# Probability

## Question Paper 6

| | |
|---|---|
| **Level** | A Level |
| **Subject** | Maths |
| **Exam Board** | AQA |
| **Module** | Statistics 1 |
| **Topic** | Probability |
| **Sub Topic** | |
| **Booklet** | Question Paper - 6 |

**Time Allowed:** **58 minutes**

**Score:** **/48**

**Percentage:** **/100**

**Grade Boundaries:**

| A* | A | B | C | D | E | U |
|---|---|---|---|---|---|---|
| >85% | '77.5% | 70% | 62.5% | 57.5% | 45% | <45% |

**Q1.** A health club has a number of facilities which include a gym and a sauna. Andrew and his wife, Heidi, visit the health club together on Tuesday evenings.

On any visit, Andrew uses either the gym or the sauna or both, but no other facilities. The probability that he uses the gym, P($G$), is 0.70. The probability that he uses the sauna, P($S$), is 0.55. The probability that he uses both the gym and the sauna is 0.25.

(a) Calculate the probability that, on a particular visit:

(i) he does not use the gym;

**(1)**

(ii) he uses the gym but not the sauna;

**(2)**

(iii) he uses either the gym or the sauna but not both.

**(2)**

(b) Assuming that Andrew's decision on what facility to use is independent from visit to visit, calculate the probability that, during a month in which there are exactly four Tuesdays, he does not use the gym.

**(2)**

(c) The probability that Heidi uses the gym when Andrew uses the gym is 0.6, but is only 0.1 when he does not use the gym.

Calculate the probability that, on a particular visit, Heidi uses the gym.

**(3)**

(d) On any visit, Heidi uses **exactly one** of the club's facilities.

The probability that she uses the sauna is 0.35.

Calculate the probability that, on a particular visit, she uses a facility other than the gym or the sauna.

**(2)**
**(Total 12 marks)**

**Q2.** A basket in a stationery store contains a total of 400 marker and highlighter pens. Of the marker pens, some are permanent and the rest are non-permanent. The colours and types of pen are shown in the table.

| | Colour | | | |
|---|---|---|---|---|
| **Type** | **Black** | **Blue** | **Red** | **Green** |
| **Permanent marker** | 44 | 66 | 32 | 18 |
| **Non-permanent marker** | 36 | 53 | 21 | 10 |
| **Highlighter** | 0 | 41 | 37 | 42 |

A pen is selected at random from the basket. Calculate the probability that it is:

(a) a blue pen;

**(1)**

(b) a marker pen;

**(2)**

(c) a blue pen or a marker pen;

**(2)**

(d) a green pen, given that it is a highlighter pen;

**(2)**

(e) a non-permanent marker pen, given that it is a red pen.

**(2)**
**(Total 9 marks)**

**Q3.** Rea, Suki and Tora take part in a shooting competition. The final round of the competition requires each of them to try to hit the centre of a target, placed at 100 metres, with a single shot. The independent probabilities that Rea, Suki and Tora hit the centre of this target with a single shot are 0.7, 0.6 and 0.8 respectively.

Find the probability that, in the final round of the competition, the centre of the target will be hit by:

(a) Tora only;

**(2)**

(b) exactly one of the three competitors;

**(3)**

(c) at least one of the three competitors.

**(3)**

**(Total 8 marks)**

**Q4.** Dafydd, Eli and Fabio are members of an amateur cycling club that holds a time trial each Sunday during the summer. The independent probabilities that Dafydd, Eli and Fabio take part in any one of these trials are 0.6, 0.7 and 0.8 respectively.

Find the probability that, on a particular Sunday during the summer:

(a) none of the three cyclists takes part;

**(2)**

(b) Fabio is the only one of the three cyclists to take part;

**(2)**

(c) exactly one of the three cyclists takes part;

**(3)**

(d) either one or two of the three cyclists take part.

**(3)**
**(Total 10 marks)**

**Q5.** The British and Irish Lions 2005 rugby squad contained 50 players. The nationalities and playing positions of these players are shown in the table.

| | | Nationality | | | |
|---|---|---|---|---|---|
| | | **English** | **Welsh** | **Scottish** | **Irish** |
| **Playing position** | **Forward** | 14 | 5 | 2 | 6 |
| | **Back** | 8 | 7 | 2 | 6 |

(a) A player was selected at random from the squad for a radio interview. Calculate the probability that the player was:

(i) English;

**(2)**

(ii) Irish, given that the player was a back;

**(2)**

(iii) a forward, given that the player was not Scottish.

**(2)**

(b) Four players were selected at random from the squad to visit a school. Calculate the probability that all four players were English.

**(3)**
**(Total 9 marks)**