Pre-Algebra & Geometry

Word Problems — Self-Study Worksheet

Part 1 — Pre-Algebra

Memory Points: INVERSE (undo opposite) · BALANCE (same to both sides) · PER=divide · OF=multiply · RATE=amount/time

Q01 · Variables & Equations

Sarah has 3 times as many stickers as Tom. Together they have 48 stickers. How many stickers does Tom have?

Hint: Let Tom = x, Sarah = 3x. Write: x + 3x = 48. Combine like terms.

A) 16 stickers
B) 12 stickers
C) 36 stickers
D) 24 stickers

Q02 · Unit Rate

A car travels 240 miles in 4 hours. At the same rate, how far will it travel in 7 hours?

Hint: RATE = amount / time. Find speed per hour first: 240 / 4 = ? mph, then x 7.

A) 380 miles
B) 400 miles
C) 420 miles
D) 480 miles

Q03 · Percentage — Two Steps

A jacket costs $80. It is 25% off. Then 10% sales tax is added to the sale price. What is the final price?

Hint: CAUTION: Apply each % to the correct base. Step 1: $80 x 0.75 = $60. Step 2: $60 x 1.10 = ?

A) $68.00
B) $66.00
C) $60.00
D) $72.00

Q04 · Ratio & Proportion

A recipe for 12 cookies needs 3 cups of flour. How many cups are needed for 20 cookies?

Hint: Proportion: 3/12 = x/20. Cross-multiply: 12x = 60, then divide.

A) 4 cups
B) 6 cups
C) 5 cups
D) 4.5 cups

Q05 · Negative Numbers

Temperature at 6 AM was -8 degrees C. It rose 15 degrees by noon, then dropped 6 degrees by evening. What was the evening temperature?

Hint: NUMBER LINE: -8 + 15 - 6 = ? Move right for + , left for -.

A) 3 degrees C
B) -1 degrees C
C) 1 degree C
D) 13 degrees C

Q06 · Two-Step Equations

A plumber charges a $45 flat fee plus $30 per hour. The total bill was $165. How many hours did the plumber work?

Hint: Write: 45 + 30h = 165. Step 1 subtract 45, Step 2 divide by 30. Always undo + / - FIRST.

A) 3 hours
B) 4 hours
C) 5.5 hours
D) 2 hours

Q07 · Percent Change — Classic Trap

A $50 shirt is raised 20%, then the new price is lowered 20%. Is the final price equal to, more, or less than $50?

Hint: TRAP: 20% up then 20% down does NOT return to start. Calculate: $50 x 1.20 = $60. $60 x 0.80 = ?

A) $50.00 — same
B) $52.00 — more
C) $48.00 — less
D) $46.00 — less

Q08 · Average & Inequalities

Jake needs at least 75 average to pass. His three test scores are 68, 72, and 80. What is the minimum score he needs on the 4th test?

Hint: Set up: (68 + 72 + 80 + x) / 4 >= 75. Multiply both sides by 4, then solve for x.

A) 75
B) 80
C) 85
D) 70

Q09 · Exponential Growth

A bacteria culture doubles every hour. Starting with 50 bacteria at noon, how many bacteria are there at 4 PM?

Hint: FORMULA: Amount = Start x 2^n where n = hours. Noon to 4PM = 4 hours. 50 x 2^4 = ?

A) 400
B) 200
C) 500
D) 800

Q10 · Fractions in Equations

Five friends split a dinner bill equally. Two more friends join and re-split the same bill. Each person now pays $8 less. What was the total bill?

Hint: Let total = T. Set up: T/5 - T/7 = 8. Find common denominator (35), solve for T.

A) $100
B) $120
C) $160
D) $140

Part 2 — Geometry

Memory Points: TRIANGLE area=1/2 bh · CIRCLE area=pi r2, C=pi d · PYTHAGOREAN a2+b2=c2 · SUPPLEMENTARY=180 · VOLUME=lwh

G01 · Area of Triangle

A triangular garden has a base of 14 meters and a height of 9 meters. What is the area?

