Probability: exam practice

10 questions · 27 marks · worked solutions and markschemes

Name _____ Date _____ Score / 27

- 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/hlai/probability-exam-practice

1. **2 marks · Paper 1 style · calculator allowed**

A bag has 4 red, 5 green and 6 yellow sweets. One is taken at random.

Find the probability that it is not green. **[2]**

2. **2 marks · Paper 1 style · calculator allowed**

Two fair spinners numbered 1 to 5 are spun and the scores added.

Find the probability that the total is at least 8. **[2]**

3. **2 marks · Paper 1 style · calculator allowed**

A game costs $\$2$. A fair dice is rolled: a 6 wins $\$8$, a 5 wins $\$3$, otherwise nothing is won.

Find the expected profit per game for the player. **[2]**

4. 2 marks · Paper 1 style · calculator allowed

$P(A) = 0.45$, $P(B) = 0.3$ and $P(A \cap B) = 0.12$.

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

5. 3 marks · Paper 2 style · calculator allowed

60% of a company's staff drive to work. Of drivers, 30% are late at least once a month; of non-drivers, 15% are.

Find the probability that a person who is late at least once a month drives. **[3]**

6. 3 marks · Paper 1 style · calculator allowed

Two cards are drawn without replacement from 5 red and 7 blue cards.

Given the second card is red, find the probability that the first was red. **[3]**

7. 3 marks · Paper 1 style · calculator allowed

A coin is biased so that $P(\text{head}) = 0.6$. It is tossed three times.

Find the probability of exactly two heads, and of at least one tail. **[3]**

8. **3 marks · Paper 2 style · calculator allowed**

In a survey of 200 people, 120 own a car, 80 own a bike and 50 own both.

Find the probability that a bike owner also owns a car, and state whether the two events are independent.

[3]

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

X takes values $0, 1, 2, 3$ with probabilities $0.1,\ 0.3,\ 0.4,\ k$.

Find k, $E(X)$ and $\mathrm{Var}(X)$. **[4]**

10. **3 marks · Paper 2 style · calculator allowed**

The probability that a battery is faulty is 0.02. A pack has 4 batteries.

Find the probability that a pack has at least one faulty battery, and the expected number of such packs in 500. **[3]**

Answers and worked solutions

Question 1 — 2 marks

Answer: $\frac{2}{3}$

$\frac{10}{15}$ M1

$\frac{2}{3}$ A1

Question 2 — 2 marks

Answer: $\frac{6}{25}$

6 outcomes of 25 M1

$\frac{6}{25}$ A1

Question 3 — 2 marks

Answer: $-\$0.17$

$\frac{8+3}{6} - 2$ M1

$-\frac{1}{6}$ dollars A1

Question 4 — 2 marks

Answer: 0.63; 0.37

0.63 A1

0.37 A1

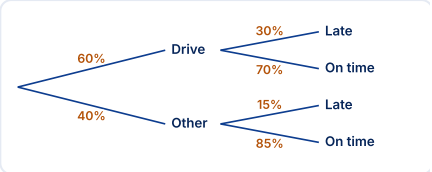
Question 5 — 3 marks

Answer: $\frac{3}{4}$

$P(L) = 0.18 + 0.06 = 0.24$ A1

$\frac{0.18}{0.24}$ M1

0.75 A1



Travel first, then late or not

Question 6 — 3 marks

Answer: $\frac{4}{11}$

$P(R_2) = \frac{5}{12}$ A1

$\frac{\frac{5}{12} \cdot \frac{4}{11}}{\frac{5}{12}}$ M1

$\frac{4}{11}$ A1

Question 7 — 3 marks

Answer: 0.432; 0.784

$3(0.6)^2(0.4) = 0.432$ $M1$A1

$1 - 0.6^3 = 0.784$ A1

Question 8 — 3 marks

Answer: 0.625; not independent

$\frac{50}{80} = 0.625$ A1

$P(C) = 0.6$ A1

$0.625 \neq 0.6$: not independent R1

Question 9 — 4 marks

Answer: $k = 0.2$; 1.7; 0.81

$k = 0.2$ A1

$E(X) = 1.7$ A1

$E(X^2) = 3.7$ M1

$\text{Var}(X) = 0.81$ A1

Question 10 — 3 marks

Answer: 0.0776; 38.8

$1 - 0.98^4 = 0.0776$ $M1$A1

38.8 A1

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