Unit 3 · Integers

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 32

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

1 Up and down in a lift

ANSWER A · 4

i. **B1 = −1, B2 = −2, B3 = −3**: one, two and three floors below the ground floor, 0.
ii. From 2, down 4 is −2; up 1 is −1; down 2 is **−3**, the button **B3**.
iii. The floors between −3 and 5 are −2, −1, 0, 1, 2, 3 and 4: **7 floors**. (From B3 to floor 5 the lift goes 3 + 5 = 8 floors up.)

MARKING SCHEME

✓ −1, −2, −3.
✓ The moves followed on the number line.
✓ −3, button B3.
✓ 7 floors between them.

2 Spot the errors

ANSWER U · 3

i. **−8 > −3 is wrong.** −8 is further left on the number line than −3, so **−8 < −3**.
ii. **−8, −3, 0.**
iii. Of two negative numbers, the one further from 0 is the **smaller** one (the one further left). Owing Rs 8 is worse than owing Rs 3.

MARKING SCHEME

✓ −8 < −3.
✓ −8, −3, 0.
✓ The negative number further from 0 is smaller.

3 Who am I?

ANSWER A · 3

i. Greater than −4 and less than 3: **−3, −2, −1, 0, 1, 2**.
ii. To the left of the origin means negative: **−3, −2, −1**.
iii. −2 is 2 steps from 0, so I am more than 2 steps from 0: **−3**.

MARKING SCHEME

✓ −3, −2, −1, 0, 1, 2.
✓ −3, −2, −1.
✓ −3.

4 Counting the integers between

ANSWER A · 3

i. From −12 up to −1 is 12 integers, then 0, then 1 up to 8 is 8 more: 12 + 1 + 8 = **21**.
ii. From −19 up to −6: 19 − 6 + 1 = **14** integers.
iii. **Yes**, he is right: −3, −2, −1, 0, 1, 2, 3 are **7**. −4 and 4 are 8 steps apart, and between two integers 8 steps apart there are 8 − 1 = 7 marks.

MARKING SCHEME

✓ 21.
✓ 14.
✓ He is right: 7, with a reason.

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5 Halfway

ANSWER A · 4

i. 7 steps from A to 0, then 5 steps to B: $7 + 5 =$ **12 steps**.
ii. Half of 12 is 6. Six steps right of -7 is **-1** (and 6 steps left of 5 is -1 too). M $= -1$.
iii. M is 6 steps right of A, so C is 6 steps left of -7: **C $= -13$**.
iv. Descending means biggest first: **B (5), M (-1), A (-7), C (-13)**.

MARKING SCHEME

- ✓ 12 steps.
- ✓ M $= -1$.
- ✓ C $= -13$.
- ✓ 5, -1, -7, -13.

6 Always, sometimes or never?

ANSWER HA · 4

i. **Always.** Every negative integer is left of 0 and every positive one right of 0: $-100 < 1$.
ii. **Sometimes.** True for 9 and 2, but -9 is further from 0 than -2 and is the smaller one.
iii. **Sometimes.** Between -7 and -3 are -6, -5 and -4, but between -3 and -2 there is none.
iv. **Sometimes.** Halfway between -7 and 5 is -1, but halfway between -2 and 1 is no integer: they are 3 steps apart, and half of 3 steps lands between -1 and 0.

MARKING SCHEME

- ✓ i. Always, with an example.
- ✓ ii. Sometimes, with an example each way.
- ✓ iii. Sometimes, with -3 and -2 or a pair like it.
- ✓ iv. Sometimes, with an example each way.

7 Saving and owing

ANSWER A · 4

i. Aayush **+120**, Salina **−90**, Mingma **0**, Pasang **+35**, Kriti **−40**.
ii. **−90, −40, 0, 35, 120** (Salina, Kriti, Mingma, Pasang, Aayush).
iii. **Aayush's, +120**, 120 steps from 0 (Salina's -90 is 90 steps away). Yes, he is the richest, because he is furthest from 0 on the **right**. Salina is the next furthest from 0, but she is the poorest.
iv. From -40 to 0 is 40 steps, then 10 more to +10: **50 steps to the right**.

MARKING SCHEME

- ✓ The five integers.
- ✓ -90, -40, 0, 35, 120.
- ✓ Aayush, +120: furthest from 0 and on the right.
- ✓ 50 steps to the right.

8 Make your own

ANSWER A · 3

For example **−5, −1, 2, 3, 7**: all between -10 and 10; -5 and -1 are the only negative ones; no 0; from -5 to 7 is $5 + 7 = 12$ steps.
Any answer is right if every rule holds. (The smallest must be -3 or less, because the largest is less than 10, and the largest at least 3, because the smallest is more than -10.)

MARKING SCHEME

- ✓ Five different integers between -10 and 10, two negative, no 0.
- ✓ Smallest and largest 12 steps apart.
- ✓ In ascending order, with the rules checked.

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9 Think: from the bottom of the well

ANSWER HA · 4

i. Bottom of the well **−12**, top of the tank **+9**.

ii. 12 m up to the ground, then 9 m to the tank: 12 + 9 = **21 m**.

iii. From −10 to +9 is 10 + 9 = 19 m; from −4 to +9 is 4 + 9 = 13 m. The pump lifts it further in the **dry season**, by 19 − 13 = **6 m**, the distance from −10 to −4.

MARKING SCHEME

✓ −12 and +9.

✓ 21 m.

✓ 19 m in the dry season and 13 m in the rainy season.

✓ The dry season, by 6 m.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	21	8	**32**

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