Unit 4 · Ratio and Proportion

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 28

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

1 Two ratios into one

ANSWER HA · 3

i. $a : b = 8 : 12$ and $b : c = 12 : 15$, so $a : b : c =$ **8 : 12 : 15**.

ii. $8 + 12 + 15 = 35$ parts, and one part is $3500 \div 35 =$ Rs 100. They have **Rs 800, Rs 1,200 and Rs 1,500**.

MARKING SCHEME

✓ b made the same: 12 in both.

✓ 8 : 12 : 15.

✓ Rs 800, Rs 1,200 and Rs 1,500.

2 Money changes hands

ANSWER HA · 3

Let them have $7x$ and $3x$. Then $\frac{7x - 200}{3x + 200} = \frac{3}{2}$.

$2(7x - 200) = 3(3x + 200)$, so $14x - 400 = 9x + 600$, $5x = 1000$ and $x = 200$.

At first: **Alina Rs 1,400 and Salim Rs 600**. (Check: Rs 1,200 and Rs 800 are in the ratio 3 : 2. ✓)

MARKING SCHEME

✓ $(7x - 200) : (3x + 200) = 3 : 2$.

✓ $x = 200$.

✓ Rs 1,400 and Rs 600.

3 Mixing two mixtures

ANSWER A · 4

i. From A: $\frac{3}{4} \times 4 = 3$ liters of milk and 1 liter of water. From B: 1 liter of each. So **4 liters of milk and 2 liters of water**.

ii. $4 : 2 =$ **2 : 1**.

iii. The water must equal the milk, 4 liters, so add $4 - 2 =$ **2 liters**.

MARKING SCHEME

✓ 3 liters and 1 liter from A, 1 liter of each from B.

✓ 4 liters of milk and 2 liters of water.

✓ 2 : 1.

✓ 2 liters.

4 Find the number

ANSWER HA · 3

i. The product of the means equals the product of the extremes: $x^2 = 36$, so $x =$ **6**.

ii. $(3 + y)(9 + y) = (5 + y)(6 + y)$, so $27 + 12y + y^2 = 30 + 11y + y^2$, and $y =$ **3**.

(Check: 6 : 8 and 9 : 12 are both 3 : 4. ✓)

MARKING SCHEME

✓ $x = 6$.

✓ The extremes and means written for the new numbers.

✓ $y = 3$.

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5 Spot the error

ANSWER U · 3

12 isn't the total, it is the **difference**, and that is $5 - 3 = 2$ parts. (Half a child should have warned him.)

One part $= 12 \div 2 = 6$. Boys: **18**, girls: **30**.

MARKING SCHEME

- ✓ The mistake: 12 is the difference, not the total.
- ✓ The difference is 2 parts, so one part is 6.
- ✓ 18 boys and 30 girls.

6 In a real setting

ANSWER A · 4

i. 6 parts, and one part is $48 \div 6 = 8$ liters: **24 liters of soil, 16 of compost and 8 of sand**.

ii. 2 parts of compost are 12 liters, so one part is 6 liters. The mix is $6 \times 6 =$ **36 liters**, with **18 liters of soil and 6 of sand**.

MARKING SCHEME

- ✓ 24, 16 and 8 liters.
- ✓ One part is 6 liters, from the compost.
- ✓ 36 liters of mix.
- ✓ 18 liters of soil and 6 of sand.

7 Are they in proportion?

ANSWER HA · 3

i. **No.** 130 : 2 and 210 : 4 are not equal. Double the distance, from 2 km to 4 km, and the fare doesn't double ($2 \times 130 = 260$, not 210).

ii. Every 2 km adds Rs 80, so **Rs 40** a kilometer.

iii. For 2 km the distance costs Rs 80, so the rest is $130 - 80 =$ **Rs 50**.

MARKING SCHEME

- ✓ No, the ratio isn't the same.
- ✓ Rs 40 a kilometer.
- ✓ Rs 50.

8 Think

ANSWER HA · 3

3 : 5 = 0.6, 4 : 6 = 0.67, 5 : 7 = 0.71, 6 : 8 = 0.75: the ratio **rises towards 1** and never reaches it.

From 5 : 3 it **falls towards 1**: 1.67, 1.5, 1.4, 1.33.

The two numbers always differ by 2, and 2 becomes a smaller and smaller part of them, so they look more and more equal.

MARKING SCHEME

- ✓ The decimals, rising towards 1.
- ✓ From 5 : 3 the ratio falls towards 1.
- ✓ The difference stays 2 while the numbers grow.

9 Make your own

ANSWER HA · 2

For example, 2 : 3 : 4. There are 9 parts, and one part is Rs 80: Rs 160, Rs 240 and Rs 320, with $320 = 2 \times 160$. (1 : 1 : 2 and 1 : 2 : 2 work too.)

MARKING SCHEME

- ✓ A ratio with the largest number twice the smallest.
- ✓ The three shares, whole numbers that add up to Rs 720.

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See it at Science Playground

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- **The Fibonacci Spiral** (exhibit): Its squares' sides are 1, 1, 2, 3, 5, 8: the ratios of neighbors, 3 : 2, 5 : 3, 8 : 5, come ever closer to about 1.618, the golden ratio.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	8	17	**28**

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