Unit 12 · Algebraic Expression

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 29

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Spot the errors

ANSWER U · 3

i. $3x$ and $2y$ are **unlike terms**, so they can't be joined: the answer is $\mathbf{3x + 2y}$ as it is.

ii. The minus before the bracket changes **every** sign inside it: $5a - 2b - 3a + b = \mathbf{2a - b}$. He took away b where he should have added it.

iii. Multiply the letters too: $x \times x = x^2$, so $2x \times 3x = \mathbf{6x^2}$.

MARKING SCHEME

✓ $3x + 2y$ can't be simplified.

✓ $2a - b$.

✓ $6x^2$.

2 Round a triangle

ANSWER A · 3

i. $2x + 3x + x + 3 - 1 + 5 = \mathbf{(6x + 7)\ cm}$.

ii. $6 \times 4 + 7 = \mathbf{31\ cm}$.

iii. The sides are $2 \times 4 + 3 = 11$, $3 \times 4 - 1 = 11$ and $4 + 5 = 9$: $11 + 11 + 9 = 31$ cm ✓

MARKING SCHEME

✓ $6x + 7$.

✓ 31 cm.

✓ Sides 11, 11 and 9, adding to 31.

3 What must be added?

ANSWER A · 3

i. Take $3a + 2b$ from $7a - b$: $7a - b - 3a - 2b = \mathbf{4a - 3b}$.

ii. $(3a + 2b) + (4a - 3b) = 7a - b$ ✓

iii. The same, $\mathbf{4a - 3b}$: $(7a - b) - (4a - 3b) = 7a - b - 4a + 3b = 3a + 2b$.

MARKING SCHEME

✓ $4a - 3b$.

✓ The check by adding.

✓ $4a - 3b$ again.

4 A rectangle of letters

ANSWER A · 3

i. $3x(2x + 5) = 3x \times 2x + 3x \times 5 = \mathbf{(6x^2 + 15x)\ cm^2}$.

ii. $6 \times 4 + 15 \times 2 = 24 + 30 = \mathbf{54\ cm^2}$. (Check: the sides are 6 cm and 9 cm, and $6 \times 9 = 54$.)

iii. $2(3x + 2x + 5) = 2(5x + 5) = \mathbf{(10x + 10)\ cm}$.

MARKING SCHEME

✓ $6x^2 + 15x$.

✓ 54 cm^2.

✓ $10x + 10$.

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5 The missing side

ANSWER A · 3

i. $(12a^2 + 8a) \div 4a = \frac{12a^2}{4a} + \frac{8a}{4a} = \mathbf{(3a + 2)\ cm}$.

ii. $4a(3a + 2) = 12a^2 + 8a$ ✓

iii. $3 \times 5 + 2 = \mathbf{17\ cm}$.

MARKING SCHEME

✓ $3a + 2$.

✓ $4a \times (3a + 2) = 12a^2 + 8a$.

✓ 17 cm.

6 Ages in letters

ANSWER HA · 4

i. Sister $x + 3$, father $4x$. Sum: $x + x + 3 + 4x = \mathbf{6x + 3}$.

ii. Each is 5 years older, so the sum grows by 15: $\mathbf{6x + 18}$.

iii. Now $6 \times 7 + 3 = \mathbf{45}$ years; in 5 years $6 \times 7 + 18 = \mathbf{60}$ years.

iv. **No.** In 5 years Lhakpa is 12 and his father $28 + 5 = 33$, but $4 \times 12 = 48$. The father gains 5 years, not 4×5.

MARKING SCHEME

✓ $x + 3$, $4x$ and the sum $6x + 3$.

✓ $6x + 18$.

✓ 45 and 60.

✓ No: 33 is not 4×12.

7 Values with a trap

ANSWER A · 3

i. $2 \times 9 - 3 \times 3 \times 2 + 4 = 18 - 18 + 4 = \mathbf{4}$.

ii. $2 \times 4 - 3 \times 2 \times 5 + 25 = 8 - 30 + 25$. Add first what is added: $8 + 25 = 33$, then $33 - 30 = \mathbf{3}$. (Going left to right, $8 - 30 = -22$ and $-22 + 25 = 3$ too.)

iii. He squared $2a$, getting $6^2 = 36$. The index belongs only to a: $2a^2 = 2 \times 3 \times 3 = 18$.

MARKING SCHEME

✓ 4.

✓ 3.

✓ The square is only on a: 18.

8 Make your own

ANSWER A · 3

For example, $\mathbf{3x - y}$ and $\mathbf{2x + 3y}$: $3x + 2x - y + 3y = 5x + 2y$ ✓

Any pair is right if the x terms add to $5x$, the y terms add to $2y$, and one of them has a minus sign.

MARKING SCHEME

✓ Two binomials, one with a minus sign.

✓ The x terms add to $5x$.

✓ The y terms add to $2y$.

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9 Think: the number trick

ANSWER HA · 4

i. For example, 4: 12, 18, 6, 2. And 10: 30, 36, 12, **2**.

ii. $3n$; $3n + 6$; $(3n + 6) \div 3 = n + 2$; $n + 2 - n = 2$.

iii. Dividing by 3 undoes the multiplying, so you have the number plus 2; taking away the number leaves **2**, whatever it was.

iv. Add **15** instead of 6: $(3n + 15) \div 3 = n + 5$, and $n + 5 - n = 5$.

MARKING SCHEME

- ✓ Two numbers tried, each giving 2.
- ✓ $3n + 6$ and $n + 2$.
- ✓ $n + 2 - n = 2$, so the number drops out.
- ✓ Add 15 (or another change that works).

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	18	8	**29**

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