

Algebra 1 & Geometry

Essential Practice Problems · 20 Questions · Print Edition

ALGEBRA 1

Question 01 · Linear Equations

[**MEMORY KEY: ISOLATE the variable — undo operations in reverse order**]

QUICK EXAMPLE:

Quick Example: If $x - 4 = 10$, then $x = 14$ (add 4 to both sides)

A school store sells pens for \$1.50 each. Sarah buys some pens and pays with a \$10 bill, getting \$2.50 back. How many pens did she buy?

- A. 4 pens
 - B. 5 pens
 - C. 6 pens
 - D. 7 pens
-

Question 02 · Systems of Equations

[**MEMORY KEY: SUBSTITUTION or ELIMINATION — pick the easier method**]

QUICK EXAMPLE:

Quick Example: $x + y = 5$ and $x - y = 1$. Add: $2x = 6$, $x = 3$, $y = 2$.

Two friends, Alex and Ben, together have \$40. Alex has \$8 more than Ben. How much does Ben have?

- A. \$12
 - B. \$14
 - C. \$16
 - D. \$20
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Question 03 · Inequalities (Most Missed!)

[**MEMORY KEY: FLIP the inequality sign when multiplying or dividing by a NEGATIVE**]

QUICK EXAMPLE:

Quick Example: $-2x < 6 \Rightarrow x > -3$ (sign flipped!)

A taxi charges \$3 flat fee plus \$2 per mile. You have at most \$15. What is the maximum number of whole miles you can ride?

- A. 5 miles
 - B. 6 miles
 - C. 7 miles
 - D. 9 miles
-

Question 04 · Slope & Rate of Change

[**MEMORY KEY:** slope = RISE over RUN = $(y_2 - y_1) / (x_2 - x_1)$]

QUICK EXAMPLE:

Quick Example: Points (1,2) and (3,8): slope = $(8-2)/(3-1) = 3$

A plant is 4 cm tall on Day 1. It grows at a constant rate and is 16 cm tall on Day 7. How many centimeters does it grow per day?

- A. 2 cm/day
 - B. 3 cm/day
 - C. 4 cm/day
 - D. 2.5 cm/day
-

Question 05 · Distributive Property (Sneaky Trap!)

[**MEMORY KEY:** DISTRIBUTE first — multiply EVERY term inside the parentheses]

QUICK EXAMPLE:

Quick Example: $3(x + 4) = 3x + 12$

A rectangle has length $(2x + 3)$ cm and width 4 cm. Its perimeter is 38 cm. What is x ?

- A. 2
 - B. 3
 - C. 4
 - D. 6
-

Question 06 · Percent Problems

[**MEMORY KEY:** IS over OF = PERCENT over 100. Sequential discounts are NOT additive!]

QUICK EXAMPLE:

Quick Example: 30% of 80 = $0.30 \times 80 = 24$

A jacket costs \$60. It goes on sale at 25% off. Then a coupon gives 10% off the sale price. What is the final price?

- A. \$37.50
 - B. \$40.50
 - C. \$39.00
 - D. \$42.00
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Question 07 · Functions & Input-Output

[**MEMORY KEY:** $f(x)$ means PLUG x into the rule — substitute and simplify]

QUICK EXAMPLE:

Quick Example: $f(x) = 2x - 1$, so $f(3) = 2(3) - 1 = 5$

A vending machine gives $f(n) = 4n - 3$ points for buying n items. How many items must you buy to earn exactly 29 points?

- A. 6 items
- B. 7 items

- C. 8 items
 - D. 9 items
-

Question 08 · Age Word Problems

[MEMORY KEY: NOW vs FUTURE — write TWO separate equations, one for each time]

QUICK EXAMPLE:

Quick Example: Now: Mom = 3 x child. In 10 yrs: Mom+10 = 2(child+10).

Emma is 3 times as old as her brother now. In 4 years, she will be twice as old as her brother. How old is Emma now?

- A. 12
 - B. 16
 - C. 9
 - D. 24
-

Question 09 · Mixture Problems

[MEMORY KEY: Amount x Rate = Total acid. Make a TABLE to organize your work.]

QUICK EXAMPLE:

Quick Example: $0.10(4) + 0.50(x) = \text{rate} \times (4+x)$

A chemist mixes 4 liters of 10% acid with x liters of 50% acid to get a 25% solution. How many liters of 50% acid are needed?

