Histograms - Worksheet

Skill

Group A - Frequency Density

Fill in the frequency density columns for the given grouped frequency tables:

1)

Width, mm	Frequency	Frequency Density
$0 \leq x < 10$	6	
$10 \leq x < 20$	9	
$20 \leq x < 25$	13	
$25 \leq x < 30$	4	

2)

Mass, kg	Frequency	Frequency Density
$0 \leq x < 5$	3	
$5 \leq x < 10$	4	
$10 \leq x < 20$	15	
$20 \leq x < 35$	3	

3)

Time, s	Frequency	Frequency Density
$0 \leq x < 2$	2	
$2 \leq x < 4$	6	
$4 \leq x < 10$	9	
$10 \leq x < 14$	6	

4)

Height, cm	Frequency	Frequency Density
$110 \leq x < 120$	7	
$120 \leq x < 130$	12	
$130 \leq x < 135$	16	
$135 \leq x < 150$	9	

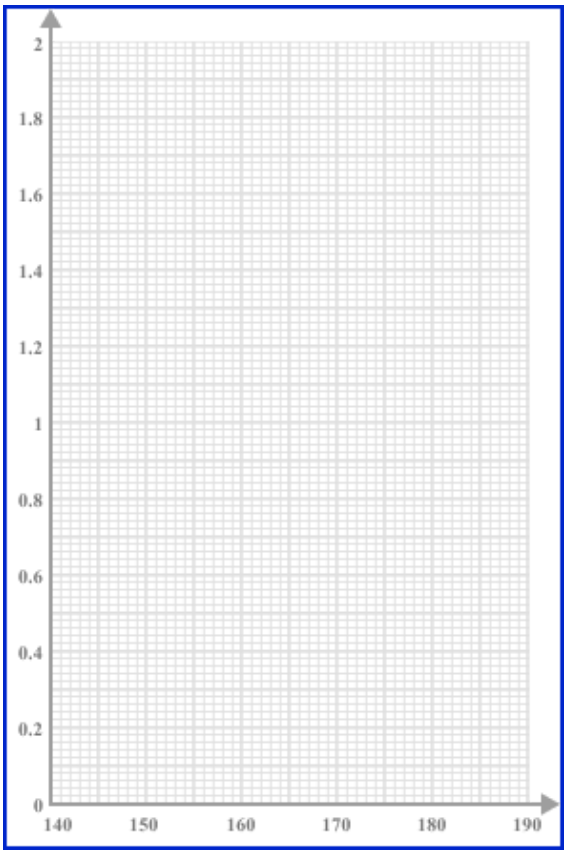
Histograms - Worksheet

Group B - Drawing histograms

Complete the frequency density columns and draw the histograms, using the axes provided:

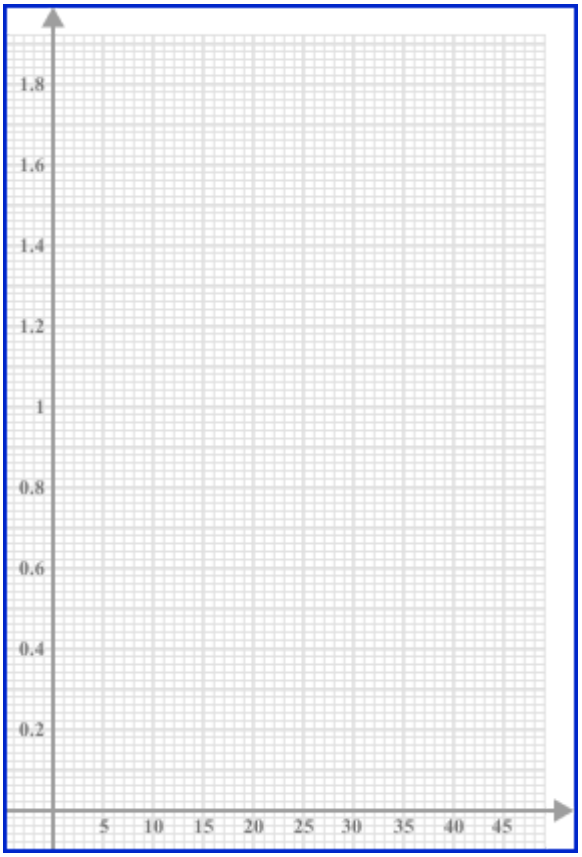
1)

Height, cm	Frequency	Frequency Density
$150 \leq x < 160$	3	0.3
$160 \leq x < 165$	4	
$165 \leq x < 170$	8	1.6
$170 \leq x < 180$	4	



2)

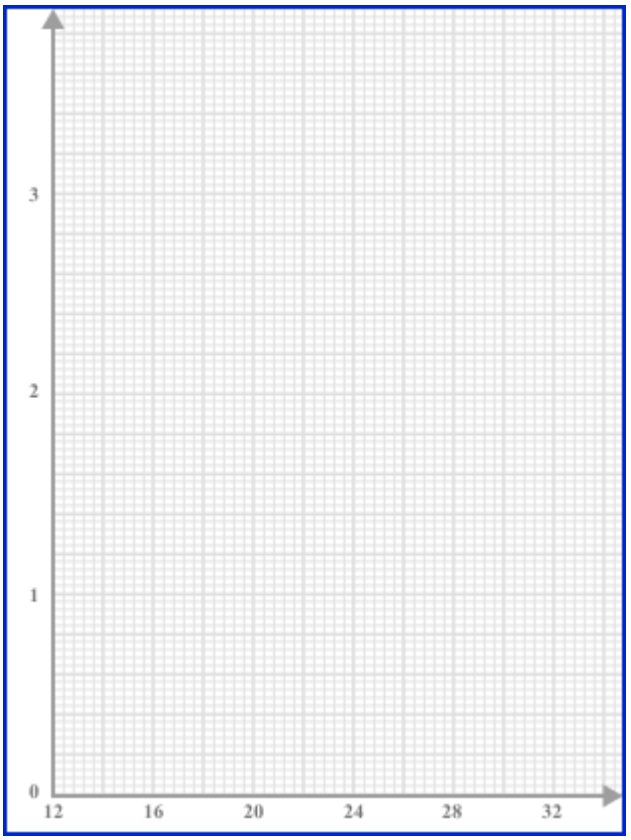
Distance, km	Frequency	Frequency Density
$0 \leq x < 5$	2	
$5 \leq x < 10$	6	1.2
$10 \leq x < 20$	15	1.5
$20 \leq x < 35$	12	



Histograms - Worksheet

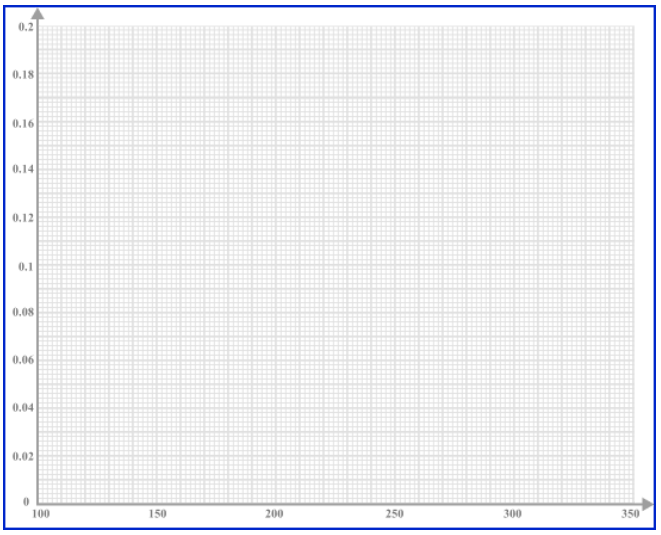
3)

Time, s	Frequency	Frequency Density
$16 \leq x < 18$	5	2.5
$18 \leq x < 20$	7	
$20 \leq x < 24$	12	
$24 \leq x < 30$	3	0.5



4)

Mass, grams	Frequency	Frequency Density
$100 \leq x < 150$	6	0.12
$150 \leq x < 200$	8	0.16
$200 \leq x < 300$	15	
$300 \leq x < 325$	2	



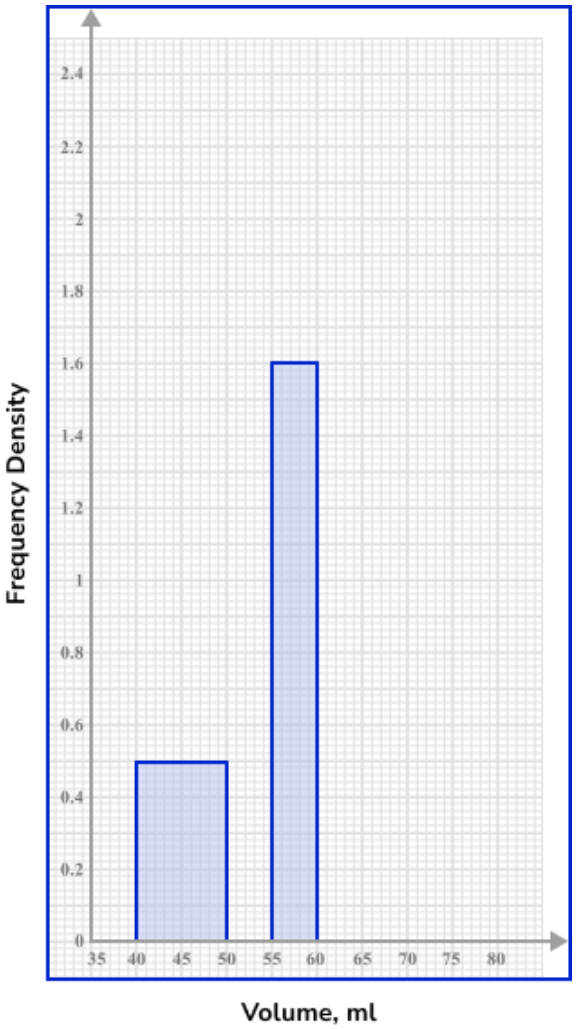
Histograms - Worksheet

Group C - Completing histograms and frequency tables

Use the information in the incomplete tables and histograms to fill in the missing values and bars:

