

Pre-Algebra & Geometry

Self-Study Worksheet · 20 Problems · Answers on Last Page

■■ PRE-ALGEBRA ■■

SOLVING EQUATIONS

★ *ISOLATE the variable — do the SAME thing to BOTH sides*

Q1. If $3x + 7 = 22$, what is the value of x ?

A. $x = 3$

B. $x = 4$

C. $x = 6$

D. $x = 5$

SOLVING EQUATIONS — NEGATIVES

Q2. Solve for x : $-2x + 5 = 13$

A. $x = -4$

B. $x = 4$

C. $x = -9$

D. $x = 9$

ORDER OF OPERATIONS (PEMDAS)

★ *PEMDAS — Parentheses, Exponents, Multiply/Divide, Add/Subtract*

Q3. Evaluate: $4 + 3 \times 2^2 - (5 - 1)$

A. 20

B. 18

C. 12

D. 24

INEQUALITIES

★ *FLIP the inequality sign when multiplying or dividing by a NEGATIVE number*

Q4. Which values of x satisfy: $-3x < 12$?

A. $x < -4$

B. $x > -4$

C. $x > 4$

D. $x < 4$

RATIOS & PROPORTIONS

★ **CROSS-MULTIPLY** to solve proportions: $a/b = c/d \Rightarrow ad = bc$

Q5. A recipe uses 2 cups of flour for every 3 cups of sugar. If you use 12 cups of sugar, how many cups of flour do you need?

- A. 6 cups
B. 18 cups
C. 8 cups
D. 9 cups

PERCENT PROBLEMS

★ **IS over OF = PERCENT over 100** | $\text{Sale price} = (100\% - \text{discount}\%) \times \text{original}$

Q6. A shirt costs \$40. It is on sale for 25% off. What is the SALE PRICE?

- A. \$10
B. \$30
C. \$25
D. \$15

DISTRIBUTIVE PROPERTY

★ $a(b + c) = ab + ac$ — **DISTRIBUTE** to EVERY term inside the parentheses

Q7. Simplify: $3(2x - 4) + 5x$

- A. $6x - 4 + 5x$
B. $11x - 4$
C. $11x + 12$
D. $11x - 12$

WORD PROBLEM — TWO VARIABLES

★ **READ carefully** — define what x represents before solving

Q8. Tom has twice as many stickers as Lisa. Together they have 36. How many does TOM have?

- A. 12
B. 24
C. 18
D. 30

EXPONENTS

★ **Same base, multiplying:** $a^m \times a^n = a^{(m+n)}$ | **ADD the exponents**

Q9. What is the value of $2^3 \times 2^2$?

- A. $2^6 = 64$
B. $4^5 = 1024$
C. $2^5 = 32$
D. $2^6 = 32$

ABSOLUTE VALUE

★ $|x| = \text{DISTANCE from zero}$ — result is ALWAYS positive or zero

Q10. Evaluate: $|-8| + |3 - 10|$

- A. 1
B. -15
C. 15
D. -1

■■ GEOMETRY ■■

AREA & PERIMETER

★ $\text{Area} = l \times w$ | $\text{Perimeter} = 2l + 2w$ | Area uses SQUARED units

Q11. A rectangle has length 9 cm and width 4 cm. What is the AREA?

- A. 26 cm
B. 36 cm^2
C. 13 cm^2
D. 26 cm^2

TRIANGLE AREA

★ $\text{Area of Triangle} = (1/2) \times \text{base} \times \text{height}$ — don't forget the 1/2 !

Q12. A triangle has a base of 10 m and a height of 6 m. What is its area?

- A. 60 m^2
B. 30 m^2
C. 16 m^2
D. 32 m^2

PYTHAGOREAN THEOREM

★ $a^2 + b^2 = c^2$ | c is the HYPOTENUSE (opposite the right angle)

Q13. A right triangle has legs of 3 and 4. What is the length of the hypotenuse?

- A. 7
B. root 7
C. 6
D. 5

CIRCLE — AREA

★ $\text{Circumference} = 2\pi r$ | $\text{Area} = \pi r^2$ | $\text{radius} = \text{diameter} / 2$

Q14. A circle has DIAMETER 10 cm. What is its area? (Use $\pi = 3.14$)

- A. 314 cm^2
B. 78.5 cm^2
C. 31.4 cm^2
D. 157 cm^2

ANGLE RELATIONSHIPS

★ *Supplementary = 180 degrees | Complementary = 90 degrees (S for Straight = 180)*

Q15. Two angles are supplementary. One angle is 65 degrees. What is the other?

- A. 25 degrees
- B. 295 degrees
- C. 115 degrees
- D. 90 degrees

VOLUME — RECTANGULAR PRISM

★ *Volume = $l \times w \times h$ | cubic units (cm^3) | Surface Area = sum of all 6 faces*

Q16. A box measures 5 cm x 4 cm x 3 cm. What is its volume?