- A. 2 liters
 - B. 2.4 liters
 - C. 4 liters
 - D. 5 liters
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Question 10 · Quadratic — Projectile Motion

[MEMORY KEY: Max height at vertex: $t = -b / (2a)$. Landing when $h = 0$.]

QUICK EXAMPLE:

Quick Example: $h = -16t^2 + 64t$. Max at $t = -64/(2(-16)) = 2$ seconds.

A ball is thrown upward with height $h = -5t^2 + 20t$ (meters). At what time t does the ball reach its maximum height?

- A. 1 second
 - B. 2 seconds
 - C. 4 seconds
 - D. 5 seconds
-

GEOMETRY

Question 11 · Pythagorean Theorem

[MEMORY KEY: $a^2 + b^2 = c^2$ — c is ALWAYS the hypotenuse (longest side)]

QUICK EXAMPLE:

Quick Example: Legs 3 and 4: $\text{sqrt}(9 + 16) = \text{sqrt}(25) = 5$

A ladder leans against a wall. The bottom is 6 ft from the wall and the top reaches 8 ft up the wall. How long is the ladder?

- A. 7 ft
 - B. 9 ft
 - C. 10 ft
 - D. 14 ft
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Question 12 · Angle Sum — Triangle

[MEMORY KEY: Angles in ANY triangle ALWAYS add up to 180 degrees]

QUICK EXAMPLE:

Quick Example: Angles 50 and 70 => third = $180 - 50 - 70 = 60$ degrees

In a triangle, one angle is twice the smallest, and the third is three times the smallest. What is the largest angle?

- A. 30 degrees
 - B. 60 degrees
 - C. 80 degrees
 - D. 90 degrees
-

Question 13 · Area of Composite Shapes

[MEMORY KEY: SPLIT into simple rectangles/triangles, then ADD or SUBTRACT]

QUICK EXAMPLE:

Quick Example: L-shape = large rectangle - small rectangle

An L-shaped room: the large rectangle is 8 m x 6 m, and a corner piece of 3 m x 2 m is removed. What is the area?

- A. 40 m²
 - B. 42 m²
 - C. 48 m²
 - D. 36 m²
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Question 14 · Circle — Area vs Circumference (Trap!)

[MEMORY KEY: Area = $\pi \times r^2$ (covering). Circumference = $2 \times \pi \times r$ (border).]

QUICK EXAMPLE:

Quick Example: $r=5$: Area = 25π (big), Circumference = 10π (smaller)

A circular pool has a diameter of 14 meters. How much fencing (circumference) is needed? Use $\pi = 3.14$.

- A. 43.96 m
- B. 153.86 m

- C. 87.92 m
 - D. 21.98 m
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Question 15 · Parallel Lines & Transversal

[MEMORY KEY: Z-angles = EQUAL (alternate). C-angles = 180 degrees (co-interior).]

QUICK EXAMPLE:

Quick Example: Co-interior angles: $110 + ? = 180$, so $? = 70$ degrees

Two parallel lines are cut by a transversal. One angle formed is 110 degrees. What is the co-interior (same-side interior) angle?

- A. 110 degrees
 - B. 70 degrees
 - C. 80 degrees
 - D. 55 degrees
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Question 16 · Volume — Cylinder and Cone

[MEMORY KEY: $V(\text{cone}) = (1/3) \times V(\text{cylinder})$ with same base and height. Always!]

QUICK EXAMPLE:

Quick Example: Cylinder $r=3$, $h=4$: $V = \pi(9)(4) = 36\pi$

A cylinder ($r=3$ cm, $h=10$ cm) has a cone with same base and height inside. What is the volume between them? ($\pi = 3.14$)

- A. 94.2 cm³
 - B. 141.3 cm³
 - C. 188.4 cm³
 - D. 282.6 cm³
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Question 17 · Similar Triangles — Scale Factor

[MEMORY KEY: Sides scale by k . Areas scale by k^2 . Always SQUARE ROOT area ratio for sides.]

QUICK EXAMPLE:

Quick Example: Areas 4 and 9 \Rightarrow side ratio = $\sqrt{9/4} = 1.5$

Two similar triangles have areas of 16 cm² and 100 cm². If the shorter side of the small one is 4 cm, what is the corresponding side of the large one?

- A. 16 cm
 - B. 8 cm
 - C. 10 cm
 - D. 25 cm
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Question 18 · Exterior Angle Theorem

[MEMORY KEY: Exterior angle = SUM of the two NON-ADJACENT interior angles]

QUICK EXAMPLE:

Quick Example: Interior angles 50 and 70 \Rightarrow exterior = $50 + 70 = 120$ degrees

In a triangle, two interior angles are 55 degrees and 72 degrees. What is the exterior angle at the third vertex?

