Worksheet - Statistics: scatter graphs and averages

Year: Year 8 · 20

Show your working.

Question 1

Question 1 – Mean, median, mode and range *(Section A · Skills practice)*

Eight pupils recorded the number of books they read in a month: 4, 7, 9, 10, 10, 3, 6, 11.

a. Write the data in order.
b. Find the mode.
c. Find the median.
d. Find the mean.
e. Find the range.

Question 2

Question 2 – Missing value in a mean *(Section A · Skills practice)*

Use the idea that total = mean × number of values.

a. The mean of five numbers is 12. Four of them are 8, 15, 10 and 14. Find the fifth.
b. The mean of 6 test scores is 72. A seventh score of 86 is added. Find the new mean to 1 decimal place.
c. The mean of 4 numbers is 9 and the mean of 6 other numbers is 14. Find the mean of all 10.
d. Three numbers have a mean of 20 and a range of 10, and the smallest is 15. Find the other two if the median is 20.

Question 3

Question 3 – Frequency tables *(Section A · Skills practice)*

Forty pupils were asked how many pets they have.

Pets	0	1	2	3	4
Frequency	8	14	10	5	3

a. Check that the frequencies add up to 40.
b. Find the mode.
c. Find the median (the 20th and 21st values).
d. Find the mean number of pets.

e. Find the range.

Question 4

Question 4 – Grouped data *(Section A · Skills practice)*

The heights of 30 plants are shown in a grouped frequency table.

Height h (cm)	0	10	20	30
Frequency	4	11	10	5

a. Write down the modal class.
b. Which class contains the median?
c. Use midpoints to estimate the mean height.
d. Explain why the answer is only an estimate.

Question 5

Question 5 – Pie chart angles *(Section A · Skills practice)*

A survey of 90 pupils asked for their favourite subject.

Subject	**Maths**	**English**	**Science**	**Art**
Pupils	30	24	21	15

a. Check that the total is 90.
b. Work out the angle for each subject ($360 \div 90 = 4^\circ$ per pupil).
c. Check that your angles add to 360°.
d. What fraction of pupils chose Science? Write as a percentage to 1 decimal place.

Question 6

Question 6 – Scatter graphs and correlation *(Section A · Skills practice)*

Describe the correlation in each situation and say if you would draw a line of best fit.

a. Height of a pupil and shoe size.
b. Temperature outside and sales of hot chocolate.
c. Shoe size and score in a spelling test.
d. Age of a car and its value.

Question 7

Question 7 – Football goals *(Section B · Real-life practice)*

The goals scored by a school football team in 12 matches are: 2, 0, 3, 1, 1, 4, 2, 2, 0, 5, 1, 2.

Goals	0	1	2	3	4	5
Frequency	2	3	4	1	1	1

a. Complete a frequency table (given above) and check it.
b. Find the mean, median and mode.
c. Which average best describes a typical match? Explain.
d. In the next match the team scores 9 goals. Find the new mean and median.

Question 8

Question 8 – Pocket money survey *(Section B · Real-life practice)*

A class of 20 pupils recorded their weekly pocket money (£): 5, 8, 10, 10, 12, 12, 12, 15, 15, 15, 15, 18, 20, 20, 25, 25, 30, 30, 40, 100.

a. Find the mean, median and mode.
b. Which value looks like an outlier?
c. Find the mean without the outlier and compare.
d. Which average is best for describing the class and why?

Question 9

Question 9 – Test scores in two classes *(Section B · Real-life practice)*

Two classes took the same maths test. The scores are summarised.

Class	Mean	Median	Range
8A	62	65	40
8B	60	58	18

a. Which class did better on average? Use the mean and median.
b. Which class has more consistent results? Explain.
c. Class 8A has 25 pupils. How many marks did they score altogether?
d. A new pupil joins 8B and scores 78. Does the mean go up or down? Explain without calculating.

Question 10

Question 10 – The school bus times *(Section B · Real-life practice)*

A pupil timed the bus journey to school on 30 mornings.

Time t (min)	10	15	20	25
Frequency	6	12	9	3

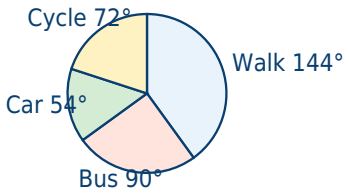
a. Write the modal class.
b. Estimate the mean journey time using midpoints.

c. Draw (describe) a pie chart for the data and give the angle of each sector.
d. What fraction of journeys took more than 20 minutes?

Question 11

Question 11 – Reading a pie chart *(Section B · Real-life practice)*

A pie chart shows how 240 pupils travel to school: walk 144°, bus 90°, car 54°, cycle 72°.