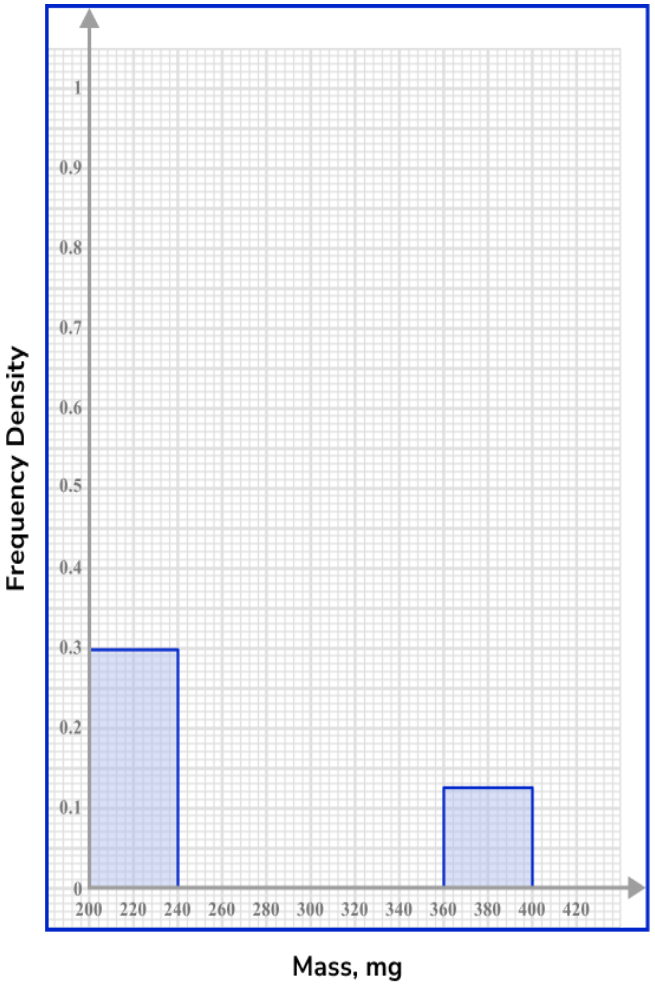
1)

Volume, ml	Frequency	Frequency Density
$40 \leq x < 50$		0.5
$50 \leq x < 55$	11	
$55 \leq x < 60$		1.6
$60 \leq x < 75$	3	



2)

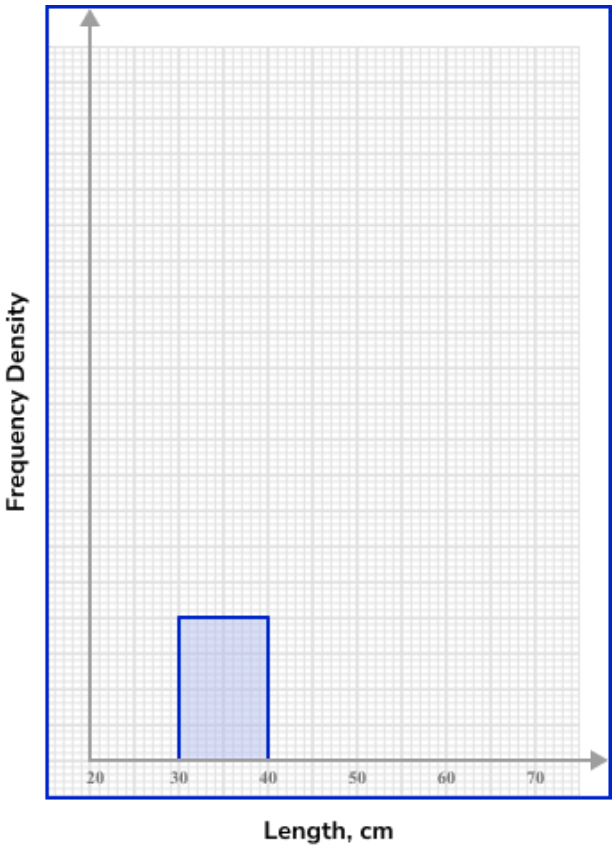
Mass, mg	Frequency	Frequency Density
$200 \leq x < 240$		0.3
$240 \leq x < 280$	20	
$280 \leq x < 360$	16	
$360 \leq x < 400$		0.125



Histograms - Worksheet

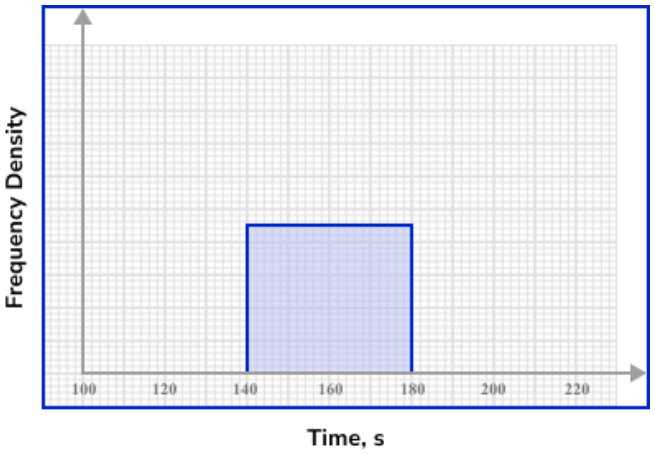
3)

Length, cm	Frequency	Frequency Density
$30 \leq x < 40$	4	
$40 \leq x < 45$		1.8
$45 \leq x < 55$		1.4
$55 \leq x < 60$		0.6



4)

Time, s	Frequency	Frequency Density
$110 \leq x < 120$		0.9
$120 \leq x < 140$		0.65
$140 \leq x < 180$	18	
$180 \leq x < 200$	7	



Histograms - Worksheet

Applied

1) Fred measured the heights of 30 sunflowers in a field. He rounded the heights to the nearest centimetre and made a list of the measurements.

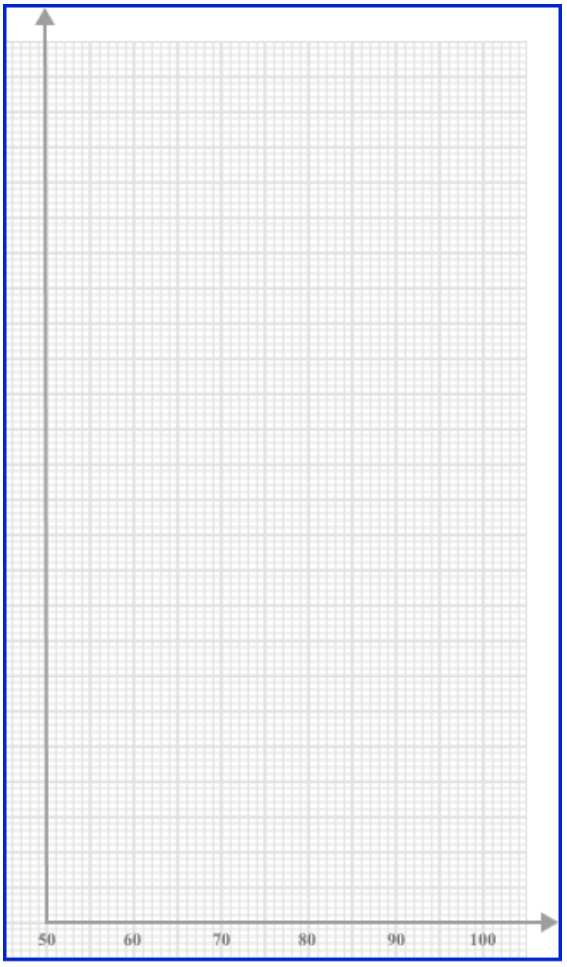
51	74	61	72	65	70
70	82	71	79	74	81
60	74	73	57	65	99
75	67	72	72	62	69
64	73	63	89	73	95

(a) Use the data to complete the frequency and frequency density columns in the table below.

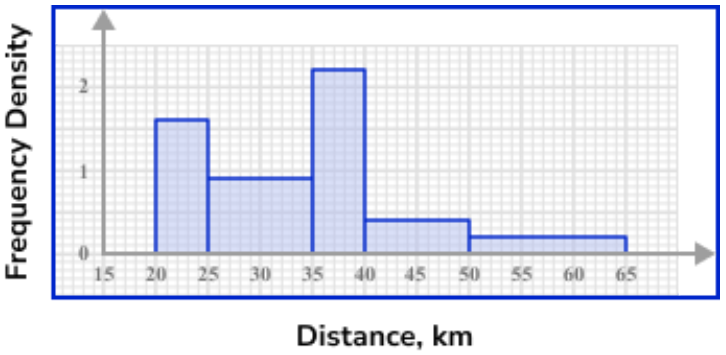
Height, cm	Frequency	Frequency Density
$50 \leq x < 60$		
$60 \leq x < 70$		
$70 \leq x < 75$		
$75 \leq x < 85$		
$85 \leq x < 100$		

Histograms - Worksheet

(b) Draw the histogram for the data on the axes provided.



