Representing data

Worked solutions

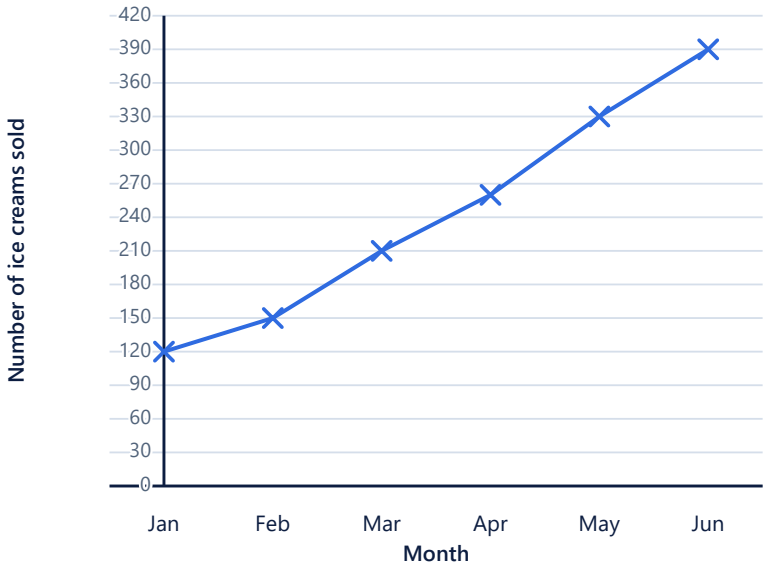
KS3 Maths topic practice

This topic online

1 The time series graph shows the number of ice creams a kiosk sold each month from January to June.

a. Write down the number of ice creams sold in April.

b. Between which two consecutive months was the biggest increase in sales?



(2 marks)

a) The point for April is at 260 ice creams

b) The increases are: Jan to Feb 30, Feb to Mar 60, Mar to Apr 50, Apr to May 70, May to Jun 60

The biggest increase, 70, is between April and May - the steepest line segment on the graph

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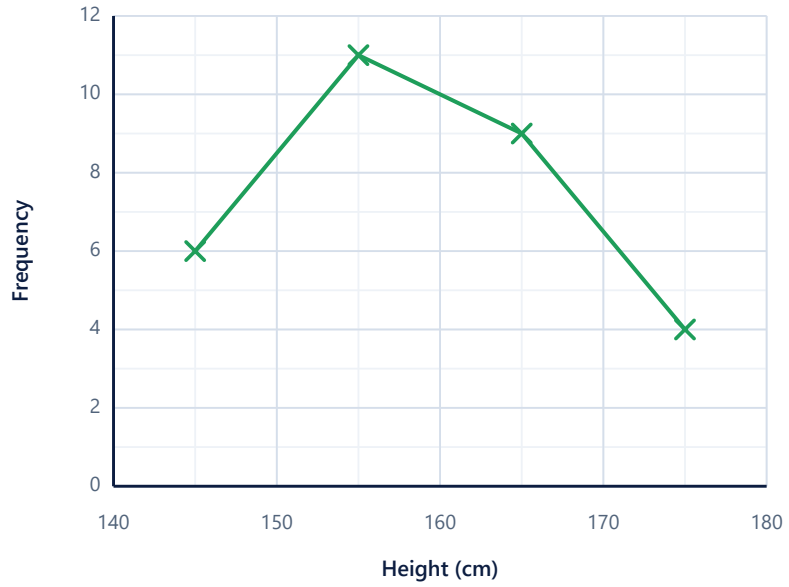
2 The table shows the heights, in centimetres, of 30 students.

Height (h cm)	Frequency
140 < h ≤ 150	6
150 < h ≤ 160	11
160 < h ≤ 170	9
170 < h ≤ 180	4

Draw a frequency polygon for this information.



(2 marks)

Plot each frequency at the midpoint of its class: (145, 6), (155, 11), (165, 9) and (175, 4)

Join the four points, in order, with straight lines

Do not join the last point back to the first

3 Choose the most suitable diagram for each set of data from this list.

pie chart scatter graph time series graph frequency polygon

a. The temperature in a classroom, taken every hour during a school day.

b. The height and the arm span of each of 20 pupils.

c. The favourite crisp flavours of Year 9, to show what proportion chose each flavour.

d. The finishing times of 60 runners in a fun run, grouped into classes.

