Algebraic expressions and formulas - topic test

15 questions | 36 marks | 45 minutes

A progressive by-hand paper covering notation, expressions, brackets, substitution, equivalence and formula tables.

Equivalent correct methods earn the corresponding marks.

1. In $5x + 9$, name the variable. [1 mark]

The variable is the letter whose value can change.

Answer: x

2. What is the coefficient of a in $7a + 4$? [1 mark]

It is the number multiplying a.

Answer: 7

3. Write $6 \times b$ using algebraic shorthand. [1 mark]

Put the numerical coefficient before the variable.

Answer: $6b$

4. Write $p \times p \times p$ using a power. [1 mark]

The factor p appears three times.

Answer: p^3

5. Write four more than twice n. [2 marks]

Twice n is $2n$. Add 4.

Answer: $2n + 4$

6. Write five less than $3t$. [2 marks]

Start with $3t$, then subtract 5.

Answer: $3t - 5$

7. Evaluate $3m + 8$ when $m = 4$. [2 marks]

$3 \times 4 + 8 = 20$.

Answer: 20

8. Evaluate $x^2 + 3x$ when $x = 5$. [2 marks]

$5^2 + 3 \times 5 = 25 + 15 = 40$.

Answer: 40

9. Simplify $4a + 3a + 6$. [2 marks]

Combine the like terms; keep the constant.

Answer: $7a + 6$

10. Write $3(k + 2)$ without brackets. [2 marks]

There are three copies of k and three copies of 2.

Answer: $3k + 6$

11. Use $P = 2(l + w)$ for a rectangle 11 cm long and 4 cm wide. [2 marks]

$P = 2(11 + 4) = 30$ cm.

Answer: 30 cm

12. Badges cost $C = 2n + 7$ dollars. Find the cost for 9 badges and explain what 7 represents. [3 marks]

$2 \times 9 + 7 = 25$.

The 7 is added once, independently of the number of badges.

Answer: 25 dollars; a fixed charge of 7 dollars.

13. A snack pack contains a sandwich costing s dollars and a drink costing 3 dollars. Answer the parts. [6 marks]

(a) Write the cost of one pack. [1 mark]

Add the two costs.

Answer: $s + 3$ dollars.

(b) Write the cost of four equal packs. [2 marks]

One pack costs $s + 3$.

Multiply the whole cost by 4.

Answer: $4(s + 3)$ dollars.

(c) Find the cost of four packs when $s = 5$. [3 marks]

$4(5 + 3) = 4 \times 8 = 32$.

The cost is 32 dollars.

Answer: 32 dollars.

14. Oliver says $2(x + 6)$ is always $2x + 6$. Check $x = 3$ and correct the expression. [3 marks]

$2(3 + 6) = 18$.

$2 \times 3 + 6 = 12$.

Both copies of 6 must be counted.

Answer: False: 18 differs from 12. Correct expression: $2x + 12$.

15. Use the rule $y = 3x + 2$ to answer the parts. [6 marks]

(a) Find y for $x = 0$, 2 and 5. [3 marks]

$3 \times 0 + 2 = 2$.

$3 \times 2 + 2 = 8$.

$3 \times 5 + 2 = 17$.

Answer: 2, 8 and 17.

(b) Cell A2 holds x. Write a spreadsheet formula. No computer is needed. [1 mark]

Use A2 as the input and * for multiplication.

Answer: =3*A2+2

(c) How does y change if x increases by 1? Explain. [2 marks]

The coefficient multiplies the extra input by 3.

The constant 2 stays unchanged.

Answer: It increases by 3.