# OCR 11 Probability (Foundation)

1. The probability that Mark is late for school is 0.35.

What is the probability that he is not late for school?

1. What is the probability of randomly selecting a king from a normal pack of cards? Give your answer as a fraction in its simplest form.
2. Maria rolls a fair, normal six-sided dice once.

Write down the probability that she gets a number less than 3.

1. Raffle tickets numbered from 1 to 50 are sold at a church fete. Find the probability that a ticket with a multiple of 10 is chosen. Give your answer as a fraction in its simplest form.
2. A bag of sweets contains only 15 red sweets, 10 yellow sweets and 5 green sweets.

What is the probability of randomly selecting a sweet that is not yellow?

1. A letter is chosen at random from the word MATHEMATICS.

What is the probability that it is an M?

1. The probability that a biased spinner will land on its green section is 0.15. Harry is going to spin it 300 times. Work out an estimate for the number of times the spinner will land on its green section.
2. A bus can arrive early, on time or late. The probability that the bus is on time is 0.61 and the probability that it is early is 0.03. What is the probability that the bus is late?
3. Ajay spins two spinners together. Spinner 1 has 3 sides labelled 1, 2 and 3. Spinner 2 has 3 sides labelled A, B and C. What is the probability that Ajay spins a 2 and a C?
4. A fair, four-sided spinner can land on 1, 2, 3 or 4. The spinner is spun twice and the two scores added together to give a total. Fill in the table below to show all the possible totals.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Spin 2** | | | |
|  |  | 1 | 2 | 3 | 4 |
| **Spin 1** | 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
|  |  |  |  |  |  |

1. Using the table in question 10, find the probability that the total is at least 5.
2. The three possible outcomes for a team playing football are win, lose or draw.

Does this mean that their probability of winning is ? Explain your answer.

1. A tin contains only 5 chocolate biscuits and 3 ginger biscuits. John chooses a biscuit at random from the tin, eats it and then chooses a second biscuit from the tin. Draw a tree diagram to show this information.
2. Using your tree diagram in question 13, find the probability that John chooses at least one ginger biscuit.
3. Mary rolls a dice 180 times and gets a six 65 times.

Do you think her dice is biased? Explain your answer.

1. Gemma and Abbie go to the cinema. The probability that Gemma enjoys the film is 0.7.

The probability that Abbie enjoys the film is . These events are independent.

What is the probability that they both enjoy the film?

1. A dessert consists of ice cream, sauce and a topping.

Here are the different options.

* **Ice cream**: Strawberry or vanilla
* **Sauce**: Chocolate or strawberry
* **Topping**: Marshmallows, chopped nuts or chocolate sprinkles

What proportion of total dessert combinations do not involve chocolate?

1. Barry has a bag of sweets. The bag contains only 4 red, 5 green and 7 yellow sweets. Barry chooses a sweet at random and eats it. He then chooses a second sweet. Find the probability that both sweets were red.
2. A fair 5-sided spinner has sides numbered 1 to 5. Ruth spins the spinner three times and wins a prize if the spinner lands on a 4 or a 5 all three times. Find the probability of Ruth winning a prize.
3. A board has three coloured sections, red, yellow and blue. Jim throws a dart at the board. The probability his dart misses the board is 0.64. The probabilities of his dart hitting each coloured section are equal. What is the probability his dart hits the yellow section of the board?

### Answers

1. 0.65
2. 
3. 
4. 
5.  or 
6. 
7. 
8. 0.32
9. 

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Spin 2** | | | |
|  |  | 1 | 2 | 3 | 4 |
| **Spin 1** | 1 | 2 | 3 | 4 | 5 |
| 2 | 3 | 4 | 5 | 6 |
| 3 | 4 | 5 | 6 | 7 |
| 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |

1. 
2. Whilst we know that there are three outcomes we do not know the probability of achieving each outcome. There will be many factors affecting the probability of winning so the probability is not simply .