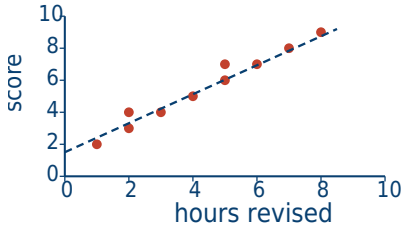
a. Check that the angles add to 360°.
b. How many pupils walk?
c. How many more pupils walk than cycle?
d. What percentage take the bus?

Question 12

Question 12 – Revision time and test score *(Section B · Real-life practice)*

Ten pupils recorded the hours revised (x) and the score out of 10 (y).

Hours x	1	2	2	3	4	5	5	6	7	8
Score y	2	3	4	4	5	6	7	7	8	9



a. Describe the correlation.
b. Use the line of best fit to estimate the score for 6 hours revised.
c. Use it to estimate the hours needed to score 6. Is this safe?
d. Why is it unsafe to use the line to predict the score after 20 hours?

Question 13

Question 13 – Monthly rainfall *(Section B · Real-life practice)*

The rainfall in a Welsh town (in mm) over six months was: Jan 120, Feb 95, Mar 80, Apr

65, May 60, Jun 70.

a. Find the mean monthly rainfall.
b. Find the median and the range.
c. The next month, July, has 50 mm. Find the new mean to 1 decimal place.
d. The tourist office says "it rains on average less than 80 mm a month". Is this true for the six months? For all seven?

Question 14

Question 14 – Shoe sizes in the shop *(Section B · Real-life practice)*

A shoe shop records the sizes of 25 pairs sold in one day.

Size	3	4	5	6	7	8
Pairs sold	2	4	7	6	4	2

a. Find the modal shoe size.
b. Find the median size.
c. Find the mean size to 1 decimal place.
d. Which average is most useful to the shop manager when ordering stock? Explain.

Question 15

Question 15 – Comparing two groups *(Section C · Problem solving)*

The table shows the number of goals scored by two teams over 10 matches.

Team	Goals scored
Reds	0, 1, 1, 2, 2, 2, 3, 3, 4, 4
Blues	0, 0, 0, 1, 1, 2, 3, 3, 4, 10

a. Find the mean, median and range for each team.
b. Which team is more consistent?
c. Which team has the higher mean? Which has the higher median?
d. The Blues' coach says "We are the better team because our mean is 2.4." Comment.

Question 16

Question 16 – Mean from a frequency table *(Section C · Problem solving)*

A shop records the number of items per customer.

Items	1	2	3	4	5	6
Customers	12	25	18	10	4	1

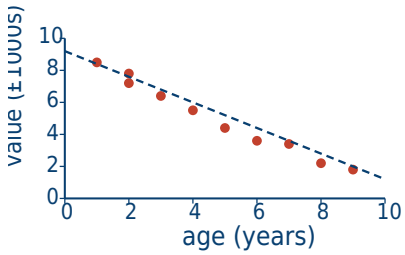
a. How many customers are there?

b. Find the total number of items.
c. Find the mean number of items per customer to 2 decimal places.
d. Find the median and the mode.
e. The next 10 customers buy a mean of 3 items each. Find the new overall mean.

Question 17

Question 17 – Interpreting a scatter graph *(Section C · Problem solving)*

The scatter graph shows the age of a second-hand car (years) and its value (£1000s).



a. Describe the correlation.
b. Estimate the value of a 5-year-old car from the line of best fit.
c. Estimate the age of a car worth £4 000.
d. A 15-year-old car is worth £0 according to the line. Comment on this.
e. Another car is 3 years old and is worth £2 000. What is special about this point?

Question 18

Question 18 – Pie charts compared *(Section C · Problem solving)*

A pie chart for Year 8 and another for Year 9 show favourite sports. In Year 8 (120 pupils) football is 150°. In Year 9 (180 pupils) football is 100°.

a. How many pupils in each year chose football?
b. Which year had the higher percentage choosing football?
c. Priya says "More Year 8 pupils chose football because its angle is larger." Is she right?
d. In Year 9, rugby is 80° and the rest are tennis and hockey in the ratio $1:2$. Find those angles.

Question 19

Question 19 – Estimated mean and the modal class *(Section C · Problem solving)*

The weights of 50 parcels are shown.

Weight w (kg)	0	2	4	6
Frequency	10	22	13	5

a. Find the modal class.

b. Use midpoints 1, 3, 5 and 8 to estimate the mean.
c. Parcels over 4 kg cost an extra £2. How many parcels is that, and what is the extra income?
d. Explain why the class 6 is hard to use for the mean.

Question 20

Question 20 – Challenge: changing the mean and the median *(Section D · Challenge)*

Five numbers are 3, 5, 7, 9 and 11.

a. Find the mean and the median.
b. A sixth number x is added. Find x so that the mean stays the same.
c. Find x so that the median becomes 8.
d. Explain what happens to the mean and the median if a very large number, 100, is added instead.