

WA7MNAA4

Algebraic techniques

Core + Challenge

Substitution

I can substitute values into algebraic expressions and everyday formulas, using the correct order of operations.

Name: _____ Date: _____ Score: _____ / 55

Key idea

Substitute means replace each letter with its value, then calculate. If $a = 3$ and $b = 5$: $2a + b = 2 \times 3 + 5 = 11$

Put back the hidden $\times$: $ab = a \times b = 15$ (not 35). $3a$ with $a = 4$ is $3 \times 4 = 12$.

Order of operations: brackets, then powers, then $\times$ and $\div$, then $+$ and $-$. With $x = 2$: $3x^2 = 3 \times 4 = 12$ but $(3x)^2 = 6^2 = 36$

Formulas: carry-on bag total $= l + w + d$; taxi cost $C = 4 + 2k$; temperature $F = 1.8C + 32$

A

Fluency *practise the skill*

/ 16 marks

Evaluate each expression when $a = 3$, $b = 5$ and $c = 2$.

1. $a + b =$ _____

9. $abc =$ _____

2. $4a =$ _____

10. $b^2 - a^2 =$ _____

3. $ab =$ _____

11. $10 - 2c =$ _____

4. $b - c =$ _____

12. $\frac{6a}{c} =$ _____

5. $2a + 3c =$ _____

13. $a + b \times c =$ _____

6. $a^2 =$ _____

14. $(a + b) \times c =$ _____

7. $\frac{(a+b)}{c} =$ _____

15. $2a^2 =$ _____

8. $3(b - a) =$ _____

16. $5c - a =$ _____

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B

Core *apply the skill to problems*

/ 21 marks

- 1 An airline allows carry-on bags where $l + w + d \leq 115$ cm. Mia's bag measures 56 cm by 36 cm by 23 cm. Is it allowed? [2 marks]

Answer: _____

- 2 A taxi fare is $C = 4 + 2k$ dollars, where k is the distance in km. Find the fare for 12.5 km. [2 marks]

Answer: _____

- 3 Use $P = 2l + 2w$ to find the perimeter of a rectangle with $l = 7.5$ cm and $w = 4$ cm. [2 marks]

Answer: _____

- 4 Convert 25°C to Fahrenheit using $F = 1.8C + 32$. [2 marks]

Answer: _____

- 5 A person's maximum heart rate is estimated as $220 - \text{age}$. What is it for a 13-year-old? [2 marks]

Answer: _____

- 6 The area of a triangle is $A = \frac{bh}{2}$. Find the area when $b = 12$ cm and $h = 7$ cm. [2 marks]

Answer: _____

- 7 Tickets cost $2a + 3c$ dollars for a family, where a = adult price and c = child price. Find the cost when $a = 24$ and $c = 15$. [2 marks]

Answer: _____

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- 8 A phone bill is $25 + 0.1t$ dollars for t texts. Find the bill for 180 texts. [2 marks]

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Answer:

- 9 The volume of a rectangular prism is $V = lwh$. Find V when $l = 2.5$ m, $w = 4$ m and $h = 3$ m. [2 marks]

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Answer:

- 10 Average speed is $s = \frac{d}{t}$. [3 marks]

(a) Find s when $d = 150$ km and $t = 2.5$ h.

(b) Find s when $d = 90$ km and $t = 1.5$ h.

(c) Which trip was faster?

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Answer:

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why $3a$ with $a = 4$ equals 12, not 34. [2 marks]

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- 2 When $x = 2$, evaluate $3x^2$ and $(3x)^2$. Explain why the answers are different. [3 marks]

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- 3 Tom says that when $n = 5$, $2n = 25$. Explain his mistake. [2 marks]

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- 4 Find a value of x for which $2x$ and x^2 are equal. Explain how you found it. [2 marks]

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D**Challenge** *multi-step and problem-solving*

/ 9 marks

- 1 If $p = 4$ and $q = 2p - 3$, find the value of $3q + p$. [2 marks]

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Answer: _____

- 2 Use substitution to find the whole number x that makes $5x - 3$ equal to 32. Show your trials. [2 marks]

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Answer: _____

- 3 The expression $n^2 + n + 41$ gives a prime number for $n = 1, 2, 3, \dots$. Show that it does **not** give a prime when $n = 40$. [3 marks]

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Answer: _____

- 4 When $a = 0.5$, which is largest: a^2 , $2a$, $\frac{1}{a}$ or $\frac{a}{2}$? Show the values. [2 marks]

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Answer: _____

How did I go?Fluency ____ / 16 Core ____ / 21 Reasoning ____ / 9 Challenge ____ / 9 **Total ____ / 55**

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