Write your name here

Surname	Other Names

AS/A Level Mathematics

Probability

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled..
- Answer the questions in the spaces provided
– there may be more space than you need.
- You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Information

- The marks for **each** question are shown in brackets
– use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

1 The events A and B are such that $P(A) = 0.4$ $P(B) = 0.5$ $P(A \cap B) = 0.3$

Find

(a) $P(A \cup B)$ **(2)**

(b) $P(A|B)$ **(3)**

(c) $P(A'|B')$ **(3)**

(Total for question 1 is 8 marks)

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2 The events A and B are such that $P(A) = \frac{5}{16}$, $P(B) = \frac{1}{2}$ and $P(A|B) = \frac{1}{4}$

Find

(a) $P(A \cap B)$ **(2)**

(b) $P(B'|A)$ **(3)**

(c) $P(A' \cup B)$ **(2)**

(d) Determine whether the events A and B are independent, give a reason for your answer. **(3)**

(Total for question 2 is 10 marks)

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3 The events A and B are such that $P(A) = 0.3$ $P(A \cup B) = 0.7$

Find

(a) $P(A' \cap B')$ **(2)**

(b) $P(A' \cap B)$ **(2)**

Given also that the events A and B are independent, find

(c) $P(B)$ **(4)**

(d) $P(A' \cup B')$ **(2)**

(Total for question 3 is 10 marks)

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4 The events A and B are such that $P(A) = \frac{3}{20}$ $P(A \cap B) = \frac{1}{20}$ $P(A|B) = \frac{5}{14}$

Find

(a) $P(B)$ **(3)**

(b) $P(A \cup B)$ **(3)**

(c) $P(B|A')$ **(3)**

(Total for question 4 is 9 marks)

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5 A company has three machines that produce a component. Machine A produces 40% of the components. Machine B produces 35% of the components and machine C produces 25% of the components.

If a component is produced by machine A the chance that it will be faulty is 3%.
If a component is produced by machine B the chance that it will be faulty is 2%.
If a component is produced by machine C the chance that it will be faulty is 1%.

(a) Draw a tree diagram to show this information. **(3)**

A component is selected at random. Find the probability:

(b) it is faulty. **(2)**

Given that the component is faulty

(c) Find the probability it was produced by machine C **(3)**

(Total for question 5 is 8 marks)

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6 A bag contains 10 blue counters, 8 red counters and 6 green counters.
Two counters are removed from the bag at random.

(a) Draw a tree diagram to represent this information **(3)**

(b) Find the probability that the two counters removed are both green **(2)**

Given that at least one of the counters removed is red.

(c) Find the probability that both counters are red **(3)**

(Total for question 6 is 8 marks)

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7 Leroy asks 50 people which sports they watch. The can chose from football, golf and hockey.

5 people watch all three sports.
8 people watch football and golf
7 people watch golf and hockey
9 people watch football and hockey
31 people watch football
13 people watch golf
17 people watch hockey.

(a) Draw a Venn diagram for this information. **(3)**

One of the people is selected at random.

(b) Given they watch football, find the probability they do not watch hockey. **(3)**

(Total for question 7 is 6 marks)