Algebra 1 & Geometry

Essential Practice Worksheet · 20 Problems · Print Version

ALGEBRA 1

Question 01 — Linear Equations

Word Problem | Common Mistake: Solving for the Wrong Person

Emma has 3 times as many stickers as Jake. Together they have 48 stickers.

How many stickers does Emma have?

■ **Memory: LET smaller = x | E = 3x, J = x | x + 3x = 48 | x = 12 (Jake) | Emma = 3x = 36**

A) 12 stickers
B) 36 stickers
C) 24 stickers
D) 16 stickers

Answer: (B) 36 stickers

Explanation: Let Jake = x, Emma = 3x. Then x + 3x = 48 → 4x = 48 → x = 12. Emma = 3 x 12 = 36. Trap: stopping at x=12 and picking (A).

Question 02 — Rate & Time

Average Speed | Common Mistake: Averaging Speeds Directly

A car travels at 60 mph for 2 hours, then 40 mph for 3 hours.

What is the average speed for the entire trip?

■ **Memory: Average speed = Total Distance / Total Time | NOT (v1+v2)/2 when times differ!**

A) 50 mph
B) 55 mph
C) 48 mph
D) 52 mph

Answer: (C) 48 mph

Explanation: Total dist = (60x2)+(40x3) = 240 mi. Total time = 5 hr. Avg speed = 240/5 = 48 mph. (A) 50 mph comes from wrongly averaging 60 and 40.

Question 03 — Percent & Discount

Successive Percentages | Common Mistake: Adding Percentages

A jacket costs $120. It is 25% off, then a further 10% off the sale price.

What is the final price?

■ **Memory: MULTIPLY multipliers: x0.75 x 0.90 | NOT 35% off! Successive % ≠ sum of %**

A) $81.00
B) $78.00
C) $84.00
D) $82.50

Answer: (A) $81.00

Explanation: $120 x 0.75 = $90. Then $90 x 0.90 = $81. Mistake: 25%+10%=35% → $120 x 0.65 = $78 — WRONG! Each % applies to the already-reduced price.

Question 04 — Inequalities

Solving Inequalities | Common Mistake: Forgetting to Flip the Sign

Solve: -3x + 7 > 16. Which value of x satisfies the inequality?

■ **Memory: FLIP the sign when dividing/multiplying by NEGATIVE! | -3x > 9 → x < -3**

A) x = -2
B) x = 0
C) x = -3
D) x = -5

Answer: (D) x = -5

Explanation: -3x + 7 > 16 → -3x > 9 → x < -3 (sign flips!). Only x = -5 satisfies x < -3. Check: -3(-5)+7 = 22 > 16 ✓

Question 05 — Systems of Equations

Elimination Method | Word Problem

Alex pays $14 for 2 burgers and 1 drink. Sam pays $20 for 2 burgers and 3 drinks.

How much does one drink cost?

■ **Memory: ELIMINATE: subtract eq1 from eq2 | 2b+3d - (2b+d) = 20-14 → 2d = 6 → d = $3**

A) $2
B) $3
C) $4
D) $5

Answer: (B) $3

Explanation: Eq1: 2b+d=14, Eq2: 2b+3d=20. Subtract: 2d=6 → d=$3. Back-sub: 2b+3=14 → b=$5.50. Check Eq2: 11+9=20 ✓

Question 06 — Slope & y-Intercept

Linear Equations | Finding y-Intercept from Two Points

A line passes through (2, 5) and (6, 13).

What is the y-intercept of this line?

■ **Memory: SLOPE first: m = (y2-y1)/(x2-x1) | Then y = mx+b → plug one point → solve b**

A) b = 3
B) b = 0
C) b = 1
D) b = 2

Answer: (C) b = 1

Explanation: m = (13-5)/(6-2) = 8/4 = 2. Use y=2x+b, plug (2,5): 5=4+b → b=1. Equation: y=2x+1. Verify: 2(6)+1=13 ✓

Question 07 — Factoring

Quadratic Equations | Common Mistake: Sign Errors

Which are the solutions to x^2 - x - 12 = 0?