**First biscuit**

Chocolate

Ginger

**Second biscuit**



Chocolate

Chocolate

Ginger

Ginger

1. Three ways of choosing a ginger biscuit: (ginger first and chocolate second) OR (chocolate first and ginger second) OR ( 2 ginger biscuits)



1. If the dice was not biased she would expect to get a six 30 times (). In her experiment she gets a six almost double the expected number of times, so her dice is likely to be biased.
2. 



1. There are 12 possible combinations, shown below.

There are 4 combinations that do not involve chocolate (shaded in table below).

The proportion of total dessert combinations that do not involve chocolate is .

|  |  |  |
| --- | --- | --- |
| **Ice cream** | **Sauce** | **Topping** |
| Strawberry | Chocolate | Marshmallows |
| Strawberry | Chocolate | Chopped nuts |
| Strawberry | Chocolate | Chocolate sprinkles |
| Strawberry | Strawberry | Marshmallows |
| Strawberry | Strawberry | Chopped nuts |
| Strawberry | Strawberry | Chocolate sprinkles |
| Vanilla | Chocolate | Marshmallows |
| Vanilla | Chocolate | Chopped nuts |
| Vanilla | Chocolate | Chocolate sprinkles |
| Vanilla | Strawberry | Marshmallows |
| Vanilla | Strawberry | Chopped nuts |
| Vanilla | Strawberry | Chocolate sprinkles |

1. 
2. Probability of spinner landing on a 4 or a 5 .

Probability of Ruth winning a prize .

1. 

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Apply the addition law of probability |  |  |  |  | AO1 | 1 | Apply the addition law of probability |  |  |  |
| AO1 | 2 | Calculate simple probability |  |  |  |  | AO1 | 2 | Calculate simple probability |  |  |  |
| AO1 | 3 | Calculate simple probability |  |  |  |  | AO1 | 3 | Calculate simple probability |  |  |  |
| AO1 | 4 | Calculate simple probability |  |  |  |  | AO1 | 4 | Calculate simple probability |  |  |  |
| AO1 | 5 | Calculate simple probability |  |  |  |  | AO1 | 5 | Calculate simple probability |  |  |  |
| AO1 | 6 | Calculate simple probability |  |  |  |  | AO1 | 6 | Calculate simple probability |  |  |  |
| AO1 | 7 | Calculate relative frequency |  |  |  |  | AO1 | 7 | Calculate relative frequency |  |  |  |
| AO1 | 8 | Apply the addition law of probability |  |  |  |  | AO1 | 8 | Apply the addition law of probability |  |  |  |
| AO1 | 9 | Calculate a probability |  |  |  |  | AO1 | 9 | Calculate a probability |  |  |  |
| AO1 | 10 | Draw a sample space diagram |  |  |  |  | AO1 | 10 | Draw a sample space diagram |  |  |  |
| AO2 | 11 | Calculate probabilities from a sample space diagram |  |  |  |  | AO2 | 11 | Calculate probabilities from a sample space diagram |  |  |  |
| AO2 | 12 | Interpret probability |  |  |  |  | AO2 | 12 | Interpret probability |  |  |  |
| AO2 | 13 | Draw a tree diagram |  |  |  |  | AO2 | 13 | Draw a tree diagram |  |  |  |
| AO2 | 14 | Calculate probability from a tree diagram |  |  |  |  | AO2 | 14 | Calculate probability from a tree diagram |  |  |  |
| AO2 | 15 | Compare a relative frequency to an expected outcome |  |  |  |  | AO2 | 15 | Compare a relative frequency to an expected outcome |  |  |  |
| AO3 | 16 | Calculate a probability of two independent events both happening |  |  |  |  | AO3 | 16 | Calculate a probability of two independent events both happening |  |  |  |
| AO3 | 17 | Use systematic listing to calculate a probability |  |  |  |  | AO3 | 17 | Use systematic listing to calculate a probability |  |  |  |
| AO3 | 18 | Calculate a conditional probability |  |  |  |  | AO3 | 18 | Calculate a conditional probability |  |  |  |
| AO3 | 19 | Calculate a probability of repeated events |  |  |  |  | AO3 | 19 | Calculate a probability of repeated events |  |  |  |
| AO3 | 20 | Calculate a probability in context |  |  |  |  | AO3 | 20 | Calculate a probability in context |  |  |  |