = 2**
05	In y = –4x + 7, what is the y-intercept?	**b = 7**
06	Solve: y = x+1 and 2x + y = 7 → What is x?	**x = 2**
07	Simplify: 10 – (3x – 4) → What is the constant term...	**14 (expression: 14 – 3x)**
08	Simplify: $x^2 \cdot x^{\blacksquare}$ → What is the exponent?	**7 (answer: $x^{\blacksquare}$)**
09	Factor: $4x^2 + 8x$ → What is the GCF?	**4x (answer: 4x(x + 2))**
10	If f(x) = 3x – 1, find f(5)	**f(5) = 14**

GEOMETRY 1 ANSWERS

#	Question (Short)	Answer
G1	Angle B = 52°. What is its supplement?	**128°**
G2	Triangle has angles 55° and 75°. Find the third angle.	**50°**
G3	Right triangle legs = 5 and 12. Find the hypotenuse.	**c = 13**
G4	Triangle: base = 10, height = 6. Find the area.	**A = 30**
G5	Find circumference of a circle with radius 5. (Use π)	**C = 10π**
G6	One alternate interior angle is 73°. Find the other.	**73°**
G7	Sum of interior angles of a hexagon (6 sides)?	**720°**
G8	Trapezoid: bases 5 and 9, height 6. Find area.	**A = 42**
G9	All three pairs of sides are equal. Which shortcut?	**SSS**
G10	Box: length 6, width 4, height 3. Find volume.	**V = 72**