

Algebra 2 & Geometry

Core Study Worksheet · 20 Questions · Multiple Choice

Instructions: Choose the best answer for each question. Memory keys are provided to help you recall key formulas. Answers are listed at the bottom of each section.

ALGEBRA 2 — Word Problems

Q01 · Quadratic Functions · Easy

■ *VERTEX: $x = -b/(2a) \rightarrow$ substitute back for max/min value*

EXAMPLE

$$h(t) = -16t^2 + 32t + 5 \rightarrow t = 1 \rightarrow h(1) = 21 \text{ ft (max height)}$$

A rocket's height is $h(t) = -5t^2 + 40t + 10$ (feet). What is the maximum height?

- A. 80 ft
 - B. 90 ft
 - C. 85 ft
 - D. 100 ft
-

Q02 · Exponential Growth · Easy

■ *GROWTH: $A = P(1+r)^t$ | Doubling: $A = P \times 2^{\text{(periods)}}$*

EXAMPLE

$$500 \text{ at } 6\%/yr \times 3 \text{ yr: } A = 500(1.06)^3 \approx \$595.51$$

A bacteria colony starts with 200 cells and doubles every 3 hours. How many cells after 9 hours?

- A. 800
 - B. 1,600
 - C. 1,200
 - D. 2,400
-

Q03 · Systems of Equations · Medium

■ *ELIMINATION: multiply one equation to cancel a variable, then subtract*

EXAMPLE

$$\text{Tickets } \$12 \text{ adult, } \$8 \text{ child; } 50 \text{ sold for } \$520 \rightarrow a=30, c=20$$

Notebooks cost \$3 each, pens \$1.50 each. Maya buys 12 items and spends \$27. How many notebooks?

- A. 4
 - B. 8
 - C. 6
 - D. 10
-

Q04 - Logarithms - Medium

■ LOG ↔ EXP: $\log_b(a)=c \leftrightarrow b^c=a$ | $-\log(10^{-4}) = -(-4) = 4$

EXAMPLE

$M = \log_{10}(I/I_0)$; if $I = 1000 I_0 \rightarrow M = \log_{10}(1000) = 3$

pH = $-\log[H^+]$. If $[H^+] = 10^{-4}$ mol/L, what is the pH?

- A. -4
 - B. 0.0001
 - C. 4
 - D. 40
-

Q05 - Rational Functions / Work - Medium

■ COMBINED WORK: $1/a + 1/b = 1/t$ (DO NOT average the times!)

EXAMPLE

Pipes A(4h) + B(6h): $1/4+1/6 = 5/12 \rightarrow t = 12/5 = 2.4$ h

Printer A finishes in 6 min, Printer B in 4 min. Time together?

- A. 2.4 min
 - B. 5 min
 - C. 3 min
 - D. 10 min
-

Q06 - Arithmetic Sequences - Easy

■ nth TERM: $a_n = a_1 + (n-1)d$ | SUM: $S_n = (n/2)(a_1 + a_n)$

EXAMPLE

Row 1=10 seats, d=3: row 8 = $10+7(3) = 31$ seats

Theater: 15 rows, row 1 has 20 seats, each row has 4 more. Total seats?

- A. 600
 - B. 720
 - C. 660
 - D. 740
-

Q07 - Polynomial / Area Setup - Medium

■ ZERO PRODUCT: set each factor = 0; reject negative dimensions

EXAMPLE

Area = length × width → set equal to given value → solve quadratic

Rectangle: length = $(2x-1)$, width = $(x+3)$, area = 49 sq units. Find positive x.

- A. 7
 - B. 4
 - C. 5
 - D. 3
-

Q08 · Inverse Functions · Medium

■ *INVERSE STEPS: replace $f(x)$ with $y \rightarrow$ swap x and $y \rightarrow$ solve for y*

EXAMPLE

$$f(x)=2x+3 \rightarrow \text{swap} \rightarrow x=2y+3 \rightarrow f^{-1}(x) = (x-3)/2$$

$F(c) = (9/5)c + 32$ converts Celsius to Fahrenheit. What is $F^{-1}(f)$?

- A. $(5/9)f + 32$
 - B. $(5/9)(f-32)$
 - C. $(9/5)(f-32)$
 - D. $(5f-32)/9$
-

Q09 · Geometric Series · Medium

■ *GEO SUM: $S_n = a(1-r^n)/(1-r)$ | r = ratio between consecutive terms*

EXAMPLE

$$\text{Ball drops } 100\text{cm, bounces } 60\% \text{ each time; total} = 100(1-0.6^3)/(1-0.6) = 196\text{cm}$$

Chain email: 3 people each send to 3 more, 5 rounds total. Total emails sent?

- A. 243
 - B. 121
 - C. 364
 - D. 363
-

Q10 · Completing the Square · Hard

■ *VERTEX FORM: $y=a(x-h)^2+k$ | Add $(b/2)^2$ to both sides*

EXAMPLE

$$x^2+6x+5=0 \rightarrow (x+3)^2=4 \rightarrow x=-1 \text{ or } x=-5$$

Rectangle: length is 6 m more than width, area = 91 m². What is the width?