(2 marks)

a) values over time

time series graph

b) two measurements for each pupil

scatter graph

c) parts of a whole

pie chart

d) grouped data

frequency polygon

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4 40 students each chose one sport. 15 chose football and 6 chose tennis. Ellie is going to draw a pie chart of the results.

a. Work out the angle Ellie should use for football.

b. Work out the angle Ellie should use for tennis.

(3 marks)

Each student is worth 360 divided by 40 = 9 degrees

a) Football

15 x 9 = 135 degrees

b) Tennis

6 x 9 = 54 degrees

5 Six people work at a sports shop on Saturdays. Here is what each of them was paid last Saturday.

£42 £45 £46 £48 £49 £190

a. Work out the mean pay.

b. Work out the median pay.

c. Which average best describes the pay of a typical worker? Give a reason.

(3 marks)

a)

42 + 45 + 46 + 48 + 49 + 190 = 420

420 ÷ 6 = 70

£70

b) middle two are 46 and 48

(46 + 48) ÷ 2 = 47

£47

c)

£190 is an extreme value

it pulls the mean up above 5 of the 6

the median

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6 80 students each chose one club: Art, Music or Drama.

The two-way table shows some information about their choices.

	Art	Music	Drama	Total
Boys	14		9	35
Girls		18	11	
Total				80

Complete the two-way table. (3 marks)

Boys Music = 35 - 14 - 9 = 12

Girls Total = 80 - 35 = 45

Girls Art = 45 - 18 - 11 = 16

Column totals

Art = 14 + 16 = 30, Music = 12 + 18 = 30, Drama = 9 + 11 = 20

Check

30 + 30 + 20 = 80

7 The table shows the number of members of a gym at the end of each year.

Year	Members
2021	2000
2022	2200
2023	2420

a. Show that the number of members increased by the same percentage each year.

b. Assuming this trend continues, predict the number of members at the end of 2024.

c. Give one reason why your prediction may not be reliable. (3 marks)

a) 2200 divided by 2000 = 1.1 and 2420 divided by 2200 = 1.1, so members grew by 10% in each year

b) 2420 x 1.1 = 2662 members

c) The prediction assumes the 10% growth continues, but the trend may not continue - for example a new competitor could open or prices could change

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8 Pupils in two classes timed how long they took to finish a puzzle. The times for Class 9A are shown in the back-to-back stem and leaf diagram.

Class 9A	Stem	Class 9B
8 5 2	1	
7 3 3 1	2	
6 4 0	3	
1	4	

Key: 5 | 1 | 9 means 15 seconds for 9A and 19 seconds for 9B

Here are the times, in seconds, for the 11 pupils in Class 9B.

19 25 31 28 22 33 26 38 29 24 35

a. Complete the diagram by adding the times for Class 9B.

b. Work out the median and the range for each class.

c. Compare the times of the two classes.

(4 marks)

a) 9B in order

19 22 24 25 26 28 29 31 33 35 38

1 | 9

2 | 2 4 5 6 8 9

3 | 1 3 5 8

b) 11 values, so the median is the 6th

9A

median = 23

range = 41 − 12 = 29

9B

median = 28

range = 38 − 19 = 19

c)

9A lower median: quicker on average

9B smaller range: more consistent

9A quicker, 9B more consistent

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9 The table shows how long 40 Year 9 pupils spent on homework one evening.

Time (t minutes)	Frequency
$0 < t \leq 10$	4
$10 < t \leq 20$	7
$20 < t \leq 30$	12
$30 < t \leq 40$	17

a. Write down the modal class.

b. Write down the class that contains the median.

c. Work out an estimate for the mean time.

(4 marks)

