

P39/P40- Histograms

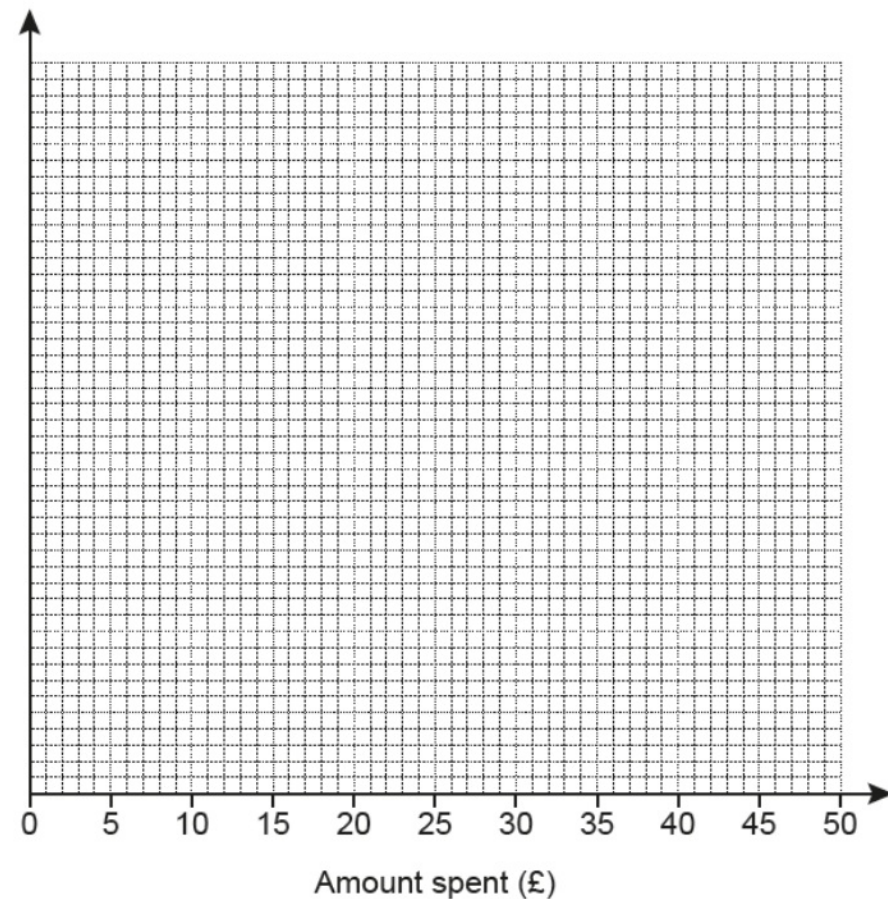
OCR

10 Ana records the amount of money spent by 140 customers in her shop on one day.

Video created by W Neill

Amount spent (£ a)	Frequency
$0 < a \leq 5$	35
$5 < a \leq 10$	42
$10 < a \leq 15$	20
$15 < a \leq 20$	18
$20 < a \leq 30$	14
$30 < a \leq 50$	11

(a) Draw a histogram to represent this information.



10 Ana records the amount of money spent by 140 customers in her shop on one day.

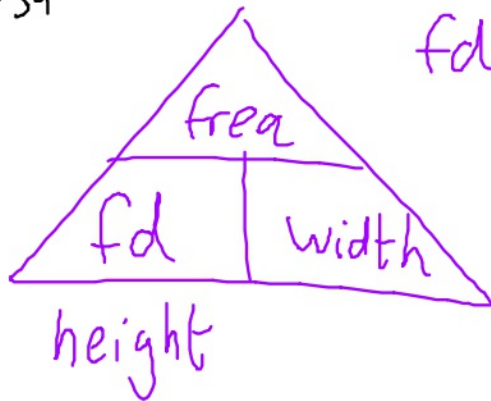
Video created by W Neill

Amount spent (£a)	Frequency	fd
$0 < a \leq 5$	35	7
$5 < a \leq 10$	42	8.4
$10 < a \leq 15$	20	4
$15 < a \leq 20$	18	3.6
$20 < a \leq 30$	14	1.4
$30 < a \leq 50$	11	0.55

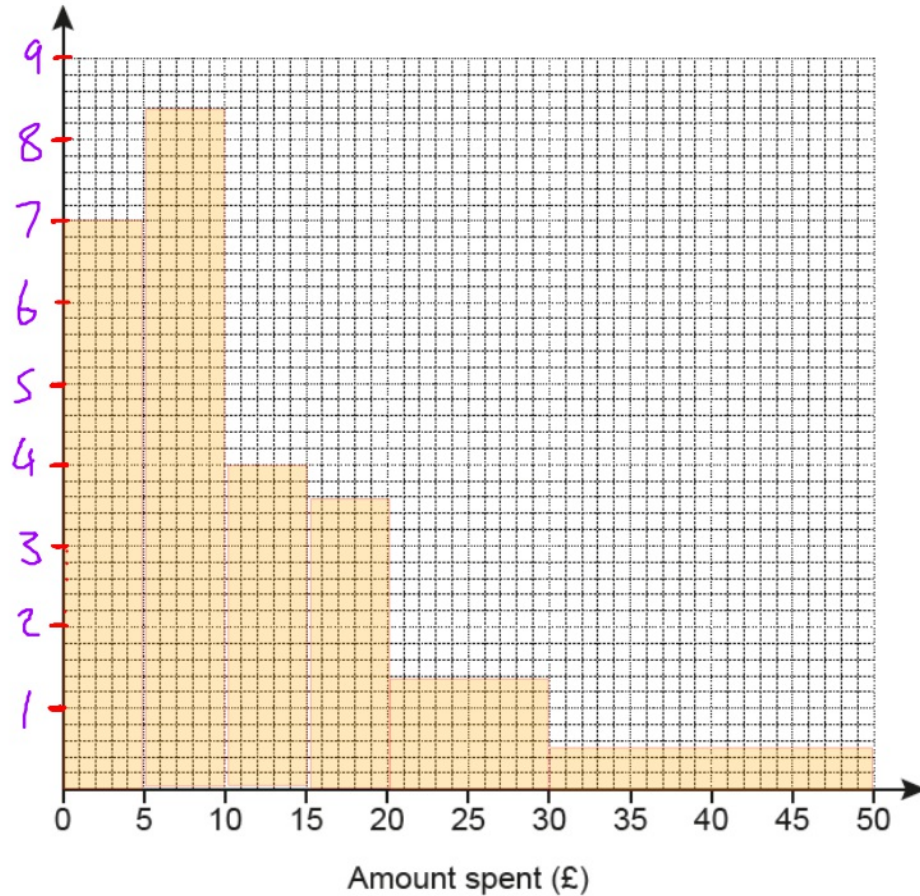
(a) Draw a histogram to represent this information.

fd

p39

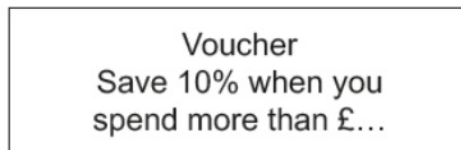


$$fd = \frac{frea}{width}$$



Amount spent (£ a)	Frequency
$0 < a \leq 5$	35
$5 < a \leq 10$	42
$10 < a \leq 15$	20
$15 < a \leq 20$	18
$20 < a \leq 30$	14
$30 < a \leq 50$	11

(b) Ana wants to offer a discount to the customers who spend the most money in her shop.



She wants to give the discount to approximately 25% of her customers.

Suggest a suitable amount of money for Ana to use on her voucher.
Justify your decision.

..... [4]

Amount spent (£a)	Frequency
$0 < a \leq 5$	35
$5 < a \leq 10$	42
$10 < a \leq 15$	20
$15 < a \leq 20$	18
$20 < a \leq 30$	14
$30 < a \leq 50$	11

140 customers

25% of 140 = 35 customers

↑ 10 customers
25 ↑
✓ 11 ↑

$$\frac{10}{18} = \frac{5}{9}$$

(b) Ana wants to offer a discount to the customers who spend the most money in her shop.

P40

Voucher
Save 10% when you
spend more than £...

$$\frac{5}{9} \text{ of } £5 = £2.77$$

She wants to give the discount to approximately 25% of her customers.

$$£20 - £2.77$$

Suggest a suitable amount of money for Ana to use on her voucher.
Justify your decision.

$$= £17.22 \checkmark$$

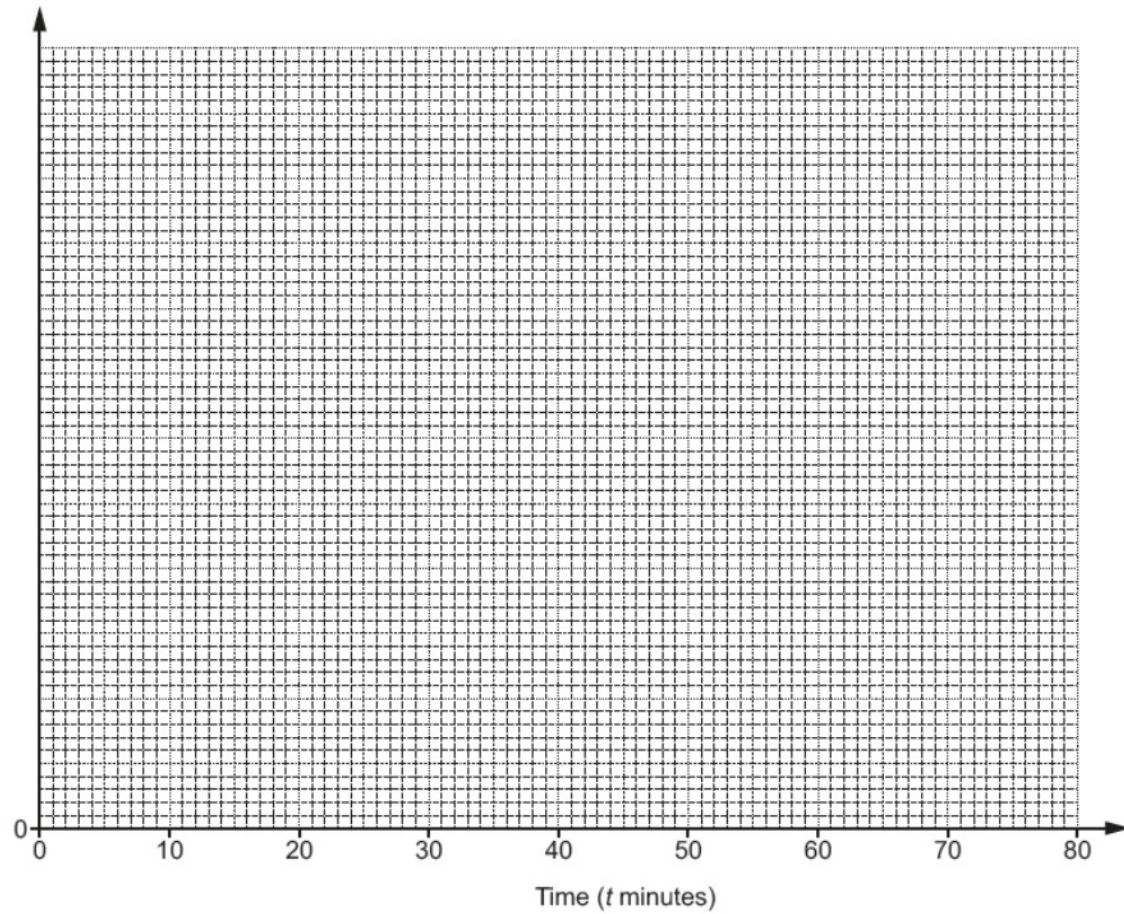
$$£17 - £18$$

19 Ceri records the time taken, t minutes, to travel to school for a sample of 168 students at her Academy.

Created by W Neill

P39/40

Time taken (t minutes)	Frequency
$0 < t \leq 10$	54
$10 < t \leq 20$	50
$20 < t \leq 40$	44
$40 < t \leq 80$	20