2) The histogram shows the distance 35 employees travel to get to work each morning.

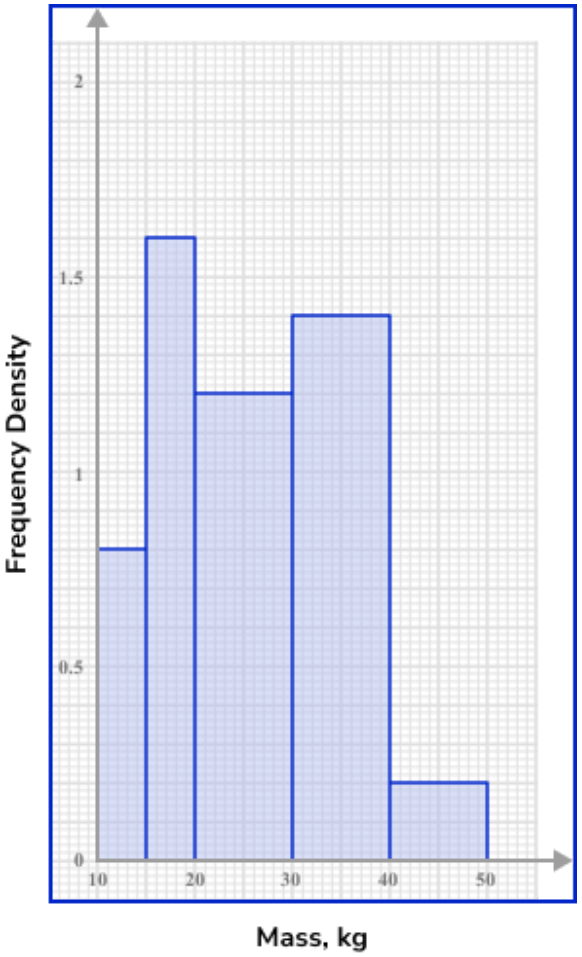


(a) Use the histogram to find an estimate of the mean distance.

(b) Use the histogram to find the percentage of employees that travel more than $45km$.

Histograms - Worksheet

3) **(a)** The histogram shows the mass of 40 rocks found on a beach.

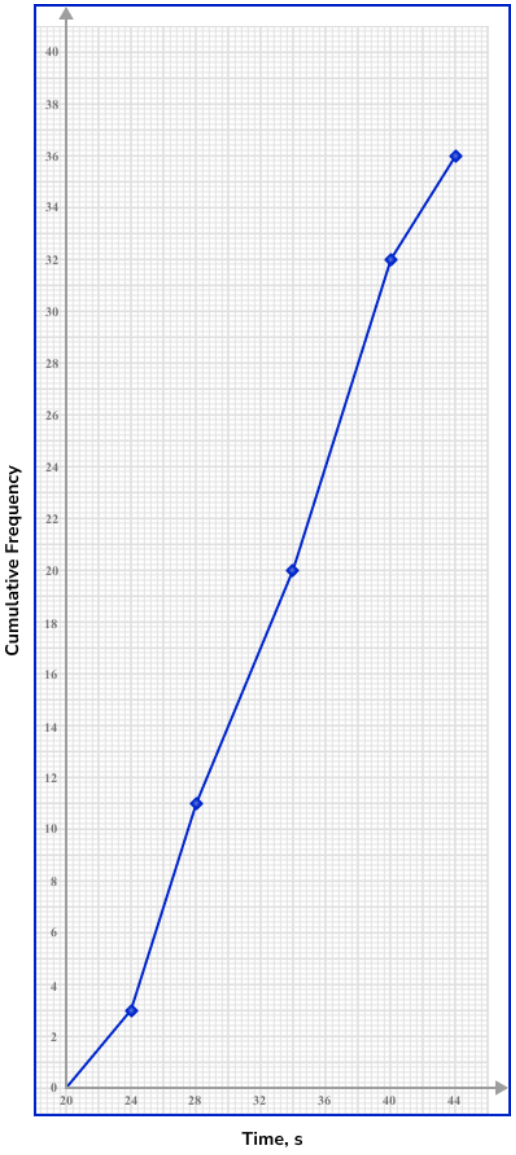


Use the histogram to find estimates for the lower quartile, median and upper quartile.

(b) The smallest rock had a mass of $11kg$, the largest rock had a mass of $48.5kg$. Use this information and your figures from part a to draw a box plot. For the mass of the rocks.

Histograms - Worksheet

4) The cumulative frequency graph shows information about the time taken for a group of 36 students to do a logic puzzle.

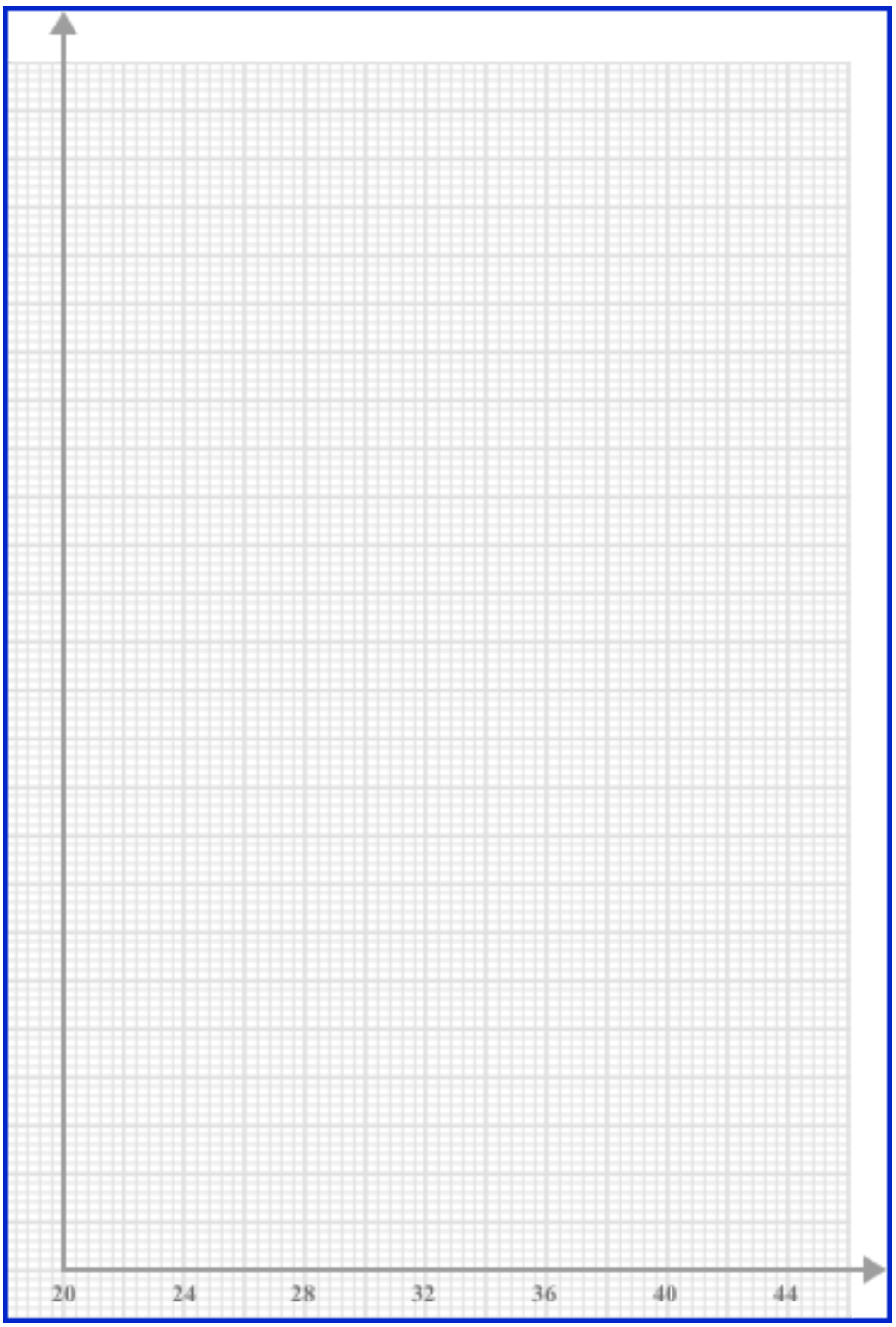


(a) Use the graph to complete the frequency and frequency density columns in the table below.

Time, s	Frequency	Frequency Density
$20 \leq x < 24$		
$24 \leq x < 28$		
$28 \leq x < 34$		
$34 \leq x < 40$		
$40 \leq x < 44$		

Histograms - Worksheet

(b) Use the table to draw a histogram for the time taken to complete the logic puzzle.