a) highest frequency is 17

$30 < t \leq 40$

b) median is between the 20th and 21st

running totals 4, 11, 23

$20 < t \leq 30$

c) use the midpoints

$4 \times 5 = 20$

$7 \times 15 = 105$

$12 \times 25 = 300$

$17 \times 35 = 595$

total = 1020

mean = $1020 \div 40 = 25.5$

25.5 minutes

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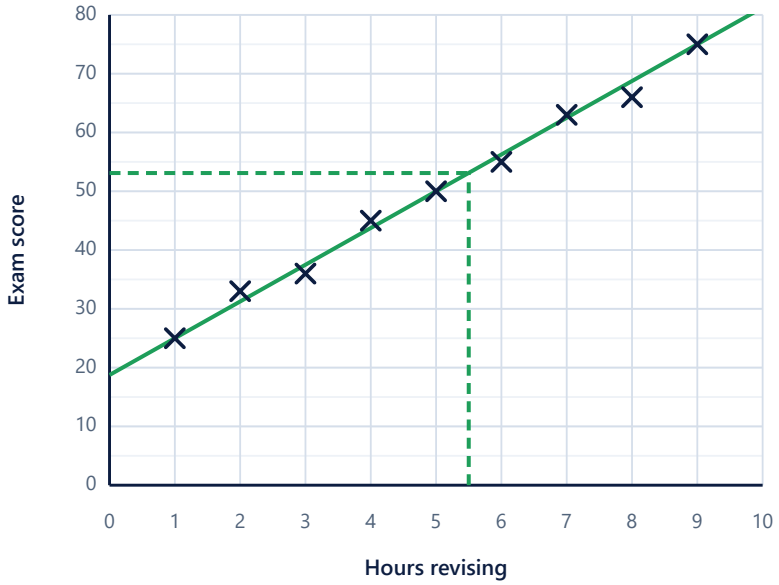
10 The scatter graph shows the number of hours each of 9 students spent revising and their scores in an exam marked out of 80.

a. Write down the type of correlation shown.

b. Draw a line of best fit on the scatter graph.

c. Use your line of best fit to estimate the exam score of a student who revised for 5.5 hours.

d. Amir revised for 20 hours. Explain why the line of best fit should not be used to estimate his score.



(4 marks)

The points rise together, so the correlation is positive

Draw a straight line through the middle of the points, following the trend

Reading from 5.5 hours to the line gives roughly 53 marks (accept 49 to 57)

The data only goes up to 9 hours of revision, so using the line at 20 hours is extrapolation and may give a score that is impossible (over 80) or simply wrong

EXTENSION QUESTIONS

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11 The table shows the money taken by a school tuck shop in each term over three school years.

Term	Autumn 1	Spring 1	Summer 1	Autumn 2	Spring 2	Summer 2	Autumn 3	Spring 3	Summer 3
Takings (£)	150	120	90	162	126	99	171	135	105

a. Work out the 3-point moving averages.

b. Describe the trend in the takings.

(3 marks)

a) 3 terms in a year: mean of 3 in a row

$(150 + 120 + 90) \div 3 = 120$

$(120 + 90 + 162) \div 3 = 124$

$(90 + 162 + 126) \div 3 = 126$

$(162 + 126 + 99) \div 3 = 129$

$(126 + 99 + 171) \div 3 = 132$

$(99 + 171 + 135) \div 3 = 135$

$(171 + 135 + 105) \div 3 = 137$

120, 124, 126, 129, 132, 135, 137

b) the moving averages go up

the takings are increasing

12 The table shows the ages, a years, of the 60 members of a running club.

Age (a years)	Frequency
$10 < a \leq 20$	9
$20 < a \leq 30$	15
$30 < a \leq 40$	18
$40 < a \leq 50$	12
$50 < a \leq 60$	6

a. Complete a cumulative frequency table for this data.

b. Write down the class interval that contains the median age.

(3 marks)

Cumulative frequencies

$9, 9 + 15 = 24, 24 + 18 = 42, 42 + 12 = 54, 54 + 6 = 60$

For 60 members, the median lies between the 30th and 31st ordered values

The first 24 members are aged 30 or under and the first 42 are aged 40 or under. Both the 30th and 31st values therefore lie in $30 < a \leq 40$, so the median lies in this class

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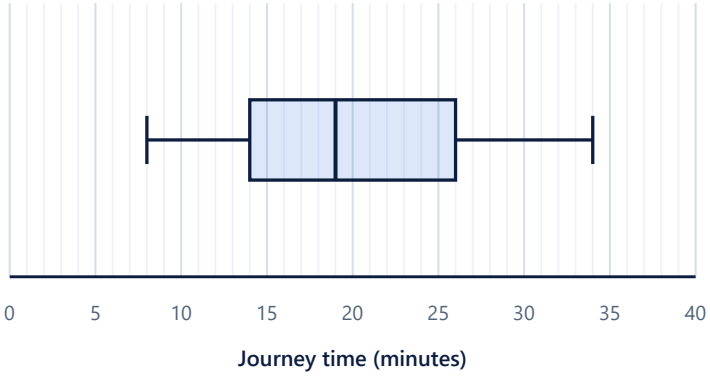
13 The box plot shows the journey times, in minutes, of 15 deliveries made by a courier.

a. Write down the median journey time.

b. Work out the interquartile range of the journey times.

c. Work out the range of the journey times.



(3 marks)

The line inside the box is at 19, so the median is 19 minutes

Interquartile range = upper quartile - lower quartile = 26 - 14 = 12 minutes

Range = longest - shortest = 34 - 8 = 26 minutes

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