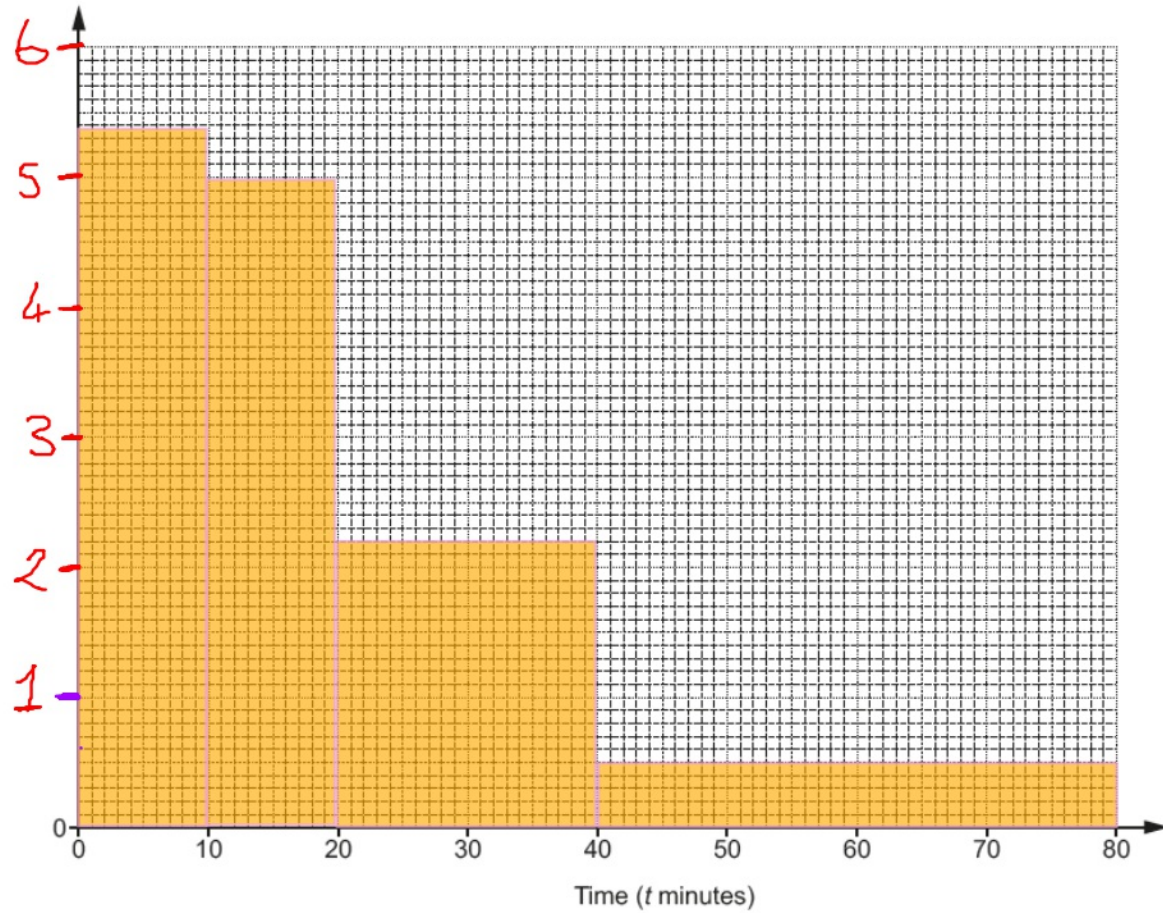
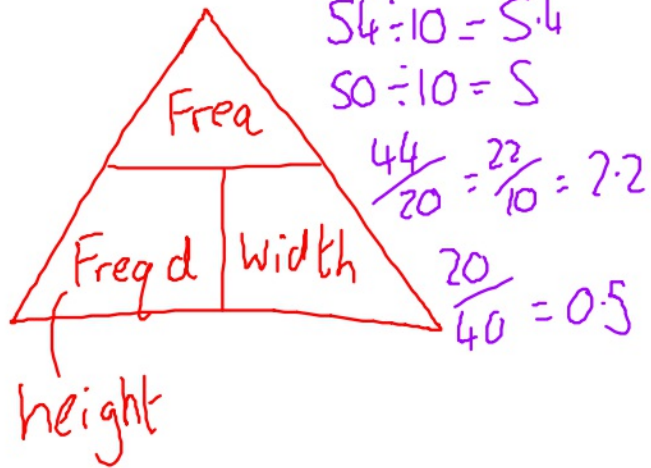


19 Ceri records the time taken, t minutes, to travel to school for a sample of 168 students at her Academy.

Created by W Neill

P39/40

Time taken (t minutes)	Frequency	fd
$0 < t \leq 10$	54	5.4
$10 < t \leq 20$	50	5
$20 < t \leq 40$	44	2.2
$40 < t \leq 80$	20	0.5



(b) Ceri says

The longest time that any of these students took to travel to school was 80 minutes.

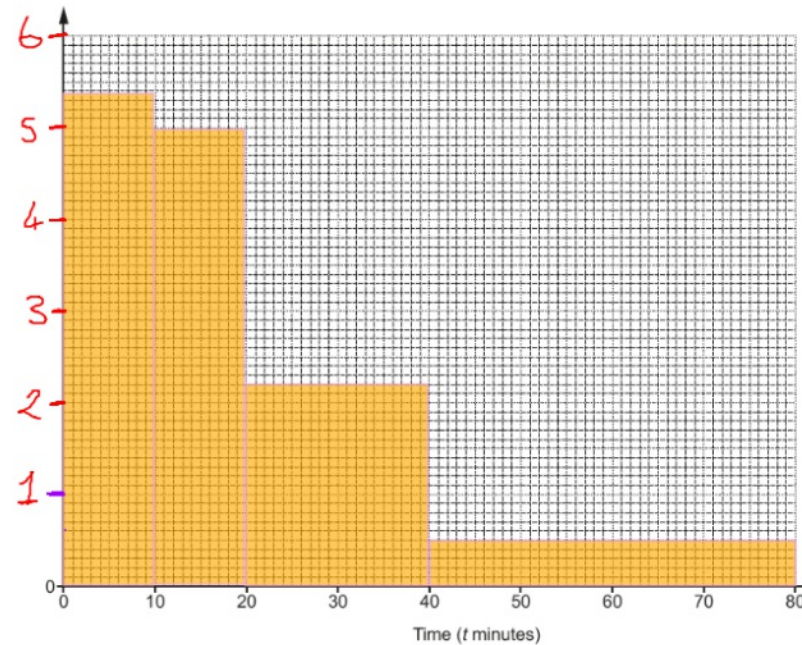
Is she correct?

Give a reason for your answer.

.....

..... [1]

Time taken (t minutes)	Frequency
$0 < t \leq 10$	54
$10 < t \leq 20$	50
$20 < t \leq 40$	44
$40 < t \leq 80$	20



(b) Ceri says

The longest time that any of these students took to travel to school was 80 minutes.

Is she correct?

Give a reason for your answer.

Don't know. When it gives a range for time it does not tell you within that range how long each person took. [1]

(c) Ceri also claims that 25% of all of the students at this Academy took more than 30 minutes to travel to school.

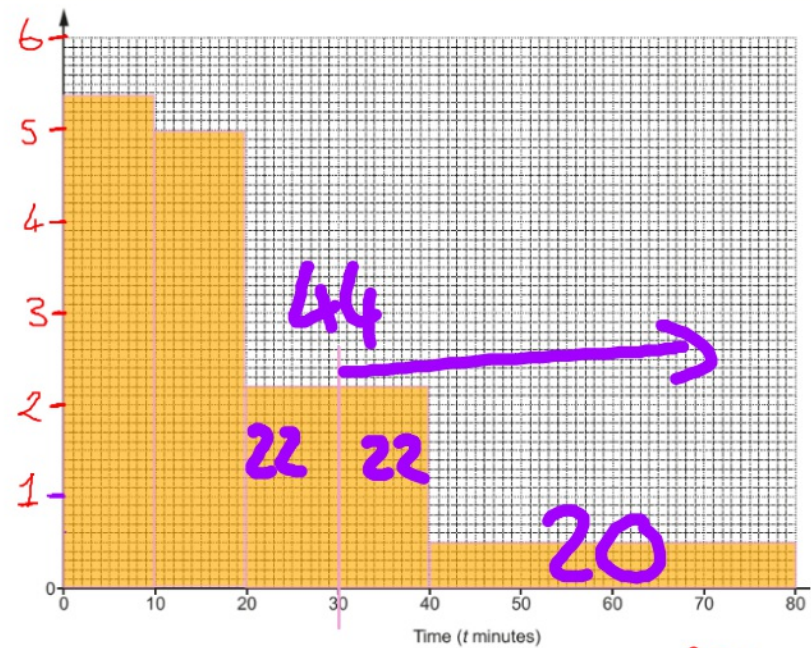
(i) Show how Ceri might have worked out her claim. [2]

(ii) State one assumption that Ceri has made in making her claim.

.....
..... [1]

Time taken (t minutes)	Frequency
$0 < t \leq 10$	54
$10 < t \leq 20$	50
$20 < t \leq 40$	44
$40 < t \leq 80$	20

$$\frac{42}{168} = \frac{1}{4} = 25\%$$



(c) Ceri also claims that 25% of all of the students at this Academy took more than 30 minutes to travel to school.

(i) Show how Ceri might have worked out her claim. ✓

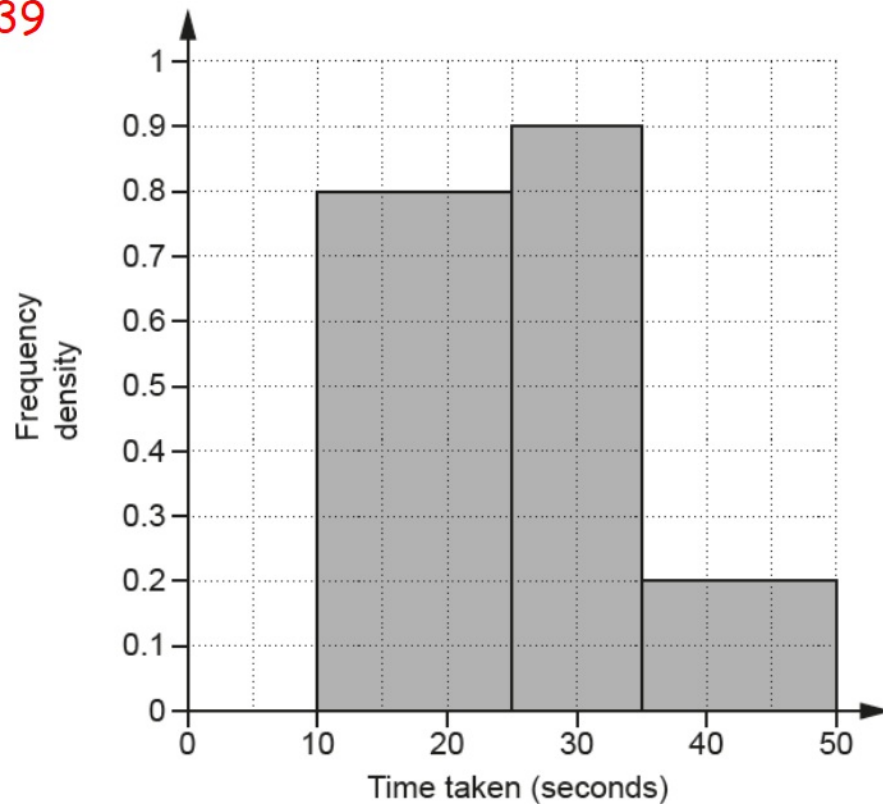
[2]

(ii) State one assumption that Ceri has made in making her claim.

She has assumed the range is consistently spread and 30 is exactly half way of 20=40. [1]

- 12 30 students completed a puzzle and their times were recorded. All of the students completed the puzzle in less than 50 seconds. The histogram shows information about some of their times.

P39

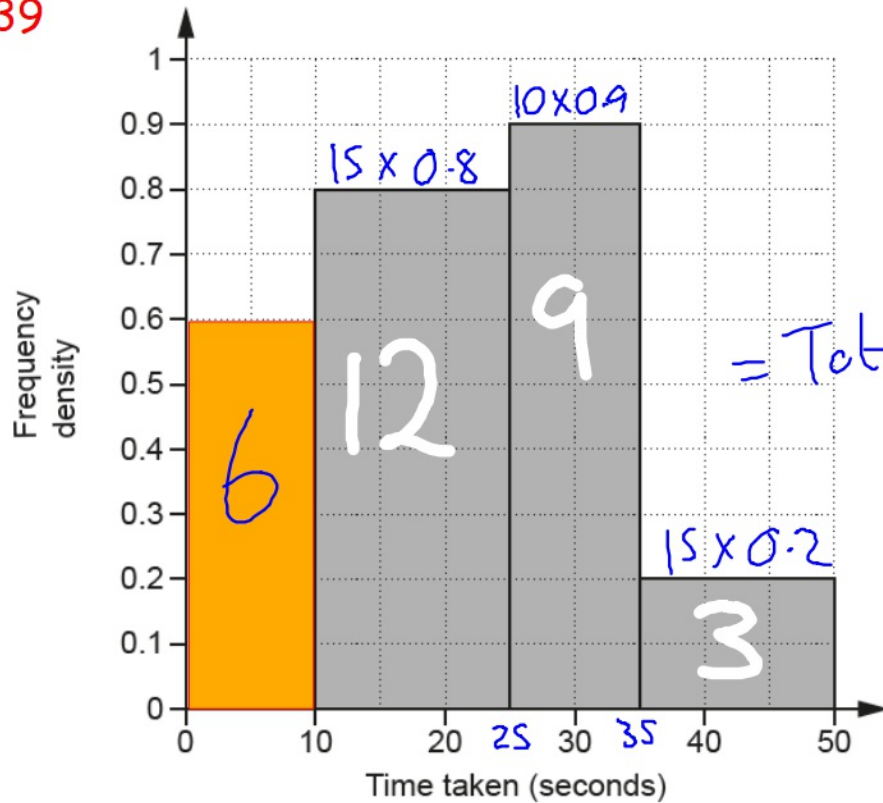


Complete the histogram for those completing the puzzle in less than 10 seconds.

