HIGHER

H26-30min The General Addition Law: 30-minute Pack

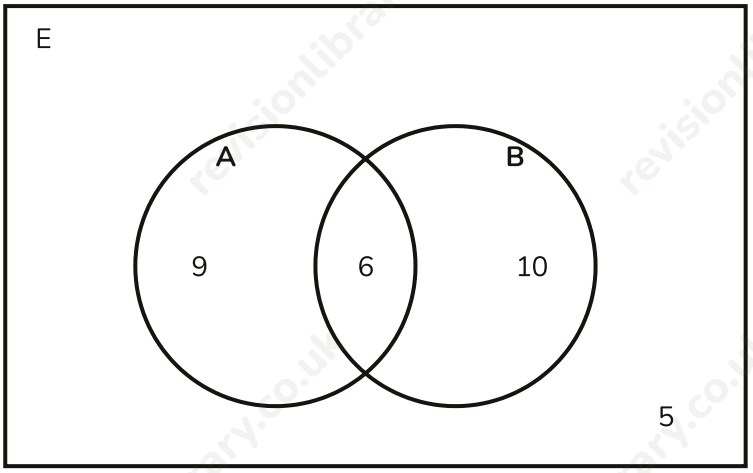
Total Marks

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The Venn diagram shows the number of people, out of 30 surveyed, in events A and B.



(a) Write down P(A and B). **(1)**

.....

(b) Use the general addition law to find P(A or B). **(2)**

(c) Verify your answer to part (b) by counting directly from the Venn diagram. **(1)**

(Total for Question 1 is 4 marks)

2 A fair 10-sided spinner is numbered 1 to 10 and spun once. Event A: the spinner lands on an even number. Event B: the spinner lands on a multiple of 5. Event C: the spinner lands on a multiple of 3.

(a) List the outcomes in "A and B", and hence write down P(A and B). **(1)**

.....

(b) Use the general addition law to find P(A or B). **(2)**

(c) Explain, with reference to the outcomes, whether events A and C are mutually exclusive. **(1)**

(Total for Question 2 is 4 marks)

3 A student is investigating whether there is a link, for Year 11 pupils, between walking to school and attending the breakfast club. She first considers surveying only pupils who arrive at school before 8am, but decides against this and instead surveys a random sample of 90 pupils from the whole year group. The two-way table shows the results of her survey. Let event A be "the pupil walks to school" and event B be "the pupil attends the breakfast club".

	Breakfast club	No breakfast club	Total
Walks	21	24	45
Does not walk	9	36	45
Total	30	60	90

(a) Explain why surveying only pupils who arrive before 8am, as she first considered, might not give a fair test of her question. **(1)**

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

.....

(c) Use the general addition law to find the probability that a pupil chosen at random walks to school or attends the breakfast club (or both). **(2)**

(d) Interpret your answer to part (c) in the context of the survey. **(1)**

(Total for Question 3 is 6 marks)

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4 For two events A and B, P(A) = 0.52, P(B) = 0.3 and P(A or B) = 0.66.

(a) Rearrange the general addition law to make P(A and B) the subject. **(1)**

(b) Hence find P(A and B). **(2)**

.....

(Total for Question 4 is 3 marks)

5 A school surveyed 200 students on whether they study French and whether they study Spanish. The two-way table shows the results, with one value missing. Let event A be "the student studies French" and event B be "the student studies Spanish".

	Spanish	No Spanish	Total
French	34	46	80
No French	?	94	120
Total	60	140	200

(a) Work out the missing value in the table, marked ?. **(2)**

.....

(b) A student is chosen at random from the 200 students. Write down P(A and B). **(1)**

.....

(c) Use the general addition law to find P(A or B), the probability that the student studies French or Spanish (or both). **(2)**

(Total for Question 5 is 5 marks)

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6 For two events A and B, P(A) = 0.4, P(B | A) = 0.25 and P(B) = 0.3.

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

.....

