

MATHS



MODEL ANSWERS

ESTIMATING MEDIAN GROUPED FREQUENCY

SCORE

/146

PERCENTAGE

%

STEMUP

- 1 The table shows information about the waiting times of some customers in a queue. Write down the class that contains the median.

Waiting time (w seconds)	Frequency
$20 < w \leq 30$	9
$30 < w \leq 40$	22
$40 < w \leq 50$	16
$50 < w \leq 60$	17
$60 < w \leq 70$	9
$70 < w \leq 80$	23

$$n = 96$$

median is the 48th value

cumulative frequencies: 9, 31, 47, 64, 73, 96

the 48th value is in the class $50 < w \leq 60$

$$50 < w \leq 60$$

1 / 1

- 2 The table shows information about the times taken by some students to complete a puzzle.
 (a) Write down the position of the median in the data.
 (b) Find the class that contains the median.

Time (t minutes)	Frequency
$20 \leq t < 30$	10
$30 \leq t < 40$	10
$40 \leq t < 50$	25
$50 \leq t < 60$	17
$60 \leq t < 70$	11
$70 \leq t < 80$	18

$$(a) n = 91$$

$$\text{median position} = (91 + 1) \div 2 = 46$$

(b) cumulative frequencies: 10, 20, 45, 62, 73, 91

the 46th value is in the class $50 \leq t < 60$

$$(a) 46 \quad (b) 50 \leq t < 60$$

2 / 2

- 3 An estimate for the median of the masses of some parcels has been worked out from a grouped frequency table.

Explain why the median you have worked out may not be the exact median.

The actual values in each class are not given,
 so we cannot know where the middle value is
 inside the median class

The method assumes an even spread

Exact values not known

2 / 2

- 4 The table shows information about the lengths of some pencils.
Write down the class that contains the median.

Length (l cm)	Frequency
$10 < l \leq 12$	9
$12 < l \leq 14$	9
$14 < l \leq 16$	4
$16 < l \leq 18$	15
$18 < l \leq 20$	18
$20 < l \leq 22$	4

$$n = 59$$

median is the 30th value

cumulative frequencies: 9, 18, 22, 37, 55, 59

the 30th value is in the class $16 < l \leq 18$

$$16 < l \leq 18$$

1 / 1

- 5 The table shows information about the distances travelled to work by some employees.
(a) Write down the position of the median in the data.
(b) Find the class that contains the median.

Distance (d km)	Frequency
$5 < d \leq 10$	8
$10 < d \leq 15$	13
$15 < d \leq 20$	20
$20 < d \leq 25$	15
$25 < d \leq 30$	20
$30 < d \leq 35$	29

$$(a) n = 105$$

$$\text{median position} = (105 + 1) \div 2 = 53$$

(b) cumulative frequencies: 8, 21, 41, 56, 76, 105

the 53th value is in the class $20 < d \leq 25$

$$(a) 53 \quad (b) 20 < d \leq 25$$

2 / 2

- 6 An estimate for the mean of the waiting times of some customers in a queue has been worked out from a grouped frequency table.

Explain why the mean worked out from a grouped frequency table is only an estimate.

The midpoint of each class is used instead of the actual values, and the actual values could be anywhere in the class

Midpoints used, not actual values

2 / 2

- 7 The table shows information about the waiting times of some customers in a queue. Write down the class that contains the median.

Waiting time (w seconds)	Frequency
$30 \leq w < 50$	10
$50 \leq w < 70$	29
$70 \leq w < 90$	18
$90 \leq w < 110$	11
$110 \leq w < 130$	9

$$n = 77$$

median is the 39th value

cumulative frequencies: 10, 39, 57, 68, 77

the 39th value is in the class $50 \leq w < 70$

$$50 \leq w < 70$$

1 / 1

- 8 The table shows information about the times taken by some students to complete a puzzle.
 (a) Write down the position of the median in the data.
 (b) Find the class that contains the median.

