



4.20F Scatter Graphs: Foundation Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Plot the point (3, 5) on a scatter diagram. Give the coordinate as your answer.

(Total for Question 1 is 1 mark)

- 2** On a scatter graph, a point is at (7, 2). Write down the x-coordinate and the y-coordinate.

(Total for Question 2 is 1 mark)

- 3** Here are five points plotted on a scatter graph: (1, 2), (2, 4), (3, 6), (4, 8), (5, 10).
Do these points show a positive correlation, negative correlation, or no correlation? Explain in one short sentence.

(Total for Question 3 is 2 marks)

- 4** A teacher draws a scatter graph of hours studied (x) and test score (y) for 6 students. The points are: (1, 55), (2, 58), (3, 60), (4, 62), (5, 61), (6, 64).
Give a one-sentence description of the strength of the correlation (strong, moderate or weak) and state whether it is positive or negative.

(Total for Question 4 is 2 marks)

- 5** Here is part of a scatter graph showing temperature (degrees C) and ice cream sales (number of tubs): points are (10, 12), (12, 18), (14, 23), (16, 28).
Estimate the number of tubs sold when the temperature is 15 degrees C by drawing a rough line of best fit through the points and reading off your estimate.
Give your estimate.

(Total for Question 5 is 3 marks)

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- 6** A survey records number of hours watching TV per week (x) and number of books read per month (y) for 7 people: (0, 4), (2, 3), (4, 2), (6, 2), (8, 1), (1, 4), (3, 3).

(a) Describe the type of correlation.

(b) A new person watches 5 hours of TV per week. Use the pattern in the scatter to estimate how many books they read per month.

(a) (a) Describe the type of correlation. (2)

(b) (b) Estimate the number of books read per month for someone who watches 5 hours of TV per week. (2)

(Total for Question 6 is 4 marks)

7 The scatter graph below shows weight (kg) and running time for a 1 km run (minutes) for 8 pupils.

Points: (45, 4.5), (50, 5.0), (55, 5.2), (60, 5.6), (48, 4.8), (52, 5.1), (58, 5.4), (62, 5.8).

(a) State whether your line of best fit would have a positive or negative gradient.

(b) Use a sensible line of best fit to estimate the running time for a pupil weighing 54 kg.

(c) One pupil weighs 70 kg. Use your line to estimate their running time and comment briefly whether this estimate is likely to be reliable.

(a) (a) State whether your line of best fit would have a positive or negative gradient. **(1)**

(b) (b) Use a sensible line of best fit to estimate the running time for a pupil weighing 54 kg. **(2)**

(c) (c) One pupil weighs 70 kg. Use your line to estimate their running time and comment briefly whether this estimate is likely to be reliable. **(2)**

(Total for Question 7 is 5 marks)

8 A small company records advertising spend per week (x in hundreds of pounds) and number of online orders (y) for 6 weeks: (2, 30), (3, 40), (4, 45), (5, 50), (3.5, 42), (6, 58).

(a) Draw or imagine a line of best fit. Describe the correlation in one sentence (positive/negative and strength).

(b) Estimate the number of orders when the company spends 4.5 hundred pounds on advertising.

(c) One week the spend was 1 (i.e. 100 pounds) and orders were 20. Is this point an outlier compared with the trend? Give a short reason.

(a) (a) Describe the correlation. **(1)**

(b) (b) Estimate the number of orders when $x = 4.5$ (i.e. 450 pounds). **(3)**

(c) (c) One week the spend was 1 (100 pounds) and orders were 20. Is this point an outlier? Give a short reason. **(2)**

(Total for Question 8 is 6 marks)

9 A teacher plots revision hours per week (x) against percentage test score (y) for 9 students: (0, 45), (1, 50), (2, 55), (3, 60), (4, 64), (5, 68), (6, 70), (7, 71), (8, 72).

(a) Describe the correlation in one sentence.

(b) A new student revises for 2.5 hours per week. Use the data to estimate their test score.

(c) Comment briefly whether this estimate is likely to be accurate for very large revision times, e.g. $x = 20$.

(a) (a) Describe the correlation. (1)

(b) (b) Estimate the test score for $x = 2.5$ hours. (4)

(c) (c) Comment on whether the estimate is likely to be accurate for $x = 20$ hours. (2)

(Total for Question 9 is 7 marks)

10 A charity records distance walked in a sponsored walk (x in km) and money raised (y in pounds) for 9 participants: (1, 10), (2, 18), (3, 25), (4, 34), (5, 39), (6, 45), (7, 48), (8, 54), (9, 57).

(a) Describe the correlation in one short sentence.

(b) Use a sensible line of best fit to estimate how much money you would expect someone to raise if they walked 5.5 km.

(c) Another participant walked 0.5 km and raised 2 pounds. Is this point consistent with the trend? Give a short reason.

(d) Explain briefly how you would draw a line of best fit on this scatter diagram.

