Algebra 2 and Geometry

Practice Worksheet - Self-Study Edition

20 Multiple Choice Problems | Answer Key Included

PART A: ALGEBRA 2 (Problems 1-10)

Quadratics | Exponentials | Logarithms | Systems | Functions

[MEMORY KEY] QUADRATIC VERTEX

vertex: t = -b/(2a) | plug back in to get max/min value | disc=b^2-4ac: pos=2 roots, zero=1 root, neg=no real roots

Q1. Rocket Launch [Quadratic/Vertex]

h(t) = -16t^2 + 80t + 6. What is the MAXIMUM height?

Hint: Use t = -b/(2a), then find h(t).

(A) 86 ft

(B) 96 ft

(C) 106 ft

(D) 116 ft

Q2. Fencing the Garden [Quadratic Max Area]

Farmer has 120 ft fencing, one side is a barn. A(w) = w(120-2w). What width maximizes area?

Hint: One side is the barn wall - only 2 widths use fencing.

(A) 20 ft

(B) 40 ft

(C) 30 ft

(D) 60 ft

Q3. Radioactive Decay [Exponential Decay]

Half-life = 5 years. Start = 320 g. Grams remaining after 15 years?

Hint: Count the number of half-lives.

(A) 160 g

(B) 80 g

(C) 40 g

(D) 20 g

Q4. Investment Doubling [Compound Interest]

00 at 6% compounded annually. A = 500(1.06)^t. When does it first exceed ,000?

Hint: Solve (1.06)^t > 2 using logarithms.

(A) 10 years

(B) 11 years

(C) 12 years

(D) 14 years

Q5. Log Equation [Solving Log Equations]

Solve: log_2(x+3) + log_2(x-1) = 5. Always check for extraneous solutions!

Hint: Combine logs first, then use b^y = x form.

(A) x = 3

(B) x = 5

(C) x = 7

(D) x = -7 and x = 5

[MEMORY KEY] EXPONENTIAL and LOG

GROWTH: y=ab^x, b greater than 1 | DECAY: 0 less than b less than 1 | log_b(x)=y means b^y=x | EXTRANEOUS: always plug back into original log equation

Q6. Mixing Solutions [Systems - Mixture]

20% acid + 50% acid = 90 mL of 30% solution. How many mL of 20% solution?

Hint: Set up: x + y = 90 and 0.2x + 0.5y = 27

(A) 30 mL

(B) 45 mL

(C) 60 mL

(D) 75 mL

Q7. Two Numbers [System with Quadratic]

Two positive numbers: sum = 10, product = 21. What is the LARGER number?

Hint: Let y = 10-x, then x(10-x) = 21.

(A) 5

(B) 6

(C) 7

(D) 8

Q8. Phone Plan Break-Even [Linear Inequalities]

Plan A: 0 + /bin/sh.10/text. Plan B: 5 unlimited. When is Plan B cheaper?

Hint: Set 35 less than 20 + 0.10t

(A) Over 100 texts

(B) Over 150 texts

(C) Over 200 texts

(D) Over 350 texts

Q9. Not a Root [Factor Theorem]

f(x) = x^3 - 7x + 6. Which is NOT a root? (Try factors of 6: 1, 2, 3, 6)

Hint: If f(x) = 0, it IS a root. Which gives nonzero?

(A) x = 1

(B) x = 2

(C) x = -3

(D) x = 3

Q10. Composition Trap [Composite Functions]

f(x) = 2x+1, g(x) = x^2-3. Find f(g(3)).

Hint: INSIDE OUT: evaluate g(3) first.

(A) 10 (B) 46

(C) 13 (D) 7

PART B: GEOMETRY (Problems 1-10)

Triangles | Circles | Area and Volume | Coordinate Geometry

[MEMORY KEY] TRIANGLE RULES

a^2+b^2=c^2 (right triangle only) | all angles sum to 180 deg | exterior angle = sum of 2 remote interior angles | Pythagorean triples: 3-4-5, 5-12-13, 8-15-17

Q1. Ladder Against a Wall [Pythagorean Theorem]

A 13-ft ladder leans against a wall, base 5 ft from wall. How high does it reach?

Hint: 5-12-13 is a Pythagorean triple.

(A) 8 ft (B) 12 ft

(C) 10 ft (D) 11 ft

Q2. Exterior Angle [Triangle Angles]

Triangle ABC: angle A = 47 deg, angle B = 68 deg. Measure of exterior angle at C?

Hint: Exterior angle = sum of 2 non-adjacent interior angles.