- A. 7 m
 - B. 13 m
 - C. 9 m
 - D. 11 m
-

■ **ANSWER KEY**

Q1: B	Q2: B	Q3: C	Q4: C	Q5: A
Q6: B	Q7: B	Q8: B	Q9: D	Q10: A

GEOMETRY — Core Problems

Q11 · Similar Triangles · Easy

■ *SCALE RATIO: height/shadow = height/shadow (keep same type on same side)*

EXAMPLE

Person 6ft / shadow 4ft = tree h / shadow 10ft → h = 15 ft

A 5-ft student casts an 8-ft shadow. A flagpole casts a 40-ft shadow. How tall is the flagpole?

- A. 20 ft
 - B. 25 ft
 - C. 32 ft
 - D. 30 ft
-

Q12 · Pythagorean Theorem · Easy

■ $a^2+b^2=c^2$ | *TRIPLES to memorize: 3-4-5, 5-12-13, 8-15-17*

EXAMPLE

Ladder 10ft, base 6ft: $6^2+h^2=10^2$ → h=8ft

A drone travels 9 km east then 12 km north. Straight-line distance from start?

- A. 18 km
 - B. 21 km
 - C. 15 km
 - D. 13 km
-

Q13 · Circle Theorems · Medium

■ *INSCRIBED ANGLE = $\frac{1}{2}$ × arc | Inscribed in semicircle = 90°*

EXAMPLE

Arc AB = 80° → central angle = 80° → inscribed angle = 40°

A central angle intercepts an arc of 140° . What is the inscribed angle intercepting the same arc?

- A. 140°
 - B. 280°
 - C. 70°
 - D. 35°
-

Q14 · Volume of Solids · Easy

■ *CONE = ■ CYLINDER | $V_{cylinder}=\pi r^2h$ | $V_{cone}=\frac{1}{3}\pi r^2h$ | $V_{sphere}=\frac{4}{3}\pi r^3$*

EXAMPLE

Cone $r=3$, $h=12$: $V = (1/3)\pi(9)(12) = 36\pi \approx 113 \text{ cm}^3$

Cylindrical tank: radius = 4 m, height = 10 m. Volume in terms of π ?

- A. $160\pi \text{ m}^3$
 - B. $80\pi \text{ m}^3$
 - C. $40\pi \text{ m}^3$
 - D. $640\pi \text{ m}^3$
-

Q15 - Coordinate Geometry - Medium

■ MIDPOINT: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2)$ | Reverse: $x_B = 2 \cdot M_x - x_A$

EXAMPLE

$A(1,2), B(5,8)$: Midpoint= $(3,5)$, Distance= $\sqrt{5^2+2^2} = 13$

P(5,1) is the midpoint of AB. If A=(2,-4), what are the coordinates of B?

- A. (8, 6)
 - B. (3.5, -1.5)
 - C. (7, 5)
 - D. (10, 8)
-

Q16 - Triangle Congruence - Medium

■ VALID: SSS SAS ASA AAS | INVALID: SSA (donkey!) and AAA (only similar)

EXAMPLE

Shared side + two equal angles \rightarrow AAS \rightarrow Congruent \checkmark

■ABC and ■DEF: AB=DE, $\angle B = \angle E$, BC=EF. Which theorem proves congruence?

- A. SSS
 - B. ASA
 - C. SAS
 - D. AAS
-

Q17 - Angles in Polygons - Easy

■ POLYGON SUM: $(n-2) \times 180^\circ$ | Each angle of regular polygon: $\div n$

EXAMPLE

Pentagon: $(5-2) \times 180^\circ = 540^\circ \rightarrow$ each angle = 108°

What is the measure of each interior angle of a regular octagon?

- A. 120°
 - B. 150°
 - C. 135°
 - D. 140°
-

Q18 - Trigonometry (SOH CAH TOA) - Medium

■ SOH=Sin(Opp/Hyp) CAH=Cos(Adj/Hyp) TOA=Tan(Opp/Adj) | $\tan 45^\circ = 1$!!

EXAMPLE

Angle 30° , dist 50m: $\tan 30^\circ = h/50 \rightarrow h \approx 28.9m$

From 60 m away, angle of elevation to building top = 45° . How tall is the building?

- A. 60 m
 - B. $60\sqrt{2}$ m
 - C. 30 m
 - D. $60/\sqrt{2}$ m
-

Q19 - Sector Area - Easy

■ *SECTOR AREA:* $(\theta/360^\circ)\times\pi r^2$ | *ARC LENGTH:* $(\theta/360^\circ)\times 2\pi r$

EXAMPLE

Pizza $r=12$, $\theta=60^\circ$: $Area=(60/360)\pi(144)=24\pi\approx 75.4$ in²

Sprinkler rotates 90° , reaches 8 m. What sector area (in terms of π) is watered?

- A. 8π m²
 - B. 32π m²
 - C. 64π m²
 - D. 16π m²
-

Q20 - Parallel Lines & Transversals - Medium

■ *CO-INTERIOR (same-side) = 180°* | *ALTERNATE (Z-angle) = EQUAL* | *CORRESPONDING = EQUAL*

EXAMPLE

Co-interior: $3x+10^\circ + 2x+30^\circ = 180^\circ \rightarrow 5x+40=180 \rightarrow x=28$

Two parallel lines cut by a transversal. Co-interior angles: $(3x+15)^\circ$ and $(2x+25)^\circ$. Find x .

- A. $x=32$
 - B. $x=28$
 - C. $x=24$
 - D. $x=20$
-

■ **ANSWER KEY**

Q11: B	Q12: C	Q13: C	Q14: A	Q15: A
Q16: C	Q17: C	Q18: A	Q19: D	Q20: B
