4.20 Scatter Graphs: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Priya records the outdoor temperature and the number of hot chocolates sold at her cafe each day. As the temperature increases, the number of hot chocolates sold decreases. State the type of correlation between temperature and the number of hot chocolates sold.

(Total for Question 1 is 1 mark)

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2 State one feature of a good line of best fit drawn on a scatter graph.

(Total for Question 2 is 1 mark)

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3 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. **(2)**

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

(Total for Question 3 is 4 marks)

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4 A scatter graph shows the relationship between the number of pages in a magazine (between 20 and 60 pages) and its weight in grams. Bilal wants to use the line of best fit to estimate the weight of a magazine with 200 pages. Explain why this estimate would not be reliable.

(Total for Question 4 is 2 marks)

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5 Six students recorded the number of hours they revised and their test score (%). Hours revised (x): 2, 4, 5, 7, 8, 10. Test score % (y): 45, 55, 60, 68, 75, 85.

(a) Calculate the mean number of hours revised. **(1)**

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(b) Calculate the mean test score. **(1)**

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(c) Write down the coordinates of the point that must lie on the line of best fit. **(1)**

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(Total for Question 5 is 3 marks)

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6 Graph A shows the relationship between arm span and height for a class of students; the points lie close to a straight line. Graph B shows the relationship between shoe size and exam score for the same class; the points are scattered with no clear pattern.

(a) State which graph shows the stronger correlation. **(1)**

(b) Give a reason for your answer. **(1)**

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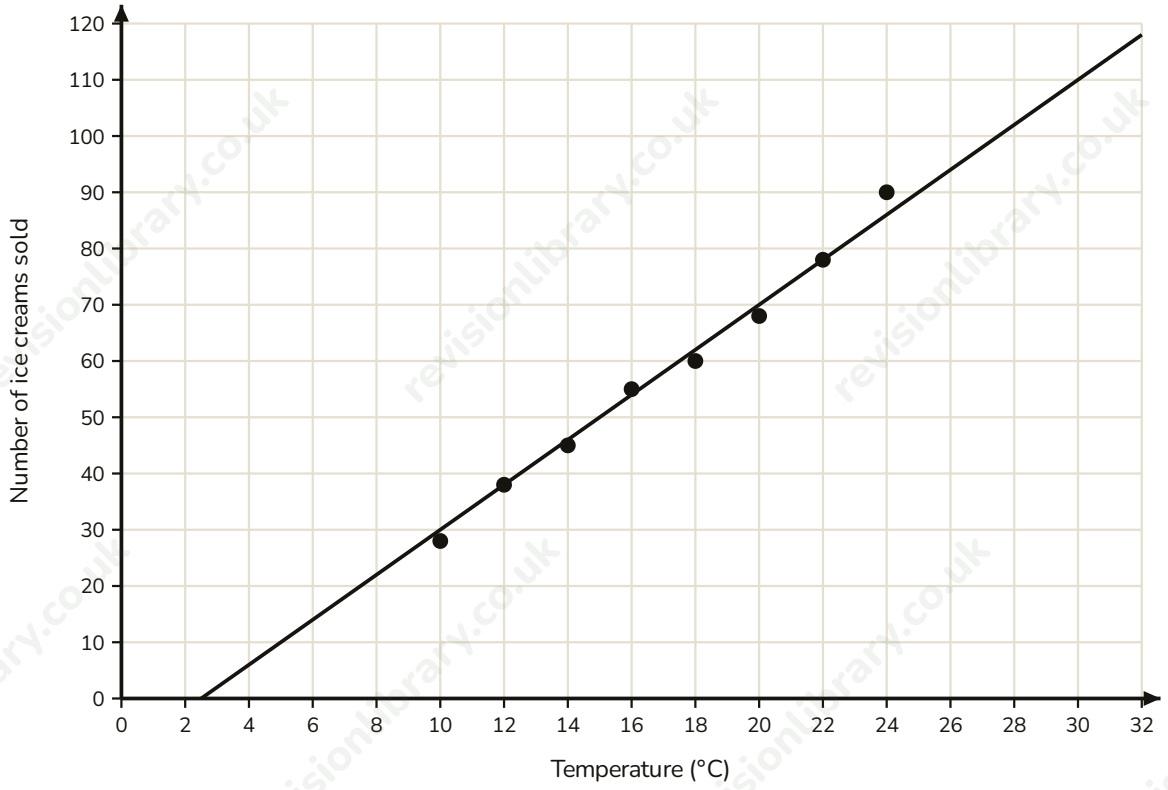
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(Total for Question 6 is 2 marks)

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7 A cafe owner records the temperature and the number of ice creams sold. Temperature in °C (x): 10, 12, 14, 16, 18, 20, 22, 24, 27, 30. Number of ice creams sold (y): 28, 38, 45, 55, 60, 68, 78, 90, 98, 112. The points for the first 8 temperatures (10 to 24°C) have already been plotted on the grid.



