Algebra 2 & Geometry

Core Practice Problems · 20 Questions · Print Edition

PART 01 Algebra 2 — Word Problems

Q 01

✦ *DISCRIMINANT: delta = b^2 - 4ac | > 0: two roots | = 0: one root | < 0: no real roots*

A ball is thrown upward from a 4-foot platform. Its height in feet after t seconds is h(t) = -16t^2 + 24t + 4. How many times does the ball reach a height of 16 feet?

A) Never — no real solution	B) Exactly once
C) Exactly twice	D) Three times

Q 02

✦ *VERTEX = MAX/MIN point | Vertex formula: x = -b / (2a)*

A farmer has 200 meters of fence to enclose a rectangular field against a straight river (no fence along the river). What is the maximum area the farmer can enclose?

A) 4,000 m²	B) 5,000 m²
C) 2,500 m²	D) 10,000 m²

Q 03

✦ *LOG BASE CONVERSION: log_b(x) = y means b^y = x | Argument must be > 0*

A population of bacteria doubles every 3 hours. Starting with 500 bacteria, after how many hours will the population first exceed 8,000? (Use log_2(16) = 4)

A) 9 hours	B) 12 hours
C) 15 hours	D) 6 hours

Q 04

✦ *PERFECT SQUARE: x^2 + 10x + 25 = (x+5)^2 | Border adds to ALL sides*

A square garden has an area of (x^2 + 10x + 25) square feet. A 3-foot-wide border is added all around. What is the total area of the garden including the border when x = 2?

A) 196 ft^2	B) 144 ft^2
C) 225 ft^2	D) 169 ft^2

Q 05

✦ *ASYMPTOTE: Vertical = denominator zero | Horizontal = end behavior as x goes to infinity*

A company's average cost per unit is C(x) = 1200/x + 15, where x is units produced. As production increases without bound, what does the average cost approach?

A) $0	B) $15
C) $1,215	D) $1,200

Q 06

✦ *INVERSE = SWAP x and y, then SOLVE | For F to C: subtract 32 FIRST, then multiply*

A Celsius-to-Fahrenheit converter uses F = (9/5)C + 32. Using the inverse function, convert 77 degrees F back to Celsius.

A) 20 degrees C	B) 25 degrees C
C) 30 degrees C	D) 45 degrees C

Q 07

✦ *COMPLETE THE SQUARE: factor out 'a' first, then (x + b/2)^2 - (b/2)^2*

A drone's flight path follows h = -t^2 + 6t - 5 (height in meters). What is the maximum height the drone reaches?

A) 4 meters	B) 6 meters
C) 5 meters	D) 3 meters

Q 08

✦ *LOG POWER RULE: log(a * b) = log(a) + log(b) | 100x intensity = +2 on Richter (log_10 100 = 2)*

An earthquake measures 6.0 on the Richter scale. A second earthquake is 100 times more intense. What is the Richter magnitude of the second earthquake? (M = log_10 I)

A) 7.0	B) 8.0
C) 9.0	D) 600

Q 09

✦ *SUM-PRODUCT: if r + s = b and r x s = c, then r and s are roots of x^2 - bx + c = 0*

Two numbers have a sum of 10 and a product of 21. Which answer correctly represents both numbers?

A) 3 and 7	B) 4 and 6
C) 2 and 8	D) 5 and 5

Q 10

✦ *COMPOUND INTEREST: A = P(1 + r/n)^(nt) | Continuous: A = Pe^(rt) — remember PERT*

You invest $1,000 at 6% annual interest, compounded annually. After 2 years, which expression gives the correct balance?

A) 1000(1.06)^2	B) 1000 x 1.06 x 2
C) 1000 + 1000(0.06)(2)	D) 1000 x e^(0.06 x 2)

PART 02 Geometry — Core Problems

Q 11

✦ *SIMILAR = same shape, different size | Corresponding sides are PROPORTIONAL — match order carefully*

Triangle ABC is similar to Triangle DEF. AB = 6, BC = 9, AC = 12. If DE = 4, what is the length of EF?

