

## MYP Year 5: Probability test

### INSTRUCTIONS:

- Do not open this examination paper until instructed to do so.
- Calculators are not required for this exam.
- Unless otherwise stated in the question, all numerical answers must be given exactly (as fractions) or to three decimal places.
- Your work will be assessed against criterion A.

### Criterion A: Knowing and understanding

Achievement level	Level descriptor	Task-specific descriptors
0	The student does not reach a standard described by any of the descriptors below.	The student does not solve any questions
1–2	The student is able to: <ul style="list-style-type: none"><li>• <b>select</b> appropriate mathematics when solving simple problems in familiar situations</li><li>• <b>apply</b> the selected mathematics successfully when solving these problems</li><li>• generally <b>solve</b> these problems correctly.</li></ul>	The student solves questions 1, 2ab, and 3
3–4	The student is able to: <ul style="list-style-type: none"><li>• <b>select</b> appropriate mathematics when solving more complex problems in familiar situations</li><li>• <b>apply</b> the selected mathematics successfully when solving these problems</li><li>• generally <b>solve</b> these problems correctly.</li></ul>	The student solves questions 2c, 4a, and 5
5–6	The student is able to: <ul style="list-style-type: none"><li>• <b>select</b> appropriate mathematics when solving challenging problems in familiar situations</li><li>• <b>apply</b> the selected mathematics successfully when solving these problems</li><li>• generally <b>solve</b> these problems correctly.</li></ul>	The student solves questions 4b, 6, and 7

Achievement level	Level descriptor	Task-specific descriptors
7–8	<p>The student is able to:</p> <ul style="list-style-type: none"> <li><b>select</b> appropriate mathematics when solving challenging problems in both familiar and unfamiliar situations</li> <li><b>apply</b> the selected mathematics successfully when solving these problems</li> <li>generally <b>solve</b> these problems correctly.</li> </ul>	The student solves questions 8 and 9

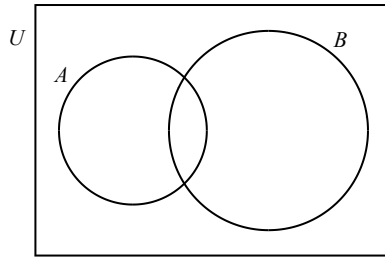
1. In a survey, 100 students were asked 'do you prefer to play chess or cards?' Of the 40 boys in the survey, 30 said they would choose chess, while only 25 girls made this choice.

	Boys	Girls	Total
Cards			
Chess	30	25	
Total	40		100

**Copy and complete the table** and hence find the probability that:

- (a) a student selected at random prefers to play cards;
- (b) a girl selected at random prefers to play cards
2. **Two** fair dice are rolled. Find probability that:
- (a) the **sum** is 8.
- (b) the **sum** is an even number
- (c) the **product** is 30
3. Given that A and B are two combined events,  $P(A) = 0.6$ ,  $P(B) = 0.7$ , and  $P(A \cup B) = 0.9$ . Find  $P(A \cap B)$

4. The following Venn diagram shows the universal set  $U$  and the sets  $A$  and  $B$ .



$$n(U) = 100, n(A) = 30, n(B) = 50, n(A \cup B) = 70.$$

- (a) An element is selected at random from  $U$ . Find the probability that this element is:
- $(A \cup B)'$
  - $A \cap B$
  - $B \cap A'$
- (b) Are the events  $A$  and  $B$  independent? Justify your answer

5. Sara is a student at IB World College.

The probability that she wakes up before 6:30 am is  $\frac{5}{8}$

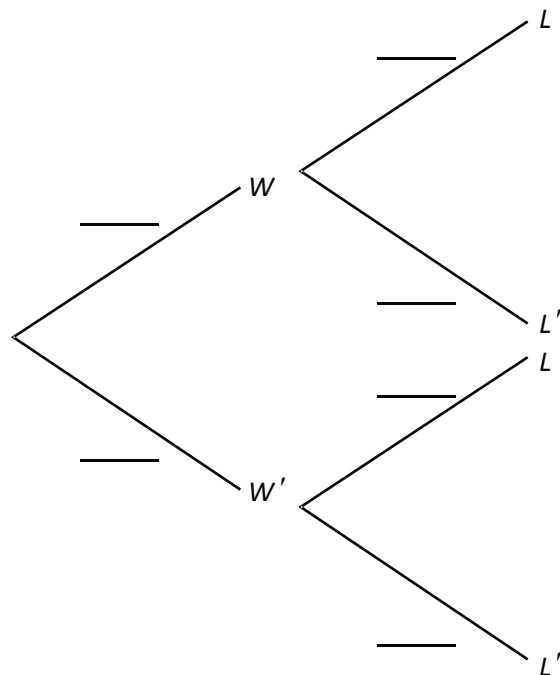
If she wakes up before 6:30 am, the probability that she will be late for school is  $\frac{1}{8}$

If she wakes up after 6:30 am, the probability she will be late for school is  $\frac{3}{4}$

Let  $W$  be the event "Sara wakes up before 6:30 am"

Let  $L$  be the event "Sara is late to school"

(a) Copy and complete the tree diagram below.



(b) Given that Sara woke up after 6:30 am, write down the probability that she goes to school on time?

(c) Find the probability that Sara wakes up before 6:30 and goes late to school

(d) Find the probability that Sara goes late for school.

6. In a class of 20 students, 13 play soccer, 8 play tennis and 2 play neither
- Find how many students
    - play soccer or tennis
    - play both, soccer and tennis
    - play only soccer
  - A student is selected at random from this class, find the probability that the student plays only tennis
  - Two students are selected at random from this class, find the probability that both of them play only tennis
7. (a) Given that the events A and B are **independent**,  $P(A \cup B) = 0.8$  and  $P(A) = 0.5$ , find probability of B.
- (b) Given that the events C and D are **exhaustive and mutually exclusive**,  $P(C) = \frac{3}{10}$ , find probability of D.
8. Given that  $P(A) = 3x$ ,  $P(B) = 5x$  and  $P(A \cap B) = 2x$ , where  $x > 0$
- Find the value of  $x$ , such that events A and B are exhaustive events.
  - Find the value of  $x$ , such that events A and B are independent events.
  - For the case when A and B are independent, find  $P(A \cup B)$
9. Given that  $2x^2 - 4x + k = 0$  and that  $k \in \{0, 1, 2, 3, 4, 5, 6\}$ .
- Find the probability that the equation has two solutions