■ **Memory: Find two nums: MULTIPLY = -12, ADD = -1 | +3 and -4 → (x+3)(x-4) = 0**

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

Answer: (A) x = 4 and x = -3

Explanation: (x+3)(x-4)=0 → x=-3 or x=4. Trap: flipping signs gives (B). Check: 4^2-4-12=0 ✓, (-3)^2-(-3)-12=0 ✓

Question 08 — Functions

Evaluating Functions | Common Mistake: (-n)^2 = negative

If f(x) = 3x^2 - 2x + 1, what is f(-2)?

■ **Memory: SUBSTITUTE carefully: (-2)^2 = +4, NOT -4 | Negative squared = POSITIVE!**

A) 3
B) 9
C) 17
D) -7

Answer: (C) 17

Explanation: f(-2) = 3(-2)^2 - 2(-2) + 1 = 3(4) + 4 + 1 = 12+4+1 = 17. Error: (-2)^2=-4 → -12+4+1=-7 (D). Squaring always gives positive!

Question 09 — Proportions

Ratio & Proportion | Word Problem

A recipe calls for 2.5 cups of flour for every 12 cookies.

How many cups are needed for 60 cookies?

■ **Memory: CROSS-MULTIPLY: 2.5/12 = x/60 | x = 2.5 x 60 / 12 = 12.5 cups**

A) 10 cups
B) 12.5 cups
C) 15 cups
D) 7.5 cups

Answer: (B) 12.5 cups

Explanation: 2.5/12 = x/60 → 12x = 150 → x = 12.5. Or: 60÷12=5 batches, 2.5×5=12.5 cups ✓

Question 10 — Age Word Problem

Two-Variable Equations | Common Mistake: Ignoring Future Age

Mom is 4 times as old as her son now. In 6 years, she will be 3 times as old.

How old is the son now?

■ **Memory: NOW vs FUTURE — make a table! | Now: M=4s | Future: M+6 = 3(s+6) → s=12**

A) 6 years old
B) 10 years old
C) 12 years old
D) 8 years old

Answer: (C) 12 years old

Explanation: Son=s, Mom=4s. Future: 4s+6=3(s+6) → 4s+6=3s+18 → s=12. Check: Son=12, Mom=48 → Son=18, Mom=54=3×18 ✓

GEOMETRY

Question 11 — Pythagorean Theorem

Right Triangles | Pythagorean Triple

A right triangle has legs of length 7 and 24.

What is the length of the hypotenuse?

■ **Memory: a^2 + b^2 = c^2 | Hypotenuse = c (longest side) | 7^2+24^2 = 49+576 = 625 = 25^2**

A) 20
B) 26
C) 30
D) 25

Answer: (D) 25

Explanation: c^2 = 7^2+24^2 = 49+576 = 625. c=25. This is a Pythagorean triple (7-24-25). Memorize common triples: 3-4-5, 5-12-13, 8-15-17, 7-24-25.

Question 12 — Circle Area

Circles | Common Mistake: Using Diameter Instead of Radius

A circle has a diameter of 10 cm.

What is its area? (Use pi = 3.14)

■ **Memory: A = pi x r^2 | r = d/2 = 5 | DIAMETER given → HALVE it first!**

A) 314 cm^2
B) 78.5 cm^2
C) 31.4 cm^2
D) 157 cm^2

Answer: (B) 78.5 cm^2

Explanation: r=10/2=5. Area=3.14x25=78.5 cm^2. Mistake (A): using d=10 as radius → 3.14x100=314 — 4x too large!

Question 13 — Angle Relationships

Parallel Lines & Transversal | Co-Interior Angles

Two parallel lines are cut by a transversal. One angle is 65 degrees.

What is the co-interior (same-side interior) angle?

■ **Memory: Co-interior → SUPPLEMENTARY (sum=180) | Alternate → EQUAL | Corresponding → EQUAL**

A) 65 degrees
B) 90 degrees
C) 115 degrees
D) 125 degrees

Answer: (C) 115 degrees

Explanation: Co-interior angles are supplementary: 180-65=115. Don't confuse with alternate interior (equal at 65). 'Same side' = supplementary; 'opposite side' = equal.

Question 14 — Triangle — Exterior Angle

Triangles | Exterior Angle Theorem

In a triangle, two interior angles are 47 degrees and 68 degrees.

What is the exterior angle at the third vertex?