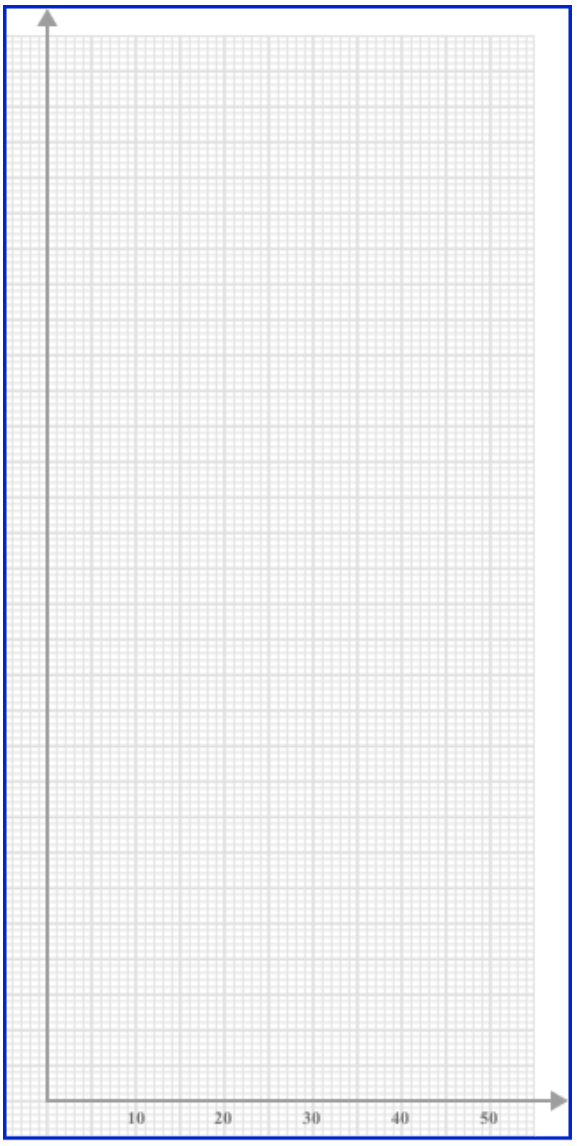
Histograms - Exam Questions

1) **(a)** The frequency table shows the ages of guests at a hotel.

Age, years	Frequency	Frequency Density
$0 \leq x < 5$	6	
$5 \leq x < 10$	13	
$10 \leq x < 20$	14	
$20 \leq x < 30$	15	
$30 \leq x < 50$	12	

Complete the frequency density column. **(3)**

(b) Use the table to draw a histogram for the data.

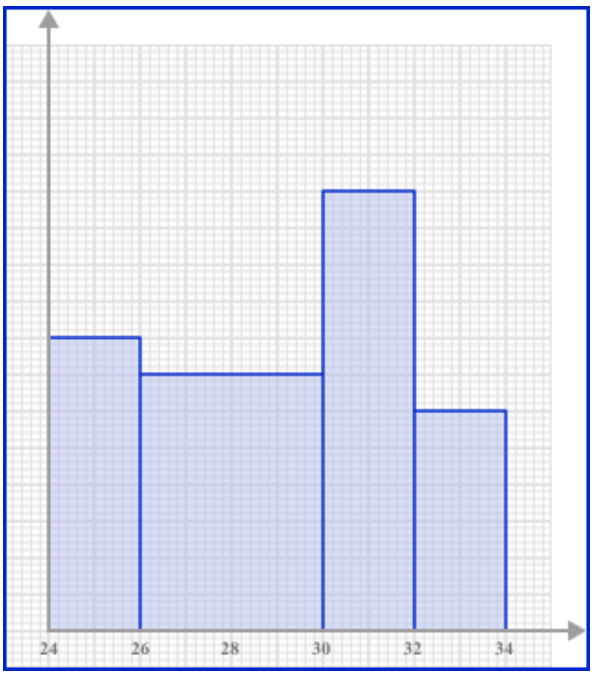


(3)

(6 marks)

Histograms - Exam Questions

2) The histogram shows information about the mass of 20 newborn calves on a farm.



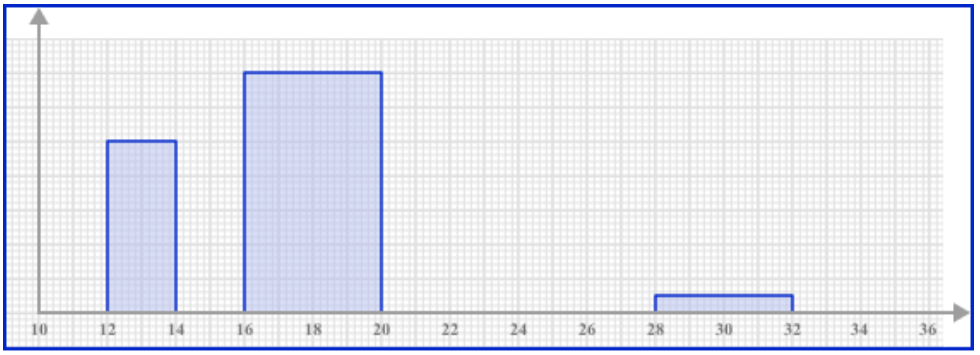
Use the histogram to estimate the number of calves with a mass of more than 31 kg.

……..

(5 marks)

Histograms - Exam Questions

3) The widths of flowers in a garden were collected. An incomplete histogram and table is shown below.



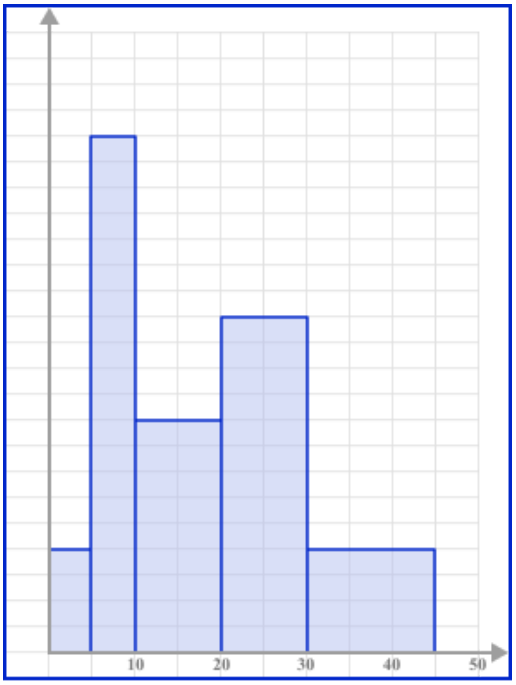
Width, mm	Frequency	Frequency Density
$12 \leq x < 14$		
$14 \leq x < 16$	9	
$16 \leq x < 20$	14	
$20 \leq x < 28$	4	
$28 \leq x < 32$		

Use the information provided to complete the histogram and table.

(5 marks)

Histograms - Exam Questions

4) The histogram shows information about the mass of stones in a field.



Use the histogram to estimate the interquartile range.

……..

(6 marks)

Histograms - Answers

	Question	Answer
	Skill Questions	
Group A	Fill in the frequency density columns for the given grouped frequency tables:	

1)

Width, mm	Frequency	Frequency Density
$0 \leq x < 10$	6	
$10 \leq x < 20$	9	
$20 \leq x < 25$	13	
$25 \leq x < 30$	4	

1)

Width, mm	Frequency	Frequency Density
$0 \leq x < 10$	6	0.6
$10 \leq x < 20$	9	0.9
$20 \leq x < 25$	13	2.6
$25 \leq x < 30$	4	0.8

2)

Mass, kg	Frequency	Frequency Density
$0 \leq x < 5$	3	
$5 \leq x < 10$	4	
$10 \leq x < 20$	15	
$20 \leq x < 35$	3	

2)

Mass, kg	Frequency	Frequency Density
$0 \leq x < 5$	3	0.6
$5 \leq x < 10$	4	0.8
$10 \leq x < 20$	15	1.5
$20 \leq x < 35$	3	0.2

3)

Time, s	Frequency	Frequency Density
$0 \leq x < 2$	2	
$2 \leq x < 4$	6	
$4 \leq x < 10$	9	
$10 \leq x < 14$	6	

3)

Time, s	Frequency	Frequency Density
$0 \leq x < 2$	2	1
$2 \leq x < 4$	6	3
$4 \leq x < 10$	9	1.5
$10 \leq x < 14$	6	1.5

4)

Height, cm	Frequency	Frequency Density
$110 \leq x < 120$	7	
$120 \leq x < 130$	12	
$130 \leq x < 135$	16	
$135 \leq x < 150$	9	

4)

Height, cm	Frequency	Frequency Density
$110 \leq x < 120$	7	0.7
$120 \leq x < 130$	12	1.2
$130 \leq x < 135$	16	3.2
$135 \leq x < 150$	9	0.6

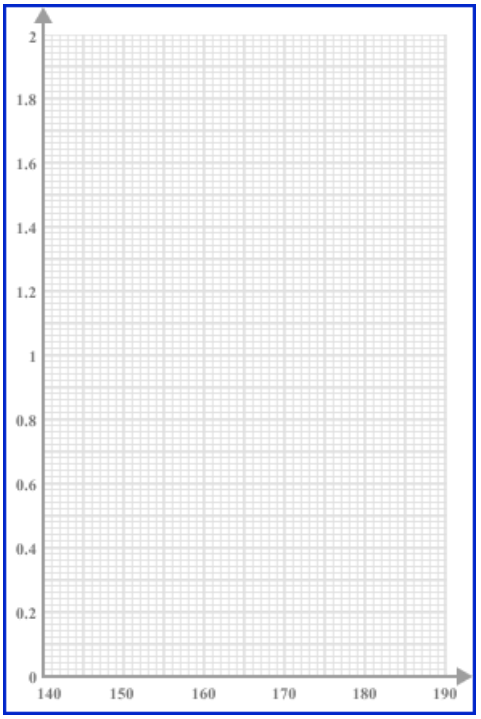
Histograms - Answers

Group B

Complete the frequency density columns and draw the histograms, use the axes templates provided:

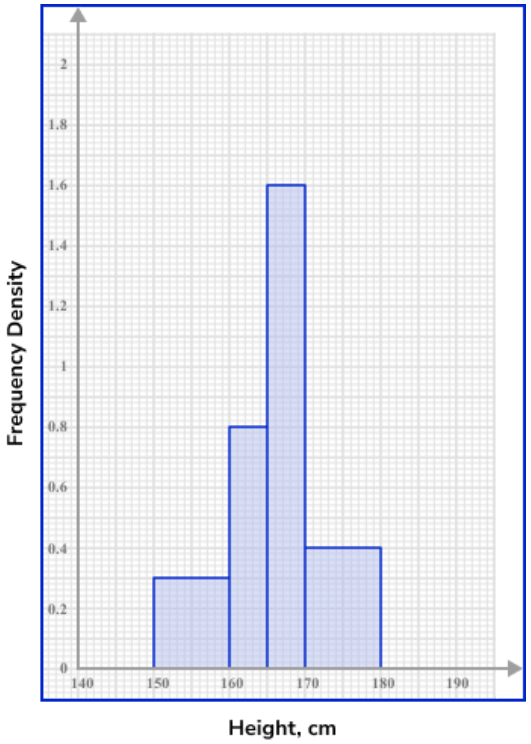
1)

Height, cm	Frequency	Frequency Density
$150 \leq x < 160$	3	0.3
$160 \leq x < 165$	4	
$165 \leq x < 170$	8	1.6
$170 \leq x < 180$	4	



1)

Height, cm	Frequency	Frequency Density
$150 \leq x < 160$	3	0.3
$160 \leq x < 165$	4	0.8
$165 \leq x < 170$	8	1.6
$170 \leq x < 180$	4	0.4

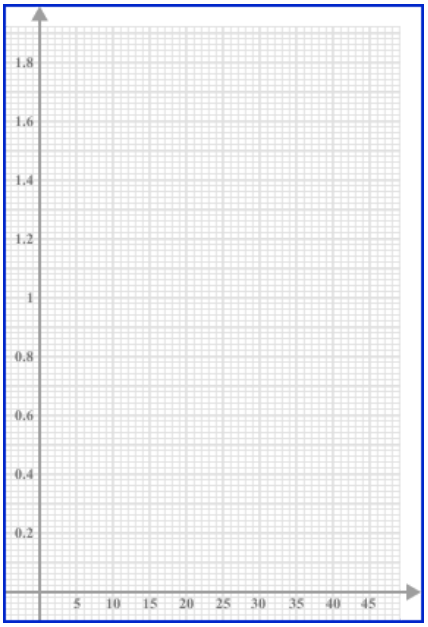


Histograms - Answers

Group B

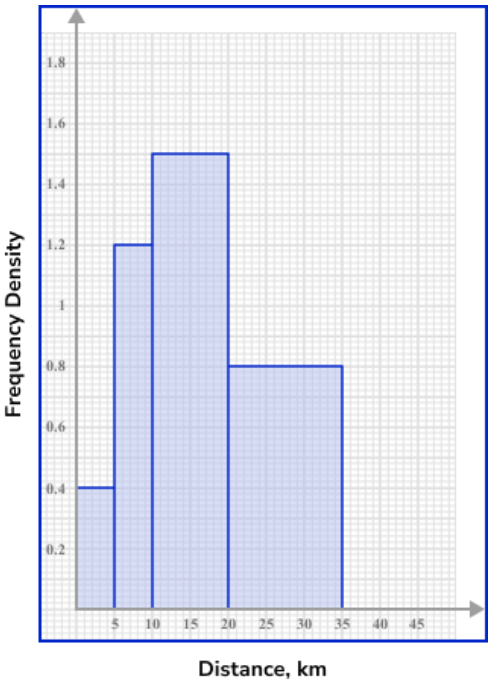
2)

Distance, km	Frequency	Frequency Density
$0 \leq x < 5$	2	
$5 \leq x < 10$	6	1.2
$10 \leq x < 20$	15	1.5
$20 \leq x < 35$	12	



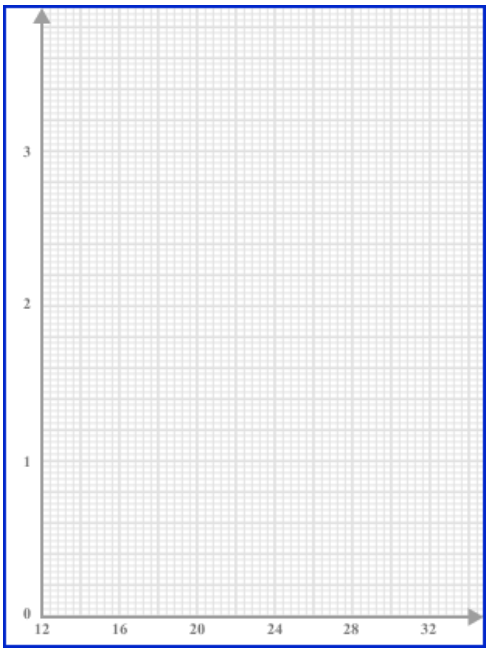
2)

Height, cm	Frequency	Frequency Density
$0 \leq x < 5$	2	0.4
$5 \leq x < 10$	6	1.2
$10 \leq x < 20$	15	1.5
$20 \leq x < 35$	12	0.8



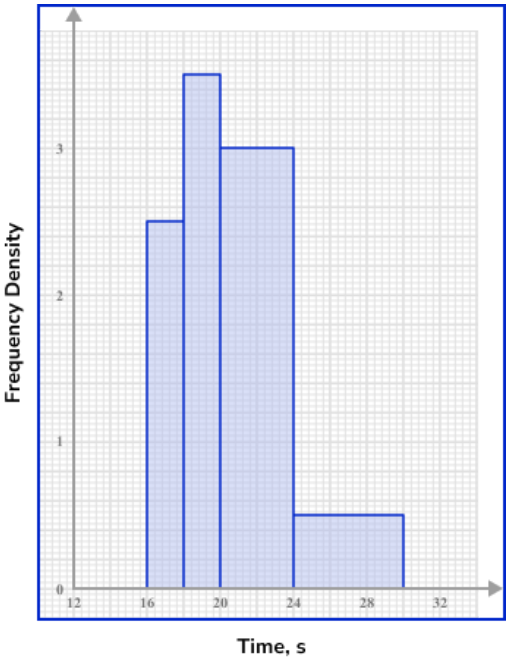
3)

Time, s	Frequency	Frequency Density
$16 \leq x < 18$	5	2.5
$18 \leq x < 20$	7	
$20 \leq x < 24$	12	
$24 \leq x < 30$	3	0.5



3)

Time, s	Frequency	Frequency Density
$16 \leq x < 18$	5	2.5
$18 \leq x < 20$	7	3.5
$20 \leq x < 24$	12	3
$24 \leq x < 30$	3	0.5

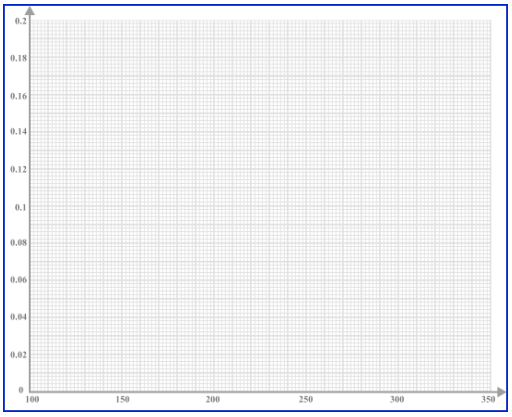


Histograms - Answers

Group B contd

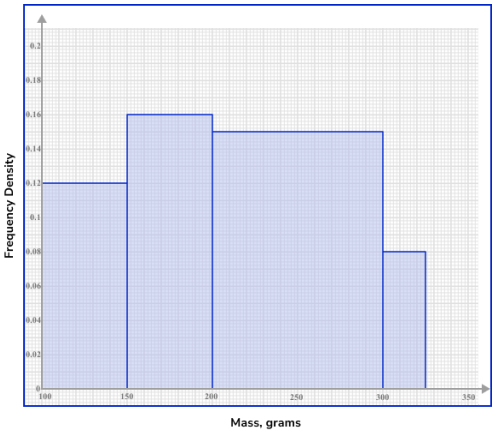
4)

Mass, grams	Frequency	Frequency Density
$100 \leq x < 150$	6	0.12
$150 \leq x < 200$	8	0.16
$200 \leq x < 300$	15	
$300 \leq x < 325$	2	



4)

Mass, grams	Frequency	Frequency Density
$100 \leq x < 150$	6	0.12
$150 \leq x < 200$	8	0.16
$200 \leq x < 300$	15	0.15
$300 \leq x < 325$	2	0.08

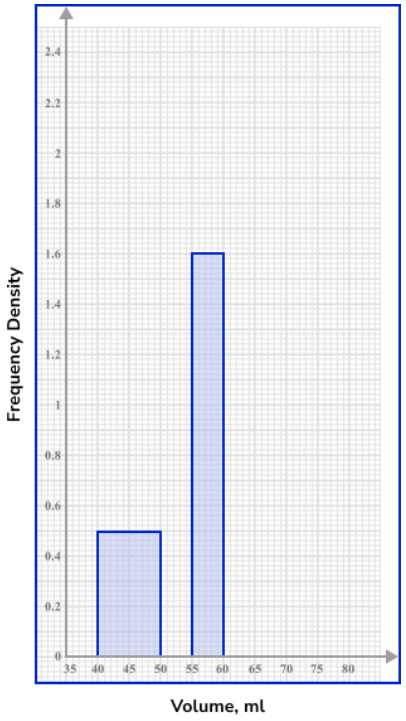


Group C

Use the information in the incomplete tables and histograms to fill in the missing values and bars:

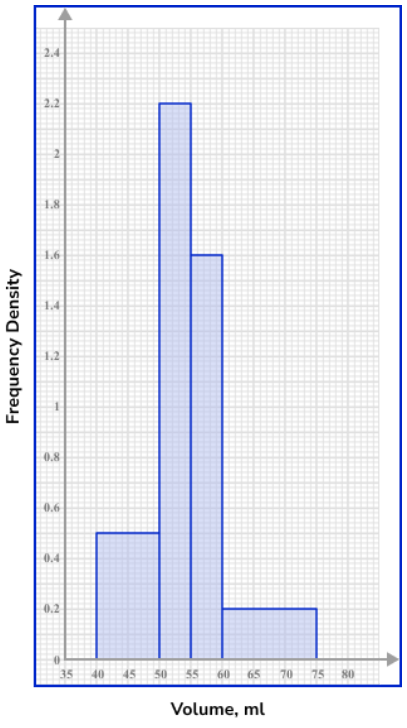
1)

Volume, ml	Frequency	Frequency Density
$40 \leq x < 50$		0.5
$50 \leq x < 55$	11	
$55 \leq x < 60$		1.6
$60 \leq x < 75$	3	



1)

Volume, ml	Frequency	Frequency Density
$40 \leq x < 50$	5	0.5
$50 \leq x < 55$	11	2.2
$55 \leq x < 60$	8	1.6
$60 \leq x < 75$	3	0.2

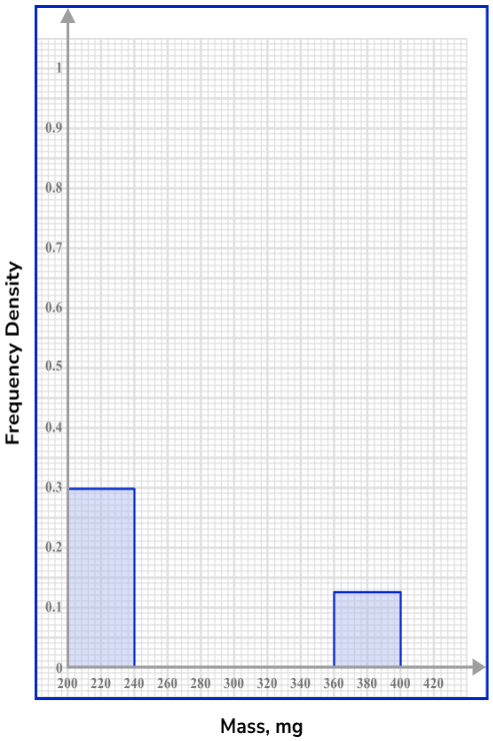


Histograms - Answers

Group C contd

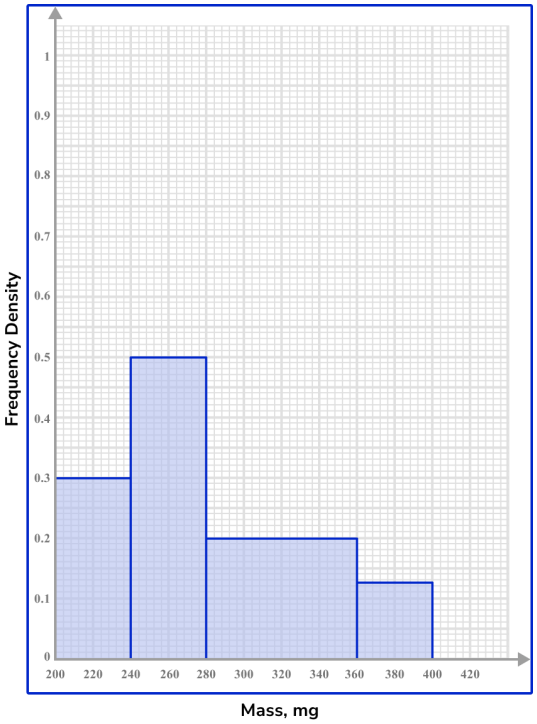
2)

Mass, mg	Frequency	Frequency Density
$200 \leq x < 240$		0.3
$240 \leq x < 280$	20	
$280 \leq x < 360$	16	
$360 \leq x < 400$		0.125



2)

Mass, mg	Frequency	Frequency Density
$200 \leq x < 240$	12	0.3
$240 \leq x < 280$	20	0.5
$280 \leq x < 360$	16	0.2
$360 \leq x < 400$	5	0.125

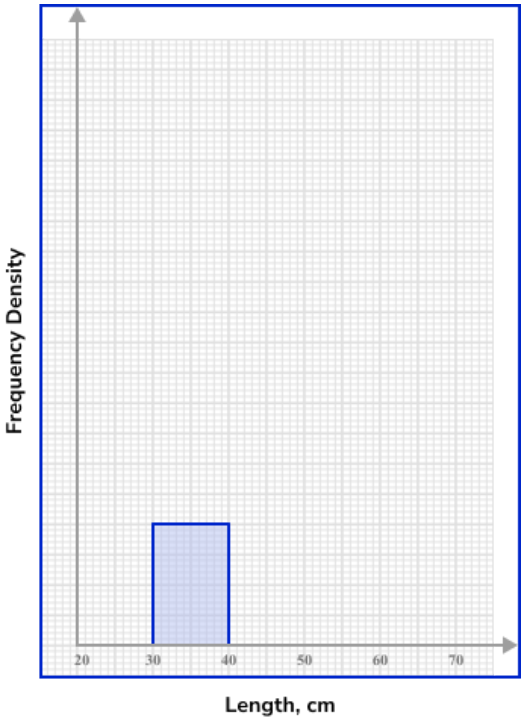


Histograms - Answers

Group C contd

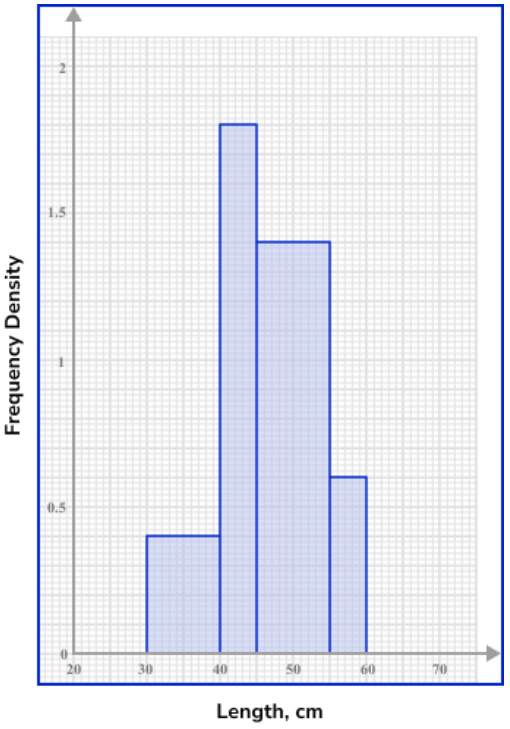
3)

Length, cm	Frequency	Frequency Density
$30 \leq x < 40$	4	
$40 \leq x < 45$		1.8
$45 \leq x < 55$		1.4
$55 \leq x < 60$		0.6



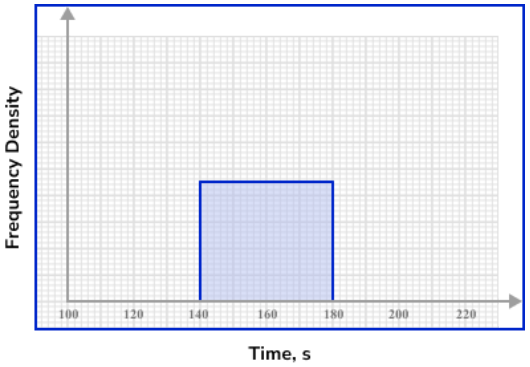
3)

Length, cm	Frequency	Frequency Density
$30 \leq x < 40$	4	0.4
$40 \leq x < 45$	9	1.8
$45 \leq x < 55$	14	1.4
$55 \leq x < 60$	3	0.6



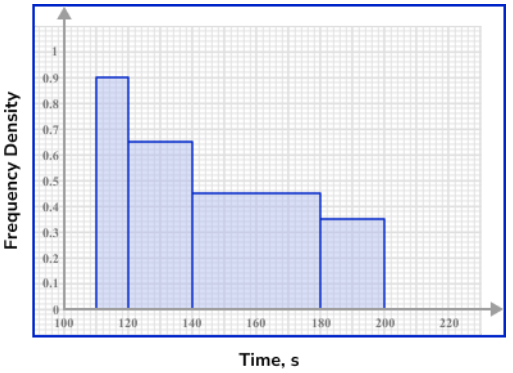
4)

Time, s	Frequency	Frequency Density
$110 \leq x < 120$		0.9
$120 \leq x < 140$		0.65
$140 \leq x < 180$	18	
$180 \leq x < 200$	7	



4)

Time, s	Frequency	Frequency Density
$110 \leq x < 120$	9	0.9
$120 \leq x < 140$	13	0.65
$140 \leq x < 180$	18	0.45
$180 \leq x < 200$	7	0.35



Histograms - Answers

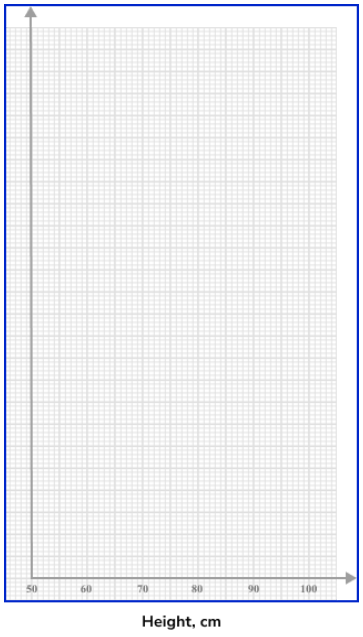
	Question	Answer
	Applied Questions	
1)	Fred measured the heights of 30 sunflowers in a field. He rounded the heights to the nearest centimetre and made a list of the measurements.	