Time (t minutes)	Frequency
$10 < t \leq 20$	8
$20 < t \leq 30$	14
$30 < t \leq 40$	15
$40 < t \leq 50$	8
$50 < t \leq 60$	9
$60 < t \leq 70$	11

$$(a) n = 65$$

$$\text{median position} = (65 + 1) \div 2 = 33$$

(b) cumulative frequencies: 8, 22, 37, 45, 54, 65

the 33th value is in the class $30 < t \leq 40$

$$(a) 33 \quad (b) 30 < t \leq 40$$

2 / 2

- 9 The table shows information about the distances travelled to work by some employees. Work out an estimate for the median. Give your answer correct to 1 decimal place.

Distance (d km)	Frequency
$5 \leq d < 15$	3
$15 \leq d < 25$	7
$25 \leq d < 35$	16
$35 \leq d < 45$	15
$45 \leq d < 55$	15

$$n \div 2 = 56 \div 2 = 28$$

cumulative frequency before this class = 26

class $35 \leq d < 45$

$$35 + (28 - 26) \div 15 \times 10 = 36.3$$

$$36.3 \text{ km}$$

2 / 2

- 10** The table shows information about the speeds of some cars passing a school.
Write down the class that contains the median.

Speed (s km/h)	Frequency
$30 < s \leq 40$	24
$40 < s \leq 50$	14
$50 < s \leq 60$	16
$60 < s \leq 70$	12
$70 < s \leq 80$	22
$80 < s \leq 90$	7

$$n = 95$$

median is the 48th value

cumulative frequencies: 24, 38, 54, 66, 88, 95

the 48th value is in the class $50 < s \leq 60$

$$50 < s \leq 60$$

1 / 1

- 11** The table shows information about the times taken by some students to complete a puzzle.
Work out an estimate for the median.
Give your answer correct to 1 decimal place.

Time (t minutes)	Frequency
$20 \leq t < 30$	22
$30 \leq t < 40$	23
$40 \leq t < 45$	23
$45 \leq t < 50$	12
$50 \leq t < 55$	28

$$n \div 2 = 108 \div 2 = 54$$

cumulative frequency before this class = 45

class $40 \leq t < 45$

$$40 + (54 - 45) \div 23 \times 5 = 42.0$$

$$42.0 \text{ minutes}$$

3 / 3

- 12** The table shows information about the waiting times of some customers in a queue.
Work out an estimate for the median.
Give your answer correct to 1 decimal place.

Waiting time (w seconds)	Frequency
$0 \leq w < 20$	28
$20 \leq w < 40$	20
$40 \leq w < 60$	8
$60 \leq w < 80$	9
$80 \leq w < 100$	13

$$n \div 2 = 78 \div 2 = 39$$

cumulative frequency before this class = 28

class $20 \leq w < 40$

$$20 + (39 - 28) \div 20 \times 20 = 31.0$$

$$31.0 \text{ seconds}$$

2 / 2

- 13 The table shows information about the waiting times of some customers in a queue. Write down the class that contains the median.

Waiting time (w seconds)	Frequency
$0 < w \leq 10$	7
$10 < w \leq 20$	18
$20 < w \leq 30$	27
$30 < w \leq 40$	24
$40 < w \leq 50$	9
$50 < w \leq 60$	13

$$n = 98$$

median is the 49th value

cumulative frequencies: 7, 25, 52, 76, 85, 98

the 49th value is in the class $20 < w \leq 30$

$$20 < w \leq 30$$

1 / 1

- 14 The table shows information about the lengths of some pencils. Work out an estimate for the median. Give your answer correct to 1 decimal place.

Length (l cm)	Frequency
$10 < l \leq 15$	16
$15 < l \leq 25$	14
$25 < l \leq 35$	7
$35 < l \leq 40$	7
$40 < l \leq 45$	6

$$n \div 2 = 50 \div 2 = 25$$

cumulative frequency before this class = 16

class $15 < l \leq 25$

$$15 + (25 - 16) \div 14 \times 10 = 21.4$$

$$21.4 \text{ cm}$$

3 / 3

- 15 The table shows information about the waiting times of some customers in a queue. Work out an estimate for the median. Give your answer correct to 1 decimal place.

