PRE-ALGEBRA · SELF-STUDY

Numbers & Variables Master Class

Integers · Rational Numbers · Distributive Law · Factoring · Word Problems

20	5	5
Questions	Topics	Sections

● Section 1 · INTEGER OPERATIONS

■ QUICK MEMORY POINTS

SAME SIGN → ADD & KEEP	Same signs? Add absolute values, keep the sign. (-3)+(-5) = -8	**DIFF SIGN → SUBTRACT & COPY**	Different signs? Subtract, keep the sign of the BIGGER one. (-7)+(4) = -3
DOUBLE NEGATIVE → POSITIVE	Subtracting a negative = adding a positive. 5-(-3) = 5+3 = 8	**SIGN RULE (x /)**	Same signs → (+) Different signs → (-) (-4)x(-3)=+12 (-6)/2=-3

■ WORKED EXAMPLE — INTEGER OPERATIONS

Evaluate: (-8) - (-3) + (-5)

(-8) - (-3) + (-5)

(-8) + 3 + (-5) ← double negative → positive

-10

Q 01 · INTEGERS ▲ EASY

What is (-9) + (-4) ?

(A) -5	(B) +13
✓ (C) -13	(D) +5

■ Answer: (C)

Q 02 · INTEGERS ▲ EASY

What is (-7) - (-10) ?

(A) -17	✓ (B) +3
(C) -3	(D) +17

■ Answer: (B)

Q 03 · INTEGERS ▲ TRICKY

What is (-4) x (-3) x (-2) ?

(A) +24	✓ (B) -24
(C) -12	(D) +12

■ Answer: (B)

Q 04 · INTEGERS ▲ MEDIUM

The temperature was -6°C. It dropped 8° more. What is the new temperature?

(A) +2°C	(B) -2°C
✓ (C) -14°C	(D) +14°C

■ Answer: (C)

● Section 2 · RATIONAL NUMBER OPERATIONS

■ QUICK MEMORY POINTS

ADD / SUB FRACTIONS → LCD	Find Lowest Common Denominator first, then add/subtract numerators.	**MULTIPLY → STRAIGHT ACROSS**	(a/b) x (c/d) = (ac)/(bd) No LCD needed!
DIVIDE → FLIP & MULTIPLY	"Keep · Change · Flip" (KCF) (a/b) / (c/d) = (a/b) x (d/c)	**NEGATIVE FRACTION**	-3/4 = (-3)/4 = 3/(-4) All three are equivalent!

■ WORKED EXAMPLE — RATIONAL NUMBERS

Calculate: (3/4) / (-1/2)

(3/4) x (-2/1) ← KCF: Keep · Change · Flip

-(6/4) = -(3/2) = -1 1/2

Q 05 · RATIONAL NUMBERS ▲ EASY

What is 2/3 + 1/4 ?

(A) 3/7	(B) 3/12
✓ (C) 11/12	(D) 8/12

■ Answer: (C)

Q 06 · RATIONAL NUMBERS ▲ MEDIUM

What is -(5/6) x (3/10) ?

(A) 1/4	**✓ (B) -(1/4)**
(C) -(15/60)	(D) 15/60

■ Answer: (B)

Q 07 · RATIONAL NUMBERS ▲ TRICKY

What is -(3/4) / (-(9/8)) ?

(A) -(2/3)	✓ (B) 2/3
(C) -(27/32)	(D) 27/32

■ Answer: (B)

Q 08 · RATIONAL NUMBERS ▲ MEDIUM

Sarah has 3/4 of a pizza. She eats 1/3 of what she has. How much pizza does she eat?

(A) 4/7 of pizza	(B) 5/12 of pizza
✓ (C) 1/4 of pizza	(D) 1/12 of pizza

■ Answer: (C)

● Section 3 · DISTRIBUTIVE PROPERTY WITH VARIABLES

■ QUICK MEMORY POINTS

DISTRIBUTE = MULTIPLY ALL	a(b+c) = ab + ac The outside multiplies EVERY term inside.	**WATCH THE SIGN!**	-a(b+c) = -ab - ac Negative outside → ALL signs flip!
COMBINE LIKE TERMS	Only add/subtract SAME variable and power. 3x + 5x = 8x / 3x + 5x² NO	**ORDER: DISTRIBUTE FIRST**	Always distribute BEFORE combining like terms. Never skip this step!

