



S20-test Mutually Exclusive Events: Test Pack

EDEXCEL 1ST0 · Calculator allowed · about 25 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A fair spinner has four coloured sections: red, blue, green and yellow. The table shows the probability that the spinner lands on each colour, but one probability is missing.

Colour	Red	Blue	Green	Yellow
Probability	0.35	0.25	0.15	?

- (a) State the rule that connects the probabilities of all the possible outcomes of the spinner. (1)
- (b) Work out the probability that the spinner lands on yellow. (2)

.....
(Total for Question 1 is 3 marks)

- 2** A bag contains coloured counters. A counter is taken from the bag at random. The table shows the probability of taking each colour of counter.

Colour	Red	Blue	Green
Probability	0.5	0.3	0.2

- (a) Write down the probability that the counter is blue. (1)
- (b) Write down the colour of counter that is most likely to be taken. (1)
- (c) Explain how the table shows that red, blue and green are the only colours of counter in the bag. (1)

.....
(Total for Question 2 is 3 marks)

- 3** A card is drawn from a standard 52-card pack. State whether the events 'drawing a King' and 'drawing a Heart' are mutually exclusive.

(Total for Question 3 is 1 mark)

- 4** A survey found that $P(\text{a person owns a cat}) = 0.3$ and $P(\text{a person owns a dog}) = 0.45$, and some people in the survey own both a cat and a dog. Write down why 'owns a cat' and 'owns a dog' are not mutually exclusive events in this survey.

(Total for Question 4 is 1 mark)

- 5** Two fair ordinary six-sided dice are rolled and their scores are added together. The table shows the probability of each possible total, based on the 36 equally likely combinations.

Total	2	3	4	5	6	7	8	9	10	11	12
Probability	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

- (a) Write down the probability that the total is 7. (1)

- (b) Work out the probability that the total is 7 or 11. (2)

- (c) Work out the probability that the total is not 7. (1)

(Total for Question 5 is 4 marks)

6 A fair ordinary six-sided dice is rolled once. For each pair of events, state whether they are mutually exclusive or not mutually exclusive, giving a reason.

(i) Event P: rolling a 2. Event Q: rolling a 5. (1)

(ii) Event R: rolling an even number. Event S: rolling a number greater than 4. (1)

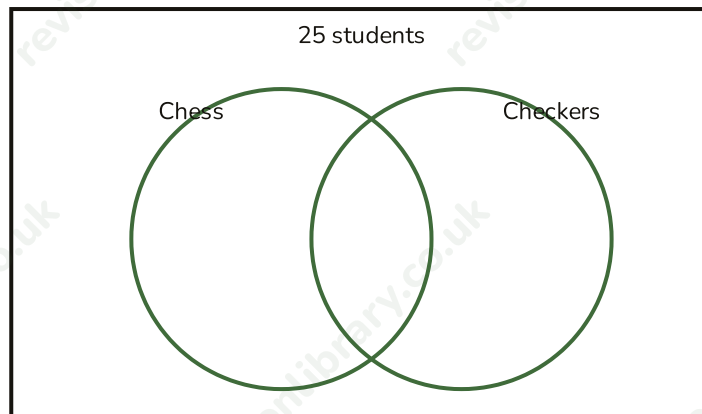
(iii) Event T: rolling a number less than 3. Event U: rolling a 6. (1)

(Total for Question 6 is 3 marks)

7 A class has 30 students. Event M is 'studies Music' and event D is 'studies Drama'. 12 students study Music only, 7 study Drama only, and 5 study both Music and Drama. Work out the probability that a randomly chosen student studies neither Music nor Drama.

(Total for Question 7 is 3 marks)

- 8** 25 students are asked whether they play Chess and whether they play Checkers. 12 students play Chess, 9 students play Checkers, and 4 students play both games. Complete the Venn diagram, then answer the question below.



- (a) Complete the Venn diagram with the number of students in each of the four regions. (3)
- (b) Work out the probability that a randomly selected student plays Chess but not Checkers. (1)

.....
(Total for Question 8 is 4 marks)

- 9** A gym reports that 65% of members use the pool and 50% use the gym floor. The manager claims: "Since $65\% + 50\% = 115\%$, this proves at least 15% of members use both facilities." Explain whether the manager's reasoning is valid, and show the minimum percentage of members who must use both.

(Total for Question 9 is 3 marks)

Mark scheme · S20-test Mutually Exclusive Events: Test Pack

Question 1

- (a) **B1** the probabilities of all the possible outcomes sum to 1 (oe)
- (a) **Answer: The probabilities of all the possible outcomes sum to 1.**
- (b) **M1** $0.35 + 0.25 + 0.15 (= 0.75)$, oe
- (b) **A1** 0.25 cao
- (b) **Answer: 0.25**

Question 2

- (a) **B1** 0.3 cao
- (a) **Answer: 0.3**
- (b) **B1** Red cao
- (b) **Answer: Red**
- (c) **B1** $0.5 + 0.3 + 0.2 = 1$, so these outcomes are exhaustive (oe)
- (c) **Answer: $0.5 + 0.3 + 0.2 = 1$, so red, blue and green must be all of the possible outcomes.**

Question 3

- **B1** not mutually exclusive - the King of Hearts is both a King and a Heart, oe
- **Answer: Not mutually exclusive**

Question 4

- **B1** some people own both a cat and a dog, so the two events can happen at the same time, oe
- **Answer: Some people own both a cat and a dog, so the two events can occur together.**

Question 5

- (a) **B1** $6/36$ oe ($1/6$)
- (a) **Answer: $1/6$**
- (b) **M1** $6/36 + 2/36$, oe
- (b) **A1** $2/9$ oe cao
- (b) **Answer: $2/9$**
- (c) **B1** $5/6$ oe ft ($1 - 6/36$)
- (c) **Answer: $5/6$**

Question 6

- (i) **B1** mutually exclusive - a single roll cannot score both 2 and 5 (oe)
- (i) **Answer: Mutually exclusive**
- (ii) **B1** not mutually exclusive - 6 is even and greater than 4, so R and S can both happen (oe)
- (ii) **Answer: Not mutually exclusive**
- (iii) **B1** mutually exclusive - the score cannot be less than 3 and equal to 6 (oe)
- (iii) **Answer: Mutually exclusive**

Question 7

- **M1** $12 + 7 + 5 (= 24)$, oe
- **M1** $30 - 24$, oe
- **A1** $1/5$ oe cao
- **Answer: $1/5$**

Question 8

- (a) **B1** 8 correctly placed in the 'Chess only' region (12-4)
- (a) **B1** 5 correctly placed in the 'Checkers only' region (9-4) and 4 in the overlap
- (a) **B1** 8 correctly placed outside both circles (25-8-5-4)
- (a) **Answer: Chess only: 8, Checkers only: 5, both: 4, neither: 8.**
- (b) **B1** 8/25 oe ft
- (b) **Answer: 8/25**

Question 9

- **M1** recognises that the probability of using at least one facility cannot exceed 100%
- **A1** $65+50-100 = 15$ shown, oe
- **B1** concludes the manager's reasoning is valid: at least 15% of members must use both facilities
- **Answer: The manager's reasoning is valid. Since $P(\text{pool or gym floor})$ cannot exceed 100%, $P(\text{both}) \geq 65+50-100 = 15\%$, so at least 15% of members must use both.**