Waiting time (w seconds)	Frequency
$0 < w \leq 10$	30
$10 < w \leq 20$	13
$20 < w \leq 30$	10
$30 < w \leq 40$	26
$40 < w \leq 50$	23

$$n \div 2 = 102 \div 2 = 51$$

cumulative frequency before this class = 43

class $20 < w \leq 30$

$$20 + (51 - 43) \div 10 \times 10 = 28.0$$

$$28.0 \text{ seconds}$$

2 / 2

- 16 The table shows information about the waiting times of some customers in a queue. Write down the class that contains the median.

Waiting time (w seconds)	Frequency
$30 \leq w < 50$	25
$50 \leq w < 70$	6
$70 \leq w < 130$	24
$130 \leq w < 170$	11
$170 \leq w < 190$	18

$$n = 84$$

median is the 42th value

cumulative frequencies: 25, 31, 55, 66, 84

the 42th value is in the class $70 \leq w < 130$

$$70 \leq w < 130$$

1 / 1

- 17 The table shows information about the masses of some parcels. Work out an estimate for the median. Give your answer correct to 1 decimal place.

Mass (m kg)	Frequency
$0 < m \leq 5$	14
$5 < m \leq 10$	30
$10 < m \leq 20$	29
$20 < m \leq 35$	7
$35 < m \leq 40$	18

$$n \div 2 = 98 \div 2 = 49$$

cumulative frequency before this class = 44

class $10 < m \leq 20$

$$10 + (49 - 44) \div 29 \times 10 = 11.7$$

$$11.7 \text{ kg}$$

3 / 3

- 18 The table shows information about the speeds of some cars passing a school. Work out an estimate for the median. Give your answer correct to 1 decimal place.

Speed (s km/h)	Frequency
$40 < s \leq 50$	26
$50 < s \leq 60$	17
$60 < s \leq 70$	8
$70 < s \leq 80$	15
$80 < s \leq 90$	24

$$n \div 2 = 90 \div 2 = 45$$

cumulative frequency before this class = 43

class $60 < s \leq 70$

$$60 + (45 - 43) \div 8 \times 10 = 62.5$$

$$62.5 \text{ km/h}$$

2 / 2

- 19 The estimated median and the estimated interquartile range of speeds for two groups are shown.

Road A: median 41.4 km/h, interquartile range 9.6 km/h. Road B: median 36.3 km/h, interquartile range 3.7 km/h.

Compare the distributions of the two groups.

median: 41.4 and 36.3

interquartile range: 9.6 and 3.7

The median speed for Road A (41.4 km/h) is greater than the median for Road B (36.3 km/h), so on average the speeds for Road A are higher

The interquartile range for Road A (9.6 km/h) is greater than for Road B (3.7 km/h), so the speeds for Road A are more spread out

$$\text{median } 41.4 > 36.3; \text{ IQR } 9.6 > 3.7$$

3 / 3

- 20 The table shows information about the distances travelled to work by some employees.

Work out an estimate for the median.

Give your answer correct to 1 decimal place.

Distance (d km)	Frequency
$5 < d \leq 10$	22
$10 < d \leq 20$	12
$20 < d \leq 30$	9
$30 < d \leq 35$	6
$35 < d \leq 40$	25

$$n \div 2 = 74 \div 2 = 37$$

cumulative frequency before this class = 34

class $20 < d \leq 30$

$$20 + (37 - 34) \div 9 \times 10 = 23.3$$

23.3 km

3 / 3

- 21 The table shows information about the lengths of some pencils.

Work out an estimate for the median.

Give your answer correct to 1 decimal place.

Length (l cm)	Frequency
$0 < l \leq 4$	28
$4 < l \leq 8$	24
$8 < l \leq 12$	26
$12 < l \leq 16$	14
$16 < l \leq 20$	8

$$n \div 2 = 100 \div 2 = 50$$

cumulative frequency before this class = 28

class $4 < l \leq 8$

$$4 + (50 - 28) \div 24 \times 4 = 7.7$$

7.7 cm

2 / 2

- 22 The estimated median and the estimated interquartile range of distances for two groups are shown.