[5]

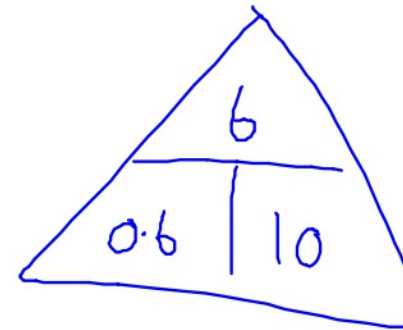
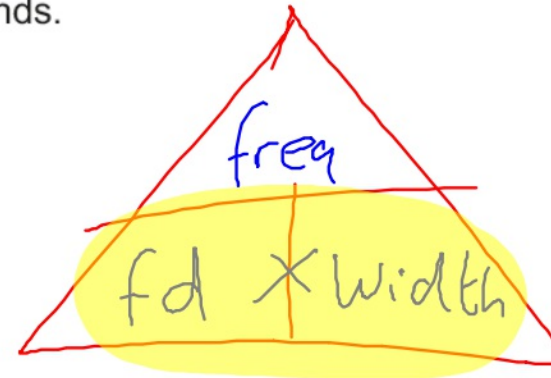
12 30 students completed a puzzle and their times were recorded. All of the students completed the puzzle in less than 50 seconds. The histogram shows information about some of their times.

P39



= Total

$$\begin{array}{r} 12 \\ + 9 \\ + 3 \\ \hline 24 \end{array}$$



Complete the histogram for those completing the puzzle in less than 10 seconds.

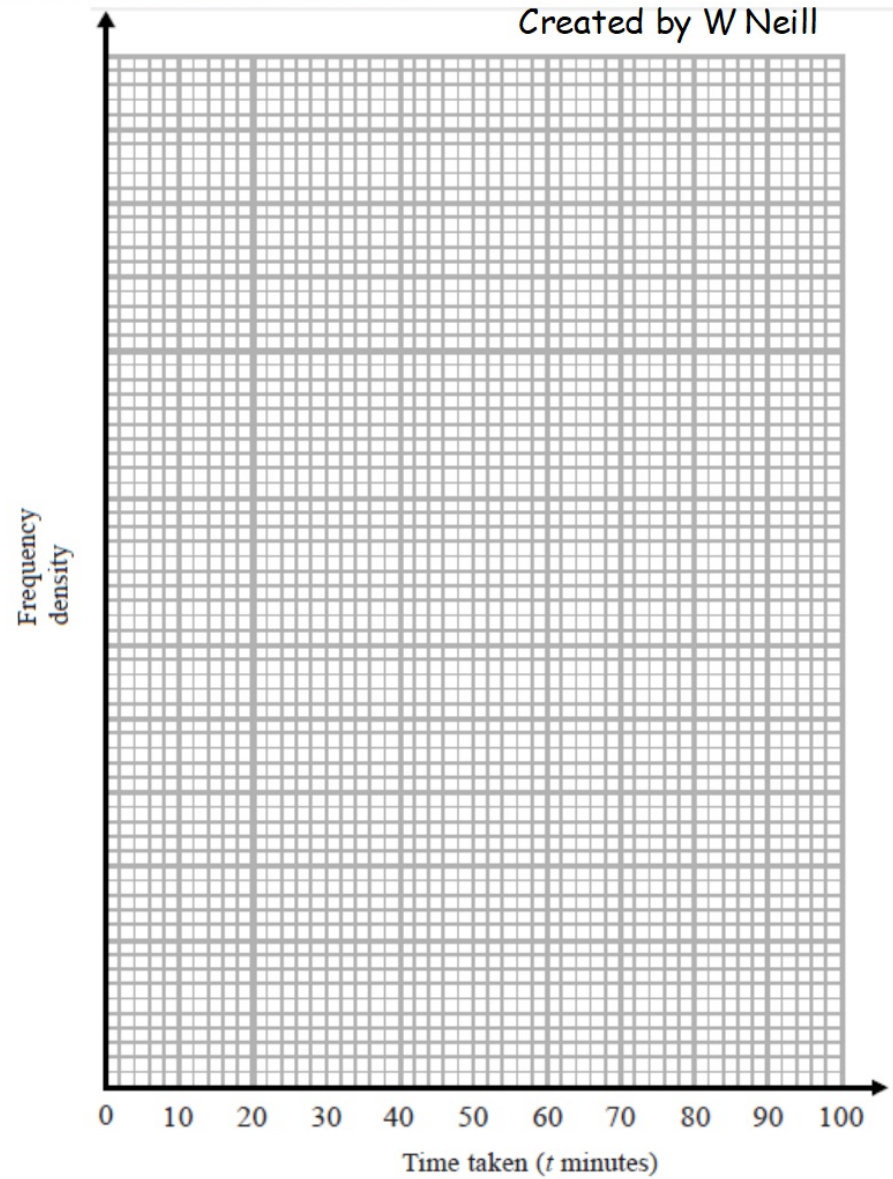
[5]

Edexcel

15 The table shows information about the times a group of students took to do a park run.

Draw a histogram for this information.

Time taken (t minutes)	Frequency
$0 < t \leq 25$	20
$25 < t \leq 45$	35
$45 < t \leq 60$	45
$60 < t \leq 75$	87
$75 < t \leq 85$	10
$85 < t \leq 95$	8



15 The table shows information about the times a group of students took to do a park run.

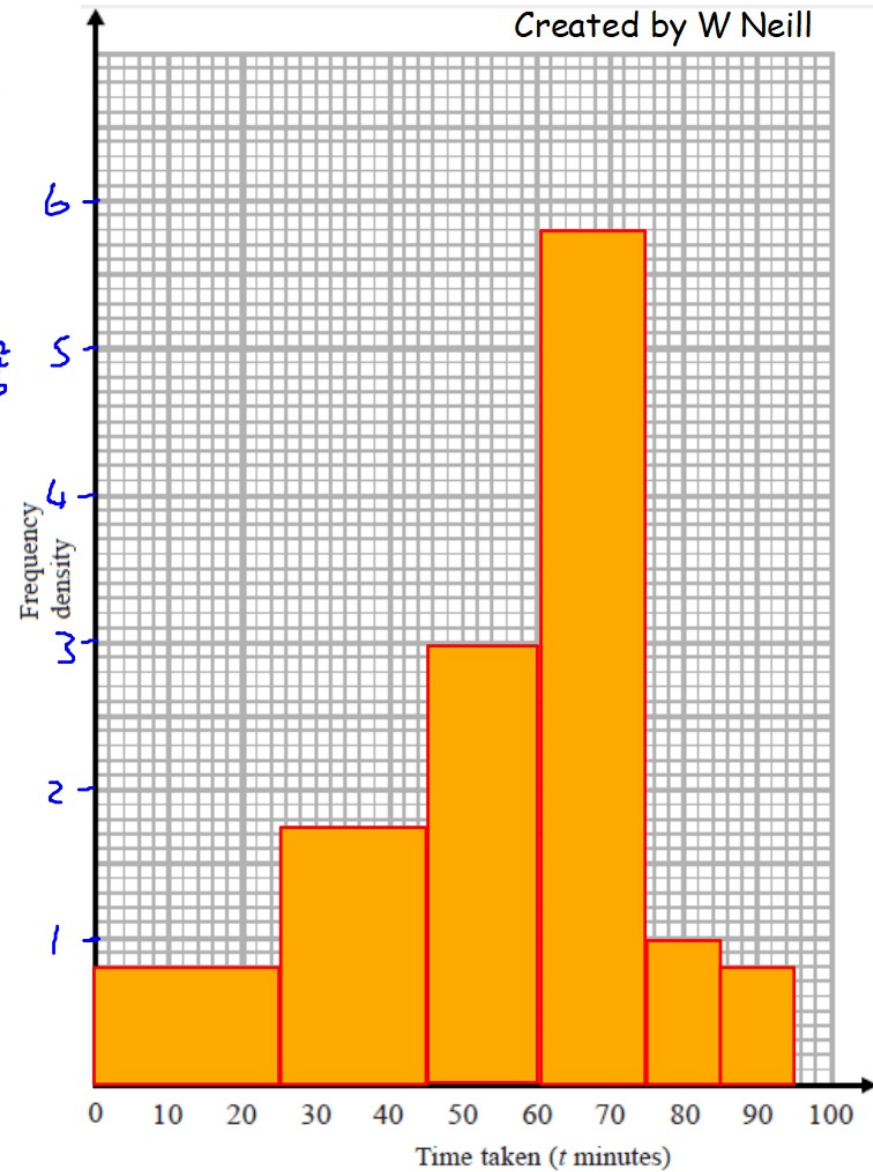
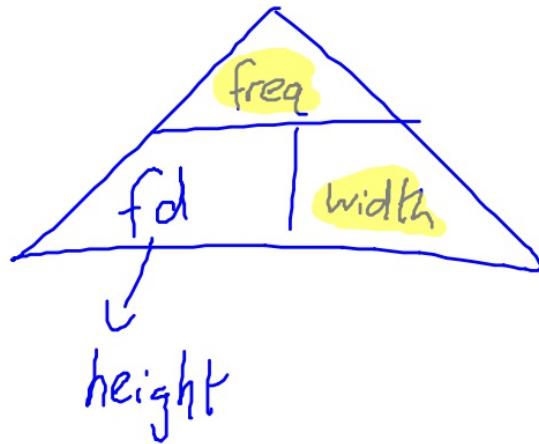
Draw a histogram for this information.

Time taken (t minutes)	Frequency
$0 < t \leq 25$	20
$25 < t \leq 45$	35
$45 < t \leq 60$	45
$60 < t \leq 75$	87
$75 < t \leq 85$	10
$85 < t \leq 95$	8

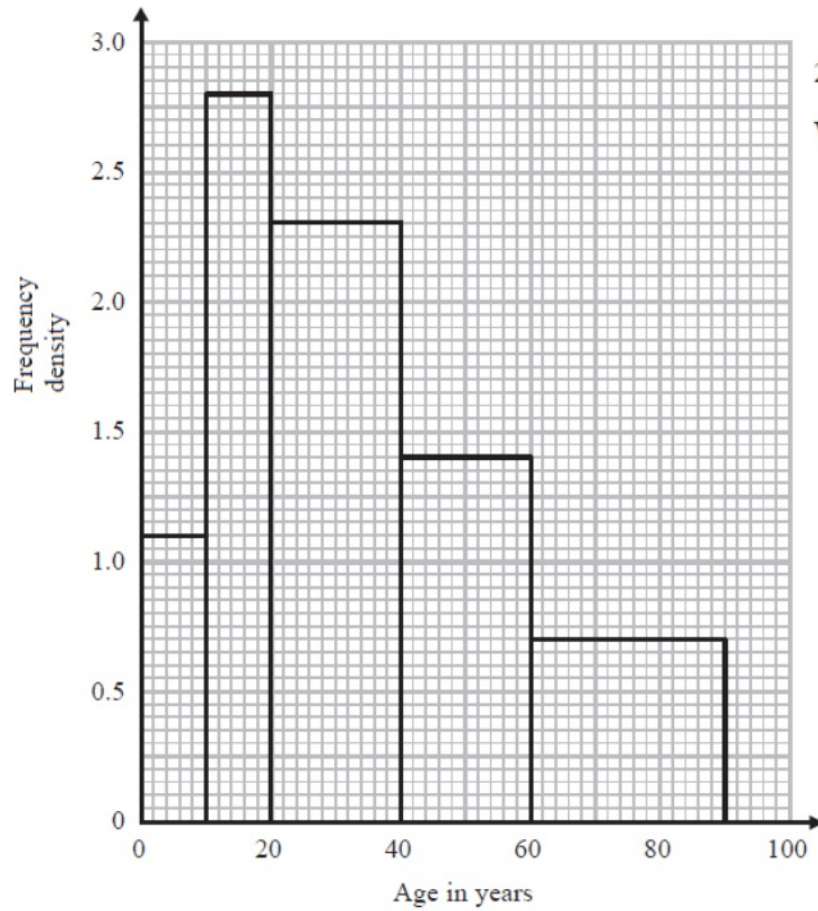
Handwritten calculations for frequency density (fd):

- 0.8
- 1.75
- 3
- 5.8
- 1
- 0.8

A vertical bracket on the right side of these calculations is labeled "fd".



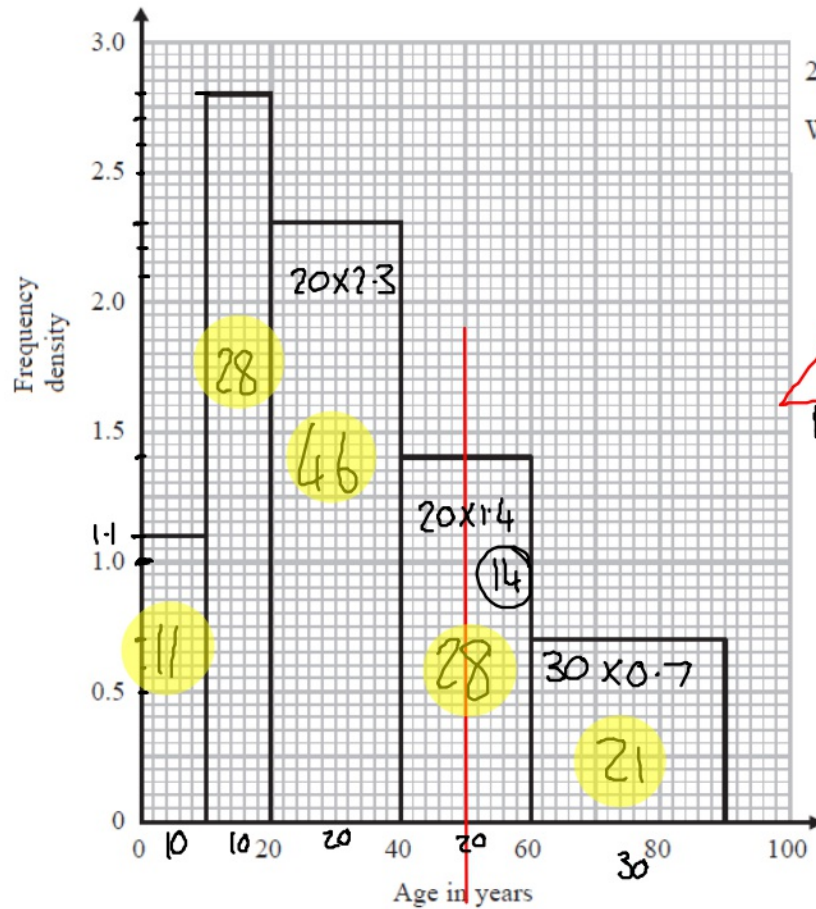
13 The histogram shows some information about the ages of the 134 members of a sports club.