A) 6	B) 5
C) 8	D) 3

Q 12

✦ *INSCRIBED ANGLE = 1/2 of intercepted arc | Central angle = arc | Memory: INSCRIBED = HALF*

In circle O, an inscribed angle ABC intercepts an arc of 110 degrees. What is the measure of angle ABC?

A) 110 degrees	B) 220 degrees
C) 55 degrees	D) 70 degrees

Q 13

✦ *SECTOR AREA = (theta/360) x pi x r^2 | ARC LENGTH = (theta/360) x 2pi x r | Sector = fraction of whole circle*

A pizza slice is a sector with radius 10 inches and central angle 60 degrees. What is the area of the slice? (Use pi = 3.14)

A) approximately 52.3 in^2	B) approximately 10.5 in^2
C) approximately 62.8 in^2	D) approximately 314 in^2

Q 14

✦ *Z-ANGLES (alternate interior) = EQUAL | C-ANGLES (co-interior / same-side) = 180 degrees (supplementary)*

Two parallel lines are cut by a transversal. One co-interior angle measures (3x + 20) degrees and the other measures (x + 40) degrees. Find x.

A) x = 25	B) x = 30
C) x = 35	D) x = 40

Q 15

✦ *PYTHAGOREAN TRIPLES: 3-4-5 | 5-12-13 | 8-15-17 | Memorize these — saves time!*

A ladder 13 feet long leans against a vertical wall. The base is 5 feet from the wall. How high up the wall does the ladder reach?

A) 8 feet	B) 10 feet
C) 12 feet	D) 11 feet

Q 16

✦ *CYLINDER TOTAL SA = 2(pi)r^2 + 2(pi)rh | Two circles + rectangle | Read question: TOTAL vs LATERAL*

A cylindrical tank has radius 3 m and height 10 m. What is the total surface area including both circular ends? (Answer in terms of pi)

A) 60pi m^2	B) 66pi m^2
C) 78pi m^2	D) 90pi m^2

Q 17

✦ *MIDSEGMENT = HALF the base and PARALLEL to it | Common mistake: dividing instead of multiplying by 2*

In triangle PQR, M is the midpoint of PQ and N is the midpoint of PR. If MN = 14 cm, what is the length of QR?

A) 7 cm	B) 14 cm
C) 21 cm	D) 28 cm

Q 18

✦ *EXTERIOR ANGLE = sum of two NON-ADJACENT interior angles | Memory: EXTERIOR = REMOTE INTERIORS*

In triangle ABC, the exterior angle at C measures 115 degrees. The interior angle at A is 65 degrees. What is the measure of the interior angle at B?

A) 50 degrees	B) 65 degrees
C) 115 degrees	D) 180 degrees

Q 19

✦ *CONE volume = (1/3) pi r^2 h | SPHERE volume = (4/3) pi r^3 | Both use r^2 or r^3 — don't mix!*

An ice cream cone has radius 3 cm and height 12 cm. A spherical scoop with radius 3 cm sits on top. What is the total volume? (Leave in terms of pi)

A) 72pi cm^3	B) 108pi cm^3
C) 48pi cm^3	D) 144pi cm^3

Q 20

✦ *TWO TANGENTS from external point = EQUAL length | TANGENT perpendicular to RADIUS at point of tangency*

From external point P, tangent segments PA = 3x - 1 and PB = x + 7 are drawn to circle O. What is the length of each tangent?

A) 11	B) 13
C) 9	D) 15

ANSWER KEY

Q	1	2	3	4	5	6	7	8	9	10
Ans	A	B	B	D	B	B	A	B	A	A
Q	11	12	13	14	15	16	17	18	19	20
Ans	A	C	A	B	C	C	D	A	A	A

★ *Answer key is at the bottom for self-checking after completing all questions.*