(a) (a) Describe the correlation. **(1)**

(b) (b) Estimate money raised for $x = 5.5$ km using a sensible line of best fit. **(4)**

(c) (c) A participant walked 0.5 km and raised 2 pounds. Is this consistent with the trend? Give a short reason. **(2)**

(d) (d) Explain briefly how you would draw a line of best fit on this scatter diagram. **(2)**

(Total for Question 10 is 9 marks)

Mark scheme · 4.20F Scatter Graphs: Foundation Tier Practice

Question 1

- **B1** (3, 5) plotted or coordinate given as (3, 5) cao
- **Answer:** (3, 5)

Question 2

- **B1** $x = 7$, $y = 2$ cao
- **Answer:** $x = 7$, $y = 2$

Question 3

- **M1** identify positive correlation
- **A1** brief reason, e.g. as x increases y increases or points rise left to right cao
- **Answer: Positive correlation. As x increases, y increases.**

Question 4

- **M1** identify positive correlation
- **A1** identify strength as strong (points lie close to a rising straight-line trend) cao
- **Answer: Strong positive correlation.**

Question 5

- **M1** sensible line of best fit through points or description of trend and interpolation at $x = 15$
- **M1** interpolate between (14, 23) and (16, 28) or use a line giving around 25 per 15 degrees
- **A1** 25 tubs cao (allow answers 24 to 26 awrt)
- **Answer: 25**

Question 6

- (a) **M1** identify negative correlation
- (a) **A1** state strength e.g. moderate negative correlation (points generally fall as x increases) cao
- (a) **Answer: Moderate negative correlation**
- (b) **M1** interpolate between $x = 4$ ($y = 2$) and $x = 6$ ($y = 2$) or use nearby points to estimate
- (b) **A1** 2 books cao (allow 1 or 3 if justified)
- (b) **Answer: 2**

Question 7

- (a) **B1** positive gradient identified
- (a) **Answer: Positive gradient**
- (b) **M1** use interpolation or a sensible straight line through the points to find y at $x = 54$
- (b) **A1** estimate 5.15 minutes cao (allow 5.0 to 5.3 awrt)
- (b) **Answer: Approximately 5.15 minutes**
- (c) **M1** extrapolate using line of best fit to give a sensible time at $x = 70$ (eg about 6.5 to 6.8)
- (c) **A1** comment: not very reliable because 70 is outside the data range (extrapolation) cao
- (c) **Answer: Estimated time about 6.6 minutes. Not very reliable because 70 kg is outside the range of the given data (extrapolation).**

Question 8

- (a) **B1** positive correlation identified
- (a) **Answer: Positive correlation, moderately strong.**
- (b) **M1** use interpolation between (4,45) and (5,50) or use line of best fit to find y at $x = 4.5$
- (b) **M1** calculate midpoint: $45 + 0.5 \times (50 - 45) = 47.5$ or equivalent
- (b) **A1** 47.5 orders cao (allow 47 to 48 awrt)
- (b) **Answer: Approximately 47.5 orders**
- (c) **M1** identify it as an outlier or not
- (c) **A1** reason: it is below the trend (fewer orders than expected for that spend) or lies far from the line of best fit cao
- (c) **Answer: Yes, it is an outlier, because it lies well below the trend/line of best fit for the other points.**

Question 9

- (a) **B1** positive correlation identified
- (a) **Answer: Positive correlation, fairly strong but leveling off at higher x .**
- (b) **M1** interpolate between $x = 2$ ($y = 55$) and $x = 3$ ($y = 60$) or use nearby points to estimate
- (b) **M1** calculate mid-value: $55 + 0.5 \times (60 - 55) = 57.5$
- (b) **M1** state 57.5 and accept decimal or 58 if rounded
- (b) **A1** 57.5 cao (allow 57 to 58 awrt)
- (b) **Answer: Approximately 57.5%**
- (c) **M1** state extrapolation to $x = 20$ is not reliable
- (c) **A1** reason: 20 is far outside the data range and trend may level off or change, so prediction not trustworthy cao
- (c) **Answer: Not accurate; predicting at $x = 20$ is unreliable because it is far outside the observed data and the trend appears to level off.**

Question 10

- (a) **B1** positive correlation identified
- (a) **Answer: Positive correlation, fairly strong.**
- (b) **M1** use interpolation between (5,39) and (6,45) or a sensible line to find y at $x = 5.5$
- (b) **M1** calculate midpoint: $39 + 0.5 \times (45 - 39) = 42$
- (b) **M1** state 42 pounds or equivalent
- (b) **A1** 42 pounds cao (allow 41 to 43 awrt)
- (b) **Answer: Approximately 42 pounds**
- (c) **M1** state whether consistent or not
- (c) **A1** reason: point lies below expected trend but near extrapolated low values so could be consistent but shows lower fundraising per km; accept reasonable justification
- (c) **Answer: It is slightly low compared with the trend but could be consistent for very small distances; it lies below the line of best fit so it is lower than expected.**
- (d) **M1** state method: draw a straight line that has roughly equal numbers of points above and below it and follows the overall trend
- (d) **A1** mention minimizing distances or that the line should reflect the general trend, not through all points; accept 'eye-fit' explanation
- (d) **Answer: Draw a straight line that follows the overall trend and has roughly equal numbers of points above and below it; do not try to pass through every point.**