20% of the members of the sports club who are over 50 years of age are female.

Work out an estimate for the number of female members who are over 50 years of age.

13 The histogram shows some information about the ages of the 134 members of a sports club.



20% of the members of the sports club who are over 50 years of age are female.

Work out an estimate for the number of female members who are over 50 years of age.



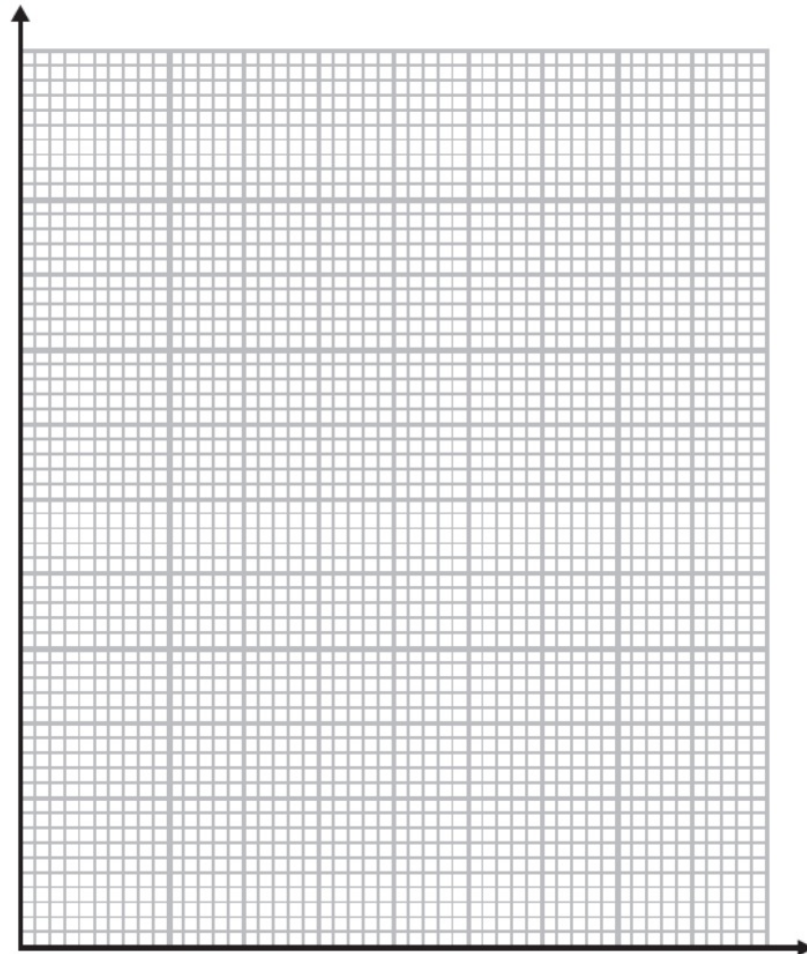
$$14 + 21 = 35 \text{ people over 50}$$

$$20\% \text{ of } 35 = \underline{7 \text{ female}} \checkmark$$

17 The table gives information about the heights of 150 students.

(a) On the grid, draw a histogram for this information.

Height (h cm)	Frequency
$140 < h \leq 150$	15
$150 < h \leq 155$	30
$155 < h \leq 160$	51
$160 < h \leq 165$	36
$165 < h \leq 180$	18



(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

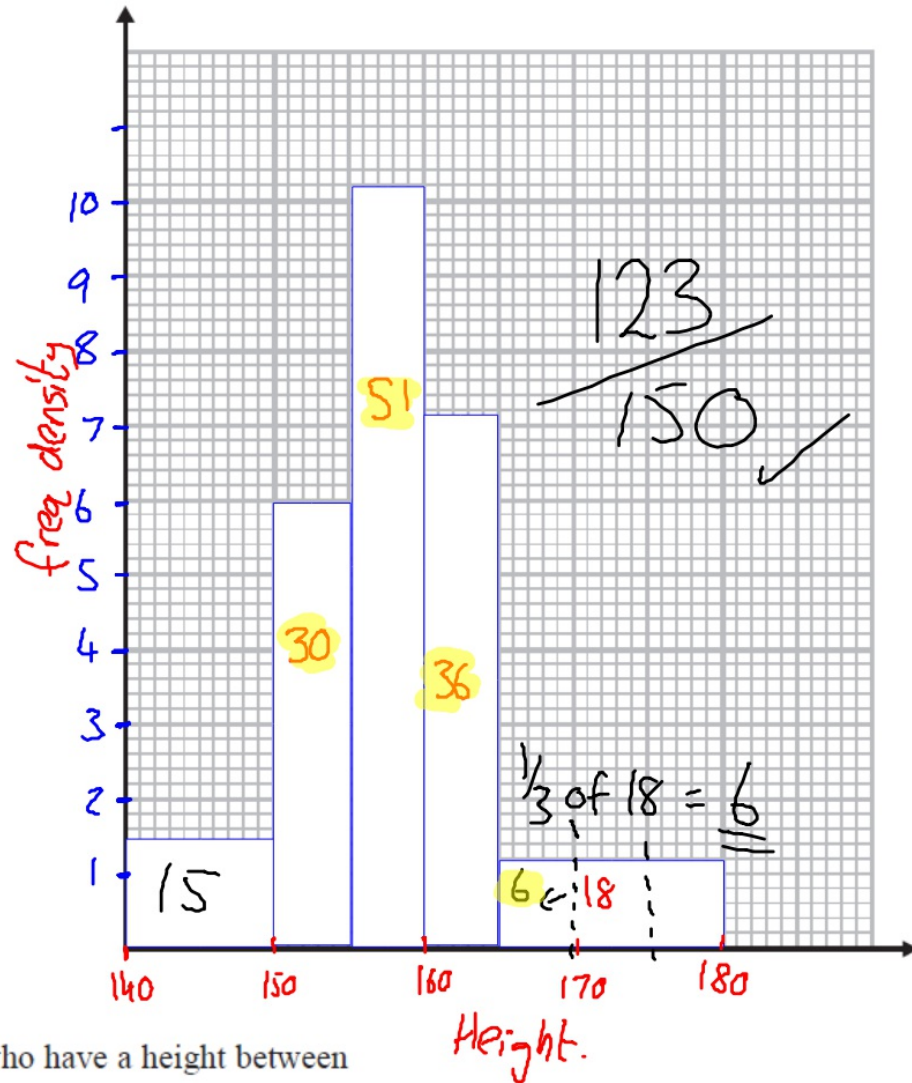
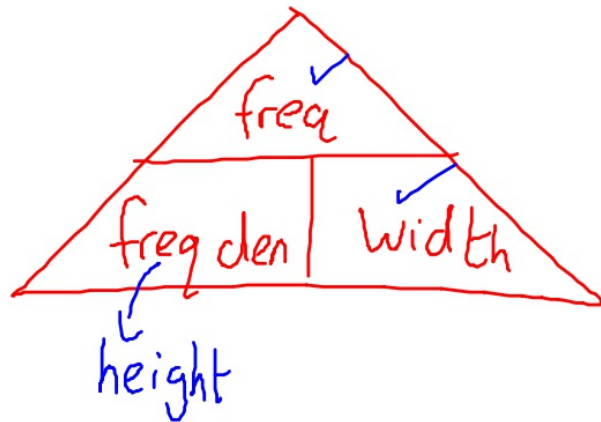
.....|.....

(2)

17 The table gives information about the heights of 150 students.

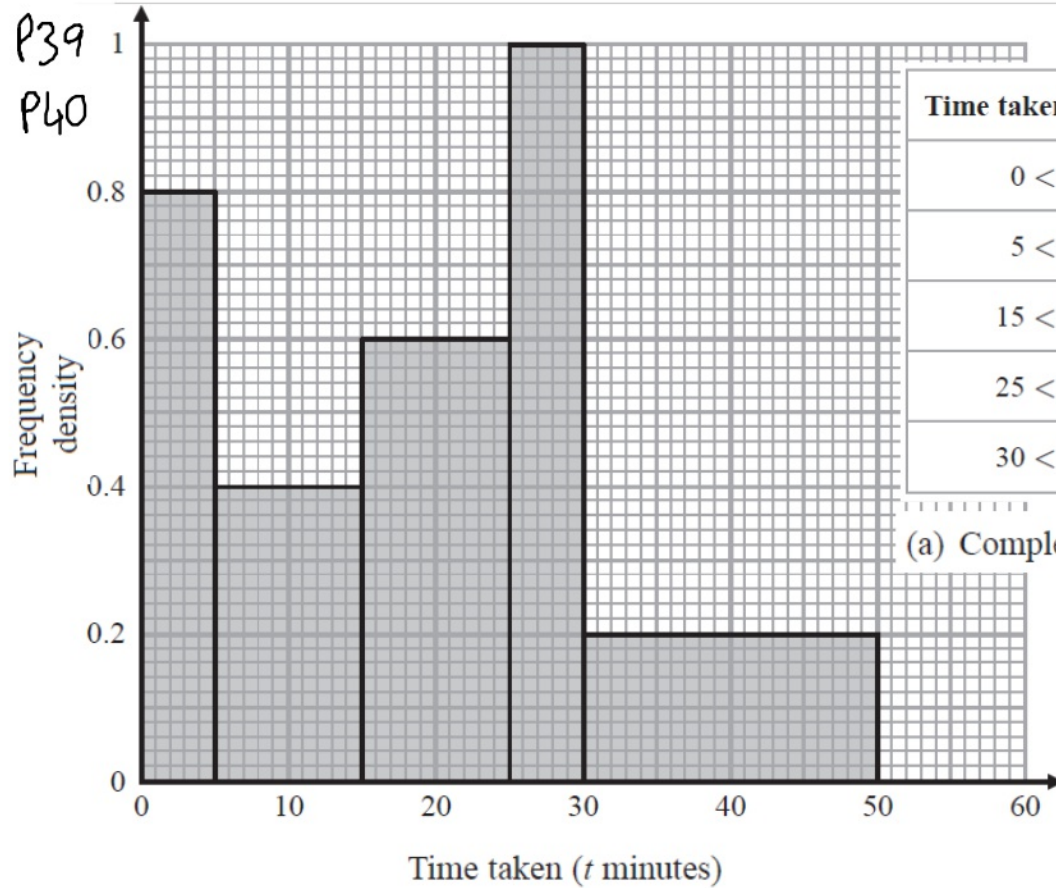
(a) On the grid, draw a histogram for this information.

Height (h cm)	Frequency	FD
$140 < h \leq 150$	15	1.5
$150 < h \leq 155$	30	6
$155 < h \leq 160$	51	10.2
$160 < h \leq 165$	36	7.2
$165 < h \leq 180$	18	1.2



(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

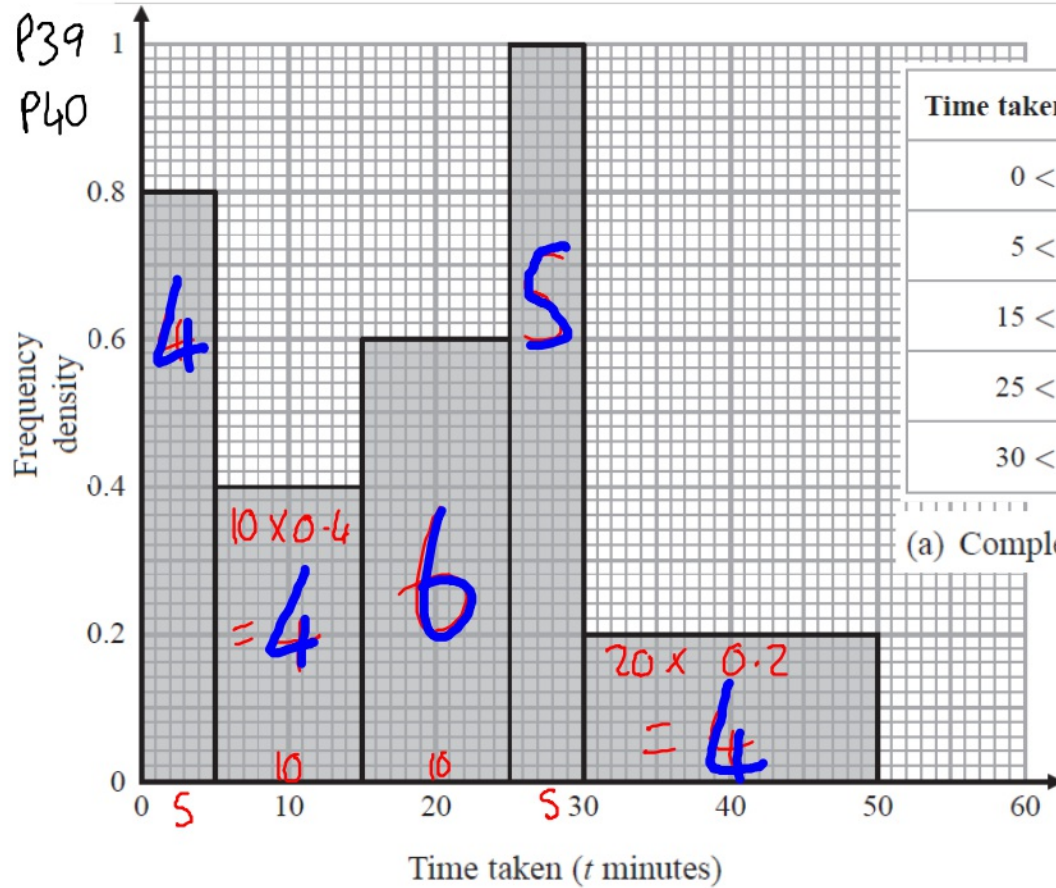
17 The histogram shows information about the times taken by some students to finish a puzzle.