■ WORKED EXAMPLE — DISTRIBUTIVE PROPERTY

Simplify: -3(2x - 5) + 4x

(-3)(2x) + (-3)(-5) + 4x ← Distribute

-6x + 15 + 4x

-2x + 15 ← Combine like terms

Q 09 · DISTRIBUTIVE PROPERTY ▲ EASY

Simplify: 3(x + 4)

(A) 3x + 4	✓ (B) 3x + 12
(C) x + 12	(D) 3x + 7

■ Answer: (B)

Q 10 · DISTRIBUTIVE PROPERTY ▲ TRICKY

Simplify: -2(3x - 7) + 5x

✓ (A) -x + 14	(B) -x - 14
(C) 11x - 14	(D) -6x + 14

■ Answer: (A)

Q 11 · DISTRIBUTIVE PROPERTY

▲ MEDIUM

Simplify: 4(2x - 3) - 2(x + 5)

(A) 6x - 2	(B) 6x + 2
✓ (C) 6x - 22	(D) 10x - 2

■ Answer: (C)

Q 12 · DISTRIBUTIVE PROPERTY

▲ TRICKY

Which expression equals (1/2)(6x - 10) + 3 ?

✓ (A) 3x - 2	(B) 3x + 2
(C) 6x - 2	(D) 3x - 5

■ Answer: (A)

● Section 4 · FACTORING — REVERSE DISTRIBUTION

■ QUICK MEMORY POINTS

FIND GCF FIRST	Greatest Common Factor of ALL terms goes OUTSIDE the parentheses.	**CHECK: DISTRIBUTE BACK**	Always verify by distributing your answer — should match original!
FACTOR = UNDO DISTRIBUTE	ab + ac = a(b+c) Distribution in reverse!	**VARIABLES IN GCF**	If all terms have x, pull out x! $6x^2 + 4x = 2x(3x + 2)$

■ WORKED EXAMPLE — FACTORING

Factor completely: 12x - 8

GCF of 12 and 8 = 4

4(3x - 2)

Check: 4(3x - 2) = 12x - 8 ✓

Q 13 · FACTORING ▲ EASY

Factor: 15x + 10

✓ (A) 5(3x + 2)	(B) 3(5x + 10)
(C) 10(x + 5)	(D) 5(3x + 10)

■ Answer: (A)

Q 14 · FACTORING ▲ MEDIUM

Factor completely: $6x^2 + 9x$

(A) $3(2x^2 + 3x)$	**✓ (B) 3x(2x + 3)**
(C) 6x(x + 9)	(D) x(6x + 9)

■ Answer: (B)

Q 15 · FACTORING

▲ TRICKY

Factor: -4x + 12

(A) 4(-x + 3)	✓ (B) -4(x - 3)
(C) -4(x + 3)	(D) 4(x - 3)

■ Answer: (B)

● Section 5 · WORD PROBLEMS — MIXED CHALLENGE

■ QUICK MEMORY POINTS

DEFINE → WRITE → SOLVE	Step 1: Let x = ? Step 2: Write the equation Step 3: Solve!	**KEY WORDS**	"more than" → + "less than" → - "times as many" → x "split equally" → /
TOTAL = PART x RATE	Perimeter, cost, and rate problems all use this pattern.	**UNITS MATTER!**	Check your answer makes sense! (No negative lengths, etc.)

Q 16 · WORD PROBLEM ▲ EASY

A rectangle has length (3x + 2) cm and width 4 cm. Which expression gives the perimeter?

(A) 12x + 8	(B) 6x + 4
✓ (C) 6x + 12	(D) 8x + 6

■ Answer: (C)

Q 17 · WORD PROBLEM ▲ MEDIUM

Jake earns $8/hr + $15 bonus per week. Maria earns $6/hr + $30 bonus per week. After how many hours do they earn the same total?

(A) 5 hours	**✓ (B) 7.5 hours**
(C) 10 hours	(D) 15 hours

■ Answer: (B)

Q 18 · WORD PROBLEM ▲ MEDIUM

The sum of three consecutive integers is -33. What is the SMALLEST integer?

(A) -10	✓ **(B) -12**
(C) -11	(D) -9

■ **Answer: (B)**

Q 19 · WORD PROBLEM ▲ TRICKY

Apples cost $3/4 each, oranges $1/2 each. Lily buys 8 apples and 6 oranges. How much does she spend in total?

(A) $7.00	✓ **(B) $9.00**
(C) $8.00	(D) $6.50

■ **Answer: (B)**

Q 20 · WORD PROBLEM ▲ TRICKY

A garden's perimeter is 34 m. The length is 3 m more than twice the width. Find the WIDTH.

(A) 4 m	✓ **(B) 5 m**
(C) 7 m	(D) 9 m

■ **Answer: (B)**

Answer Key

Q01	Q02	Q03	Q04	Q05
(C)	**(B)**	**(B)**	**(C)**	**(C)**
Q06	Q07	Q08	Q09	Q10
(B)	**(B)**	**(C)**	**(B)**	**(A)**
Q11	Q12	Q13	Q14	Q15
(C)	**(A)**	**(A)**	**(B)**	**(B)**
Q16	Q17	Q18	Q19	Q20
(C)	**(B)**	**(B)**	**(B)**	**(B)**