Algebra 2 & Geometry

Word Problems — Self-Study Worksheet | 20 Problems | Multiple Choice

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Directions: Choose the best answer for each problem. The answer key is printed on the last page. Formulas are **not** provided — use your memory cues (KEY notes) to recall them.

ALGEBRA 2

Q1. [Quadratic Equations] (Easy)

KEY: Set h(t) = target height, solve quadratic

A rocket is launched from ground level. Its height in feet is $h(t) = -16t^2 + 80t$, where t is time in seconds. After how many seconds does the rocket first reach a height of 64 feet?

A) t = 1 second only

B) t = 1 and t = 4 seconds

C) t = 2 and t = 3 seconds

D) t = 5 seconds

Q2. [Quadratic Functions — Vertex] (Easy)

KEY: Vertex form $f(x)=a(x-h)^2+k$ -> vertex=(h,k), max/min=k

A company's daily profit is $P(x) = -2(x - 30)^2 + 1800$, where x is candles sold. What is the maximum daily profit, and how many candles must be sold?

A) $900 at 15 candles

B) $1800 at 30 candles

C) $1800 at 60 candles

D) $2000 at 30 candles

Q3. [Exponential Growth] (Easy)

KEY: A = P(1+r)^t [growth] A = P(1-r)^t [decay]

A town had a population of 12,000 in 2015. The population grows at 3% per year. Which expression gives the population in 2025?

A) 12000 + 0.03 x 10

B) 12000 x (1.03)^5

C) 12000 x (1.03)^10

D) 12000 x (0.97)^10

Q4. [Logarithms] (Medium)

KEY: log(10^n) = n | log_b(x)=y means b^y=x

The decibel level of a sound is L = 10 log(I / I0), where I0 = 10^-12 W/m^2. A sound has intensity I = 10^-4 W/m^2. What is the decibel level?

A) 40 dB

B) 60 dB

C) 80 dB

D) 120 dB

Q5. [Systems of Equations — Distance] (Medium)

KEY: Set distances equal | Let t = time after the SECOND car starts

Car A travels at 60 mph heading east. Car B travels at 80 mph, but starts 1 hour later. After Car B starts, how many hours will it take Car B to catch Car A?

A) 2 hours

B) 4 hours

C) 3 hours

D) 6 hours

Q6. [Rational Expressions — Work Rate] (Medium)

KEY: Rate = 1/time | Together: 1/A + 1/B = 1/T (add RATES, not times!)

Machine A completes a job in 6 hours. Machine B completes the same job in 4 hours. How long does it take both machines working together?

A) 5 hours

B) 3 hours

C) 2 and 2/5 hours

D) 1 and 1/2 hours

Q7. [Polynomial Zeros — Factor Theorem] (Hard)

KEY: If f(c)=0, then (x-c) is a factor -> use synthetic division

The profit function is $P(x) = x^3 - 6x^2 + 11x - 6$. The company breaks even at x = 1. What are the other two break-even values of x?

A) x = 2 and x = 4

B) x = 2 and x = 3

C) x = -2 and x = 3

D) x = 3 and x = 6

Q8. [Arithmetic Sequences] (Medium)

KEY: a_n = a_1 + (n-1)d | n-1, not n (trap!)

A theater has 20 rows. The first row has 15 seats, and each row has 3 more seats than the previous. How many seats are in the 20th row?

A) 60 seats

B) 70 seats

C) 72 seats

D) 75 seats

Q9. [Geometric Series — Bouncing Ball] (Hard)

KEY: Total dist = first drop + 2 x sum of bounce heights

A ball drops from 64 feet. After each bounce it rises to half the previous height. What is the total distance traveled after 4 complete bounces?

A) 120 feet

B) 124 feet

C) 184 feet

D) 252 feet

Q10. [Inverse Functions] (Hard)

KEY: Inverse -> swap x and y, then solve for y

A converter uses f(C) = (9C/5) + 32. A reading of 212 units corresponds to what Celsius temperature?

A) 80 degrees C

B) 100 degrees C

C) 120 degrees C

D) 212 degrees C

GEOMETRY

Q11. [Pythagorean Theorem] (Easy)

KEY: $a^2 + b^2 = c^2$ | c = hypotenuse (longest side) | Triples: 3-4-5, 5-12-13

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

A) 8 feet

B) 12 feet

C) 10 feet

D) 18 feet

Q12. [Circle — Circumference] (Easy)

KEY: C = 2(pi)r | A = (pi)r^2 | Given diameter? Halve it first!

