Unit 6 · Ratio and Proportion

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 33

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 · 4

i. **4 : 1.** Change both to minutes first: 120 minutes : 30 minutes = 4 : 1.

ii. $\frac{3}{8}$ of the class are girls: 3 girls in every 3 + 5 = 8 students. $\frac{3}{5}$ compares girls with boys, not with the class.

iii. **Not in proportion**: $2 \times 16 = 32$ and $5 \times 6 = 30$ are not equal.

iv. **5 : 2.** The order matters: Rs 500 comes first. 2 : 5 is the ratio the other way round.

MARKING SCHEME

- ✓ i. 4 : 1, in the same unit.
- ✓ ii. 3/8: a ratio of parts is not a fraction of the whole.
- ✓ iii. Not in proportion: $32 \neq 30$.
- ✓ iv. 5 : 2: keep the order.

2 Simplest forms

ANSWER U · 4

a. Multiply both terms by 6: **3 : 2**.

b. 250 g : 750 g = **1 : 3**.

c. 150 cm : 45 cm = divide by 15: **10 : 3**.

d. 45 minutes : 90 minutes = **1 : 2**.

MARKING SCHEME

- ✓ a. 3 : 2.
- ✓ b. 1 : 3.
- ✓ c. 10 : 3.
- ✓ d. 1 : 2.

3 Whose tea is milkier?

ANSWER A · 4

i. Ashish $\frac{3}{2} = 1.5$, Kritika $\frac{5}{4} = 1.25$: **Ashish's** is milkier, with more milk for each cup of water.

ii. Ashish: $\frac{3}{3+2} = \frac{3}{5}$. Kritika: $\frac{5}{5+4} = \frac{5}{9}$. ($\frac{3}{5} = 0.6 > 0.56$, the same answer.)

iii. She needs 3 : 2 :: x : 4, so $2x = 12$ and $x = 6$ cups of milk. She has 5: **1 more cup**.

MARKING SCHEME

- ✓ i. 3/2 and 5/4: Ashish's.
- ✓ ii. 3/5 and 5/9.
- ✓ iii. The proportion 3 : 2 :: x : 4, x = 6.
- ✓ iii. 1 more cup.

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4 Sharing, backwards

ANSWER A · 4

i. Swastika has 5 parts and Nirjala 4: the difference is **1 part**, Rs 600.
ii. 4 + 5 = 9 parts: 9 × 600 = **Rs 5,400**.
iii. Nirjala 4 × 600 = **Rs 2,400**, Swastika 5 × 600 = **Rs 3,000**.
iv. Both have Rs 2,700: **1 : 1**.

MARKING SCHEME

✓ i. 1 part = Rs 600.
✓ ii. Rs 5,400.
✓ iii. Rs 2,400 and Rs 3,000.
✓ iv. 1 : 1.

5 A class that changes

ANSWER HA · 4

i. 12 parts = 48, 1 part = 4: **28 boys** and **20 girls**.
ii. **8 girls**, to make 28 : 28.
iii. 32 : 24 = **4 : 3**, not 7 : 5. Adding the same number to both terms changes the ratio.
iv. The boys stay 28. 4 : 5 :: 28 : x, so $4x = 140$ and $x = 35$ girls: **15 girls** must join.

MARKING SCHEME

✓ i. 28 boys, 20 girls.
✓ ii. 8 girls.
✓ iii. 32 : 24 = 4 : 3, not the same.
✓ iv. 35 girls needed: 15 join.

6 A bigger photo

ANSWER A · 3

i. 10 : 15 :: 24 : x, so $10x = 15 \times 24 = 360$ and $x =$ **36 cm**.
ii. **No.** The photo is 10 : 15 = 2 : 3, the frame 12 : 20 = 3 : 5. The ratios are not equal ($2 \times 5 = 10$, $3 \times 3 = 9$), so the shapes differ.

MARKING SCHEME

✓ i. The proportion set up.
✓ i. 36 cm.
✓ ii. No: 2 : 3 is not equal to 3 : 5.

7 Four numbers, many proportions

ANSWER HA · 3

i. For example **3 : 4 :: 6 : 8** ($3 \times 8 = 24 = 4 \times 6$) and **3 : 6 :: 4 : 8** ($3 \times 8 = 24 = 6 \times 4$). Others: 4 : 3 :: 8 : 6, 8 : 6 :: 4 : 3, …
ii. The extremes and the means must be two pairs with equal products. The three ways to pair the numbers give $3 \times 4 = 12$ and $6 \times 9 = 54$; $3 \times 6 = 18$ and $4 \times 9 = 36$; $3 \times 9 = 27$ and $4 \times 6 = 24$. No two products are equal.

MARKING SCHEME

✓ i. A first proportion, checked.
✓ i. A second, different proportion, checked.
✓ ii. All three pairings tested: no equal products.

8 Make your own

ANSWER

For example:

i. 40 cm : 0.6 m = 40 : 60 = 2 : 3. (Or 1 kg : 1,500 g.)
ii. 2 : 3 :: 10 : 15 ($2 \times 15 = 30 = 3 \times 10$), or 2 : 5 :: 6 : 15.

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iii. "Rs 800 is shared in the ratio 3 : 5. How much is each share?" 8 parts = Rs 800, so Rs 300 and Rs 500. **A · 3**

Any correct answers are right.

MARKING SCHEME

- ✓ i. Two quantities, changed to one unit, giving 2 : 3.
- ✓ ii. A proportion with 2 and 15 outside, checked.
- ✓ iii. A problem with 3 : 5, solved.

9 Think: add the same to both

ANSWER **HA · 4**

i. **No.** $2 : 3 = \frac{2}{3}$ is not $\frac{1}{2}$ ($1 \times 3 \neq 2 \times 2$).

ii. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$: it gets **closer and closer to 1**, but never reaches it.

iii. Only ratios whose two terms are **equal**, 1 : 1. For example, 5 : 5 becomes 8 : 8, still 1 : 1.

iv. 3 : 6 = 1 : 2: **yes**. Multiplying both terms makes each the same number of **times** bigger, so they still compare in the same way. Adding makes each the same number of **units** bigger, which is a bigger share of the small term than of the big one.

MARKING SCHEME

- ✓ i. 2 : 3, not equal.
- ✓ ii. The fractions get closer to 1.
- ✓ iii. Only 1 : 1.
- ✓ iv. Yes, with a reason.

See it at Science Playground

Exhibits and plants at the center, Bhaktapur, that go with this unit. Book a class visit at science-playground.com/booking.

- **Build a Gear Train** (exhibit): Count the teeth on a big gear and a small one, and write their ratio in its simplest form. It compares two numbers of the same kind, so it has no unit.
- **Growing Dominoes** (exhibit): Each domino is about the same number of times taller than the one before, roughly 1.5, so first : second :: second : third: the heights are in proportion.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	8	14	11	**33**

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