Time taken (t minutes)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 15$	
$15 < t \leq 25$	
$25 < t \leq 30$	
$30 < t \leq 50$	

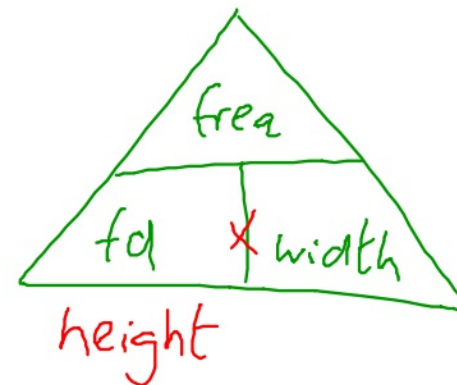
(a) Complete the frequency table for this information.

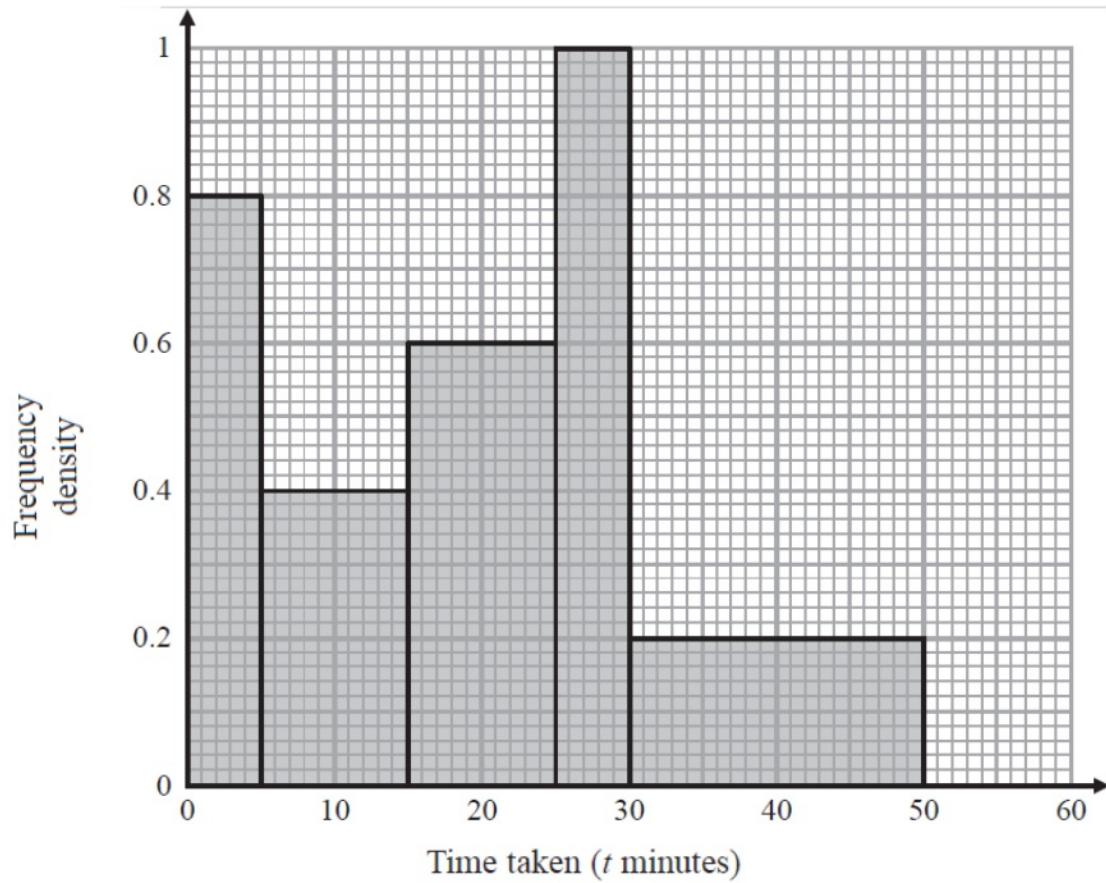
17 The histogram shows information about the times taken by some students to finish a puzzle.



Time taken (t minutes)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 15$	4
$15 < t \leq 25$	6
$25 < t \leq 30$	5
$30 < t \leq 50$	4

(a) Complete the frequency table for this information.

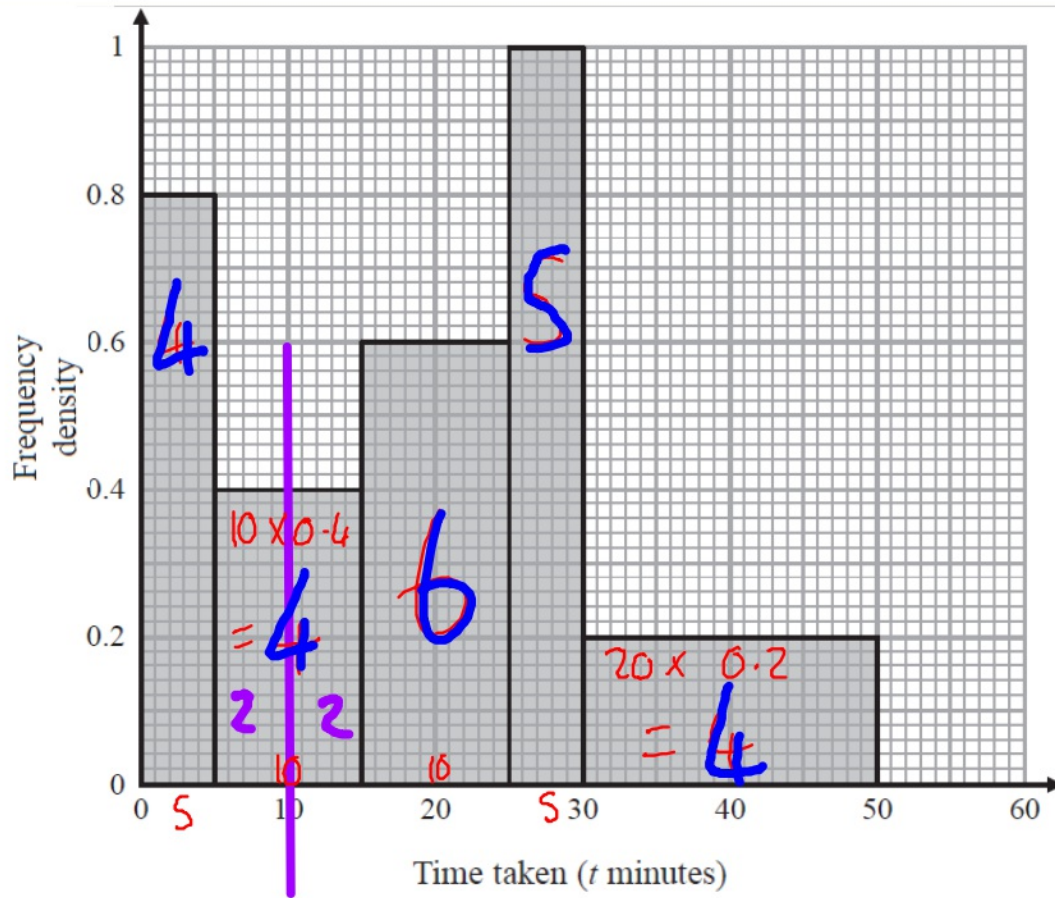




(b) Find an estimate for the lower quartile of the times taken to finish the puzzle.

P40

..... minutes
(2)



$$\begin{aligned} \text{Total} &= 4 + 4 + 6 + 5 + 4 \\ &= 23 \text{ people} \end{aligned}$$

$$\begin{aligned} LQ &= \frac{1}{4}(23 + 1) \\ &= \frac{1}{4}(24) \\ &= 6^{\text{th}} \text{ person} \end{aligned}$$

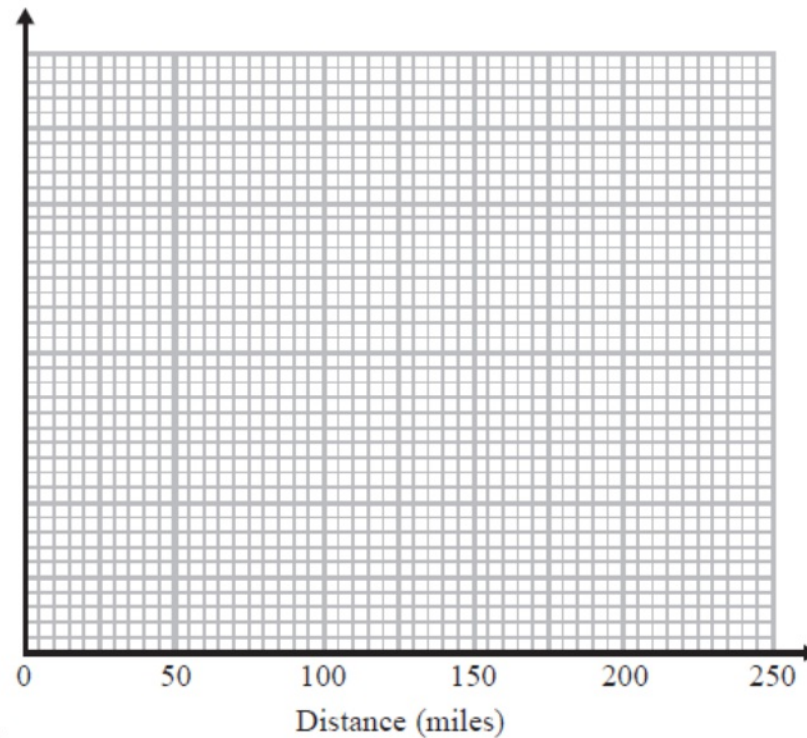
(b) Find an estimate for the lower quartile of the times taken to finish the puzzle.

P40

10 minutes
(2)

17 The table shows information about the distances 570 students travelled to a university open day.

Distance (d miles)	Frequency
$0 < d \leq 20$	120
$20 < d \leq 50$	90
$50 < d \leq 80$	120
$80 < d \leq 150$	140
$150 < d \leq 200$	100



(a) Draw a histogram for the information in the table.

(3)

P39

(b) Estimate the median distance.

..... miles

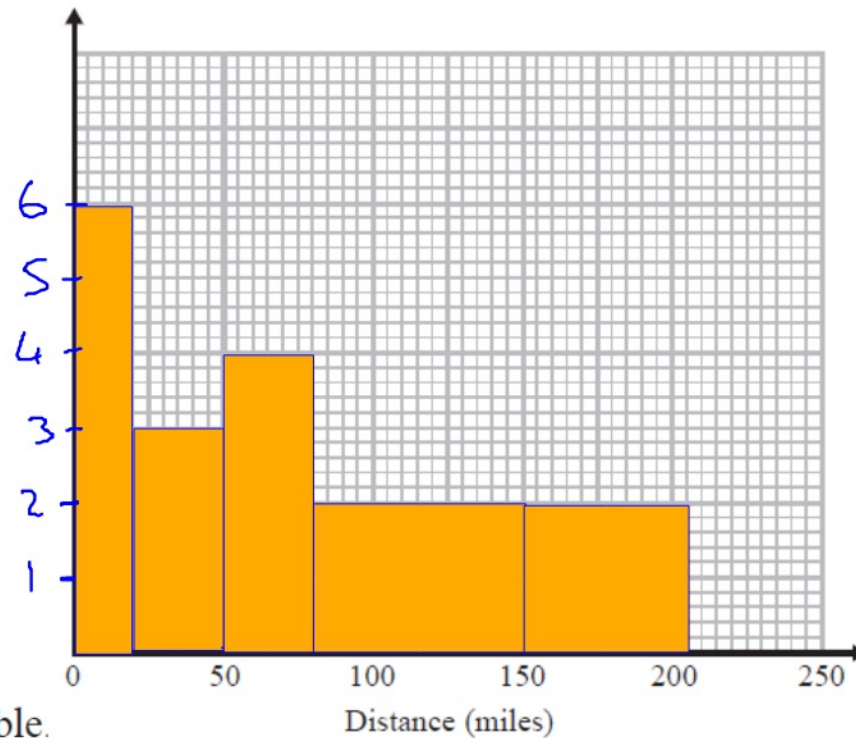
(2)

P40

17 The table shows information about the distances 570 students travelled to a university open day.

fd = height

Distance (d miles)	Frequency	<i>fd</i>
$0 < d \leq 20$	120	$\frac{120}{20}$ 6
$20 < d \leq 50$	90	$\frac{90}{30}$ 3
$50 < d \leq 80$	120	$\frac{120}{30}$ 4
$80 < d \leq 150$	140	$\frac{140}{70}$ 2
$150 < d \leq 200$	100	$\frac{100}{50}$ 2



(a) Draw a histogram for the information in the table.

