Algebra 1 & Geometry

Self-Study Workbook · 20 Core Questions · English

Name: _____ Date: _____ Score: _____ / 20

PART 1 — ALGEBRA 1

■ **ALGEBRA MEMORY POINTS**

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ISOLATE → get the variable alone on one side BALANCE → same operation on both sides
DISTRIBUTE → multiply outside to EVERYTHING inside ( ) COMBINE → add/subtract like
terms FLIP → inequality sign flips when × or ÷ by negative
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Q1 · One-Step Equations

Jake has some baseball cards. After giving away 7 cards, he has 15 left. How many did he start with?

■ *Hint: x - 7 = 15 | Mistake: don't subtract 7 again — ADD it to both sides*

A) 8 cards	B) 22 cards
C) 105 cards	D) 7 cards

Memory Key: ISOLATE — get x alone by doing the opposite operation

Q2 · Two-Step Equations

A taxi charges a $3 base fee plus $2 per mile. Maria paid $13 total. How many miles did she travel?

■ *Equation: 2m + 3 = 13 | Mistake: forgetting to subtract base fee first*

A) 8 miles	B) 3 miles
C) 5 miles	D) 6.5 miles

Memory Key: ISOLATE — undo addition first, then undo multiplication

Q3 · Distributive Property

Simplify: 3(x + 4) - 2x

■ *Mistake: only multiplying 3 by x — distribute to EVERY term inside ( )*

A) x + 4	B) 3x + 4
C) x + 12	D) 5x + 12

Memory Key: DISTRIBUTE then COMBINE like terms

Q4 · Solving Inequalities

Solve: -4x ≤ 20

■ *CRITICAL: FLIP the inequality sign when dividing/multiplying by a NEGATIVE number!*

A) x ≤ -5	B) x ≥ -5
C) x ≥ 5	D) x ≤ 5

Memory Key: FLIP — negative number in division → flip the sign

Q5 · Slope of a Line

A line passes through (2, 5) and (6, 13). What is the slope?

■ *Formula: m = (y2 - y1) / (x2 - x1) | Keep same point on top AND bottom*

A) 1/2	B) 2
C) 4	D) -2

Memory Key: RISE over RUN — change in y divided by change in x

Q6 · Slope-Intercept Form

Which equation has slope -3 and y-intercept 7?

■ *Formula: y = mx + b | m = slope, b = y-intercept (where line crosses y-axis)*

A) y = 7x - 3	B) y = 3x + 7
C) y = -3x + 7	D) y = -7x + 3

Memory Key: y = mx + b : m is SLOPE, b is where it BEGINS

Q7 · Systems of Equations

Two friends spend $14 total on lunch. One spends $2 more. How much is the cheaper meal?

■ *System: x + y = 14 and y = x + 2 | Use SUBSTITUTION: plug 2nd into 1st*

A) $5	B) $6
C) $7	D) $8

Memory Key: SUBSTITUTE — replace one variable with the expression for it

Q8 · Exponent Rules

Simplify: $x^3 \cdot x$■

■ *Mistake: students multiply exponents. For same base multiplication — ADD exponents!*

A) x^1■	B) x■
C) 2x■	D) x^2

Memory Key: MULTIPLY bases → ADD exponents | POWER of power → MULTIPLY

Q9 · Proportions

A car travels 120 miles in 2 hours. How far in 5 hours at the same speed?

■ *Proportion: 120/2 = x/5 | Cross-multiply: 120 × 5 = 2 × x*

A) 200 miles	B) 240 miles
C) 300 miles	D) 360 miles

Memory Key: PROPORTION — equal ratios, cross-multiply to solve

Q10 · Percent Problems

A shirt costs $40 and is on sale for 25% off. What is the sale price?

■ *Mistake: finding 25% = $10 and stopping. Remember to SUBTRACT from original!*

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

Memory Key: PERCENT OFF: find discount → subtract (or multiply by what REMAINS)

PART 2 — GEOMETRY

■ **GEOMETRY MEMORY POINTS**

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SUPPLEMENTARY → two angles add to 180° COMPLEMENTARY → two angles add to 90°
PYTHAGOREAN → a² + b² = c² (right triangles, c = hypotenuse) AREA formulas → Triangle:
½bh | Rectangle: lw | Circle: πr² VERTICAL angles → always EQUAL
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G1 · Supplementary Angles

Two angles are supplementary. One is 65°. What is the other?

