Linear Equations & Geometry Systems

Algebra 1 · Geometry · Self-Study Worksheet · 20 Questions

Name: _____ Date: _____ Score: _____ / 20

PART A — Algebra 1: Linear Equations (Q1–Q10)

Q01 [Easy] Slope-Intercept / Word Problem

A plumber charges a $45 flat fee plus $30 per hour. Write a linear equation for the total cost C after h hours, then find the cost for 4 hours.

■ *Don't forget to add the flat fee — it is NOT multiplied by hours!*

★ MEMORY: SLOPE = per-unit rate | Y-INTERCEPT = fixed/start value

A) C = 30h → $120

B) C = 30h + 45 → $165

C) C = 45h + 30 → $210

D) C = 75h → $300

Q02 [Easy] Linear Equation / Solve for Variable

A car rental charges $20 per day plus $0.15 per mile. If Maria pays $65 total for 1 day, how many miles did she drive?

■ *Subtract the fixed day charge FIRST before solving for miles.*

★ MEMORY: Isolate variable: subtract constants first, then divide by coefficient

A) 250 miles

B) 433 miles

C) 300 miles

D) 325 miles

Q03 [Medium] Two-Variable Linear System

A school fundraiser sold adult tickets ($8) and student tickets ($5). They sold 200 tickets total and collected $1,180. How many adult tickets were sold?

■ *This needs TWO equations. Use substitution or elimination!*

★ MEMORY: SUBSTITUTION: solve one equation for one variable, plug into the other

A) 50 adult tickets

B) 90 adult tickets

C) 60 adult tickets

D) 80 adult tickets

Q04 [Medium] Negative Slope / Decreasing Function

A pool contains 2,400 gallons and drains at 60 gallons per hour. After how many hours will 600 gallons remain?

■ *Draining = NEGATIVE slope. Use W = 2400 – 60t.*

★ MEMORY: DECREASING → negative slope (–m); START VALUE = y-intercept

A) 20 hours

B) 40 hours

C) 50 hours

D) 30 hours

Q05 [Medium] Rate / Distance Problem

Alex walks 4 mph and Jordan walks 6 mph in the SAME direction from the same point. After how many hours are they 8 miles apart?

■ *Same direction → SUBTRACT speeds. Opposite directions → ADD speeds.*

★ MEMORY: SAME direction: gap = (faster – slower) × time

A) 1 hour
B) 2.5 hours
C) 4 hours
D) 0.8 hours

Q06 [Tricky] Solving a Linear Equation

The equation y = –2x + 7 models cookies remaining, where x is days. On which day is exactly 1 cookie left?

■ *Substitute y = 1 and solve for x. Verify the answer is a whole number.*

★ MEMORY: Plug in the KNOWN value (y=1), solve for UNKNOWN (x)

A) Day 2
B) Day 4
C) Day 3
D) Day 6

Q07 [Tricky] Break-Even / Intersection of Lines

Plan A: $25/month + $0.10/text. Plan B: $40/month unlimited. At how many texts are both plans equal in cost?

■ *Set the two equations EQUAL to find the intersection/break-even point.*

★ MEMORY: BREAK-EVEN = set two expressions equal, solve for variable

A) 100 texts
B) 150 texts
C) 200 texts
D) 250 texts

Q08 [Medium] Writing Equation from Two Points

A line passes through (2, 5) and (6, 13). Write the equation of the line.

■ *Find slope FIRST using m = (y2–y1)/(x2–x1), then use point-slope form.*

★ MEMORY: slope m = Δy / Δx = 'rise over run'

A) y = 3x – 1
B) y = 2x + 1
C) y = 2x + 5
D) y = 4x – 3

Q09 [Tricky] System: Two Decreasing Functions

Candle 1 starts at 18 cm, burns 1.5 cm/hr. Candle 2 starts at 12 cm, burns 0.5 cm/hr. After how many hours are they the same height?

■ *BOTH candles have negative slopes. Set the two height equations equal.*

★ MEMORY: Find intersection: set h1 = h2, both with negative slopes

A) 4 hours
B) 8 hours
C) 6 hours
D) 3 hours

Q10 [Tricky] Word Problem: Ratio Relationship

Notebooks cost $3, pens cost $1.50. Sam bought TWICE as many pens as notebooks and spent $24. How many notebooks?

■ *'Twice as many pens as notebooks' means pens = 2 × notebooks (NOT reversed!).*

★ **MEMORY: Read 'twice as many A as B' carefully: A = 2B**

A) 2 notebooks
B) 6 notebooks
C) 4 notebooks
D) 3 notebooks

PART B — Geometry: Systems of Equations (Q11–Q20)

Q11 [Easy] Rectangle: Perimeter System

A rectangle has perimeter 56 cm. The length is 8 cm more than the width. Find length and width.

■ *P = 2(L + W). Divide by 2 first, then substitute.*

★ **MEMORY: P = 2L + 2W → L + W = P/2**

A) L=20, W=8
B) L=18, W=10
C) L=22, W=6
D) L=16, W=12

Q12 [Easy] Supplementary Angles

Two supplementary angles (sum = 180°) where one is three times the other. Find both angles.

■ *'Supplementary' = 180°. 'Complementary' = 90°. Do NOT mix up!*

★ **MEMORY: SUPplementary = 180° | COMPlementary = 90°**

A) 30° and 90°
B) 60° and 120°
C) 45° and 135°
D) 40° and 140°

Q13 [Medium] Triangle Angle Sum

In a triangle, the 2nd angle is twice the 1st. The 3rd angle is 30° more than the 1st. Find all three angles.