(3)

P39

(b) Estimate the median distance.

..... miles

(2)

P40

AQA

24

48 students completed some homework.

Video created by W Neill

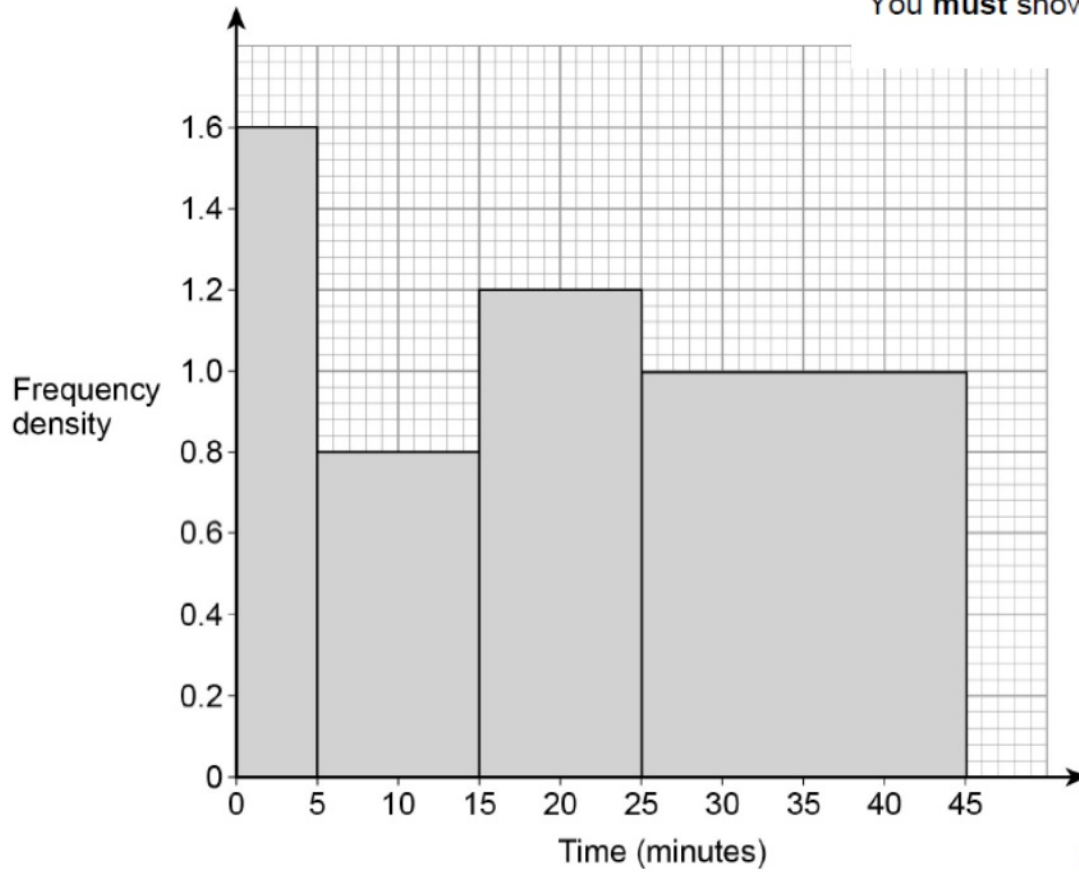
P40

This histogram shows information about the times taken.

Work out an estimate of the interquartile range.

You **must** show your working.

[4 m



Answer _____ minutes

24

48 students completed some homework.

Video created by W Neill

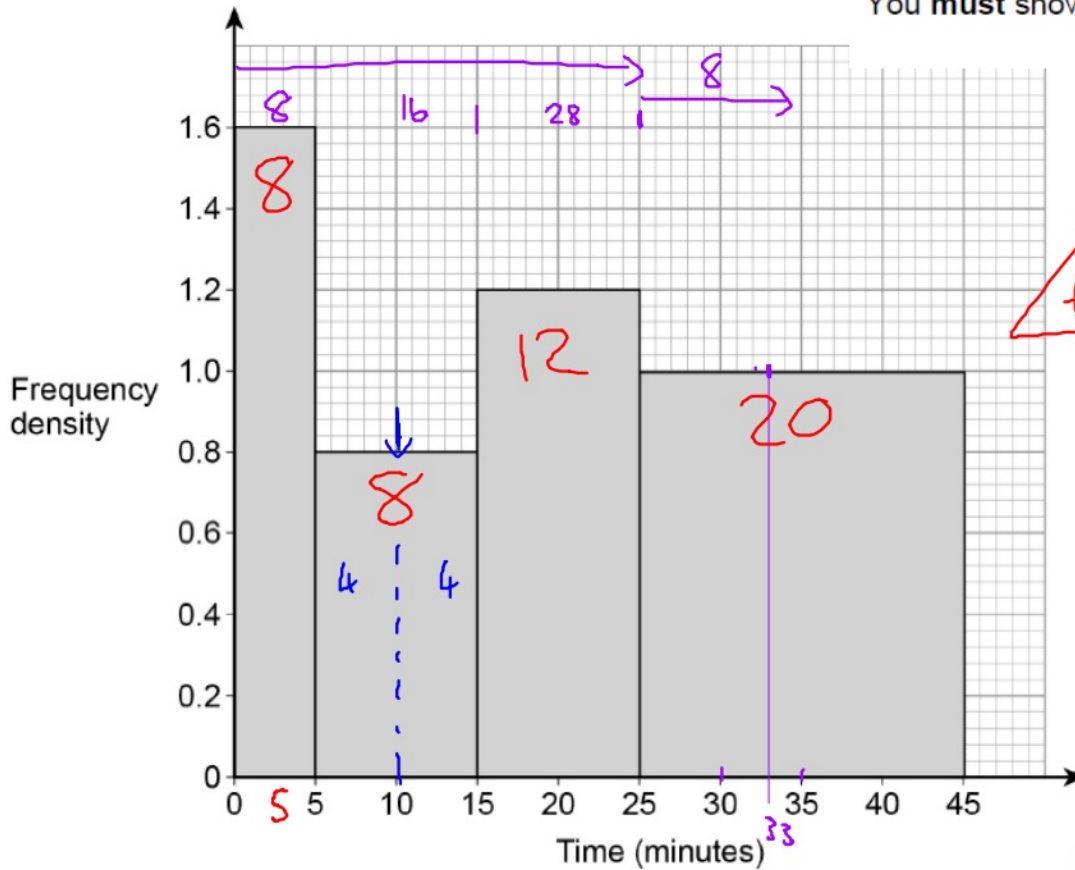
P40

This histogram shows information about the times taken.

Work out an estimate of the interquartile range.

You must show your working.

[4 m



$$IQR = UQ - LQ$$

$$48 \dots UQ = \frac{3}{4} = 36^{th} \quad 33min$$

$$LQ = \frac{1}{4} = 12^{th} \quad 10min$$

$$IQR = UQ - LQ$$

$$33 - 10 =$$

Answer 23 minutes

23

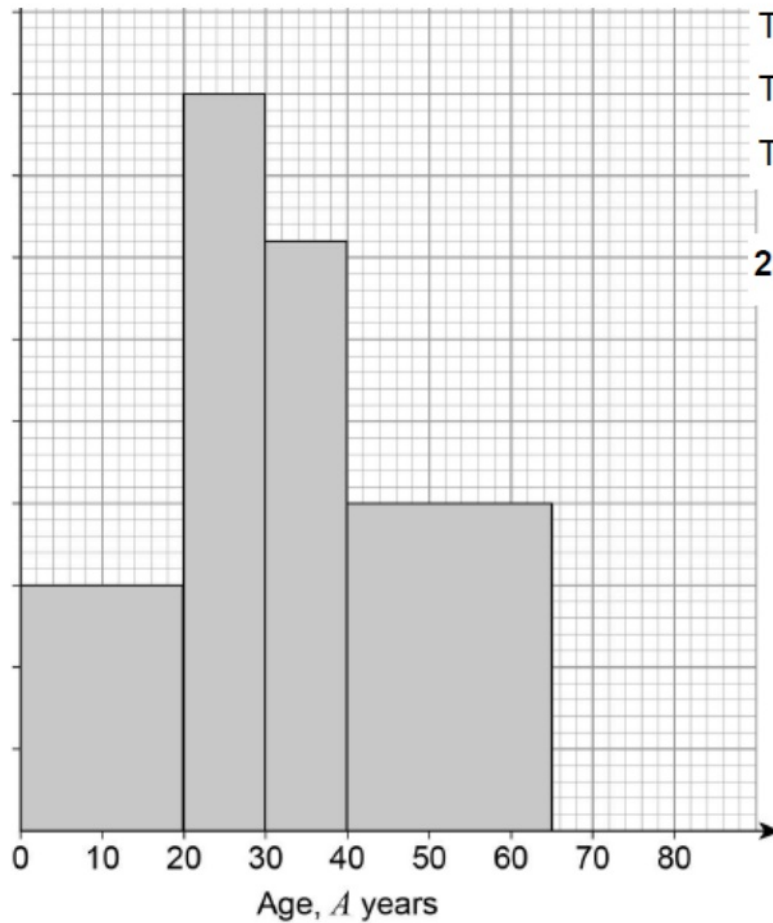
Here is some information about a tennis club.

Video created by W Neill

P39

P40

Frequency
density



There are 30 members with $A < 20$

There are 12 members with $65 \leq A < 80$

There are no members with $A \geq 80$

23 (a) Complete the histogram. **[3 marks]**

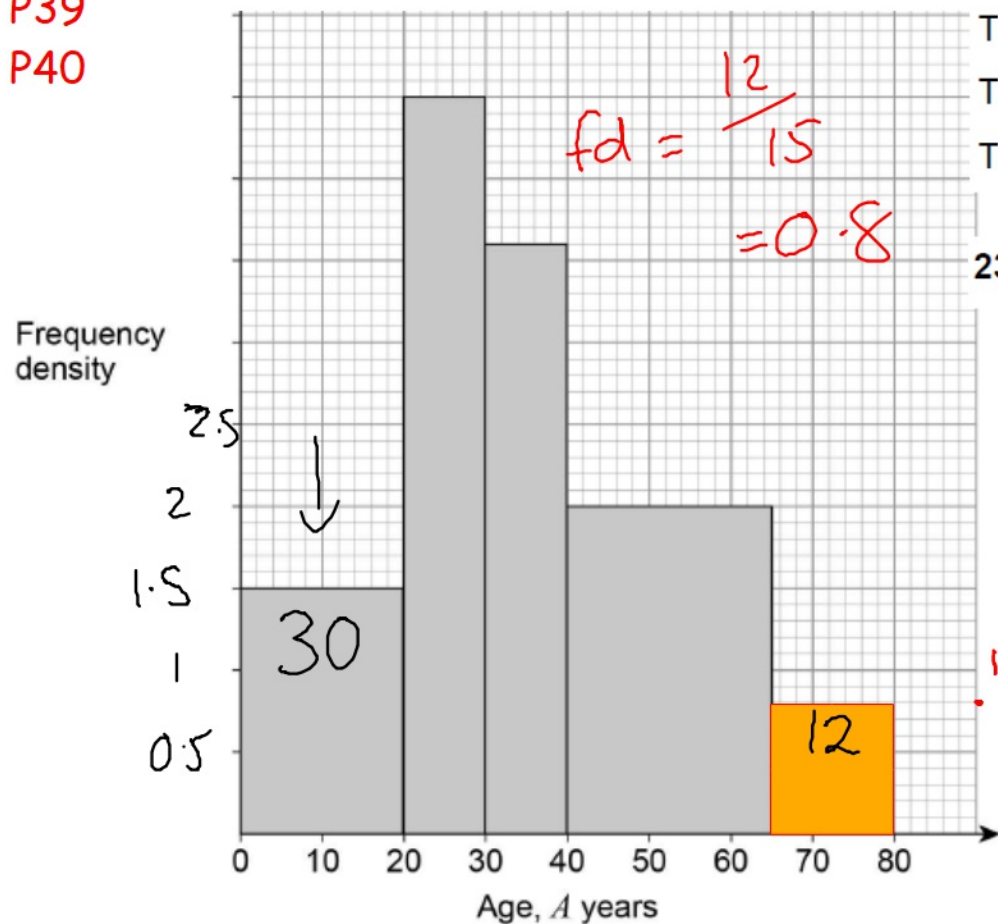
23

Here is some information about a tennis club.