Office A: median 28.3 km, interquartile range 8.4 km. Office B: median 33.8 km, interquartile range 4.7 km.

Compare the distributions of the two groups.

median: 28.3 and 33.8

interquartile range: 8.4 and 4.7

The median distance for Office A (28.3 km) is less than the median for Office B (33.8 km), so on average the distances for Office A are lower

The interquartile range for Office A (8.4 km) is greater than for Office B (4.7 km), so the distances for Office A are more spread out

$$\text{median } 28.3 < 33.8; \text{ IQR } 8.4 > 4.7$$

3 / 3

- 23 The table shows information about the distances travelled to work by some employees.

Work out an estimate for the median.

Give your answer correct to 1 decimal place.

Distance (d km)	Frequency
$10 \leq d < 20$	16
$20 \leq d < 40$	13
$40 \leq d < 50$	9
$50 \leq d < 70$	29
$70 \leq d < 90$	7
$90 \leq d < 100$	20

$$n \div 2 = 94 \div 2 = 47$$

cumulative frequency before this class = 38

class $50 \leq d < 70$

$$50 + (47 - 38) \div 29 \times 20 = 56.2$$

56.2 km

3 / 3

- 24 The table shows information about the distances travelled to work by some employees.

Work out an estimate for the median.

Give your answer correct to 1 decimal place.

Distance (d km)	Frequency
$10 \leq d < 15$	30
$15 \leq d < 20$	8
$20 \leq d < 25$	13
$25 \leq d < 30$	29
$30 \leq d < 35$	18

$$n \div 2 = 98 \div 2 = 49$$

cumulative frequency before this class = 38

class $20 \leq d < 25$

$$20 + (49 - 38) \div 13 \times 5 = 24.2$$

24.2 km

2 / 2

- 25 The estimated median and the estimated interquartile range of speeds for two groups are shown.

Road A: median 46.2 km/h, interquartile range 6.6 km/h. Road B: median 49.1 km/h, interquartile range 10.8 km/h.

Compare the distributions of the two groups.

median: 46.2 and 49.1

interquartile range: 6.6 and 10.8

The median speed for Road A (46.2 km/h) is less than the median for Road B (49.1 km/h), so on average the speeds for Road A are lower

The interquartile range for Road A (6.6 km/h) is less than for Road B (10.8 km/h), so the speeds for Road A are less spread out (more consistent)

$$\text{median } 46.2 < 49.1; \text{IQR } 6.6 < 10.8$$

3 / 3

- 26 The table shows information about the heights of some young trees.

(a) Write down the class that contains the median.

(b) Work out an estimate for the median, correct to 1 decimal place.

Height (h cm)	Frequency
$150 \leq h < 170$	19
$170 \leq h < 190$	13
$190 \leq h < 230$	24
$230 \leq h < 290$	23
$290 \leq h < 310$	13

$$(b) n \div 2 = 92 \div 2 = 46$$

cumulative frequency before this class = 32

class $190 \leq h < 230$

$$190 + (46 - 32) \div 24 \times 40 = 213.3$$

$$(a) 190 \leq h < 230 \quad (b) 213.3 \text{ cm}$$

3 / 3

- 27 The table shows information about the distances travelled to work by some employees.

Work out an estimate for the median.

Give your answer correct to 1 decimal place.

Distance (d km)	Frequency
$0 < d \leq 5$	17
$5 < d \leq 10$	23
$10 < d \leq 15$	10
$15 < d \leq 20$	14
$20 < d \leq 25$	30

$$n \div 2 = 94 \div 2 = 47$$

cumulative frequency before this class = 40

class $10 < d \leq 15$

$$10 + (47 - 40) \div 10 \times 5 = 13.5$$

$$13.5 \text{ km}$$

2 / 2

- 28 The table shows information about the times taken by some students to complete a puzzle.
 (a) Complete the cumulative frequency column.
 (b) Use the table to work out an estimate for the median, correct to 1 decimal place.