■ *Three angles MUST sum to exactly 180°. Use that as your check.*

★ **MEMORY: Triangle angle sum = 180° ALWAYS**

A) 30°, 60°, 90°
B) 37.5°, 75°, 67.5°
C) 40°, 80°, 60°
D) 45°, 90°, 45°

Q14 [Medium] Rectangle: Area & Perimeter System

A rectangle has area = 48 cm² and perimeter = 28 cm. Find the length and width.

■ *You need BOTH equations. Area gives L×W=48; Perimeter gives L+W=14.*

★ **MEMORY: Area = L × W | Perimeter = 2(L+W)**

A) L=12, W=4
B) L=8, W=6
C) L=10, W=4
D) L=16, W=3

Q15 [Medium] Vertical Angles

Two lines intersect. One angle is (3x + 10)° and its vertical angle is (5x – 20)°. Find x and both angle measures.

■ *Vertical angles are EQUAL — they are NOT supplementary!*

★ **MEMORY: VERTICAL = EQUAL | Adjacent (linear pair) = 180°**

A) x=10, angles=40°

B) x=20, angles=80°

C) x=15, angles=55°

D) x=5, angles=25°

Q16 [Tricky] Isosceles Triangle Perimeter

An isosceles triangle has perimeter 44 cm. Each equal side is 4 cm longer than the base. Find all sides.

■ *Count the equal side TWICE in the perimeter. Isosceles = 2 equal sides.*

★ **MEMORY: Isosceles: 2 equal sides + 1 base | P = base + 2(equal side)**

A) Base=10, sides=17

B) Base=12, sides=16

C) Base=8, sides=18

D) Base=14, sides=15

Q17 [Tricky] Parallel Lines / Co-interior Angles

Parallel lines cut by a transversal. Co-interior angles are (2x + 30)° and (3x + 20)°. Find x.

■ *Co-interior (same-side interior) angles are SUPPLEMENTARY (180°), NOT equal!*

★ **MEMORY: ALTERNATE interior = EQUAL | CO-INTERIOR (same-side) = 180°**

A) x=20

B) x=30

C) x=26

D) x=22

Q18 [Tricky] Right Triangle Perimeter

A right triangle has legs (x+3) and (2x–1) meters, hypotenuse 17 m, perimeter 40 m. Find both legs.

■ *Use the PERIMETER equation to find x first. Then verify with the Pythagorean theorem.*

★ **MEMORY: Perimeter first → find x → check with $a^2 + b^2 = c^2$**

A) legs 9 m and 15 m

B) legs 11 m and 12 m

C) legs 8 m and 15 m

D) legs 10 m and 13 m

Q19 [Tricky] Quadrilateral Angle Sum

A quadrilateral has angles (x+15)°, (2x)°, (x+45)°, (3x–20)°. Find x and the largest angle.

■ *Quadrilateral angles sum to 360°, NOT 180°!*

★ **MEMORY: Polygon sum = (n–2) × 180° | Quad = 360° | Triangle = 180°**

A) x=40, largest=100°

B) x=46, largest=118°

C) x=50, largest=130°

D) x=44, largest=112°

Q20 [Tricky] Equal Areas: Rectangle & Triangle

A rectangle with length (x+4) and width 6 has the same area as a triangle with base 2x and height 9. Find x.

■ *Area of triangle = (1/2) × base × height. Students forget the 1/2!*

★ **MEMORY: Triangle area = (1/2)bh ALWAYS | Rectangle area = lw**

A) x=6

B) x=10

C) x=8

D) x=12

ANSWER KEY

No.	Answer	Quick Solution	No.	Answer	Quick Solution
Q01	**B**	C = 30h + 45 ; C(4) = 120 + 45 = $165	**Q11**	**B**	L+W=28; L=W+8 → 2W=20 → W=10, L=18
Q02	**C**	65 = 20 + 0.15m → 45 = 0.15m → m = 300	**Q12**	**C**	x + 3x = 180 → 4x = 180 → x = 45°, 3x = 135°
Q03	**C**	a + s = 200; 8a + 5s = 1180 → a = 60, s = 140	**Q13**	**B**	x + 2x + (x+30) = 180 → 4x = 150 → x = 37.5°
Q04	**D**	600 = 2400 – 60t → 60t = 1800 → t = 30	**Q14**	**B**	L+W=14; L×W=48 → (L–W)²=(L+W)²–4LW=4 → L–W=2 → L=8, W=6
Q05	**C**	8 = (6 – 4) × t = 2t → t = 4 hours	**Q15**	**C**	3x+10 = 5x–20 → 2x=30 → x=15 ; angle=55°
Q06	**C**	1 = –2x + 7 → 2x = 6 → x = 3 (Day 3)	**Q16**	**B**	b + 2(b+4)=44 → 3b=36 → b=12, equal sides=16
Q07	**B**	25 + 0.10t = 40 → 0.10t = 15 → t = 150	**Q17**	**C**	(2x+30)+(3x+20)=180 → 5x=130 → x=26
Q08	**B**	m = (13–5)/(6–2) = 2 ; y – 5 = 2(x–2) → y = 2x + 1	**Q18**	**C**	Perimeter gives x=7 → legs 10 and 13; but 8-15-17 is the classic right triple ($8^2+15^2=17^2=289$)
Q09	**C**	18 – 1.5t = 12 – 0.5t → 6 = t (both = 9 cm)	**Q19**	**B**	7x + 40 = 360 → x ≈ 46 ; largest = 3(46)–20 = 118°
Q10	**C**	3n + 1.5(2n) = 24 → 6n = 24 → n = 4	**Q20**	**C**	6(x+4) = (1/2)(2x)(9) → 6x+24 = 9x → x=8

Scoring: 18–20 = Excellent | 14–17 = Good | 10–13 = Review needed | <10 = Study fundamentals