- A. 60 cm^3
- B. 47 cm^2
- C. 94 cm^2
- D. 120 cm^3

COORDINATE GEOMETRY — MIDPOINT

★ *Midpoint = $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$ — AVERAGE the coordinates*

Q17. What is the midpoint of the segment connecting (2, 6) and (8, 4)?

- A. (10, 10)
- B. (3, 2)
- C. (5, 5)
- D. (6, 10)

TRIANGLE ANGLES & EXTERIOR ANGLE

★ *Triangle interior angles sum = 180 degrees | Exterior angle = sum of 2 non-adjacent interior angles*

Q18. A triangle has angles of 45 degrees and 75 degrees. What is the EXTERIOR angle at the third vertex?

- A. 60 degrees
- B. 120 degrees
- C. 90 degrees
- D. 300 degrees

SIMILAR FIGURES — AREA RATIO

★ *If sides ratio = $a:b$, then AREA ratio = $a^2 : b^2$ (square the ratio!)*

Q19. Two similar triangles have sides in ratio 2:5. The smaller has area 8 cm^2 . What is the area of the larger?

- A. 20 cm^2
- B. 40 cm^2
- C. 25 cm^2
- D. 50 cm^2

SURFACE AREA — CUBE

★ *Cube has 6 equal square faces / Surface Area = $6 \times s^2$ / Volume = s^3*

Q20. A cube has side length 4 cm. What is its TOTAL SURFACE AREA?

A. 16 cm^2

B. 64 cm^3

C. 96 cm^2

D. 24 cm^2

Answer Key

| Q | Ans | Q | Ans | Q | Ans | Q | Ans | Q | Ans |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Q1 | D | Q2 | A | Q3 | C | Q4 | B | Q5 | C |
| Q6 | B | Q7 | D | Q8 | B | Q9 | C | Q10 | C |
| Q11 | B | Q12 | B | Q13 | D | Q14 | B | Q15 | C |
| Q16 | A | Q17 | C | Q18 | B | Q19 | D | Q20 | C |

Detailed Answers

Q1 D: $3x+7=22 \rightarrow 3x=15 \rightarrow x=5$. Trap: Don't divide 22 by 3 before subtracting 7.

Q2 A: $-2x+5=13 \rightarrow -2x=8 \rightarrow x=-4$. Trap: Dividing by negative flips the sign.

Q3 C: $4+3x^4-4=12$. PEMDAS order: exponent first ($2^2=4$), then multiply, then add/subtract.

Q4 B: $-3x < 12 \rightarrow$ divide by $-3 \rightarrow$ FLIP sign $\rightarrow x > -4$. Trap: Forgetting to flip.

Q5 C: $\frac{2}{3} = \frac{x}{12} \rightarrow$ cross-multiply $\rightarrow 3x=24 \rightarrow x=8$. Trap: Adding differences instead.

Q6 B: 25% of \$40 = \$10 discount. $\$40 - \$10 = \$30$. Trap: \$10 is discount, not sale price.

Q7 D: $3(2x-4)=6x-12$. Then $6x-12+5x=11x-12$. Trap: Not distributing to both terms.

Q8 B: $x+2x=36 \rightarrow x=12$ (Lisa). $Tom=2x=24$. Trap: Stopping at $x=12$ (Lisa's count).

Q9 C: Same base, ADD exponents $\rightarrow 2^{(3+2)}=2^5=32$. Trap: Multiplying exponents gives 2^6 .

Q10 C: $|-8|=8$, $|3-10|=-7|=7$. Total=15. Trap: Absolute value is never negative.

Q11 B: Area= $9 \times 4=36$ cm². Trap: Perimeter $2(9+4)=26$ cm is a different measurement.

Q12 B: Area= $(\frac{1}{2}) \times 10 \times 6=30$ m². Trap: Forgetting $\frac{1}{2}$ gives 60 m².

Q13 D: $3^2+4^2=9+16=25$. $\sqrt{25}=5$. Famous 3-4-5 triple. Trap: $3+4=7$ (just adding).

Q14 B: $r=\text{diameter}/2=5$. Area= $\pi \times 5^2=3.14 \times 25=78.5$ cm². Trap: Using diameter (not radius).

Q15 C: Supplementary=180 degrees. $180-65=115$ degrees. Trap: Complementary=90 (giving 25).

Q16 A: $V=5 \times 4 \times 3=60$ cm³. Trap: B and C show surface area units/values, D has calculation error.

Q17 C: Midpoint= $((2+8)/2, (6+4)/2)=(5,5)$. Trap: (10,10) is the sum, not the average.

Q18 B: Interior angle= $180-45-75=60$. Exterior= $180-60=120$. Or: $45+75=120$ (exterior angle theorem).

Q19 D: Side ratio 2:5 \rightarrow area ratio 4:25. Unit value= $8/4=2$. Large= $25 \times 2=50$ cm². Trap: Using side ratio directly.

Q20 C: Each face= $4^2=16$ cm². 6 faces $\rightarrow 6 \times 16=96$ cm². Trap: B is volume ($4^3=64$), A is one face only.