Time (t minutes)	Frequency	Cumulative frequency
$10 \leq t < 20$	17	17
$20 \leq t < 30$	10	27
$30 \leq t < 50$	13	40
$50 \leq t < 80$	3	43
$80 \leq t < 90$	7	50

(a) 17, 27, 40, 43, 50

(b) $n \div 2 = 50 \div 2 = 25$
 cumulative frequency
 before this class = 17
 class $20 \leq t < 30$
 $20 + (25 - 17) \div 10 \times 10$
 $= 28.0$

(b) 28.0 minutes

3 / 3

- 29 The cumulative frequency table shows information about the lengths of some pencils. No value is less than 0.
 Work out an estimate for the median, correct to 1 decimal place.

Length (l cm)	$l \leq 4$	$l \leq 8$	$l \leq 12$	$l \leq 16$	$l \leq 20$
Cumulative frequency	6	26	35	47	58

$n = 58$, so median position = 29
 this is between 26 and 35, so the class is $8 < l \leq 12$
 $8 + (29 - 26) \div 4 \times 4 = 9.3$

9.3 cm

3 / 3

- 30 The table shows information about the waiting times of some customers in a queue.
 Work out an estimate for the median.
 Give your answer correct to 1 decimal place.

Waiting time (w seconds)	Frequency
$30 < w \leq 40$	11
$40 < w \leq 50$	6
$50 < w \leq 60$	14
$60 < w \leq 70$	13
$70 < w \leq 80$	20
$80 < w \leq 90$	20

$n \div 2 = 84 \div 2 = 42$
 cumulative frequency before this class = 31
 class $60 < w \leq 70$
 $60 + (42 - 31) \div 10 \times 10 = 68.5$

68.5 seconds

3 / 3

- 31 The table shows information about the times taken by some students to complete a puzzle.
 (a) Complete the cumulative frequency column.
 (b) Use the table to work out an estimate for the median, correct to 1 decimal place.

Time (t minutes)	Frequency	Cumulative frequency
$10 < t \leq 20$	13	13
$20 < t \leq 30$	19	32
$30 < t \leq 40$	16	48
$40 < t \leq 50$	13	61
$50 < t \leq 60$	19	80

(a) 13, 32, 48, 61, 80
 (b) $n \div 2 = 80 \div 2 = 40$
 cumulative frequency
 before this class = 32
 class $30 < t \leq 40$
 $30 + (40 - 32) \div 16 \times 10$
 $= 35.0$

(b) 35.0 minutes

3 / 3

- 32 The cumulative frequency table shows information about the heights of some young trees. No value is less than 150.
 Work out an estimate for the median, correct to 1 decimal place.

Height (h cm)	$h \leq 170$	$h \leq 190$	$h \leq 210$	$h \leq 230$	$h \leq 250$
Cumulative frequency	19	24	29	39	52

$n = 52$, so median position = 26
 this is between 24 and 29, so the class is $190 < h \leq 210$
 $190 + (26 - 24) \div 5 \times 20 = 198.0$

198.0 cm

3 / 3

- 33 The table shows information about the times taken by some students to complete a puzzle.
 (a) Work out an estimate for the mean, correct to 1 decimal place.
 (b) Work out an estimate for the median, correct to 1 decimal place.

Time (t minutes)	Frequency
$0 < t \leq 10$	11
$10 < t \leq 20$	11
$20 < t \leq 30$	16
$30 < t \leq 40$	3
$40 < t \leq 50$	13

(a) midpoints 5, 15, 25, 35, 45
 total = 1310
 mean = $1310 \div 54 = 24.3$
 (b) $n \div 2 = 54 \div 2 = 27$
 cumulative frequency before this class = 22
 class $20 < t \leq 30$
 $20 + (27 - 22) \div 16 \times 10 = 23.1$

(a) 24.3 minutes (b) 23.1 minutes

4 / 4

- 34 The table shows information about the times taken by some students to complete a puzzle.
 (a) Complete the cumulative frequency column.
 (b) Use the table to work out an estimate for the median, correct to 1 decimal place.