■ **Memory: Exterior angle = SUM of two NON-adjacent interior angles | 47+68=115**

A) 65 degrees
B) 115 degrees
C) 180 degrees
D) 125 degrees

Answer: (B) 115 degrees

Explanation: Third interior = 180-47-68=65. Exterior = 180-65=115. Shortcut: exterior = 47+68=115 (Exterior Angle Theorem). (A) 65 is the interior angle — very common mistake!

Question 15 — Area of Composite Figures

Area | L-Shape / Subtract Method

An L-shaped figure: total width 10 m, total height 8 m. A 4m x 3m rectangle is cut from the top-right corner.

What is the area of the L-shape?

■ **Memory: SUBTRACT method: Big rectangle - cut-out | (10x8) - (4x3) = 80-12 = 68 m^2**

A) 68 m^2
B) 80 m^2
C) 60 m^2
D) 72 m^2

Answer: (A) 68 m^2

Explanation: Big area=10x8=80. Cut-out=4x3=12. L-shape=80-12=68 m^2. (B) 80 is before cutting — always subtract the removed piece!

Question 16 — Similar Triangles

Similarity | Area Ratio = (Side Ratio)^2

Two similar triangles have sides 6 cm and 9 cm. The smaller area is 24 cm^2.

What is the larger triangle's area?

■ **Memory: Area ratio = (side ratio)^2 | Side ratio 6:9 = 2:3 → Area ratio = 4:9 | 24 x (9/4) = 54**

A) 36 cm^2
B) 48 cm^2
C) 54 cm^2
D) 72 cm^2

Answer: (C) 54 cm^2

Explanation: Scale factor=9/6=3/2. Area ratio=(3/2)^2=9/4. Larger=24x(9/4)=54 cm^2. Mistake: multiplying by 3/2 only → 36 (A). Areas scale by the SQUARE!

Question 17 — Volume of Cylinder

3D Solids | Common Mistake: Using Diameter as Radius

A cylindrical can: diameter 8 cm, height 15 cm.

What is its volume? (Use pi = 3.14)

■ **Memory: V = pi x r^2 x h | r = d/2 = 4 | HALVE diameter FIRST, then square!**

A) 3,014.4 cm^3
B) 753.6 cm^3
C) 1,507.2 cm^3
D) 376.8 cm^3

Answer: (B) 753.6 cm^3

Explanation: r=4. V=3.14x16x15=753.6 cm^3. Mistake (A): using d=8 as radius → 3.14x64x15=3014.4 — 4x too large!

Question 18 — Coordinate Geometry

Distance Formula | Pythagorean Triples

What is the distance between (1, 2) and (7, 10)?

■ **Memory: Distance = sqrt[(x2-x1)^2 + (y2-y1)^2] | sqrt[36+64] = sqrt[100] = 10**

A) 10
B) 14
C) sqrt(28)
D) 8

Answer: (A) 10

Explanation: dx=6, dy=8. Distance=sqrt(36+64)=sqrt(100)=10. This is 6-8-10 (3-4-5 triple x2). Recognizing Pythagorean triples saves time!

Question 19 — Interior Angles of Polygons

Polygons | Interior Angle Sum Formula

What is the sum of interior angles of a hexagon (6 sides)?

■ **Memory: Sum = (n-2) x 180 | n = number of sides | n=6: (6-2)x180 = 720 degrees**

A) 540 degrees
B) 900 degrees
C) 720 degrees
D) 1080 degrees

Answer: (C) 720 degrees

Explanation: (n-2)x180 = 4x180 = 720. (A) 540 is pentagon (n=5). (D) 1080 is octagon (n=8). Always use the formula with correct n!

Question 20 — Surface Area of Cuboid

3D Solids | Common Mistake: Forgetting the Factor of 2

A rectangular box measures 5 cm x 4 cm x 3 cm.

What is the total surface area?

■ **Memory: SA = 2(lw + lh + wh) | 3 pairs of faces x 2 | = 2(20+15+12) = 94 cm^2**

A) 60 cm^2
B) 47 cm^2
C) 120 cm^2
D) 94 cm^2

Answer: (D) 94 cm^2

Explanation: SA=2(5x4+5x3+4x3)=2(20+15+12)=2x47=94. (B) 47 is forgetting to multiply by 2. (A) 60 = volume, not surface area!