(A) 65 deg (B) 115 deg

(C) 180 deg (D) 245 deg

Q3. Pizza Slice Area [Sector Area]

Pizza diameter = 16 inches, cut into 8 equal slices. Area of one slice (in terms of pi)?

*Hint: Diameter = 16, so radius = 8. Area = pi*r^2.*

(A) 4pi sq in (B) 16pi sq in

(C) 8pi sq in (D) 32pi sq in

Q4. Pool Tile Border [Composite Area]

Pool: 20 ft x 12 ft. Tile border 2 ft wide all around. Area of border only?

Hint: Outer = 24x16, border = outer minus inner.

(A) 144 sq ft (B) 160 sq ft

(C) 176 sq ft (D) 240 sq ft

Q5. Cylinder Volume [3D Volume]

Cylinder: radius 3 m, height 10 m. V = pi*r^2*h. Volume in terms of pi?

Hint: Square the radius FIRST: 3^2 = 9.

(A) 30pi m^3

(B) 60pi m^3

(C) 90pi m^3

(D) 900pi m^3

[MEMORY KEY] CIRCLES and COORDINATE

arc length = (theta/360) times 2pi*r | sector area = (theta/360) times pi*r^2 | INSCRIBED ANGLE = HALF of central angle | midpoint = average of coordinates

Q6. Parallel Lines Angles [Co-interior Angles]

Parallel lines cut by transversal. Angles: (3x+15) deg and (2x+25) deg. Find x.

Hint: Co-interior (same-side) angles sum to 180 degrees.

(A) x = 20

(B) x = 25

(C) x = 28

(D) x = 30

Q7. Similar Triangles Perimeter [Similarity]

Triangle ABC ~ Triangle DEF. Sides of ABC: 6, 8, 10. Shortest side of DEF = 9. Perimeter of DEF?

Hint: Scale factor = 9/6 = 3/2. Multiply total perimeter.

(A) 27

(B) 30

(C) 36

(D) 40

Q8. Cone vs Cylinder [Volume Comparison]

Same radius and height. Cone volume = 60 cm^3. What is the cylinder volume?

Hint: Cylinder = 3 times cone volume.

(A) 20 cm^3

(B) 120 cm^3

(C) 180 cm^3

(D) 240 cm^3

Q9. Find Point B from Midpoint [Midpoint Formula]

M is midpoint of AB. A = (2,-4), M = (5,1). Find coordinates of B.

Hint: B = 2M - A for each coordinate.

(A) (3.5, -1.5)

(B) (7, 6)

(C) (8, 6)

(D) (8, -6)

Q10. Inscribed Angle Theorem [Circle Angles]

Central angle intercepts arc of 140 degrees. Inscribed angle intercepts same arc. Measure?

Hint: INSCRIBED = HALF CENTRAL. Always.

(A) 140 deg

(B) 40 deg

(C) 70 deg

(D) 280 deg

ANSWER KEY

Algebra 2 Answers:

Q#	Ans	Quick Solution
Q1	**C**	h(2.5) = -16(6.25)+200+6 = 106 ft
Q2	**C**	w = 30 ft gives max area of 1800 sq ft
Q3	**C**	3 half-lives: 320 to 160 to 80 to 40 g
Q4	**C**	t > ln2/ln1.06 = 11.9, first full year = 12
Q5	**B**	x=5 valid; x=-7 is extraneous (log undefined)
Q6	**C**	-0.3x = -18, x = 60 mL of 20% solution
Q7	**C**	(x-3)(x-7)=0; larger root = 7
Q8	**B**	35 < 20 + 0.10t => t > 150 texts
Q9	**D**	f(3) = 27-21+6 = 12, not zero
Q10	**C**	g(3)=6, f(6)=2(6)+1=13

Geometry Answers:

Q#	Ans	Quick Solution
Q1	**B**	5^2 + h^2 = 13^2; h = 12 ft [5-12-13 triple]
Q2	**B**	Exterior = 47 + 68 = 115 degrees
Q3	**C**	r=8, total=64pi, one slice = 8pi sq in
Q4	**C**	384 - 240 = 176 sq ft
Q5	**C**	pi(9)(10) = 90pi m^3
Q6	**C**	5x+40=180; x=28

Q7	**C**	Scale=3/2; perimeter = 24 x 3/2 = 36
Q8	**C**	3 x 60 = 180 cm^3
Q9	**C**	x_B=8, y_B=6
Q10	**C**	140 / 2 = 70 degrees