

# Algebra 2 & Trigonometry

Self-Study Worksheet · 20 Problems · Answer Key on Last Page

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## ALGEBRA 2

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Q1 · Quadratic Formula

■  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$  |  $Disc > 0 \rightarrow 2 \text{ roots}, = 0 \rightarrow 1 \text{ root}, < 0 \rightarrow \text{none}$

Solve:  $2x^2 - 5x - 3 = 0$

A)  $x = 3$  or  $x = -\frac{1}{2}$

B)  $x = -3$  or  $x = \frac{1}{2}$

C)  $x = 3$  or  $x = \frac{1}{2}$

D)  $x = -3$  or  $x = -\frac{1}{2}$

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Q2 · Vertex Form

■  $y = a(x-h)^2 + k \rightarrow \text{vertex} = (h, k)$ . Sign FLIPS for  $h$ !

The parabola  $y = 2(x - 3)^2 + 5$  has its vertex at:

A) (3, 5)

B) (-3, 5)

C) (3, -5)

D) (-3, -5)

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Q3 · Logarithm Rules

■  $\log(AB) = \log A + \log B$  |  $\log(A/B) = \log A - \log B$  |  $\log(A^n) = n \cdot \log A$

Simplify:  $\log_{\blacksquare}(32) - \log_{\blacksquare}(4)$

A) 3

B) 4

C) 8

D) 2

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Q4 · Powers of  $i$

■  $i^1=i$   $i^2=-1$   $i^3=-i$   $i^4=1$  → Cycle of 4! Divide exponent by 4, use remainder.

Simplify:  $i^2 \blacksquare$

A)  $i$

B)  $-i$

C) 1

D)  $-1$

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Q5 · Exponential Growth

■  $y = a \cdot b^t \rightarrow a = \text{start}, b = \text{growth factor}, t = \text{time}$

Bacteria start at 200 and double every hour. Population after 4 hours:

A) 3,200

B) 1,600

C) 800

D) 6,400

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Q6 · Function Composition

■  $f(g(x)) \rightarrow \text{work INSIDE OUT: find } g(x) \text{ first, then plug into } f$

If  $f(x) = x^2 + 1$  and  $g(x) = 2x$ , find  $f(g(3))$ :

- A) 37  
C) 49
- B) 19  
D) 13
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Q7 · Absolute Value Inequalities

■  $|x| < a \rightarrow -a < x < a$  (AND) |  $|x| > a \rightarrow x < -a$  OR  $x > a$  (OR)

Solve:  $|2x - 1| > 5$

- A)  $x < -2$  or  $x > 3$   
C)  $-2 < x < 3$
- B)  $x > 3$  or  $x < 2$   
D)  $x > 2$  or  $x < -3$
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Q8 · Rational Exponents

■  $x^{(m/n)} = (\sqrt[n]{x})^m \rightarrow$  Denominator = ROOT, Numerator = POWER

Evaluate:  $27^{(2/3)}$

- A) 9  
C) 3
- B) 18  
D) 6
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Q9 · Solving Log Equations

■  $\log_a(x) = y \rightarrow a^y = x$  ('flip to exponential form')

Solve for x:  $\log_2(x + 1) = 4$

- A) 80  
C) 12
- B) 82  
D) 81
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Q10 · Systems of Equations

■ Elimination: add/subtract equations to cancel one variable

Solve:  $x + y = 7$  and  $2x - y = 8$

- A)  $x=5, y=2$   
C)  $x=4, y=3$
- B)  $x=3, y=4$   
D)  $x=5, y=3$
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## GEOMETRY — TRIGONOMETRY

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Q11 · Basic Trig Ratios

■ SOH-CAH-TOA:  $\sin = \text{Opp}/\text{Hyp}$   $\cos = \text{Adj}/\text{Hyp}$   $\tan = \text{Opp}/\text{Adj}$

In a right triangle: opposite = 3, hypotenuse = 5. Find  $\sin(\theta)$ :

- A)  $3/5$   
C)  $3/4$
- B)  $4/5$   
D)  $5/3$
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Q12 · Special Angles

■  $30^\circ: \sin=1/2, \cos=\sqrt{3}/2$  |  $45^\circ: \sin=\cos=\sqrt{2}/2$  |  $60^\circ: \sin=\sqrt{3}/2, \cos=1/2$



C)  $150^\circ$

D)  $45^\circ$

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Q19 · Unit Circle

■ *Point on unit circle =  $(\cos \theta, \sin \theta) \rightarrow x = \cos, y = \sin$*

On the unit circle, the point at  $90^\circ$  is:

A) (0, 1)

B) (1, 0)

C) (0, -1)

D) (-1, 0)

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Q20 · Identifying Sides

■ *LABEL triangle first: O (opposite), A (adjacent), H (hyp)  $\rightarrow$  then write ratio*

Triangle legs: 5 and 12, hypotenuse 13. Find  $\tan(\theta)$  opposite side = 5:

A)  $5/12$

B)  $12/13$

C)  $5/13$

D)  $12/5$

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## ANSWER KEY

Q	Ans	Topic
1	<b>A</b>	Quadratic Formula
2	<b>A</b>	Vertex Form
3	<b>A</b>	Logarithm Rules
4	<b>A</b>	Powers of i
5	<b>A</b>	Exponential Growth
6	<b>A</b>	Function Composition
7	<b>A</b>	Absolute Value Inequalities
8	<b>A</b>	Rational Exponents
9	<b>A</b>	Solving Log Equations
10	<b>A</b>	Systems of Equations
11	<b>A</b>	Basic Trig Ratios

Q	Ans	Topic
12	<b>A</b>	Special Angles
13	<b>A</b>	Pythagorean Identity
14	<b>A</b>	Finding Missing Sides
15	<b>A</b>	Tangent Ratio
16	<b>A</b>	Inverse Trig
17	<b>A</b>	Quadrant Signs (ASTC)
18	<b>A</b>	Reference Angles
19	<b>A</b>	Unit Circle
20	<b>A</b>	Identifying Sides