51	74	61	72	65	70
70	82	71	79	74	81
60	74	73	57	65	99
75	67	72	72	62	69
64	73	63	89	73	95

a) Use the data to complete the frequency and frequency density columns in the table below.

Height, cm	Frequency	Frequency Density
$50 \leq x < 60$		
$60 \leq x < 70$		
$70 \leq x < 75$		
$75 \leq x < 85$		
$85 \leq x < 100$		

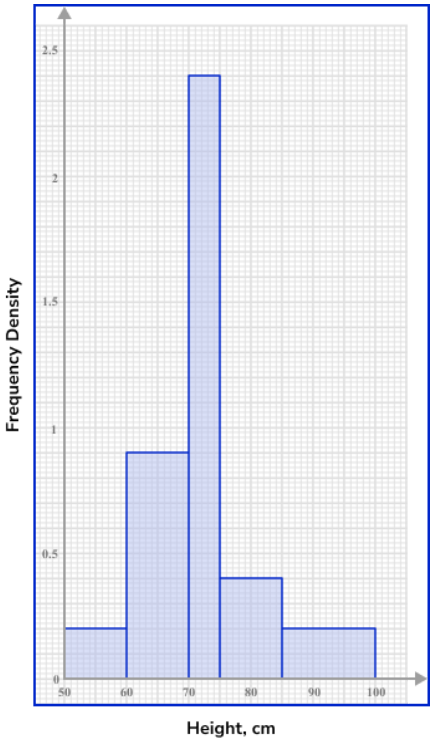
b) Draw the histogram for the data on the axes provided.



a)

Height, cm	Frequency	Frequency Density
$50 \leq x < 60$	2	0.2
$60 \leq x < 70$	9	0.9
$70 \leq x < 75$	12	2.4
$75 \leq x < 85$	4	0.4
$85 \leq x < 100$	3	0.2

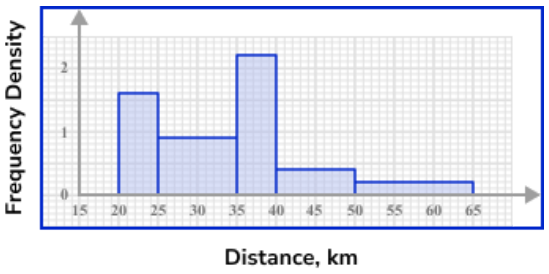
b)



Histograms - Answers

2)

The histogram shows the distance 35 employees travel to get to work each morning.



a) Use the histogram to find an estimate of the mean distance.

b) Use the histogram to find the percentage of employees that travel more than $45km$.

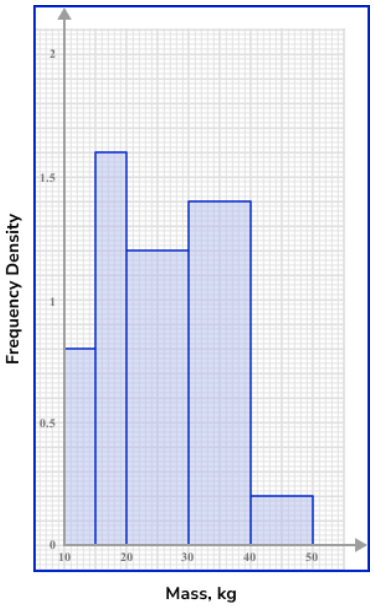
Distance, km	Frequency	Frequency Density
$20 \leq x < 25$	8	1.6
$25 \leq x < 35$	9	0.9
$35 \leq x < 40$	11	2.2
$40 \leq x < 50$	4	0.4
$50 \leq x < 65$	3	0.2

a) $34.7km$

b) 14.3%

3)

a) The histogram shows the mass of 40 rocks found on a beach.

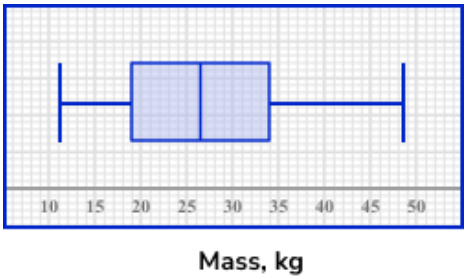


Use the histogram to find estimates for the lower quartile, median and upper quartile.

b) The smallest rock had a mass of 11 kg, the largest rock had a mass of 48.5 kg. Use this information and your figures from part a to draw a box plot. For the mass of the rocks.

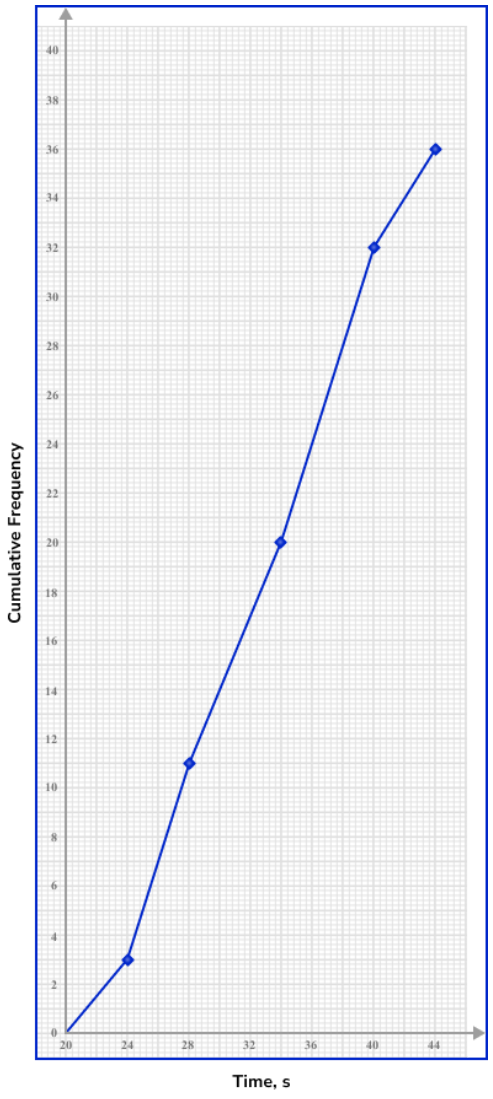
a) LQ $= 18.75\ kg$ (accept $19kg$)
Median = $26.7kg$ (accept $27kg$)
UQ $= 34.2kg$ (accept $34kg$)

b)



Histograms - Answers

4) The cumulative frequency graph shows information about the time taken for a group of 36 students to do a logic puzzle.



a) Use the graph to complete the frequency and frequency density columns in the table below.

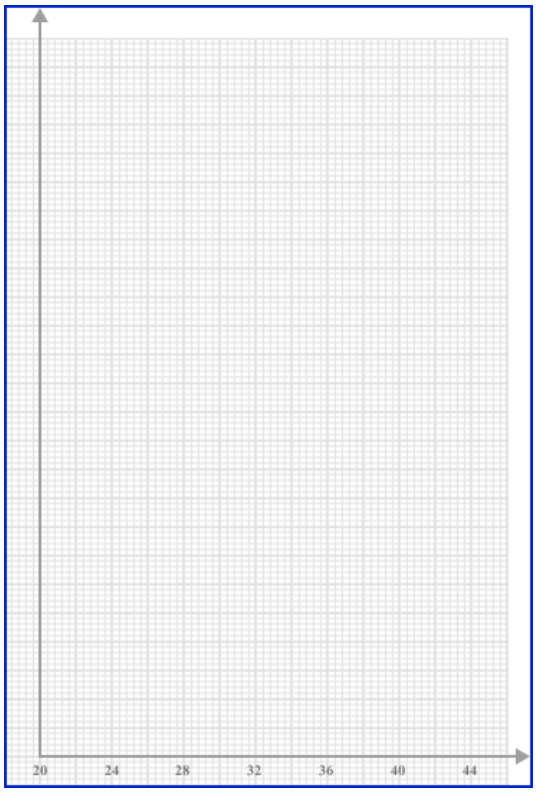
Time, s	Frequency	Frequency Density
$20 \leq x < 24$		
$24 \leq x < 28$		
$28 \leq x < 34$		
$34 \leq x < 40$		
$40 \leq x < 44$		

a)

