IB MATHS AA HL · UNIT 4

Probability: exam practice

10 questions · 35 marks · worked solutions and markschemes

Name _____ Date _____ Score / 35

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlaa/probability-exam-practice

1. **2 marks · Paper 1 style · no calculator**

A and B are mutually exclusive with $P(A) = 0.35$ and $P(B) = 0.4$.

Find $P(A \cup B)$ and $P(A \mid B)$. **[2]**

2. **2 marks · Paper 1 style · no calculator**

Sam has a probability 0.7 of passing each of two independent tests.

Find the probability that he passes at least one test. **[2]**

3. **3 marks · Paper 1 style · no calculator**

Two fair six-sided dice are rolled and the scores are multiplied.

Find the probability that the product is a multiple of 3. **[3]**

4. **4 marks · Paper 1 style · no calculator**

A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.6$.

Find $P(A \cup B)$ and $P(A' \cap B)$. **[4]**

5. **4 marks · Paper 1 style · no calculator**

A card is drawn from a standard pack of 52. A is the event \"a heart\" and B is the event \"a king\".

Find $P(A \cup B)$ and show that A and B are independent. **[4]**

6. **4 marks · Paper 1 style · no calculator**

$P(A) = 0.4$, $P(B \mid A) = 0.25$ and $P(A \cup B) = 0.7$.

Find $P(B)$ and determine whether A and B are independent. **[4]**

7. **4 marks · Paper 2 style · calculator**

Ali and Bea take turns to throw a fair dice, Ali first. The first to throw a 6 wins.

Find the probability that Ali wins. **[4]**

8. **4 marks · Paper 1 style · no calculator**

A bag contains 6 red and 4 green counters. Two counters are taken without replacement.

(a) Find the probability that both are red. **[2]**

(b) Find the probability that they are different colours. **[2]**

9. **4 marks · Paper 2 style · calculator**

The probability that it rains on a day is 0.3. If it rains, the probability that Ana cycles to school is 0.2; if it does not rain, it is 0.7.

(a) Find the probability that Ana cycles to school. **[2]**

(b) Given that Ana cycles, find the probability that it rained. **[2]**

10. **4 marks · Paper 1 style · no calculator**

In a group of 50 people, 30 like tea, 25 like coffee and 8 like neither.

(a) Find the number who like both. **[2]**

(b) Find the probability that a person who likes coffee also likes tea. **[2]**

Answers and worked solutions

Question 1 — 2 marks

Answer: 0.75; 0

0.75 A1

0 A1

Question 2 — 2 marks

Answer: $\frac{91}{100}$

$1 - 0.3^2$ M1

0.91 A1

Question 3 — 3 marks

Answer: $\frac{5}{9}$

sample space of 36 M1

$36 - 16 = 20$ outcomes A1

$\frac{5}{9}$ A1

Question 4 — 4 marks

Answer: 0.72, 0.42

$P(A \cap B) = 0.18$ A1

$P(A \cup B) = 0.72$ A1

$P(A' \cap B) = 0.7 \times 0.6$ M1

0.42 A1

Question 5 — 4 marks

Answer: $\frac{4}{13}$; independent

$\frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{4}{13}$ $M1A1$

$P(A \cap B) = \frac{1}{52} = \frac{1}{4} \times \frac{1}{13}$ R1

so independent A1

Question 6 — 4 marks

Answer: $P(B) = 0.4$; not independent

$P(A \cap B) = 0.1$ A1

$P(B) = 0.7 - 0.4 + 0.1 = 0.4$ A1

$P(B \mid A) = 0.25 \neq 0.4 = P(B)$ R1

not independent A1

Question 7 — 4 marks

Answer: $\frac{6}{11}$

$\frac{1}{6} + \left(\frac{5}{6}\right)^2 \frac{1}{6} + \ldots$ $M1A1$

$\frac{\frac{1}{6}}{1 - \frac{25}{36}}$ M1

$\frac{6}{11}$ A1

Question 8 — 4 marks

Answer: (a) $\frac{1}{3}$; (b) $\frac{8}{15}$

(a)

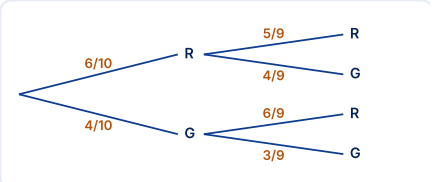
$\frac{6}{10} \times \frac{5}{9}$ M1

$\frac{1}{3}$ A1

(b)

$2 \times \frac{6}{10} \times \frac{4}{9}$ M1

$\frac{8}{15}$ A1



Without replacement: the second branches change

Question 9 — 4 marks

Answer: (a) $\frac{11}{20}$; (b) $\frac{6}{55}$

(a)

$0.3(0.2) + 0.7(0.7)$ M1

0.55 A1

(b)

$\frac{0.06}{0.55}$ M1

$\frac{6}{55}$ A1

Question 10 — 4 marks

Answer: (a) 13; (b) $\frac{13}{25}$

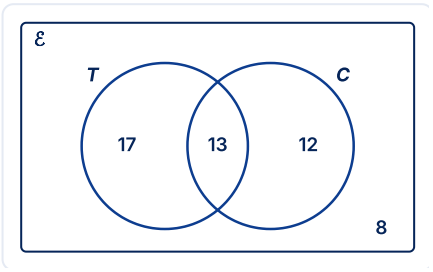
(a)

$30 + 25 - x = 42$ M1

13 A1

(b)

$\frac{13}{25}$ A2



Tea (T) and coffee (C)

Every solution is also on ibmathrevision.com/hlaa/probability-exam-practice
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