(b) Use the general addition law to find P(A or B). **(2)**

(Total for Question 6 is 4 marks)

7 Use the general addition law to decide whether each pair of events is mutually exclusive, showing your working.

(a) For events A and B, P(A) = 0.45, P(B) = 0.3 and P(A or B) = 0.75. Determine whether A and B are mutually exclusive. **(3)**

(b) For events C and D, P(C) = 0.4, P(D) = 0.35 and P(C or D) = 0.68. Determine whether C and D are mutually exclusive. **(2)**

(Total for Question 7 is 5 marks)

Mark scheme · H26-30min The General Addition Law: 30-minute Pack

Question 1

- (a) **B1** 6/30 oe cao
- **(a) Answer: 1/5**
- (b) **M1** 15/30 + 16/30 - 6/30, oe (P(A) = (9+6)/30, P(B) = (6+10)/30)
- (b) **A1** 5/6 oe cao
- **(b) Answer: 5/6**
- (c) **B1** 9 + 6 + 10 = 25, 25/30 = 5/6, ft from (b)
- **(c) Answer: 25/30 = 5/6**

Question 2

- (a) **B1** {10} identified, P(A and B) = 1/10 cao
- **(a) Answer: 1/10**
- (b) **M1** 1/2 + 1/5 - 1/10, oe
- (b) **A1** 3/5 oe cao
- **(b) Answer: 3/5**
- (c) **B1** not mutually exclusive because 6 is both even and a multiple of 3 (A and C share the outcome 6)
- **(c) Answer: Not mutually exclusive; 6 is in both A and C.**

Question 3

- (a) **B1** valid reason, e.g. pupils arriving before 8am are more likely to walk and/or attend breakfast club, so the sample would not represent all Year 11 pupils (biased/unrepresentative sample)
- **(a) Answer: The sample would be biased, as pupils who arrive early are more likely to walk or attend the breakfast club than the whole year group.**
- (b) **B1** P(A) = 45/90 and P(B) = 30/90, both oe
- (b) **B1** P(A and B) = 21/90 oe
- **(b) Answer: P(A) = 1/2, P(B) = 1/3, P(A and B) = 7/30**
- (c) **M1** 1/2 + 1/3 - 7/30, oe (15/30 + 10/30 - 7/30)
- (c) **A1** 3/5 oe cao
- **(c) Answer: 3/5**
- (d) **B1** correct interpretation in context, e.g. 3/5 (or 60%) of the 90 pupils surveyed either walk to school, attend the breakfast club, or do both
- **(d) Answer: 3/5 (60%) of the pupils surveyed walk to school, attend the breakfast club, or both.**

Question 4

- (a) **B1** P(A and B) = P(A) + P(B) - P(A or B), oe
- **(a) Answer: P(A and B) = P(A) + P(B) - P(A or B)**
- (b) **M1** 0.52 + 0.3 - 0.66, oe
- (b) **A1** 0.16 cao
- **(b) Answer: 0.16**

Question 5

- (a) **M1** 60 - 34, or 120 - 94, oe
- (a) **A1** 26 cao
- **(a) Answer: 26**
- (b) **B1** 34/200 oe cao
- **(b) Answer: 17/100**
- (c) **M1** 80/200 + 60/200 - 34/200, oe
- (c) **A1** 53/100 oe cao
- **(c) Answer: 53/100**

Question 6

- (a) **M1** 0.4 x 0.25, oe
- (a) **A1** 0.1 cao
- **(a) Answer: 0.1**
- (b) **M1** 0.4 + 0.3 - 0.1, oe
- (b) **A1** 0.6 cao
- **(b) Answer: 0.6**

Question 7

- (a) **M1** 0.45 + 0.3 - 0.75, oe
- (a) **A1** P(A and B) = 0
- (a) **B1** correct conclusion: A and B are mutually exclusive, since P(A and B) = 0, ft
- **(a) Answer: P(A and B) = 0, so A and B are mutually exclusive.**
- (b) **M1** 0.4 + 0.35 - 0.68, oe
- (b) **A1** P(C and D) = 0.07, so not mutually exclusive (since P(C and D) is not 0)
- **(b) Answer: P(C and D) = 0.07, so C and D are not mutually exclusive.**