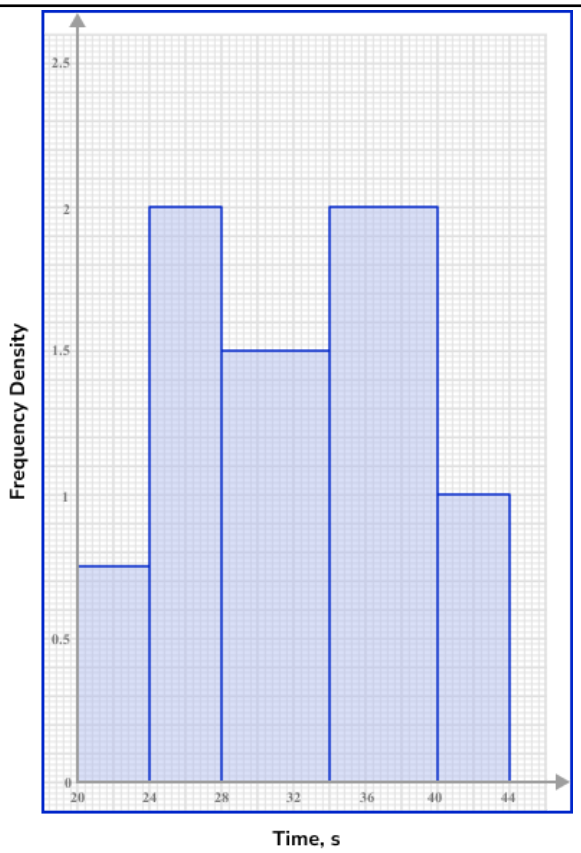
Time, s	Frequency	Frequency Density
$20 \leq x < 24$	3	0.75
$24 \leq x < 28$	8	2
$28 \leq x < 34$	9	1.5
$34 \leq x < 40$	12	2
$40 \leq x < 44$	4	1

Histograms - Answers

b) Use the table to draw a histogram for the time taken to complete the logic puzzle.



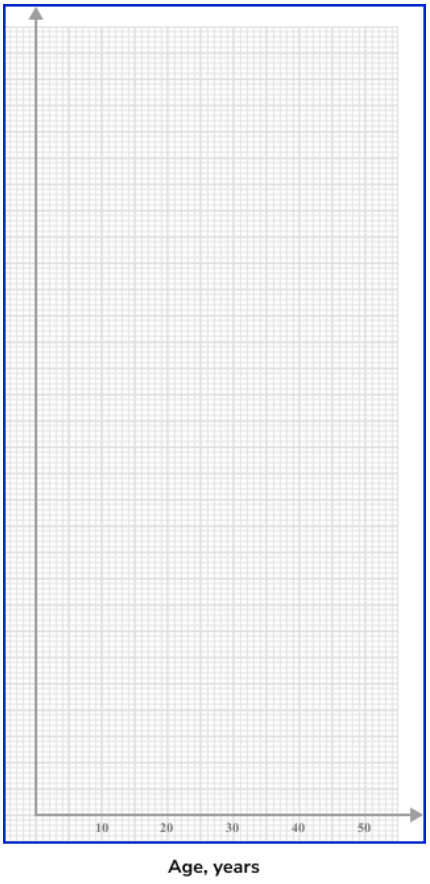
b)

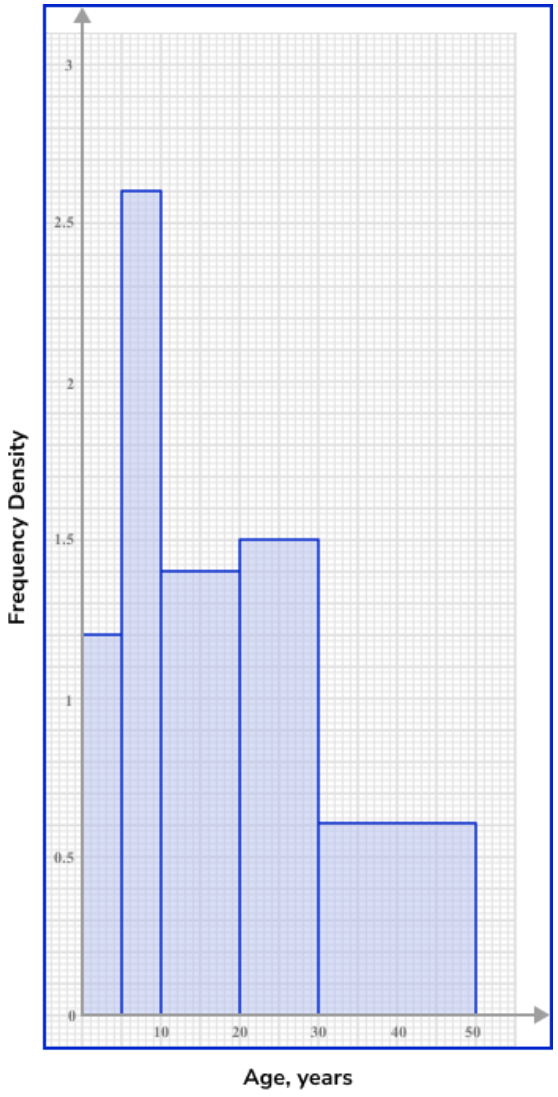


Histograms - Mark Scheme

	Question	Answer	
	Exam Questions		
1) (a)	The frequency table shows the ages of guests at a hotel. Complete the frequency density column.	(a) At least 1 Frequency Density correct 3 Frequency Densities correct All Frequency Densities correct	 (1) (1) (1)
(b)	Use the table to draw a histogram for the data.	(b) Frequency Density used for vertical scale 3 bars correct All bars correct	 (1) (1) (1)

Age, years	Frequency	Frequency Density
$0 \leq x < 5$	6	
$5 \leq x < 10$	13	
$10 \leq x < 20$	14	
$20 \leq x < 30$	15	
$30 \leq x < 50$	12	

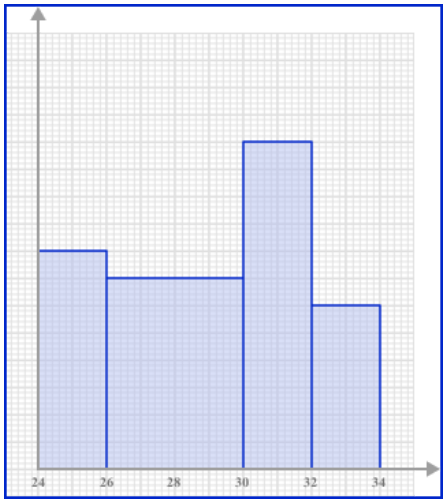




Histograms - Mark Scheme

2)

The histogram shows information about the mass of 20 newborn calves on a farm.

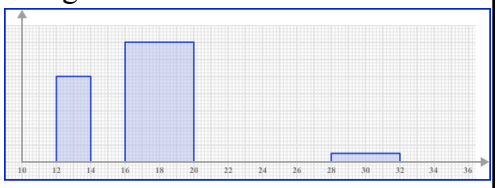


Use the histogram to estimate the number of caves with a mass of more than $31kg$.

Attempt to find "areas" of bars	**(1)**
Frequency $(30 - 32) = 6$	**(1)**
Frequency $(32 - 34) = 3$	**(1)**
Frequency $(31 - 32) = 3$	**(1)**
6	**(1)**

3)

The widths of flowers in a garden were collected. An incomplete histogram and table is shown below.



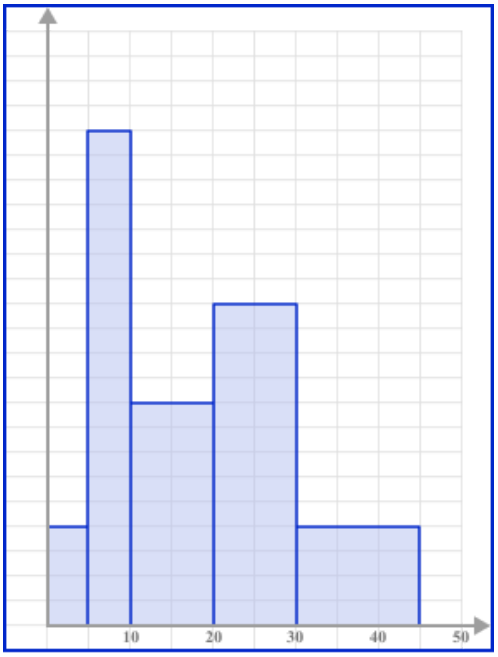
Width, mm	Frequency	Frequency Density
$12 \leq x < 14$		
$14 \leq x < 16$	9	
$16 \leq x < 20$	14	
$20 \leq x < 28$	4	
$28 \leq x < 32$		

Use the information provided to complete the histogram and table.

Width, mm	Frequency	Frequency Density
$12 \leq x < 14$	5	2.5
$14 \leq x < 16$	9	4.5
$16 \leq x < 20$	14	3.5
$20 \leq x < 28$	4	0.5
$28 \leq x < 32$	1	0.25

Frequency density $(16 - 20) = 3.5$	**(1)**
Correctly label vertical axis	**(1)**
FD: $(14 - 16) = 4.5$ **and** $(20 - 28) = 0.5$	**(1)**
$(12 - 14)$: F = 5, FD = 2.5 **and** $(28 - 32)$: F = 1, FD = 0.25	**(1)**
Add remaining bars correctly drawn	**(1)**

Histograms - Mark Scheme

4)	The histogram shows information about the mass of stones in a field.  Use the histogram to estimate the interquartile range.	Total area/frequency found e.g. 70 $\frac{8}{10}$ of 2nd group = LQ $\frac{9}{13}$ or $\frac{4}{13}$ of 4^{th} group = UQ LQ = 9 UQ = 26. 9 IQR = UQ - LQ = 17. 9kg	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**