Unit 6 · Unitary Method

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 Direct, indirect or neither?

ANSWER A · 4

i. p: $2 \times 30 = 3 \times 20 = 6 \times 10 = 60$, the **product** stays the same, so **indirect**.
q: $9 \div 2 = 13.5 \div 3 = 27 \div 6 = 4.5$, the **ratio** stays the same, so **direct**.
r: the ratios (2.5, 2.33…, 2.17) and the products (10, 21, 78) both change, so **neither**. Double x from 3 to 6, and r doesn't double or halve.
ii. $p = 60 \div 5 = \mathbf{12}$ and $q = 4.5 \times 5 = \mathbf{22.5}$.

MARKING SCHEME

- ✓ p indirect, since the product is 60.
- ✓ q direct, since the ratio is 4.5.
- ✓ r neither.
- ✓ $p = 12$ and $q = 22.5$.

2 Halfway through the job

ANSWER HA · 4

The whole job is $12 \times 20 = 240$ person-days.
i. Done in 8 days: $12 \times 8 = 96$. Left: $240 - 96 = \mathbf{144\ person\text{-}days}$.
ii. 8 workers remain: $144 \div 8 = \mathbf{18\ days}$.
iii. $8 + 18 = \mathbf{26\ days}$, which is **6 days late**.

MARKING SCHEME

- ✓ 240 person-days in all.
- ✓ 144 left.
- ✓ 18 more days.
- ✓ 26 days, 6 days late.

3 Three quantities

ANSWER A · 4

i. Fewer pumps, so more time: $\times \frac{6}{4}$. More water, so more time: $\times \frac{240000}{180000}$.

$5 \times \frac{6}{4} \times \frac{4}{3} = \mathbf{10\ hours}$.

ii. From i., 4 pumps take 10 hours. Less time, so more pumps: $4 \times \frac{10}{8} = \mathbf{5\ pumps}$.

MARKING SCHEME

- ✓ The pumps' ratio turned over, $\frac{6}{4}$.
- ✓ The water's ratio, $\frac{4}{3}$.
- ✓ 10 hours.
- ✓ 5 pumps.

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4 Men and boys

ANSWER HA · 3

Count everyone in boys: 4 men are as good as 6 boys.
So 4 men and 3 boys are 9 boys, and the field needs $9 \times 10 = 90$ boy-days.
2 men and 9 boys are $3 + 9 = 12$ boys, so they take $90 \div 12 =$ **7.5 days**.

MARKING SCHEME

- ✓ The first team is 9 boys, so 90 boy-days.
- ✓ The second team is 12 boys.
- ✓ 7.5 days.

5 Spot the error

ANSWER U · 3

She has treated masons and days as varying directly, and her answer says that fewer masons finish sooner. It is indirect: one mason takes **longer** than five, not less.
One mason: $12 \times 5 = 60$ days. Three masons: $60 \div 3 =$ **20 days**.

MARKING SCHEME

- ✓ The mistake: the variation is indirect, not direct.
- ✓ One mason takes 60 days.
- ✓ 20 days.

6 Making up the time

ANSWER A · 3

Planned time: $240 \div 40 = 6$ hours. The first 120 km took 3 hours and the wait 1 hour, so 2 hours are left.
It has 120 km to go in 2 hours: $120 \div 2 =$ **60 km per hour**.
(Or: the 3 hours planned for this part become 2, so the speed is $40 \times \frac{3}{2} = 60$.)

MARKING SCHEME

- ✓ Planned time 6 hours.
- ✓ 2 hours are left.
- ✓ 60 km per hour.

7 In a real setting

ANSWER A · 4

i. $57600 \div (8 \times 6) =$ **Rs 1,200**.
ii. 5 workers earn $5 \times 1200 =$ Rs 6,000 a day: $102000 \div 6000 =$ **17 days**.
iii. New wage: Rs 1,500, so 5 workers earn Rs 7,500 a day. $102000 \div 7500 = 13.6$, so **14 whole days**.

MARKING SCHEME

- ✓ Rs 1,200.
- ✓ 17 days.
- ✓ New wage Rs 1,500, and Rs 7,500 a day.
- ✓ 14 days, rounded up.

8 Think

ANSWER HA · 2

A shirt can't be shared out among 120 people: they would get in each other's way, and each step must wait for the one before it.
"More workers, less time" works only when the job **can be divided** into parts that people can do at the same time, at the same pace, like 120 shirts among 120 tailors.

MARKING SCHEME

- ✓ The job can't be divided among so many people.
- ✓ The method needs a job that can be shared equally, with all working at the same pace.

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9 Make your own

HA · 2

ANSWER

For example: “4 students cover 60 books in 3 hours. How long do 6 students take to cover 120 books?”

More books, so more time; more students, so less time: $3 \times \frac{120}{60} \times \frac{4}{6} = 4$ hours.

MARKING SCHEME

- ✓ A problem with one direct and one indirect quantity.
- ✓ The right ratios and a whole-number answer.

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 and turns of two meshed gears: the one with fewer teeth turns more, because teeth × turns is the same for both.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	15	11	**29**

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