A circular garden has a diameter of 20 feet. How many feet of border material is needed for the full perimeter? (Use pi = 3.14)

A) 31.4 feet

B) 125.6 feet

C) 62.8 feet

D) 314 feet

Q13. [Similar Triangles — Shadow] (Medium)

KEY: height/shadow = height/shadow (set up proportion, cross-multiply)

A 6-foot person casts a 4-foot shadow. At the same time, a tree casts a 28-foot shadow. How tall is the tree?

A) 18 feet
B) 36 feet
C) 42 feet
D) 48 feet

Q14. [Volume of Cone] (Medium)

KEY: V = (1/3)(pi)r²h | Don't forget the 1/3 !! (most common error)

An ice cream cone has a radius of 3 cm and a height of 12 cm. What is the volume? (Leave in terms of pi)

A) 108(pi) cm^3
B) 144(pi) cm^3
C) 36(pi) cm^3
D) 72(pi) cm^3

Q15. [Special Right Triangles] (Medium)

*KEY: 45-45-90 -> s : s : s*sqrt(2) | Square diagonal = side x sqrt(2)*

A square park has a diagonal of 20 meters. What is the side length of the park?

A) 10 m
B) 20 m
C) 10*sqrt(2) m
D) 20/sqrt(3) m

Q16. [Arc Length] (Hard)

KEY: Arc = (theta/360) x 2(pi)r | Convert time -> angle first

A clock's minute hand is 10 cm long. How far does the tip travel in 20 minutes? (Leave in terms of pi)

A) 5(pi) cm
B) 10(pi) cm
C) 20(pi)/3 cm
D) 20(pi) cm

Q17. [Interior Angles of Polygon] (Medium)

KEY: Sum = (n-2) x 180 degrees | Each angle (regular) = Sum / n

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

A) 108 degrees
B) 135 degrees
C) 120 degrees
D) 144 degrees

Q18. [Coordinate Geometry — Midpoint] (Medium)

KEY: Midpoint = ((x1+x2)/2 , (y1+y2)/2) — just average the coordinates

Two cell towers are at A(1, 2) and B(7, 10) on a map. What are the coordinates of the midpoint between them?

A) (3, 5)

B) (4, 6)

C) (6, 8)

D) (8, 12)

Q19. [Surface Area of Sphere] (Hard)

KEY: SA = 4(pi)r² | Diameter given -> r = d/2 first!

A spherical water tank has a diameter of 6 meters. What is the total surface area? (Leave in terms of pi)

A) 144(pi) m^2

B) 36(pi) m^2

C) 72(pi) m^2

D) 9(pi) m^2

Q20. [Parallel Lines & Transversal] (Hard)

KEY: Alternate interior = EQUAL | Co-interior (same-side) = 180 degrees

Two parallel streets are cut by a diagonal road. At the first intersection, an angle measures 118 degrees. What is the measure of the alternate interior angle at the second intersection?

A) 62 degrees

B) 180 degrees

C) 118 degrees

D) 242 degrees

ANSWER KEY

Q1	**(B)**	t=1 and t=4 seconds (solve -16t^2+80t=64)
Q2	**(B)**	$1800 at 30 candles (read vertex directly from vertex form)
Q3	**(C)**	12000 x (1.03)^10 (2015 to 2025 = 10 years)
Q4	**(C)**	80 dB (10^-4/10^-12 = 10^8, log(10^8)=8, x10=80)
Q5	**(C)**	3 hours (80t = 60(t+1), t=3)
Q6	**(C)**	2 and 2/5 hours (1/6+1/4=5/12, time=12/5)
Q7	**(B)**	x=2 and x=3 (divide by (x-1), factor x^2-5x+6)
Q8	**(C)**	72 seats (a_20 = 15 + 19x3 = 72)
Q9	**(C)**	184 feet (64 + 2(32+16+8+4) = 184)
Q10	**(B)**	100 degrees C (212=(9C/5)+32, C=100)
Q11	**(B)**	12 feet (5-12-13 triple)
Q12	**(C)**	62.8 feet (C=2(pi)(10)=62.8)
Q13	**(C)**	42 feet (6/4 = h/28, h=42)
Q14	**(C)**	36(pi) cm^3 ((1/3)(pi)(9)(12)=36(pi))
Q15	**(C)**	10*sqrt(2) m (diagonal=s*sqrt(2), s=20/sqrt(2))
Q16	**(C)**	20(pi)/3 cm (20 min = 1/3 rotation = 120 deg, arc=(1/3)x20(pi))
Q17	**(C)**	120 degrees ((6-2)x180/6=120)
Q18	**(B)**	(4, 6) ((1+7)/2=4, (2+10)/2=6)
Q19	**(B)**	36(pi) m^2 (r=3, SA=4(pi)(9)=36(pi))
Q20	**(C)**	118 degrees (alternate interior angles are equal)