Unit 4 · Expressions and Equations Cheat Sheet

Unit 4 focus: exponents, the order of operations and algebraic expressions

1 KEY VOCABULARY

exponent	How many times the base is a factor.	$2^3 = 2 \cdot 2 \cdot 2$
variable	A letter for an unknown number.	n
coefficient	The number multiplied by a variable.	7 in 7x
term	Parts of an expression separated by + or −.	3x and 5 in 3x + 5
equation	A statement that two expressions are equal.	x + 4 = 11

2 EXPONENTS

Multiply the base by itself, exponent times.

Example: Evaluate 4^3 and $(\frac{1}{2})^2$.
Expand: $4 \cdot 4 \cdot 4$ and $\frac{1}{2} \cdot \frac{1}{2}$
Answer: 64 and $\frac{1}{4}$

3 ORDER OF OPERATIONS

Parentheses, Exponents, Multiply/Divide left to right, Add/Subtract left to right.

Example: $18 - 2 \cdot (1 + 2)^2$
Parentheses: $(3)^2 = 9$
Multiply: $2 \cdot 9 = 18$
Subtract: $18 - 18$
Answer: 0

4 WORDS TO EXPRESSIONS

5 more than a number	**n + 5**
twice a number, decreased by 3	**2n − 3**
the quotient of a number and 4	$\frac{n}{4}$
8 less than y	**y − 8**

5 EVALUATING EXPRESSIONS

Substitute the value, then use the order of operations.

Example: Evaluate $3x^2 - 4$ for x = 5.
Substitute: $3(5)^2 - 4 = 3 \cdot 25 - 4$
Answer: 71

6 QUICK REMINDERS & COMMON MISTAKES

✔ Do remember

- 3x means 3 times x.
- Exponents come before multiplying.
- “Less than” reverses the order: 8 less than y is y − 8.

✘ Common mistakes

- $2^3 = 6$: it is $2 \cdot 2 \cdot 2 = 8$
- Adding before multiplying: multiply first
- 8 less than y = 8 − y: y − 8

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More practice: equivalent expressions, one-step equations and variables

1 EQUIVALENT EXPRESSIONS

Use the distributive property and combine like terms.

Example: Simplify 4(x + 3) + 2x.
Distribute: 4x + 12 + 2x
Combine: 6x + 12

Answer: 6x + 12

2 PROPERTIES

Property	Example
Commutative	a + b = b + a
Associative	(ab)c = a(bc)
Distributive	a(b + c) = ab + ac
Identity	a + 0 = a, a · 1 = a

3 SOLVING ONE-STEP EQUATIONS

Undo the operation with its inverse. Do the same to both sides.

Example: x + 9 = 23
Subtract 9: x = 23 − 9

Answer: x = 14

4 MULTIPLICATION EQUATIONS

Divide both sides by the coefficient.

Example: 6m = 42
Divide by 6: $m = \frac{42}{6}$

Answer: m = 7

5 INDEPENDENT AND DEPENDENT VARIABLES

Situation	Independent → dependent
Hours worked → pay	h → p
Gallons bought → cost	g → c
Minutes running → distance	m → d

Rule example: p = 15h (pay depends on hours).

6 CHECK YOURSELF

- Did I use PEMDAS in order?
- Did I do the same thing to both sides?
- Did I check by substituting my answer?
- Did I combine only like terms?