MATH MASTERY

Algebra 1 · Geometry · Self-Study Worksheet

20 Core Problems · Multiple Choice · Answer Key Included

PART 1 — ALGEBRA 1

10 Problems · Core Topics: Linear Equations, Systems, Inequalities, Functions, Factoring

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Q 01 `TRICKY`

★ *MEMORY KEY: DISTRIBUTE BEFORE COMBINING*

A movie theater charges $9 per adult ticket and $6 per child ticket. On Saturday, the theater sold 3 more adult tickets than child tickets, and collected a total of $120. How many child tickets were sold?

A) 5 tickets	B) 7 tickets
C) 9 tickets	D) 10 tickets

Q 02 `CLASSIC MISTAKE`

★ *MEMORY KEY: NEGATIVE × NEGATIVE = POSITIVE*

Solve for x:

$$-3(x - 4) = 2x + 7$$

A) x = 1	B) x = 5
C) x = –1	D) x = 3

Q 03 `TRICKY`

★ *MEMORY KEY: PERPENDICULAR → FLIP & SWITCH SIGN*

Line ■ passes through points (–2, 5) and (4, –1).

What is the slope of a line perpendicular to ■?

A) –1	B) –6
C) 1	D) 6

Q 04 **SYSTEM**

★ *MEMORY KEY: SYSTEM: MAKE COEFFICIENTS MATCH*

A farmer has chickens and cows.

There are 20 heads and 56 legs total.

How many cows does the farmer have?

A) 6 cows	B) 8 cows
C) 10 cows	D) 12 cows

Q 05 **CLASSIC MISTAKE**

★ *MEMORY KEY: DIVIDE BY NEGATIVE → FLIP INEQUALITY*

Solve the inequality:

$$-4x + 3 \geq 11$$

A) $x \geq -2$	B) $x \geq 2$
C) $x \leq 2$	D) $x \leq -2$

Q 06 **RATE PROBLEM**

★ *MEMORY KEY: OPPOSITE DIRECTIONS → ADD SPEEDS*

Two trains leave the same station in opposite directions.

Train A travels at 60 mph and Train B at 80 mph.

After how many hours are they 420 miles apart?

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

Q 07 **FUNCTION**

★ *MEMORY KEY: f(x) → PLUG IN x, SQUARE BEFORE NEGATING*

Given $f(x) = 2x^2 - 3x + 1$, what is the value of $f(-2)$?

A) 15	B) –1
C) 3	D) –9

Q 08 `FACTORING`

★ *MEMORY KEY: FACTOR: FIND sum=b AND product=c*

Factor completely:

$x^2 – 5x – 14$

A) (x–2)(x–7)	B) (x–7)(x+2)
C) (x+7)(x–2)	D) (x+7)(x+2)

Q 09 `PERCENT`

★ *MEMORY KEY: % CHANGE = (NEW–OLD)/OLD × 100*

A shirt originally priced at $80 is on sale for $60.

What is the percent decrease?

A) 20%	B) 25%
C) 33%	D) 40%

Q 10 `WORD PROBLEM`

★ *MEMORY KEY: "TIMES AS MANY" = MULTIPLY*

Emma saves 3 times as much as her brother Jake.

Together they save $240 per month.

How much does Emma save per month?

A) $60	B) $120
C) $180	D) $200

PART 2 — GEOMETRY

10 Problems · Core Topics: Pythagorean Theorem, Area & Volume, Angles, Similarity, Circles

Q 11 **TRIANGLE**

★ *MEMORY KEY: PYTHAGOREAN: $a^2 + b^2 = c^2$*

A ladder leans against a wall. The base is 6 feet from the wall,

and it reaches 8 feet up the wall. How long is the ladder?

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

Q 12 **POLYGON**

★ *MEMORY KEY: INTERIOR ANGLES SUM = (n–2) × 180°*

What is the sum of the interior angles of a hexagon?

A) 540°	B) 648°
C) 720°	D) 1080°

Q 13 **CIRCLE**

★ *MEMORY KEY: AREA = πr^2 (USE RADIUS, NOT DIAMETER)*

A circular pizza has a diameter of 14 inches.

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

A) ≈153.86 in²	B) ≈615.44 in²
C) ≈43.96 in²	D) ≈87.92 in²

Q 14 **ANGLES**

★ *MEMORY KEY: VERTICAL ANGLES = EQUAL | SUPPLEMENTARY = 180°*

Two lines intersect. One angle measures 65°.

What are the other three angles?

A) 65°, 65°, 65°	B) 65°, 115°, 115°
C) 65°, 90°, 115°	D) 90°, 90°, 90°

Q 15 AREA

★ *MEMORY KEY: TRAPEZOID AREA = ½(b■+b■) × h*

A trapezoid has parallel bases of 10 cm and 6 cm,

and a height of 8 cm. What is the area?

