Scatterplots and lines of good fit: 10 practice questions

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Name: _____ Date: _____

Attempt all questions and show your working. Suggested time: 15 to 20 minutes.

Section A: Consolidating (Questions 1-4)

Question 1

A teacher records the number of hours each student studied for a test and their score on the test. She wants to see whether studying more is related to a higher score.

(a) Which variable is the independent (explanatory) variable?

(b) On a scatterplot, which axis should this variable go on?

Question 2

Would you expect a positive association, a negative association or no association between each pair of variables?

(a) The age of a car and its resale value.

(b) A person's height and their arm span.

(c) The number of letters in a person's first name and their height.

(d) The outside temperature in winter and the cost of a household's heating bill.

Question 3

A line of good fit has equation $y = 2x + 10$. Use it to predict the value of y when:

(a) $x = 15$

(b) $x = 7.5$

Question 4

Describe the association shown by each scatterplot, using direction and strength.

(a) The points lie very close to a straight line that slopes down from left to right.

(b) The points are scattered all over the graph with no clear pattern.

(c) The points generally rise from left to right, but they are quite spread out around a straight line.

Section B: Standard (Questions 5-10)

Question 5

A kiosk owner recorded the maximum temperature and the number of ice creams sold on 8 days.

Tempera (°C)	18	21	24	26	29	31	34	37
Ice creams sold	120	150	170	200	230	240	280	300

(a) Draw a scatterplot of the data, with temperature on the horizontal axis.

(b) Describe the association between temperature and ice cream sales (direction, form and strength).

(c) Explain what this association means in this context.

Question 6

A student draws a line of good fit on a scatterplot. The line passes through the points (2, 15) and (10, 55).

(a) Find the gradient of the line.

(b) Find the equation of the line in the form $y = mx + c$.

(c) Use your equation to predict y when $x = 7$.

Question 7

Data was collected on used cars aged from 1 to 10 years. A line of good fit for the data is

$V = 32{,}000 - 2500a$

where V is the value of the car in dollars and a is its age in years.

(a) Explain what the number -2500 tells you in this context.

(b) Predict the value of a car that is 6 years old.

(c) Use the equation to predict the value of a car that is 15 years old. Explain why this prediction is not sensible.

Question 8

The heights of children aged 2 to 12 years were recorded. A line of good fit is $h = 6a + 80$, where h is the height in cm and a is the age in years.

(a) Predict the height of an 8-year-old. Is this interpolation or extrapolation?

(b) Predict the height of a 30-year-old. Is this interpolation or extrapolation? Is the prediction reliable? Explain.

Question 9

Eight students recorded how many hours they slept and their score on a reaction game the next morning.

Hours of sleep	**5**	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**
Score	52	58	61	66	30	72	75	79

(a) Which data point is an outlier?

(b) Suggest one possible reason for this outlier.

(c) Ignoring the outlier, describe the association between hours of sleep and score.

Question 10

At a beach, the number of ice creams sold each day and the number of people rescued by lifeguards each day have a strong positive association.

A student concludes, "Eating ice cream makes people more likely to need rescuing."

Explain why this conclusion is not justified.

Scatterplots and lines of good fit: answers

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Question 1

Answer: (a) the number of hours studied (b) the horizontal axis (x-axis)

Question 2

Answer: (a) negative (b) positive (c) no association (d) negative

Question 3

Answer: (a) 40 (b) 25

Question 4

Answer: (a) strong negative (linear) (b) no association (c) weak positive (also accept moderate positive)

Question 5

Answer: (a) 8 points plotted, rising steadily from (18, 120) to (37, 300). (b) strong, positive, linear (c) On hotter days, the kiosk tends to sell more ice creams.

Question 6

Answer: (a) 5 ((55 - 15)/(10 - 2)) (b) y = 5x + 5 (c) 40

Question 7

Answer: (a) The value of a car drops by about $2500 for each extra year of age. (b) $17 000 (c) V = -5500, a negative value, which is impossible. 15 years is outside the data (1 to 10 years), so this is extrapolation and the trend may not continue.

Question 8

Answer: (a) 128 cm, interpolation (b) 260 cm, extrapolation; not reliable, because people stop growing in their late teens, so the trend for children does not continue to age 30.

Question 9

Answer: (a) (7.5, 30) (b) Any sensible reason, for example the student was distracted, misunderstood the game, or the score was recorded wrongly. (c) strong positive (linear): more sleep tends to go with a higher score.

Question 10

Answer: Association does not prove causation. A third variable, hot weather (more people at the beach), is likely to increase both ice cream sales and the number of rescues.