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Probability

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Probability — Student Worksheet*. Question numbers match exactly: definitions K1–K4, theoretical probability T1–T4, experimental probability E1–E3, expected frequency X1–X4, complement C1–C4, the Addition Rule M1–M5, independent events I1–I5, sample space diagrams S1–S4, tree diagrams R1–R4, Venn diagrams V1–V4, conditional probability P1–P4, the Mixed Review MR1–MR10, and the examination questions Q1–Q8.
Each solution names the rule being applied and explains why it fits. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution names the rule being applied and explains why it is the right one, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones.

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4.1 Solutions — Key Definitions and the Probability Scale

Solution K1

(a) $S = \{1, 2, 3, 4, 5, 6, 7, 8\}$
(b) $n(S) = \boxed{8}$
(c) Multiples of 3 up to 8 are $\boxed{\{3, 6\}}$, so the event contains 2 outcomes.

Solution K2

(a) 0.9 is close to 1, so the event is $\boxed{\text{likely}}$.
(b) 0 means the event can never happen: $\boxed{\text{impossible}}$.
(c) $\frac{1}{2}$ means equally likely to happen or not: $\boxed{\text{even chance}}$.

Solution K3

Every probability must satisfy $0 \leq P(A) \leq 1$. A value of 1.4 is greater than 1, which would mean the event is "more than certain" — impossible. The student has made an arithmetic error, most likely by adding probabilities that should have been multiplied, or by using the wrong denominator.

Solution K4

An **outcome** is a single possible result of one trial. For a die, the outcomes are $1, 2, 3, 4, 5, 6$ — six individual results.
An **event** is an outcome *or a set of outcomes* we are interested in. For example, "rolling an even number" is the event $\{2, 4, 6\}$, which is made up of three separate outcomes.
So every outcome is an event, but an event may contain several outcomes.

4.2 Solutions — Theoretical Probability

Solution T1

Total marbles: $5 + 8 + 7 = 20$.
(a) $P(\text{green}) = \dfrac{5}{20} = \boxed{\dfrac{1}{4}}$
(b) Red or blue gives $8 + 7 = 15$ favourable outcomes:

$$P(\text{red or blue}) = \frac{15}{20} = \boxed{\frac{3}{4}}.$$

(c) There are no yellow marbles, so $P(\text{yellow}) = \dfrac{0}{20} = \boxed{0}$ (impossible).

Solution T2

The letters are S, T, A, T, I, S, T, I, C, S — that is 10 letters in total.
(a) S appears 3 times: $P(\text{S}) = \boxed{\dfrac{3}{10}}$.
(b) The vowels are A, I, I — that is 3 vowels:

$$P(\text{vowel}) = \boxed{\frac{3}{10}}.$$

(c) Checking each letter against M: S (yes), T (yes), A (no), T (yes), I (no), S (yes),

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Preview ends here

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