(a) Plot the remaining two points from the table on the grid. **(2)**

(b) Describe the correlation shown. **(1)**

(c) A line of best fit has been drawn passing through (10, 30) and (30, 110). Use this line to estimate the number of ice creams sold when the temperature is 20°C. **(2)**

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(d) One day the temperature was 38°C. Explain why it would not be appropriate to use the line of best fit to estimate the number of ice creams sold on this day. **(1)**

(Total for Question 7 is 6 marks)

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8 A builder tests samples of concrete and records the number of curing days and the compressive strength (MPa). A line of best fit passes through (2, 10) and (10, 26).

(a) Use the line of best fit to estimate the compressive strength after 6 days of curing. **(2)**

(b) Explain why it would not be sensible to use this line of best fit to estimate the compressive strength on day 0 (before any curing has taken place). **(2)**

(Total for Question 8 is 4 marks)

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Mark scheme · 4.20 Scatter Graphs: 30-minute Pack

Question 1

negative correlation (oe) **B1**

Answer: Negative correlation

Question 2

any correct feature, e.g. it follows the trend of the points with roughly equal numbers of points above and below it, or it passes through the mean point (oe) **B1**

Answer: It should follow the trend of the data with roughly equal numbers of points above and below the line.

Question 3

(a) identify negative correlation **M1**

(a) state strength e.g. moderate negative correlation (points generally fall as x increases) cao **A1**

(a) Answer: Moderate negative correlation

(b) interpolate between x = 4 (y = 2) and x = 6 (y = 2) or use nearby points to estimate **M1**

(b) 2 books cao (allow 1 or 3 if justified) **A1**

(b) Answer: 2

Question 4

200 pages is outside the range of the data collected (extrapolation) **B1**

the trend seen for 20 to 60 pages may not continue for much larger magazines (e.g. different paper or cover may be used) **B1**

Answer: The estimate is unreliable because 200 pages is far outside the data collected (20 to 60 pages), so it involves extrapolation and the same trend may not continue.

Question 5

(a) 6 cao **B1**

(a) Answer: 6 hours

(b) 64.7 (or 64.67, or 64 2/3) awrt 64.7 **B1**

(b) Answer: 64.7% (1 d.p.)

(c) (6, 64.7) ft from parts (a) and (b) **B1**

(c) Answer: (6, 64.7)

Question 6

(a) Graph A **B1**

(a) Answer: Graph A

(b) the points in Graph A lie closer to a straight line / are less scattered than in Graph B **B1**

(b) Answer: The points in Graph A lie closer to a straight line, showing a stronger correlation than the scattered points in Graph B.

Question 7

(a) point (27, 98) plotted correctly **B1**

(a) point (30, 112) plotted correctly **B1**

(a) Answer: (27, 98) and (30, 112)

(b) positive correlation **B1**

(b) Answer: Positive correlation

(c) correct method, e.g. gradient = (110-30)/(30-10) = 4, then 30 + 4 x (20-10) **M1**

(c) 70 cao **A1**

(c) Answer: 70 ice creams

(d) 38 is outside the range of the data (maximum recorded was 30), so this would be extrapolation and the trend may not continue **B1**

(d) Answer: 38°C is outside the range of the data collected (up to 30°C), so using the line here is extrapolation and unreliable.

Question 8

(a) correct method, e.g. gradient = (26-10)/(10-2) = 2, then 10 + 2 x (6-2) **M1**

(a) 18 MPa cao **A1**

(a) Answer: 18 MPa

(b) day 0 is outside the range of the data collected (curing days from 2 to 10), so this is extrapolation **B1**

(b) concrete needs time to cure, so there is no real evidence the same linear pattern applies right at the start of the process **B1**

(b) Answer: Day 0 is outside the tested range of curing days (2 to 10), so this is extrapolation, and there is no evidence the linear trend holds before curing has properly begun.

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