Video created by W Neill

P39

P40



There are 30 members with $A < 20$

There are 12 members with $65 \leq A < 80$ *fd?*

There are no members with $A \geq 80$

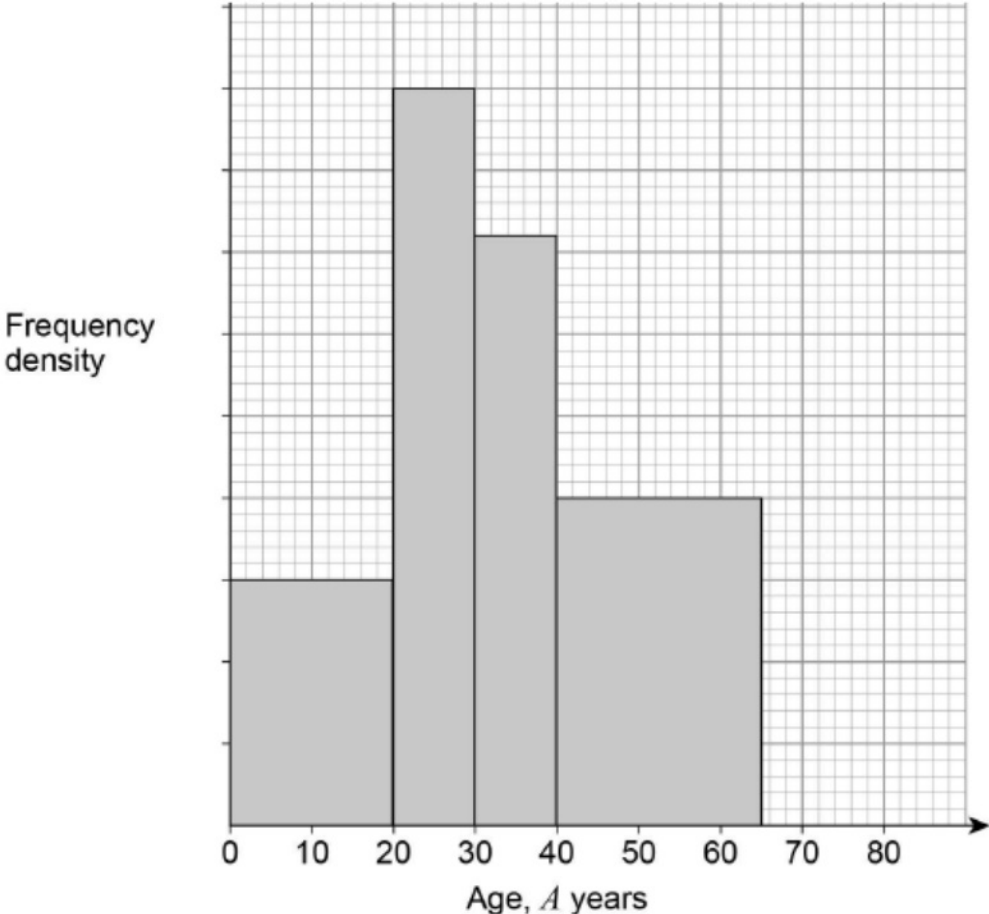
23 (a) Complete the histogram. [3 marks]



$$fd = \frac{30}{20} = 1.5$$

23 (b) Work out the total number of members of the club.

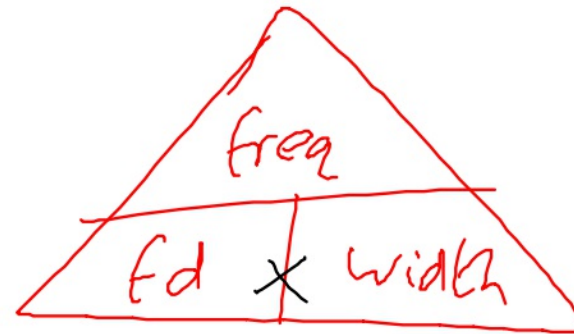
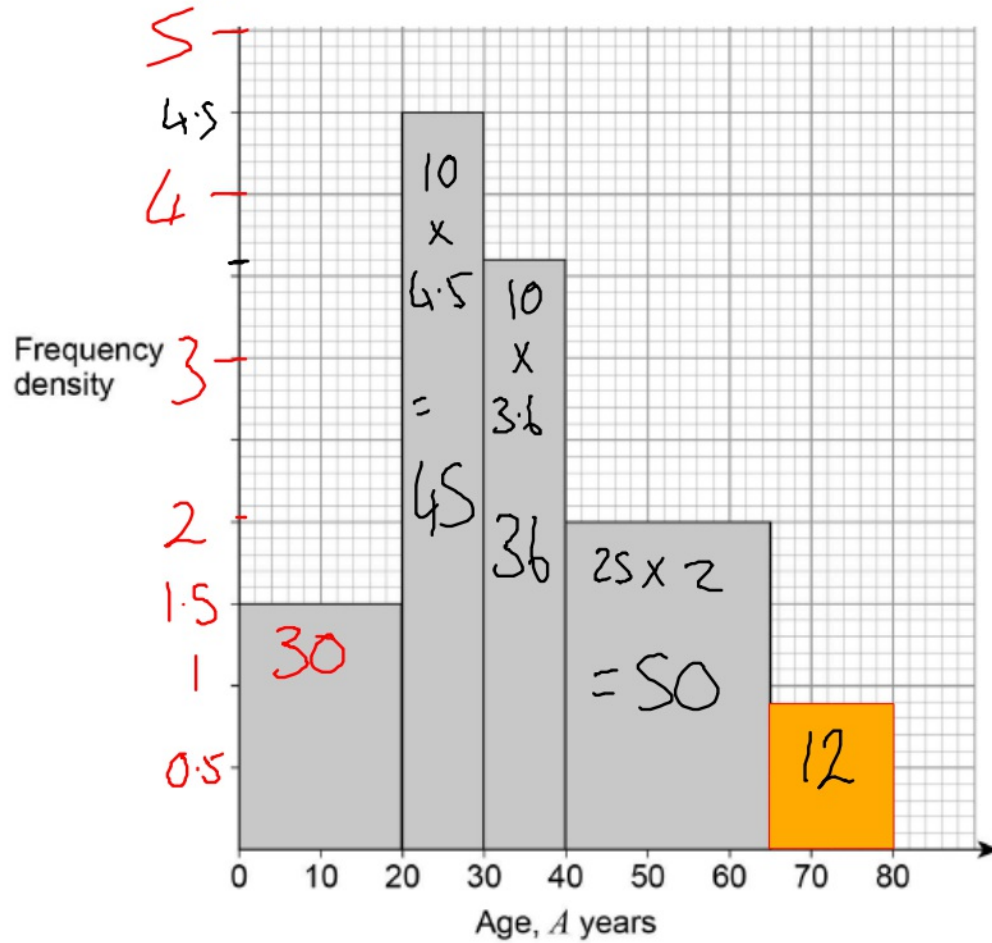
[2 marks]



Answer _____

23 (b) Work out the total number of members of the club.

[2 marks]



$$\text{Ans } 30 + 45 + 36 + 50 + 12$$

=

173 ✓

Answer

26

The histogram shows information about the speed of cars as they pass a checkpoint.

The scale on the frequency density axis is missing.

P39

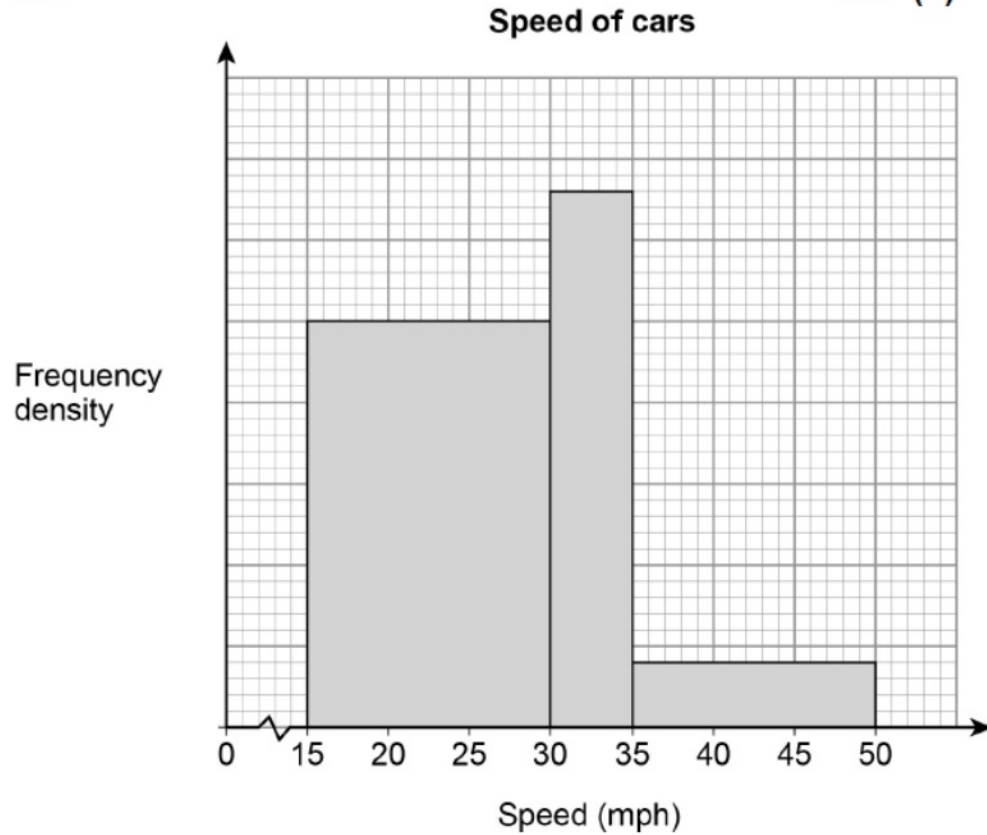
The histogram shows information about 480 cars.

P40

26 (a)

How many cars does the first bar represent?

[4 marks]



Answer _____

26 The histogram shows information about the speed of cars as they pass a checkpoint.
The scale on the frequency density axis is missing.

P39

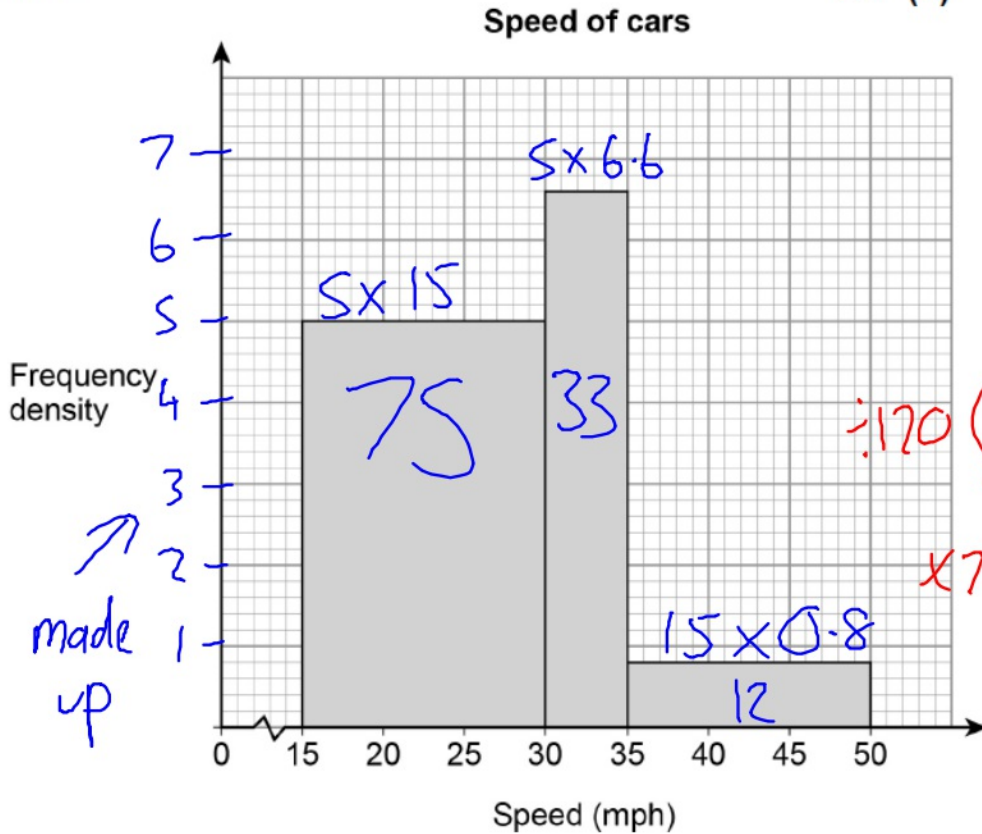
P40

The histogram shows information about 480 cars.

26 (a)

How many cars does the first bar represent?

[4 marks]



$$75 : 33 : 12$$

$\div 120$ $\left\{ \begin{array}{l} 480 \text{ cars} = 120 \text{ parts} \\ 4 \text{ cars} = 1 \text{ part} \end{array} \right. \left. \begin{array}{l} \div 120 \\ \times 75 \end{array} \right\} 300 \text{ cars} = 75 \text{ parts}$

Answer 300 ✓

26 (b)

Cars with a speed greater than 40 mph are over the speed limit.

