

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.

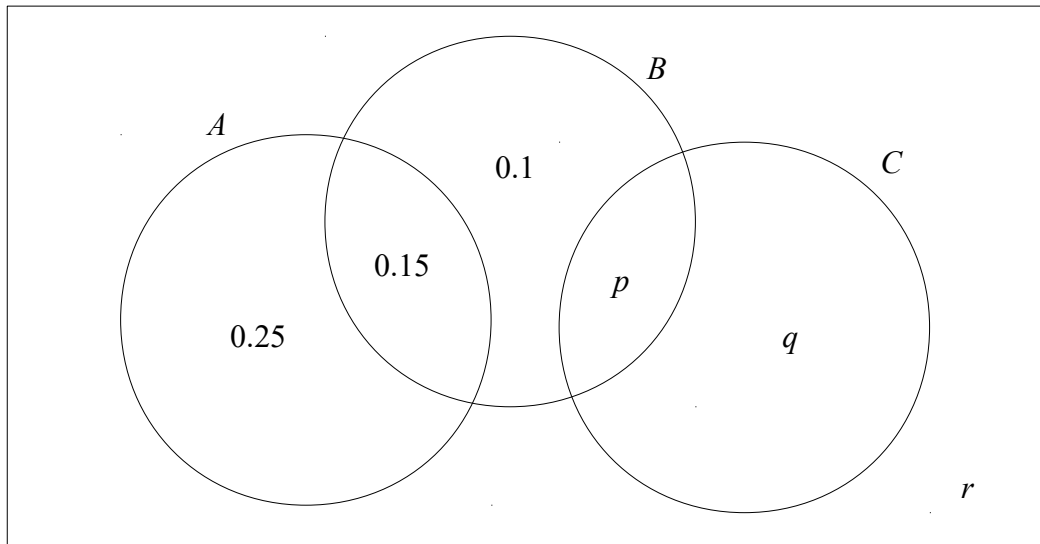
### Information

- 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 Venn diagram below shows three events  $A$ ,  $B$  and  $C$ .



(a) Write down two of the events that are mutually exclusive.

(1)

Events  $A$  and  $B$  are independent.

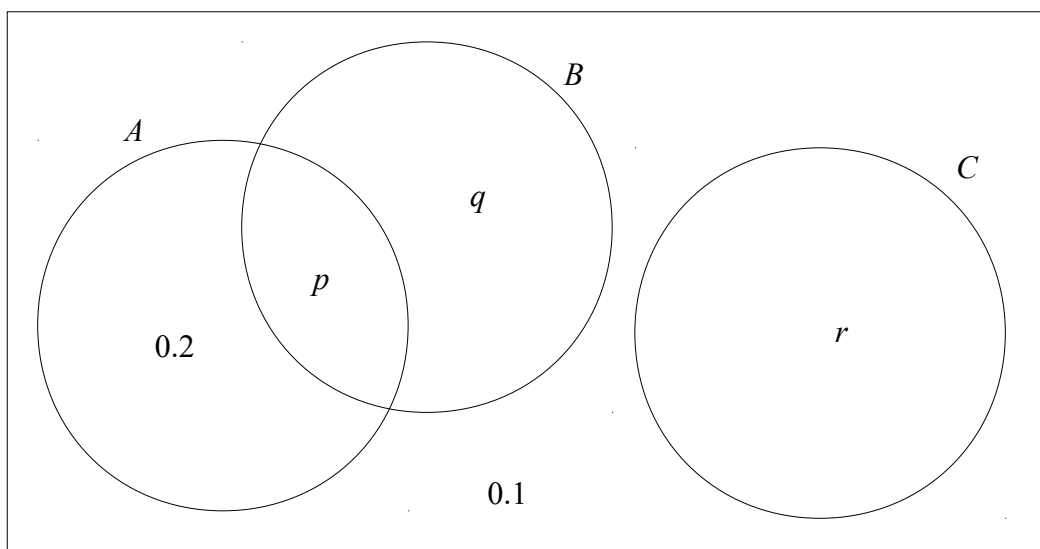
The probability of  $C$  is 0.3

(b) Find the values of  $p$ ,  $q$  and  $r$ .

(5)

(Total for question 1 is 6 marks)

2 The Venn diagram below shows three events  $A$ ,  $B$  and  $C$ .



(a) Write down two of the events that are mutually exclusive.

(1)

The probability of  $A$  is 0.4

The probability of  $A$  or  $B$  is 0.7

(b) Find the values of  $p$ ,  $q$  and  $r$ .

(2)

(c) State, giving a reason, whether or not the events  $A$  and  $B$  are statistically independent.

(2)

(Total for question 2 is 5 marks)

3 Raheem asks 50 people which sports they watch. They can choose 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)

(b) Two people are selected at random find the probability they both watch football. (2)

**(Total for question 3 is 5 marks)**

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4 For the events A and B.

The probability of A is 0.6

The probability of B is 0.5

The probability of neither A or B is 0.1.

(a) Find  $P(A \text{ and } B)$  (2)

(b) Draw a Venn diagram for this information. (2)

(c) Determine whether A and B are independent. (2)

**(Total for question 4 is 6 marks)**

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5 Two events A and B are independent and  $P(A) = 0.4$  and  $P(B) = 0.3$

(a) Find  $P(A \text{ and } B)$  (3)

(b) Draw a Venn diagram for this information. (2)

**(Total for question 5 is 5 marks)**

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6 Two events A and B are mutually exclusive and  $P(A) = 0.4$  and  $P(B) = 0.3$

(a) Write down  $P(A \text{ and } B)$  (1)

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

**(Total for question 6 is 4 marks)**

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7 Two events A and B are such that  $P(A) = 0.6$  and  $P(B) = 0.5$  and  $P(A \text{ and } B) = 0.4$

Draw a Venn diagram for this information.

**(Total for question 7 is 3 marks)**

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1 A box contains 10 milk chocolates and 8 dark chocolates. Connor takes two chocolates at random. Find the probability Connor takes

(a) Two dark chocolates (2)

(b) One milk chocolate and one dark chocolate. (2)

**(Total for question 1 is 4 marks)**

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2 A bag contains 10 blue counters, 8 red counters and 6 green counters. Two counters are removed from the bag at random. Find the probability that the two counters removed are:

(a) both red (2)

(b) different colours (2)

**(Total for question 2 is 4 marks)**

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3 The probability a tennis player gets her first serve in court is 65%. If she gets her first serve in court the probability of winning the point is 81%. The chance of getting her second serve in court is 84% and if she gets her second serve in court the chance of winning the point is 59%. If the tennis player fails to get her second serve in court she loses the point.

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

(b) Find the probability of the tennis player winning the point. (2)

**(Total for question 3 is 5 marks)**

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4 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 from machine A and faulty. (2)

(c) it is faulty. (2)

**(Total for question 4 is 7 marks)**

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