2.10 Statistics: Reading and Interpreting Given Diagrams (Venn, Tree, Histogram, Scatter, Box Plot): 30-minute Pack

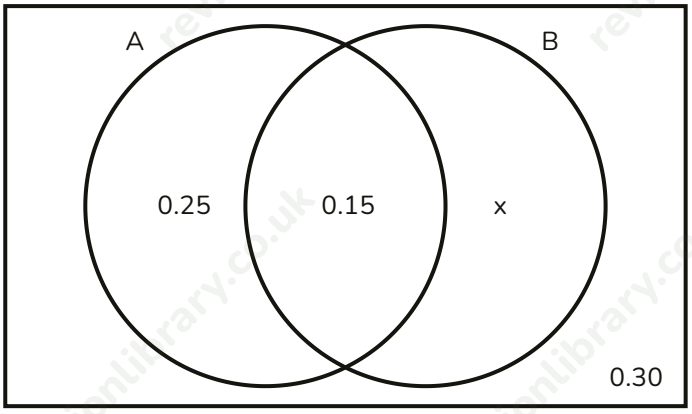
Total Marks

EDEXCEL 8MA0 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The Venn diagram below shows the probabilities associated with two events, A and B, within a sample space. One region of the diagram is unlabelled and marked x.



(a) Show that x = 0.30. **(2)**

(b) Find P(A) and P(B). **(2)**

(c) Find P(A union B). **(2)**

(d) State, with a reason, whether A and B are mutually exclusive. **(1)**

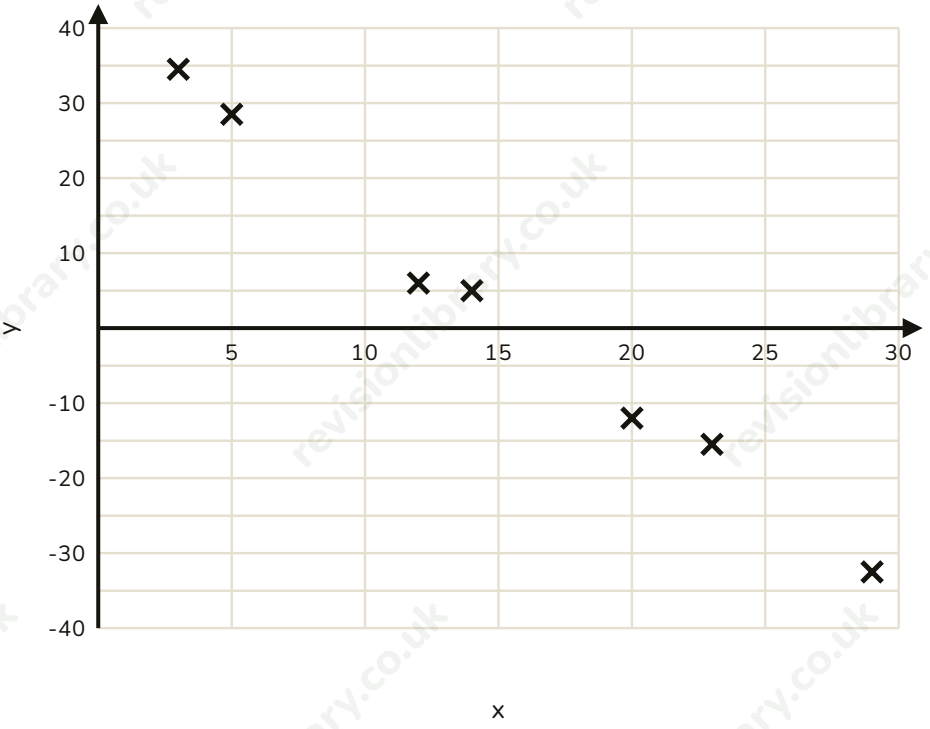
(e) Find P(A | B'). **(3)**

(Total for Question 1 is 10 marks)

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2 The scatter diagram shows the following data.

x	3	5	12	14	20	23	29
y	34.5	28.5	6	5	-12	-15.5	-32.5



(a) Find Sxx and Sxy, given that Sum(x) = 106, Sum(x^2) = 2144, Sum(y) = 14 and Sum(xy) = -1151. **(3)**

(b) Hence find the equation of the regression line of y on x, giving each coefficient to 3 significant figures. **(3)**

(c) State whether the data show positive or negative correlation, and comment on using the regression line to estimate y when x = 39. **(2)**

(Total for Question 2 is 8 marks)

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3 A tree diagram models whether a patient is in group A (probability 2/5) or group B, and whether the patient recovers (R). The probability of recovering is 3/5 for group A and 1/3 for group B.

(a) Write down the probability that a patient is in group B, and the probability that a group B patient does not recover. **(2)**

(b) Find the probability that a randomly chosen patient recovers. **(2)**

(c) Given that a patient recovered, find the probability that the patient was in group A. **(2)**

(Total for Question 3 is 6 marks)

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Mark scheme · 2.10 Statistics: Reading and Interpreting Given Diagrams (Venn, Tree, Histogram, Scatter, Box Plot): 30-minute Pack

Question 1

(a) sets up 0.25 + 0.15 + x + 0.30 = 1, using the fact that all probabilities in the diagram sum to 1 **M1**

(a) cso x = 0.30 **A1**

(a) Answer: x = 0.30 (given)

(b) P(A) = 0.25 + 0.15 = 0.40 **B1**

(b) P(B) = 0.30 + 0.15 = 0.45 **B1**

(b) Answer: P(A) = 0.40, P(B) = 0.45

(c) correct method, e.g. 0.25 + 0.30 + 0.15, or 1 - 0.30 **M1**

(c) cao 0.70 **A1**

(c) Answer: 0.70

(d) not mutually exclusive, since P(A and B) = 0.15, which is not equal to 0 **B1**

(d) Answer: Not mutually exclusive, since P(A and B) = 0.15 is not zero.

(e) P(B') = 1 - 0.45 = 0.55 **M1**

(e) P(A and B') = 0.25 identified as the 'A only' region **M1**

(e) oe 5/11, awrt 0.455 **A1**

(e) Answer: 5/11 (awrt 0.455)

Question 2

(a) $Sxx = 2144 - 106^2/7$ **M1**

(a) Sxx = 538.86 **A1**

(a) Sxy = -1363.0 **A1**

(a) Answer: Sxx = 538.86, Sxy = -1363.0

(b) b = Sxy/Sxx **M1**

(b) b = -2.53 **A1**

(b) y = 40.3 - 2.53x **A1**

(b) Answer: y = 40.3 - 2.53x

(c) negative correlation **B1**

(c) extrapolation outside the range of the data is unreliable **B1**

(c) Answer: Negative correlation; estimating at x = 39 is extrapolation beyond the observed range 3 to 29 and is unreliable.

Question 3

(a) P(B) = 3/5 **B1**

(a) P(not R | B) = 2/3 **B1**

(a) Answer: P(B) = 3/5, P(not R | B) = 2/3

(b) P(A and R) + P(B and R) **M1**

(b) 2/5 x 3/5 + 3/5 x 1/3 = 11/25 **A1**

(b) Answer: 11/25

(c) P(A | R) = P(A and R)/P(R) **M1**

(c) 6/11 **A1**

(c) Answer: 6/11

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