Time (t minutes)	Frequency	Cumulative frequency
$0 < t \leq 10$	19	19
$10 < t \leq 20$	11	30
$20 < t \leq 25$	23	53
$25 < t \leq 30$	7	60
$30 < t \leq 35$	30	90

(a) 19, 30, 53, 60, 90

(b) $n \div 2 = 90 \div 2 = 45$
 cumulative frequency
 before this class = 30
 class $20 < t \leq 25$
 $20 + (45 - 30) \div 23 \times 5$
 $= 23.3$

(b) 23.3 minutes

3 / 3

- 35 The cumulative frequency table shows information about the masses of some parcels. No value is less than 0.
 Work out an estimate for the median, correct to 1 decimal place.

Mass (m kg)	$m \leq 5$	$m \leq 10$	$m \leq 15$	$m \leq 20$	$m \leq 25$	$m \leq 30$
Cumulative frequency	10	39	63	75	93	118

$n = 118$, so median position = 59
 this is between 39 and 63, so the class is $10 < m \leq 15$
 $10 + (59 - 39) \div 24 \times 5 = 14.2$

14.2 kg

3 / 3

- 36 The table shows information about the masses of some parcels.
 (a) Work out an estimate for the mean, correct to 1 decimal place.
 (b) Work out an estimate for the median, correct to 1 decimal place.

Mass (m kg)	Frequency
$20 < m \leq 30$	18
$30 < m \leq 40$	15
$40 < m \leq 50$	10
$50 < m \leq 60$	14
$60 < m \leq 70$	15

(a) midpoints 25, 35, 45, 55, 65
 total = 3170

mean = $3170 \div 72 = 44.0$

(b) $n \div 2 = 72 \div 2 = 36$

cumulative frequency before this class = 33
 class $40 < m \leq 50$

$40 + (36 - 33) \div 10 \times 10 = 43.0$

(a) 44.0 kg (b) 43.0 kg

4 / 4

- 37 The table shows information about the waiting times of some customers in a queue.
- (a) Complete the cumulative frequency column.
- (b) Use the table to work out an estimate for the median, correct to 1 decimal place.

Waiting time (w seconds)	Frequency	Cumulative frequency
$30 < w \leq 50$	18	18
$50 < w \leq 70$	26	44
$70 < w \leq 90$	25	69
$90 < w \leq 110$	13	82
$110 < w \leq 130$	12	94

(a) 18, 44, 69, 82, 94
 (b) $n \div 2 = 94 \div 2 = 47$
 cumulative frequency before this class = 44
 class $70 < w \leq 90$
 $70 + (47 - 44) \div 25 \times 20 = 72.4$

(b) 72.4 seconds

3 / 3

- 38 The cumulative frequency table shows information about the lengths of some pencils. No value is less than 10.
- Work out an estimate for the median, correct to 1 decimal place.

Length (l cm)	$l \leq 12$	$l \leq 14$	$l \leq 18$	$l \leq 22$	$l \leq 24$
Cumulative frequency	21	33	57	62	70

$n = 70$, so median position = 35
 this is between 33 and 57, so the class is $14 < l \leq 18$
 $14 + (35 - 33) \div 24 \times 4 = 14.3$

14.3 cm

4 / 4

- 39 The table shows information about the speeds of some cars passing a school.
- (a) Work out an estimate for the mean, correct to 1 decimal place.
- (b) Work out an estimate for the median, correct to 1 decimal place.

Speed (s km/h)	Frequency
$40 \leq s < 50$	12
$50 \leq s < 60$	19
$60 \leq s < 70$	30
$70 \leq s < 80$	7
$80 \leq s < 90$	22

(a) midpoints 45, 55, 65, 75, 85
 total = 5930
 mean = $5930 \div 90 = 65.9$
 (b) $n \div 2 = 90 \div 2 = 45$
 cumulative frequency before this class = 31
 class $60 \leq s < 70$
 $60 + (45 - 31) \div 30 \times 10 = 64.7$

(a) 65.9 km/h (b) 64.7 km/h

4 / 4

- 40 The table shows information about the lengths of some pencils.
Work out an estimate for the number of pencils with length more than 24 cm.

