Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- the class width is 20, so $30 \div 20$

$$= \mathbf{1.5}$$

2.2

- frequency = density $\times$ width $= 2.4 \times 5$

$$= \mathbf{12}$$

2.3

- the classes have unequal widths
- using density makes the AREA of each bar proportional to its frequency, so a wide class is not made to look more common than it is

2.4

- frequency density $= \dfrac{\text{frequency}}{\text{class width}} = \dfrac{45}{15} = \mathbf{3}$

2.5

- frequency = frequency density $\times$ class width
- P: $2 \times 10 = \mathbf{20}$; Q: $4 \times 5 = \mathbf{20}$ – the same, although Q is twice as tall

3.1

(a)

- widths are 10, 15, 20 and 30
- $15 \div 10 = \mathbf{1.5}$
- $30 \div 15 = \mathbf{2}$
- $24 \div 20 = \mathbf{1.2}$ and $18 \div 30 = \mathbf{0.6}$

(b)

- the modal class has the greatest frequency DENSITY, which is 2

$$\mathbf{10 < t \leqslant 25}$$

- it is not the class with the greatest frequency in this table – $25 < t \leqslant 45$ has a frequency of 24 but a density of only 1.2

3.2

- width = 10, so frequency $= 3.5 \times 10$

$$= \mathbf{35}$$

3.3

- $25 < t \leqslant 45$ is 20 seconds wide; 35 to 45 is half of it, so about $\frac{1}{2} \times 24 = 12$
- add all 18 in $45 < t \leqslant 75$: $12 + 18 = \mathbf{30}$ runners

3.4

- frequency = frequency density $\times$ class width for each bar
- $1.5 \times 10 = 15$, $3.2 \times 10 = 32$, $1.1 \times 20 = 22$, $0.4 \times 20 = 8$
- total $= 15 + 32 + 22 + 8 = \mathbf{77}$

3.5

- first class: frequency density $= \dfrac{18}{10} = 1.8$, drawn 7.2 cm tall, so 1 unit $= 7.2 \div 1.8 = 4$ cm
- second class: frequency density $= \dfrac{12}{20} = 0.6$
- height $= 0.6 \times 4 = \mathbf{2.4}$ cm