Video created by W Neill

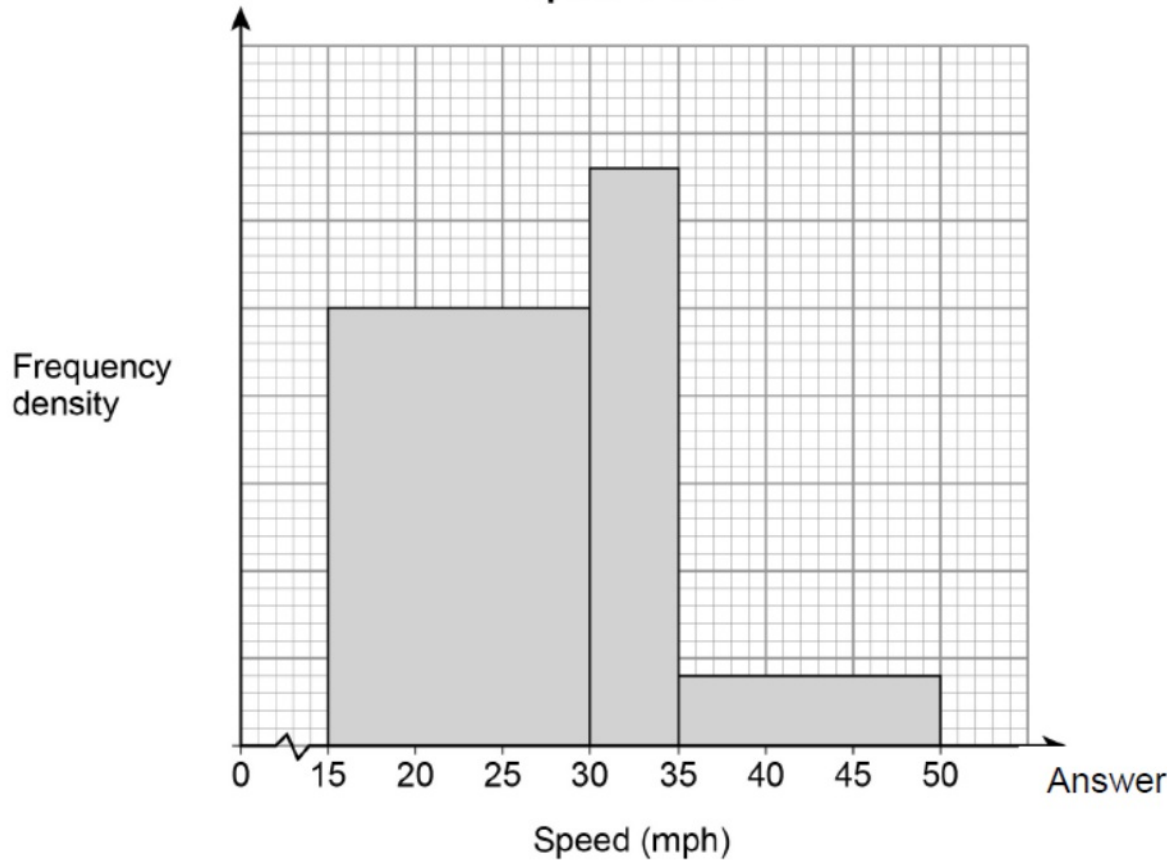
Use the histogram to estimate the number of cars that are over the speed limit.

P39

P40

[2 marks]

Speed of cars



Answer _____

26 (b)

Cars with a speed greater than 40 mph are over the speed limit.

Video created by W Neill

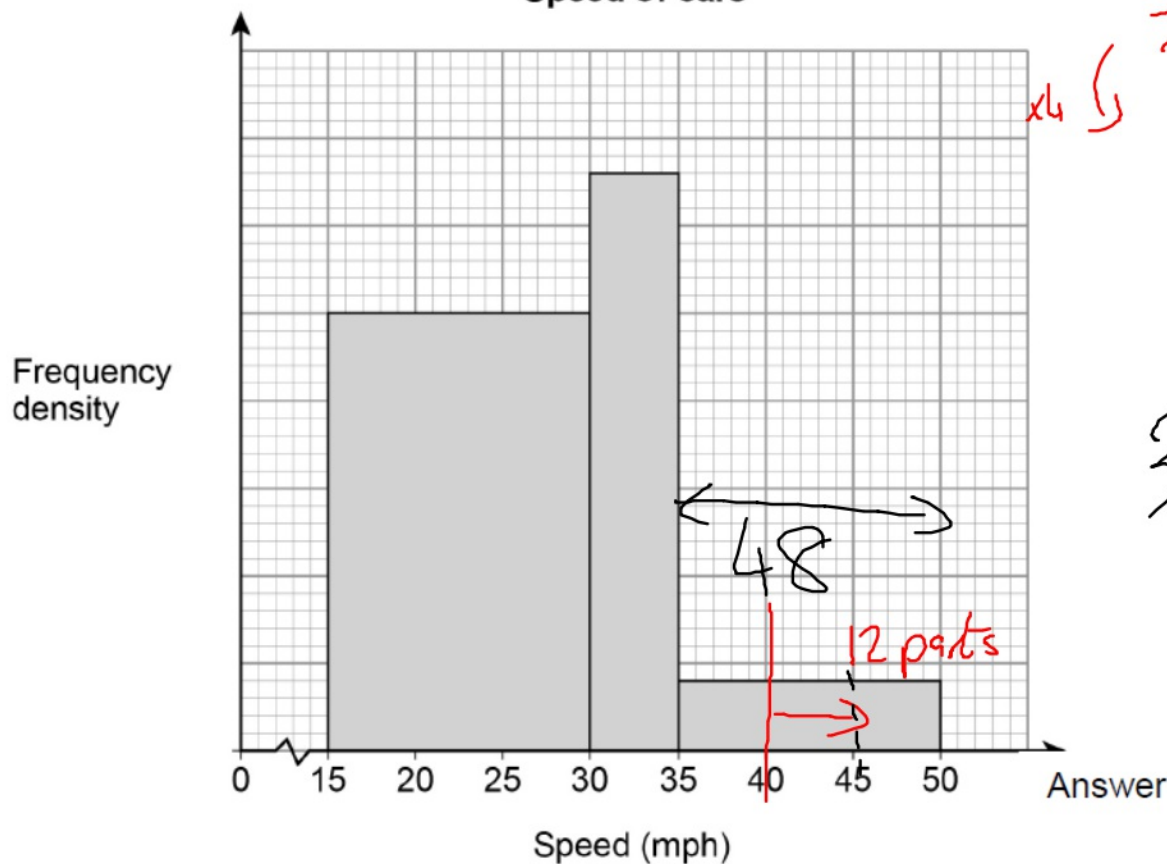
Use the histogram to estimate the number of cars that are over the speed limit.

[2 marks]

P39

P40

Speed of cars



$75 : 33 : 12$
 $\times 4 \downarrow$

4 cars = 1 part

48 cars = 12 parts

$\frac{2}{3}$ of 48 cars

32 cars ✓

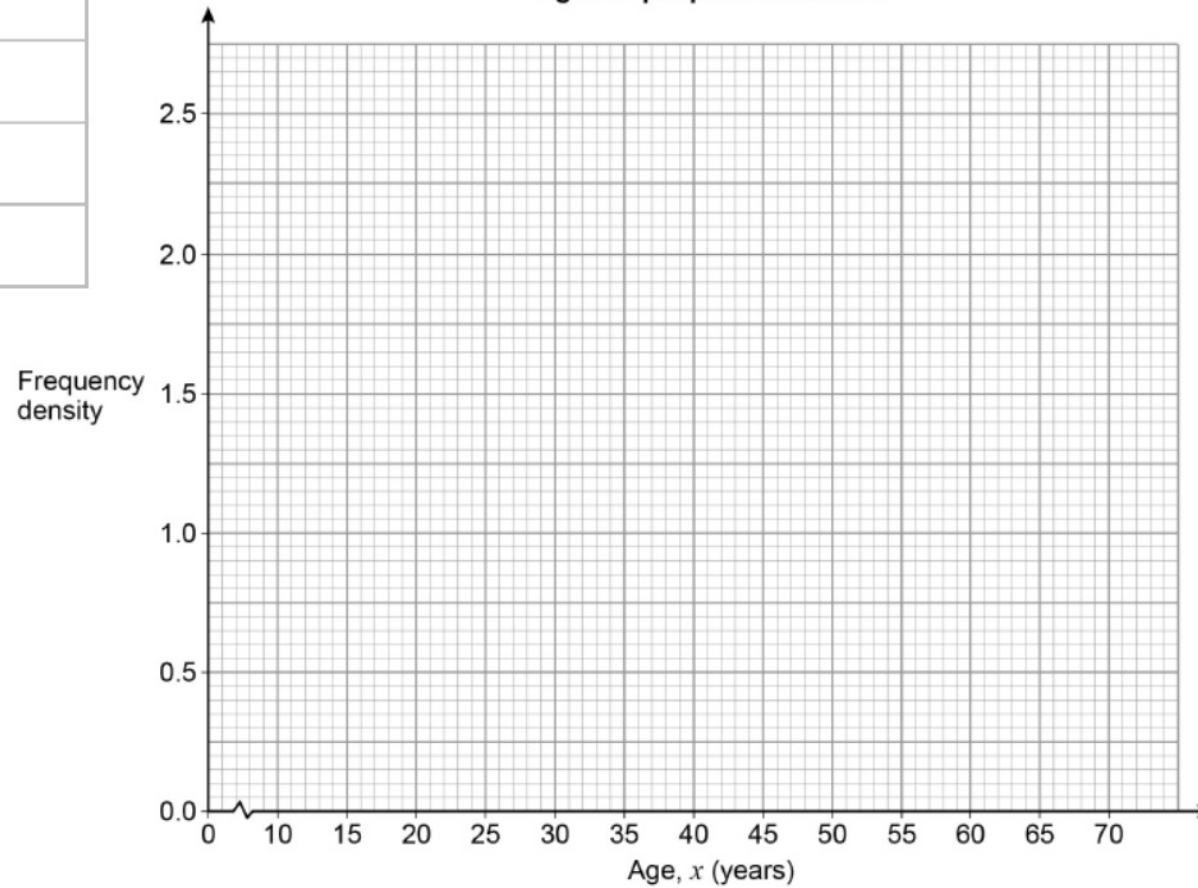
18 Here is some information about the ages of people at a concert.

Video created by W Neill

Age, x (years)	Frequency
$10 < x < 15$	8
$15 < x < 25$	24
$25 < x < 40$	30
$40 < x < 70$	39

Draw a histogram to represent the information. [3 marks]

Ages of people at a concert



P39

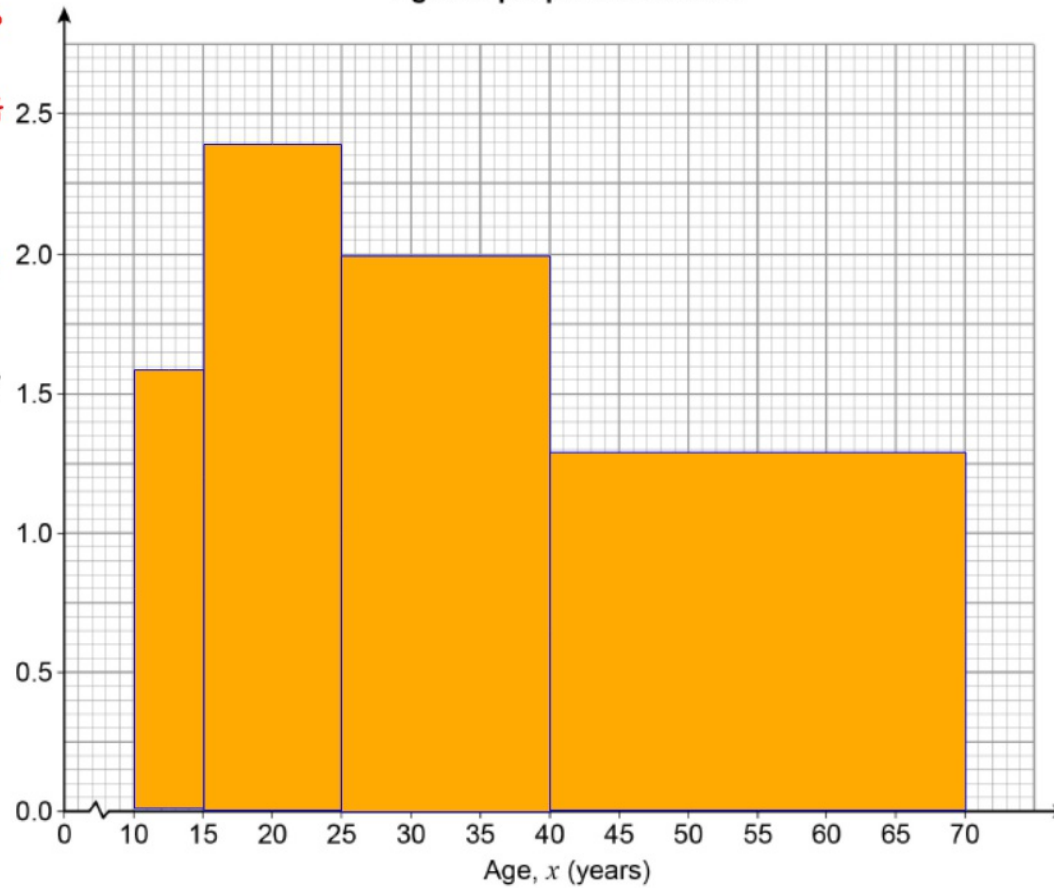
18 Here is some information about the ages of people at a concert.

Video created by W Neill

Age, x (years)	Frequency	fd
$10 < x < 15$ 5	8	1.6
$15 < x < 25$ 10	24	2.4
$25 < x < 40$ 15	30	2
$40 < x < 70$ 30	39	1.3

Draw a histogram to represent the information. [3 marks]

Ages of people at a concert



P39



Frequency density