Length (l cm)	Frequency
$10 \leq l < 14$	10
$14 \leq l < 18$	23
$18 \leq l < 22$	7
$22 \leq l < 26$	30
$26 \leq l < 30$	11

*24 is in the class $22 \leq l < 26$ (width 4)
 $(26 - 24) \div 4 \times 30 = 15$ above 24 in this class
 plus the later classes: 11
 total = 26*

26

4 / 4

- 41 The table shows the frequencies of waiting times for two groups, Shop A and Shop B.
 (a) Work out an estimate for the median for each group, correct to 1 decimal place.
 (b) The interquartile ranges are 38.9 seconds for Shop A and 64.7 seconds for Shop B.
 Compare the two distributions.

Waiting time (w seconds)	Shop A	Shop B
$20 \leq w < 40$	7	17
$40 \leq w < 60$	9	14
$60 \leq w < 80$	13	5
$80 \leq w < 100$	18	3
$100 \leq w < 120$	9	13

*(a) Shop A: $n \div 2 = 56 \div 2 = 28$
 cumulative frequency before this class = 16
 $60 + (28 - 16) \div 13 \times 20 = 78.5$
 Shop B: $n \div 2 = 52 \div 2 = 26$
 cumulative frequency before this class = 17
 $40 + (26 - 17) \div 14 \times 20 = 52.9$*

(a) 78.5, 52.9

5 / 5

- 42 The table shows information about the waiting times of some customers in a queue.
 (a) Work out an estimate for the mean, correct to 1 decimal place.
 (b) Work out an estimate for the median, correct to 1 decimal place.

Waiting time (w seconds)	Frequency
$0 < w \leq 10$	26
$10 < w \leq 20$	12
$20 < w \leq 30$	16
$30 < w \leq 40$	9
$40 < w \leq 50$	19

*(a) midpoints 5, 15, 25, 35, 45
 total = 1880
 mean = $1880 \div 82 = 22.9$
 (b) $n \div 2 = 82 \div 2 = 41$
 cumulative frequency before this class = 38
 class $20 < w \leq 30$
 $20 + (41 - 38) \div 16 \times 10 = 21.9$*

(a) 22.9 seconds (b) 21.9 seconds

4 / 4

- 43 The table shows information about the masses of some parcels.
Work out an estimate for the number of parcels with mass more than 45 kg.

Mass (m kg)	Frequency
$10 < m \leq 30$	25
$30 < m \leq 40$	16
$40 < m \leq 50$	14
$50 < m \leq 70$	15
$70 < m \leq 100$	23

45 is in the class $40 < m \leq 50$ (width 10)
 $(50 - 45) \div 10 \times 14 = 7$ above 45 in this class
 plus the later classes: $15 + 23$
 total = 45

45

4 / 4

- 44 The table shows the frequencies of speeds for two groups, Road A and Road B.
 (a) Work out an estimate for the median for each group, correct to 1 decimal place.
 (b) The interquartile ranges are 13.4 km/h for Road A and 10.8 km/h for Road B. Compare the two distributions.

Speed (s km/h)	Road A	Road B
$30 < s \leq 35$	5	19
$35 < s \leq 40$	13	11
$40 < s \leq 45$	8	25
$45 < s \leq 50$	6	13
$50 < s \leq 55$	14	8

(a) Road A: $n \div 2 = 46 \div 2 = 23$
 cumulative frequency before this class = 18
 class $40 < s \leq 45$
 $40 + (23 - 18) \div 8 \times 5 = 43.1$
 Road B: $n \div 2 = 76 \div 2 = 38$
 cumulative frequency before this class = 30
 class $40 < s \leq 45$
 $40 + (38 - 30) \div 25 \times 5 = 41.6$
 (b) The median speed for Road A (43.1 km/h) is greater than the median for Road B (41.6 km/h), so on average the speeds for Road A are higher
 The interquartile range for Road A (13.4 km/h) is greater than for Road B (10.8 km/h), so the speeds for Road A are more spread out

(a) 43.1, 41.6

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- 45 The table shows information about the distances travelled to work by some employees.
 (a) Work out an estimate for the mean, correct to 1 decimal place.
 (b) Work out an estimate for the median, correct to 1 decimal place.

