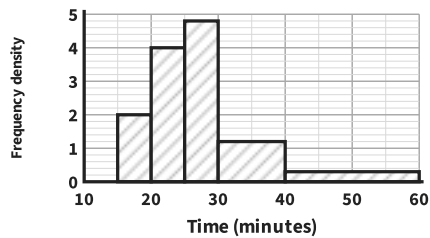


1

The histogram shows the times of the runners in a 6 km fun run. Estimate how many ran at an average speed over 15 km/h.



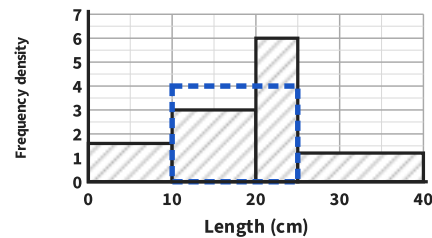
15 km/h: 6 km in 24 minutes, so under 24

$$5 \times 2 + 4 \times 4 = 10 + 16$$

Answer 26 runners

2

The classes $10 < x \leq 20$ and $20 < x \leq 25$ are joined into one class. How tall is its bar? Why is it not halfway between 3 and 6?



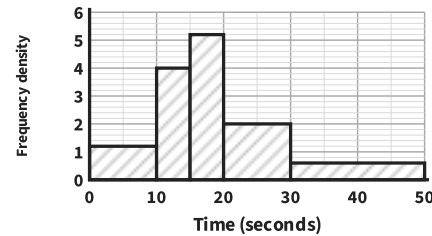
$$10 \times 3 + 5 \times 6 = 60 \text{ in a width of } 15: \\ 60 \div 15 = 4$$

the classes are not the same width

Height 4

3

The histogram shows how long 90 people took to solve a puzzle. Estimate the median time.



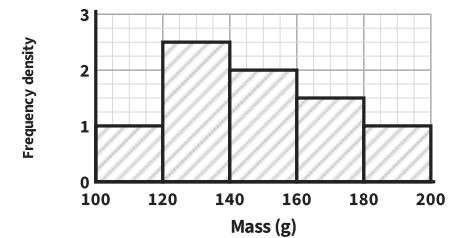
$$45\text{th: } 12 + 20 = 32, \text{ so } 13 \text{ more into} \\ 15 < t \leq 20$$

$$13 \div 5.2 = 2.5: 15 + 2.5$$

Median 17.5 seconds

4

The histogram shows the masses of 160 apples from farm A. At farm B, 54 of 120 apples are over 150 g. A shop wants apples over 150 g. Which farm suits it better?



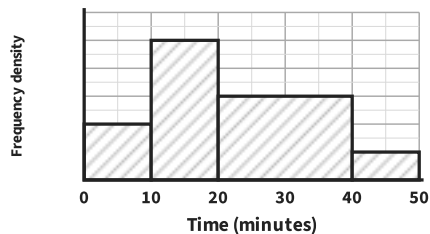
$$A: 10 \times 2 + 30 + 20 = 70 \text{ of } 160 = 43.75\%$$

B: 54 of 120 = 45%: fewer, but a bigger share

Answer B: 45% against 43.75%

5

The frequency density axis has no scale. There are 24 more people in $20 < t \leq 40$ than in $0 < t \leq 10$. How many people are there altogether?



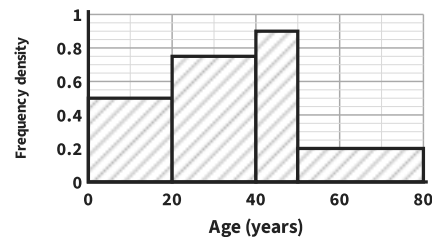
$$\text{Squares: } 8, 20, 24, 4; 24 - 8 = 16 \text{ squares is } 24 \text{ people}$$

$$1 \text{ square} = 1.5 \text{ people: } 56 \times 1.5$$

Answer 84 people

6

The histogram shows the ages of 40 people on a coach trip. Two are picked at random. Find the probability that both are over 40.



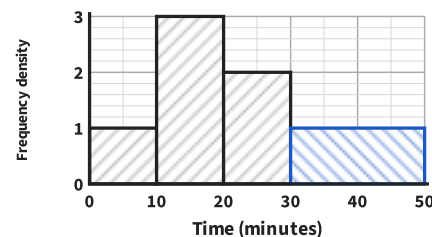
$$\text{Over } 40: 9 + 6 = 15$$

$$\frac{15}{40} \times \frac{14}{39} = \frac{7}{52}$$

Probability $\frac{7}{52}$

7

The bar for $30 < t \leq 50$ is missing. The estimated mean of all the times is 22.5 minutes. Find the height of the missing bar.



$$(50 + 450 + 500 + 40 \times 2h) \div (60 + 2h) \\ = 22.5$$

$$1000 + 80h = 1350 + 45h, h = 1$$

Height 1

8

Every bar of a histogram has the same height. Prove that the estimated median is halfway between the lowest and highest class boundaries.

$$\text{Height } h, \text{ from } a \text{ to } b: \text{area } h(b-a)$$

$$\text{Half the area lies left of } m: \\ h(m-a) = \frac{1}{2}h(b-a)$$

$$m-a = \frac{1}{2}(b-a), \text{ so } m = (a+b) \div 2$$

Proof the median is $(a+b) \div 2$