- A. 53 degrees
- B. 127 degrees
- C. 107 degrees
- D. 180 degrees

Question 19 · Surface Area — Rectangular Prism

[**MEMORY KEY:** $SA = 2(lw + lh + wh)$ — there are 3 PAIRS of faces, multiply by 2!]

QUICK EXAMPLE:

Quick Example: Box 2x3x4: $SA = 2(6+8+12) = 2(26) = 52$

A gift box is 5 cm x 4 cm x 3 cm. How much wrapping paper (surface area) is needed?

- A. 94 cm²
- B. 47 cm²
- C. 60 cm²
- D. 120 cm²

Question 20 · Coordinate Geometry — Midpoint

[**MEMORY KEY:** Midpoint = AVERAGE the x-coordinates, AVERAGE the y-coordinates]

QUICK EXAMPLE:

Quick Example: Midpoint of (2,4) and (6,10) = (4, 7)

Point A is at (1, 3) and point B is at (7, 11). M is the midpoint of AB. What is the distance from M to B?

- A. 10
- B. 5
- C. $\sqrt{50}$
- D. $2\sqrt{10}$

ANSWER KEY

#	Answer	Solution
Q01	B. 5 pens	She spent \$10 - \$2.50 = \$7.50. Equation: $1.5x = 7.50$, so $x = 5$.
Q02	C. \$16	Let $b = \text{Ben}$. Then $b + (b + 8) = 40$, so $2b = 32$, $b = \$16$.
Q03	B. 6 miles	$3 + 2m \leq 15$, so $2m \leq 12$, $m \leq 6$. Maximum = 6 miles.
Q04	A. 2 cm/day	Rate = $(16 - 4) / (7 - 1) = 12 / 6 = 2$ cm/day.
Q05	D. 6	$P = 2(l+w)$: $2(2x+3+4) = 38$, so $2x+7 = 19$, $2x = 12$, $x = 6$.
Q06	B. \$40.50	After 25% off: $\$60 \times 0.75 = \45 . Then 10% off: $\$45 \times 0.90 = \40.50 .

Q07	C. 8 items	$4n - 3 = 29$, so $4n = 32$, $n = 8$. Check: $4(8) - 3 = 29$. Correct!
Q08	A. 12	Let brother = b , Emma = $3b$. In 4 years: $3b+4 = 2(b+4)$, so $b = 4$. Emma = 12.
Q09	B. 2.4 liters	$0.10(4) + 0.50x = 0.25(4+x)$. $0.4 + 0.5x = 1 + 0.25x$. $0.25x = 0.6$. $x = 2.4$.
Q10	B. 2 seconds	Vertex at $t = -b/(2a) = -20/(2 \times -5) = -20/(-10) = 2$ seconds.
Q11	C. 10 ft	$c = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$ ft. (6-8-10 triple)
Q12	D. 90 degrees	$x + 2x + 3x = 180$, so $6x = 180$, $x = 30$. Largest = $3 \times 30 = 90$ degrees.
Q13	B. 42 m ²	Large: $8 \times 6 = 48$ m ² . Remove: $3 \times 2 = 6$ m ² . Area = $48 - 6 = 42$ m ² .
Q14	A. 43.96 m	Radius = 7. $C = 2 \times 3.14 \times 7 = 43.96$ m. Choice B is the AREA — the classic trap!
Q15	B. 70 degrees	Co-interior angles add to 180 degrees. $180 - 110 = 70$ degrees.
Q16	C. 188.4 cm ³	Cylinder: $3.14(9)(10) = 282.6$. Cone: $282.6/3 = 94.2$. Gap = $282.6 - 94.2 = 188.4$ cm ³ .
Q17	C. 10 cm	Area ratio = $100/16 = 6.25$. Side ratio = $\sqrt{6.25} = 2.5$. Side = $4 \times 2.5 = 10$ cm.
Q18	B. 127 degrees	Exterior angle = $55 + 72 = 127$ degrees. No need to find the third interior angle first!
Q19	A. 94 cm ²	$SA = 2(5 \times 4 + 5 \times 3 + 4 \times 3) = 2(20+15+12) = 2(47) = 94$ cm ² . B is the trap (forgot $\times 2$)!
Q20	B. 5	$M = (4, 7)$. Distance MB = $\sqrt{(7-4)^2 + (11-7)^2} = \sqrt{9+16} = \sqrt{25} = 5$.