Distance (d km)	Frequency
$0 < d \leq 5$	21
$5 < d \leq 10$	12
$10 < d \leq 15$	14
$15 < d \leq 20$	24
$20 < d \leq 25$	7

(a) midpoints 2.5, 7.5, 12.5, 17.5, 22.5
 total = 895
 mean = $895 \div 78 = 11.5$
 (b) $n \div 2 = 78 \div 2 = 39$
 cumulative frequency before this class = 33
 class $10 < d \leq 15$
 $10 + (39 - 33) \div 14 \times 5 = 12.1$

(a) 11.5 km (b) 12.1 km

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- 46 The table shows information about the masses of some parcels.
Work out an estimate for the number of parcels with masse less than 55 kg.

Mass (m kg)	Frequency
$20 < m \leq 30$	10
$30 < m \leq 50$	7
$50 < m \leq 70$	4
$70 < m \leq 80$	20
$80 < m \leq 90$	6

*55 is in the class $50 < m \leq 70$ (width 20)
 $(55 - 50) \div 20 \times 4 = 1$ below 55 in this class
 plus the earlier classes: $10 + 7$
 total = 18*

18

4 / 4

- 47 The table shows information about the waiting times of some customers in a queue.
 (a) Work out an estimate for the mean, correct to 1 decimal place.
 (b) Work out an estimate for the median, correct to 1 decimal place.

Waiting time (w seconds)	Frequency
$0 \leq w < 20$	10
$20 \leq w < 40$	8
$40 \leq w < 60$	30
$60 \leq w < 80$	15
$80 \leq w < 100$	19

*(a) midpoints 10, 30, 50, 70, 90
 total = 4600
 mean = $4600 \div 82 = 56.1$
 (b) $n \div 2 = 82 \div 2 = 41$
 cumulative frequency before this class = 18
 class $40 \leq w < 60$
 $40 + (41 - 18) \div 30 \times 20 = 55.3$*

(a) 56.1 seconds (b) 55.3 seconds

4 / 4

- 48 The table shows information about the lengths of some pencils.
Work out an estimate for the number of pencils with length less than 5 cm.

Length (l cm)	Frequency
$0 < l \leq 2$	13
$2 < l \leq 4$	16
$4 < l \leq 6$	14
$6 < l \leq 8$	17
$8 < l \leq 10$	8

*5 is in the class $4 < l \leq 6$ (width 2)
 $(5 - 4) \div 2 \times 14 = 7$ below 5 in this class
 plus the earlier classes: $13 + 16$
 total = 36*

36

5 / 5

- 49 The table shows information about the waiting times of some customers in a queue.
Work out an estimate for the number of customers with waiting time more than 130 seconds.

Waiting time (w seconds)	Frequency
$30 < w \leq 70$	24
$70 < w \leq 90$	8
$90 < w \leq 110$	13
$110 < w \leq 150$	18
$150 < w \leq 210$	11

*130 is in the class $110 < w \leq 150$
(width 40)
 $(150 - 130) \div 40 \times 18 = 9$ above 130 in
this class
plus the later classes: 11
total = 20*

20

5 / 5

- 50 The table shows information about the speeds of some cars passing a school.
Work out an estimate for the number of cars with speed more than 45 km/h.

Speed (s km/h)	Frequency
$30 < s \leq 40$	9
$40 < s \leq 60$	12
$60 < s \leq 80$	13
$80 < s \leq 90$	25
$90 < s \leq 100$	17

*45 is in the class $40 < s \leq 60$ (width 20)
 $(60 - 45) \div 20 \times 12 = 9$ above 45 in this
class
plus the later classes: $13 + 25 + 17$
total = 64*

64

5 / 5