Hint: Area = (1/2) x base x height. The 1/2 is critical — a triangle is half a rectangle!

A) 126 m2
B) 63 m2
C) 46 m2
D) 31.5 m2

G02 · Pythagorean Theorem

A ladder's base is 6 ft from the wall. The wall is 8 ft tall. How long is the ladder?

Hint: a^2 + b^2 = c^2. The ladder is side c (hypotenuse). 6^2 + 8^2 = ? Then take square root.

A) 12 ft
B) 14 ft
C) 10 ft
D) 11 ft

G03 · Circle — Circumference

A circular pond has a diameter of 20 meters. How long is the path around the entire pond? (pi = 3.14)

Hint: DIAMETER vs RADIUS: C = pi x d. Use diameter 20 directly, or use C = 2 x pi x r with r = 10.

A) 31.4 m
B) 125.6 m
C) 62.8 m
D) 314 m

G04 · Supplementary Angles

Two supplementary angles have one angle that is 3 times the other. What are the two angles?

Hint: SUPPLEMENTARY = 180 degrees total. Let smaller = x, larger = 3x. x + 3x = 180.

A) 45 and 135 degrees
B) 60 and 120 degrees
C) 30 and 150 degrees
D) 40 and 140 degrees

G05 · Volume — Partial Fill

A fish tank is 60 cm x 30 cm x 40 cm and is filled 3/4 full. How many cubic cm of water are inside?

Hint: TWO STEPS: Step 1 find full volume (l x w x h). Step 2 multiply by 3/4. Don't skip step 2!

A) 72,000 cm3
B) 54,000 cm3
C) 36,000 cm3
D) 18,000 cm3

G06 · Perimeter of Composite Shape

An L-shaped room is made by removing a 3m x 4m corner from a 10m x 8m rectangle. What is the perimeter?

Hint: TRICK: L-shape perimeter = original rectangle perimeter = 2(10+8) = 36 m. The corner cut adds sides equal to what was removed.

A) 30 m
B) 32 m
C) 36 m
D) 40 m

G07 · Circle — Area of a Sector

A pizza has a radius of 7 inches. You eat 3 out of 8 equal slices. What area did you eat? (pi = 3.14)

Hint: Full circle area = pi x r^2 = 3.14 x 49. Then multiply by fraction eaten: 3/8.

A) 57.75 in2
B) 57.73 in2
C) 46.2 in2
D) 65.9 in2

G08 · Similar Figures — Area Ratio

Two similar triangles have side lengths in ratio 1:3. The smaller has area 8 cm2. What is the area of the larger?

Hint: AREA TRAP: Side ratio 1:3 means area ratio is 1^2 : 3^2 = 1:9. Multiply 8 x 9, NOT 8 x 3!

A) 24 cm2
B) 48 cm2
C) 72 cm2
D) 36 cm2

G09 · Angles in a Triangle

A triangle has a 90 degree angle. Another angle is twice the third. What are the two unknown angles?

Hint: All 3 angles = 180 degrees. Already have 90 degrees. Remaining: 90 = x + 2x. Solve for x.

A) 45 and 45 degrees
B) 30 and 60 degrees
C) 40 and 50 degrees
D) 20 and 70 degrees

G10 · Surface Area of Rectangular Box

A gift box is 20 cm x 15 cm x 10 cm. How much wrapping paper (cm2) is needed to cover all 6 faces?

Hint: SA = 2(lw + lh + wh). THREE pairs of opposite faces. Calculate each pair, add, then multiply by 2.

A) 3,000 cm2
B) 1,150 cm2
C) 1,300 cm2
D) 650 cm2

Answer Key

Q01: B	Q02: C	Q03: B	Q04: C	Q05: C
Q06: B	Q07: C	Q08: B	Q09: D	Q10: D
G01: B	G02: C	G03: C	G04: A	G05: B
G06: C	G07: B	G08: C	G09: B	G10: C

Note: All answer choices are multiple-choice (A/B/C/D). Circle your answer, then check the key above.