**Classwork: Using trees to organize situations**

1. Let *F* be the set of all families that have exactly 2 children.

(a) Assuming P(boy) = P(girl), copy and complete the following tree diagram, for families with 2 children.



**(2)**

(b) What is the probability that a family chosen at random from *F* has exactly

(i) 2 boys?

(ii) 2 boys, if it is known that the first child is a boy?

(iii) 2 boys, if it is known that there is a boy in the family?

**(3)**

**(Total 5 marks)**

**Early finishers**

2. A bag contains 2 red, 3 yellow and 5 green sweets.

Without looking, Mary takes one sweet out of the bag and eats it. She then takes out a second sweet.

(a) If the first sweet is green, what is the probability that the second sweet is also green?

(b) If the first sweet is not red, what is the probability that the second sweet is red?

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| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) ………………………………………….. |

(Total 4 marks)

***Note****: For this question, it is important that you show your working and explain your method clearly.*

1. A box contains 10 coloured light bulbs, 5 green, 3 red and 2 yellow. One light bulb is selected at random and put into the light fitting of room A.

(a) What is the probability that the light bulb selected is

(i) green?

(1)

(ii) not green?

(1)

A second light bulb is selected at random and put into the light fitting in room B.

(b) What is the probability that

(i) the second light bulb is green given the first light bulb was green?

(l)

(ii) both light bulbs were not green?

(2)

(iii) one room had a green light bulb and the other room does not have a green light bulb?

(3)

A third light bulb is selected at random and put in the light fitting of room C.

(c) What is the probability that

(i) all three rooms have green light bulbs?

(2)

(ii) only one room has a green light bulb?

(3)

(iii) at least one room has a green light bulb?

(2)

(Total 15 marks)

3. In a school, 180 pupils are asked which is their favourite outdoor sport in winter. The pie chart shows the result of the survey. The diagram is **not** accurately drawn.



(a) Calculate the angle of the sector representing rugby.

(b) Estimate the probability that a pupil's favourite outdoor sport in winter will be hockey.

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| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) ………………………………………….. |

**(Total 4 marks)**

4. Nene and Deka both play netball. The probability that Nene will score a goal on her first attempt is 0.75. The probability that Deka will score a goal on her first attempt is 0.82.

Calculate the probability that

(a) Nene and Deka will both score a goal on their first attempts;

(b) neither Nene nor Deka will score a goal on their first attempts.

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| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) ………………………………………….. |

(Total 4 marks)

6. Two jars contain a number of coloured balls as indicated in the diagrams below.



**Jar One Jar Two**

Two experiments are carried out.

*First Experiment*: A jar is first chosen at random and then a ball is drawn from that jar.

(a) Draw, **and label fully**, a tree diagram to show **all** possible outcomes of this experiment.

**(2)**

(b) What is the probability that a white ball is drawn?

**(3)**

*Second Experiment*: The ball drawn in the first experiment is not replaced. A second ball is then drawn from the same jar.

(c) What is the probability that both balls are white?

**(2)**

**(Total 7 marks)**

1. A bag contains two red sweets and three green sweets. Jacques takes one sweet from the bag, notes its colour, then eats it. He then takes another sweet from the bag.

Complete the tree diagram below to show all probabilities.



(a) What is the probability two red sweets are taken from the bag?

(b) What is the probability at least one red sweet is taken from the bag?

(c) Assuming at least one red sweet is drawn, what is the probability both sweets are red?

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| *Working:* |  |

**(Total 4 marks)**

2. A teacher has a box containing six type A calculators and four type B calculators.

The probability that a type A calculator is faulty is 0.1 and the probability that a type B calculator is faulty is 0.12.

(a) Complete the tree diagram given below, showing all the probabilities.



(b) A calculator is selected at random from the box. Find the probability that the calculator is

(i) a faulty type A;

(ii) not faulty.