■ *Supplementary = 180° | Don't confuse: Complementary = 90°*

A) 25°	B) 90°
C) 105°	D) 115°

Memory Key: S = Straight line = 180° | C = Corner = 90°

G2 · Pythagorean Theorem

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

■ *Formula: $a^2 + b^2 = c^2$ | c is ALWAYS the longest side (opposite the right angle)*

A) 7	B) 12
C) 10	D) 14

Memory Key: 3-4-5 triple (×2 = 6-8-10) — memorize common Pythagorean triples!

G3 · Area of a Triangle

A triangle has base 10 cm and height 6 cm. What is the area?

■ *Formula: A = (1/2) × b × h | Mistake: forgetting the 1/2*

A) 60 cm²	B) 30 cm²
C) 16 cm²	D) 20 cm²

Memory Key: HALF of base times height — triangle is half a rectangle

G4 · Circumference of a Circle

A circle has radius 5 cm. What is the circumference? (Use $\pi \approx 3.14$)

■ *Formula: $C = 2\pi r$ | Mistake: using r^2 (that's area, not circumference!)*

A) 15.7 cm	B) 31.4 cm
C) 78.5 cm	D) 25 cm

Memory Key: Circumference = $2\pi r$ (NO square) | Area = πr^2 (SQUARED)

G5 · Interior Angles of a Triangle

A triangle has angles of 50° and 70°. What is the third angle?

■ *Rule: all 3 interior angles of ANY triangle always add to 180°*

A) 50°	B) 70°
C) 60°	D) 40°

Memory Key: Triangle = 180° (three sides, one-eighty — always!)

G6 · Perimeter of a Rectangle

A garden is 12 m long and 5 m wide. How much fencing goes around it?

■ *Formula: $P = 2(l + w)$ | 'Around' = PERIMETER, not area*

A) 60 m	B) 24 m
C) 34 m	D) 17 m

Memory Key: PERIMETER = outline = add ALL sides

G7 · Vertical Angles

Two lines intersect, forming a 42° angle. What is the vertical angle across from it?

■ *Vertical angles (directly across) are EQUAL. Adjacent angles are supplementary (180°).*

A) 138°	B) 48°
C) 90°	D) 42°

Memory Key: VERTICAL = EQUAL (think: V = same Value)

G8 · Area of a Circle

A circle has diameter 14 in. What is its area? (Use $\pi \approx 3.14$)

■ *Formula uses RADIUS not diameter! radius = 14 ÷ 2 = 7 in — don't forget to halve!*

A) 615.44 in²	B) 153.86 in²
C) 43.96 in²	D) 196 in²

Memory Key: DIAMETER ÷ 2 = RADIUS — always check which one is given!

G9 · Exterior Angle Theorem

A triangle has two interior angles of 40° and 65°. What is the exterior angle at the third vertex?

■ *Exterior Angle = sum of the TWO remote interior angles (not all three!)*

A) 75°	B) 105°
C) 180°	D) 25°

Memory Key: EXTERIOR = sum of the two REMOTE interior angles

G10 · Volume of a Rectangular Prism

A box is 4 cm × 3 cm × 5 cm. What is its volume?

■ *Formula: V = l × w × h | Volume is 3D — multiply THREE dimensions*

A) 24 cm³	B) 35 cm³
C) 47 cm³	D) 60 cm³

Memory Key: VOLUME = multiply all 3 dimensions → cubic units (³)

ANSWER KEY

Algebra 1

Q1 → **B** One-Step Equations	**Q2** → **C** Two-Step Equations	**Q3** → **C** Distributive Property	**Q4** → **B** Solving Inequalities	**Q5** → **B** Slope of a Line
Q6 → **C** Slope-Intercept Form	**Q7** → **B** Systems of Equations	**Q8** → **B** Exponent Rules	**Q9** → **C** Proportions	**Q10** → **C** Percent Problems

Geometry

G1 → **D** Supplementary Angles	**G2** → **C** Pythagorean Theorem	**G3** → **B** Area of a Triangle	**G4** → **B** Circumference of a Circle	**G5** → **C** Interior Angles of a Triangle
G6 → **C** Perimeter of a Rectangle	**G7** → **D** Vertical Angles	**G8** → **B** Area of a Circle	**G9** → **B** Exterior Angle Theorem	**G10** → **D** Volume of a Rectangular Prism