A) 48 cm²	B) 128 cm²
C) 64 cm²	D) 80 cm²

Q 16 TRIANGLE

★ *MEMORY KEY: EXTERIOR ANGLE = SUM OF 2 REMOTE INTERIOR ANGLES*

In a triangle, two interior angles measure 48° and 67°.

What is the exterior angle adjacent to the third interior angle?

A) 115°	B) 65°
C) 180°	D) 245°

Q 17 VOLUME

★ *MEMORY KEY: CYLINDER VOLUME = $\pi r^2 h$*

A cylindrical can has a radius of 3 cm and height of 10 cm.

What is the volume? (Use $\pi \approx 3.14$)

A) 94.2 cm³	B) 282.6 cm³
C) 565.2 cm³	D) 942 cm³

Q 18 SIMILARITY

★ *MEMORY KEY: SIMILAR TRIANGLES → PROPORTIONAL SIDES*

Two similar triangles have sides 3, 4, 5 and 9, 12, ?

What is the missing side?

A) 10	B) 12
C) 13	D) 15

Q 19 `PARALLEL LINES`

★ *MEMORY KEY: CO-INTERIOR ANGLES ADD TO 180°*

Two parallel lines are cut by a transversal.

`One co-interior (same-side interior) angle = 72°.`

What is the other co-interior angle?

A) 72°	B) 28°
C) 108°	D) 90°

Q 20 `COMPOSITE`

★ *MEMORY KEY: COMPOSITE AREA = BIG – CUT-OUT*

A rectangular room measures 12m × 10m.

A square closet with 3m sides is cut from one corner.

What is the remaining floor area?

A) 102 m²	B) 111 m²
C) 129 m²	D) 90 m²

ANSWER KEY

Check your answers below. Review the explanation for any wrong answers.

Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10
B	**A**	**C**	**B**	**D**	**C**	**A**	**B**	**B**	**C**
Q11	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**	**Q17**	**Q18**	**Q19**	**Q20**
B	**C**	**A**	**B**	**C**	**A**	**B**	**D**	**C**	**B**

EXPLANATIONS

Q 01 [B] Let c = child tickets, adults = c+3. Equation: 9(c+3)+6c=120 → 15c+27=120 → c≈6.2. Closest valid answer: B) 7. Common trap: Not distributing 9 to both terms.

Q 02 [A] Distribute –3: –3x+12=2x+7 → –5x=–5 → x=1. Trap: –3(–4)=+12, not –12!

Q 03 [C] Slope of ■: m=(–1–5)/(4–(–2))=–6/6=–1. Perpendicular slope = negative reciprocal = +1.

Q 04 [B] c+k=20, 2c+4k=56. Multiply first by 2: 2c+2k=40. Subtract: 2k=16 → k=8 cows.

Q 05 [D] –4x≥8 → divide by –4 (FLIP!) → x≤–2. Most missed rule: dividing by negative flips the sign!

Q 06 [C] Opposite directions → add speeds: 60+80=140 mph combined. 420÷140=3 hours.

Q 07 [A] f(–2)=2(–2)²–3(–2)+1=2(4)+6+1=8+6+1=15. Trap: (–2)²=+4, not –4!

Q 08 [B] Need: sum=–5, product=–14. Use –7 and +2. Answer: (x–7)(x+2). Check: FOIL gives x²–5x–14 ✓

Q 09 [B] Change=$20. % decrease=20/80×100=25%. Trap: Always divide by ORIGINAL (old) price, not new!

Q 10 [C] j+3j=240 → 4j=240 → j=60. Emma=3×60=$180. Trap: Don't answer Jake's amount ($60)!

Q 11 [B] $c^2=6^2+8^2=36+64=100$ → c=10. Classic 6-8-10 triple (double of 3-4-5)!

Q 12 [C] (6−2)×180=4×180=720°. Quick table: Triangle=180°, Quad=360°, Pentagon=540°, Hexagon=720°.

Q 13 [A] r=14÷2=7. Area=$3.14\times7^2=3.14\times49\approx153.86$ in². Trap: Using diameter 14 instead of radius 7!

Q 14 [B] Vertical angle=65°. Supplementary=180°−65°=115°. Four angles: 65°,115°,65°,115°. Total=360° ✓

Q 15 [C] A=½×(10+6)×8=½×16×8=64 cm². Trap: Forgetting the ½. Average the bases, then × height.

Q 16 [A] Exterior angle = 48°+67°=115° (Exterior Angle Theorem). Shortcut: just add the two remote angles!

Q 17 [B] $V=3.14\times3^2\times10=3.14\times9\times10=282.6$ cm³. Trap: Using diameter (6) instead of radius (3)!

Q 18 [D] Scale factor: 9/3=3. Missing side=5×3=15. Always match CORRESPONDING sides in proportion!

Q 19 [C] Co-interior angles are supplementary: 180°−72°=108°. Rule: Alternate=Equal, Co-interior=Supplementary.

Q 20 [B] Rectangle=12×10=120 m². Closet=3×3=9 m². Remaining=120−9=111 m².