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answers*:  (b) (i) ……………………………………...  (ii) ……………………………………... |

**(Total 4 marks)**

Heinrik rolls two 6-sided dice at the same time. One die has three red sides and three black sides. The other die has the sides numbered from 1 to 6. By means of a tree diagram, table of outcomes or otherwise, answer each of the following questions.

(a) How many different possible combinations can he roll?

(b) What is the probability that he will roll a red and an even number?

(c) What is the probability that he will roll a red or black and a 5?

(d) What is the probability that he will roll a number less than 3?

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| --- | --- |
| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) ..................................................................  (c) ..................................................................  (d) …………………………………….......... |

(Total 8 marks)

4. Today Philip intends to go walking. The probability of good weather (G) is . If the weather is good, the probability he will go walking (W) is . If the weather forecast is not good (NG) the probability he will go walking is .

(a) Complete the probability tree diagram to illustrate this information.



(b) What is the probability that Philip will go walking?

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| *Working:* |  |
|  | *Answer*:  (b) .................................................................. |

**(Total 8 marks)**

There are two biscuit tins on a shelf. The **red** tin contains three chocolate biscuits and seven plain biscuits. The **blue** tin contains one chocolate biscuit and nine plain biscuits.

(a) A child reaches into the **red** tin and randomly selects a biscuit. The child returns that biscuit to the tin, shakes the tin, and then selects another biscuit.

Find the probability that

(i) both biscuits chosen are chocolate.

**(2)**

(ii) one of the biscuits is plain and the other biscuit is chocolate.

**(3)**

(b) A second child chooses a biscuit from the **blue** tin. The child eats the biscuit and chooses another one from the **blue** tin. The tree diagram below represents the possible outcomes for this event.



(i) Write down the values of ***a*** and ***b***.

The probability, *p*, that James gets up before 07.00 is 0.95.  
If James gets up before 07.00, the probability, *t*, that he arrives at school on time is 0.98.   
If James gets up later than 07.00, the probability that he arrives at school on time is 0.55.  
The above information is represented by the following tree diagram.



(a) Complete the tree diagram.

(b) Calculate the probability that James gets up before 07.00 and is on time for school.

(c) Calculate the probability that James does **not** arrive at school on time.

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| --- | --- |
| *Working:* |  |
|  | *Answers*:  (b) ..................................................................  (c) …………………………………….......... |

**(Total 8 marks)**

Sandra is attempting an exam question. She has to choose two correct statements from a list of five. Below is a tree diagram showing Sandra's possible choices. One of the probability values is missing.



(a) Fill in the missing probability value on the diagram.

(b) (i) If Sandra makes two guesses, what is the probability that she will get only one of them correct?

(ii) Sandra definitely knows the first correct statement but has to guess the second. What is the probability that she will answer both correctly?

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| *Working:* |  |

5. The table below shows the number of left and right handed tennis players in a sample of 50 males and females.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Left handed | Right handed | Total |
| Male | 3 | 29 | 32 |
| Female | 2 | 16 | 18 |
| Total | 5 | 45 | 50 |

If a tennis player was selected at random from the group, find the probability that the player is

(a) male and left handed;

(b) right handed;

(c) right handed, given that the player selected is female.

|  |  |
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| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) …………………………………………..  (c) ………………………………………….. |

(Total 4 marks)

It is known that 5% of all AA batteries made by Power Manufacturers are defective. AA batteries are sold in packs of 4.

Find the probability that a pack of 4 has

(a) exactly two defective batteries;

(3)

(b) at least one defective battery.

(2)

(Total 5 marks)

A bag contains 2 red, 3 yellow and 5 green sweets.

Without looking, Mary takes one sweet out of the bag and eats it. She then takes out a second sweet.

(a) If the first sweet is green, what is the probability that the second sweet is also green?

(b) If the first sweet is not red, what is the probability that the second sweet is red?

|  |  |
| --- | --- |
| *Working:* |  |
|  | *Answers*:  (a) …………………………………………..  (b) ………………………………………….. |

(Total 4 marks)