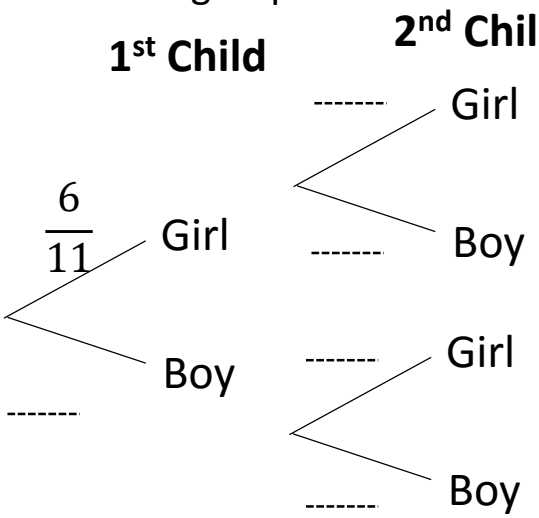
Probability of Dependent Events

The head of maths is organising a school trip. Two students need are chosen at random to be group leaders. There are 6 girls and 5 boys to choose from.



1) Complete the probability tree diagram. /2

2) Calculate the probability that the head of maths selects both a boy and a girl. /3

Abbie has 20 biscuits in a tin. She has
12 digestives
5 chocolate chip cookies
3 Oreos
Abbie takes at random two biscuits from the tin.

3) Work out the probability that the two biscuits were not the same type. /4

4) Below are the 9 tiles, Fawaz takes a tile at random and he does **not** replace the tile. Fawaz then takes a second random tile.

3	3	4	5	3	4	3	5	4

Calculate the probability that the number on Fawaz's second tile is **LESS** than the number on the first tile he took.

/3

5) There are n smarties in a tube. 4 of the smarties are blue. The rest are pink. Lina takes at random a sweet from the bag and eats it. She then takes a second sweet out of the bag and eats it.

The probability Lina eats two blue sweets is $\frac{2}{5}$

Show that $2n^2 - 2n - 60 = 0$

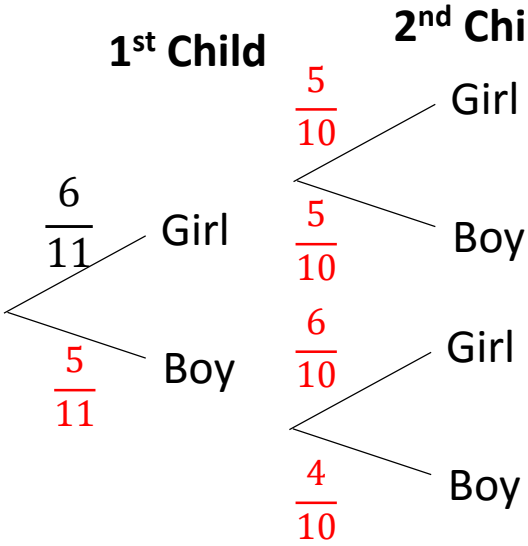
/3

Skill	Questions	Score	Available Marks
Completing a probability tree diagram for dependent events.	1		**2**
Calculate the probability of dependent events.	2,3,4		**10**
Problem solving and reasoning with dependent events.	5		**3**
	Total Marks		**15**

Answers

Probability of Dependent Events

The head of maths is organising a school trip. Two students need are chosen at random to be group leaders. There are 6 girls and 5 boys to choose from.



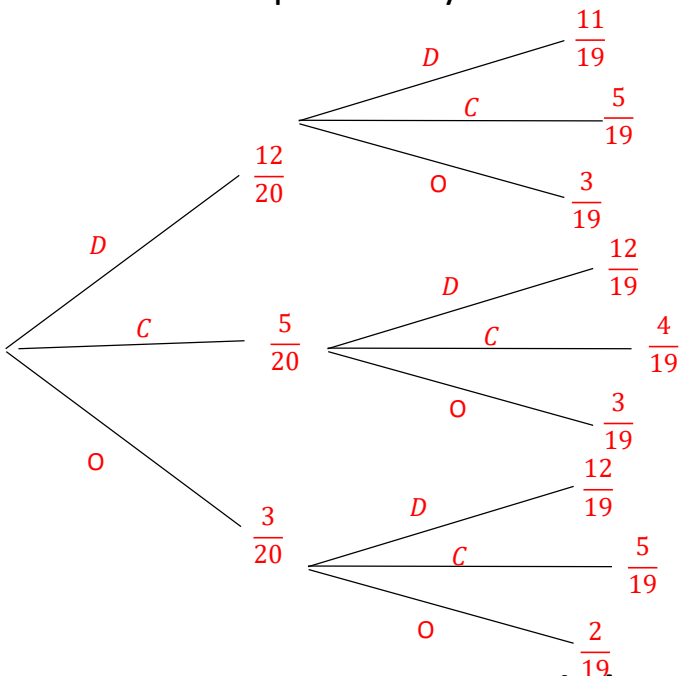
1) Complete the probability tree diagram. /2

2) Calculate the probability that the head of maths selects both a boy and a girl. $P(GB) = \frac{6}{11} \times \frac{5}{10} = \frac{30}{110}$ /3

$P(BG) = \frac{5}{11} \times \frac{6}{10} = \frac{30}{110}$ $P(B \cap G) = \frac{30}{110} + \frac{30}{110} = \frac{60}{110} = \frac{6}{11}$

Abbie has 20 biscuits in a tin. She has 12 digestives, 5 chocolate chip cookies and 3 Oreos. Abbie takes at random two biscuits from the tin.

3) Work out the probability that the two biscuits were not the same type.



$P(DD) = \frac{12}{20} \times \frac{11}{19} = \frac{132}{380}$

$P(CC) = \frac{5}{20} \times \frac{4}{19} = \frac{20}{380}$

$P(OO) = \frac{3}{20} \times \frac{2}{19} = \frac{6}{380}$

$P(same) = P(DD) + P(CC) + P(OO)$

$P(same) = \frac{132}{380} + \frac{20}{380} + \frac{6}{380} = \frac{158}{380}$

$P(not\ same) = 1 - P(same)$

$P(not\ same) = 1 - \frac{158}{380} = \frac{222}{380} = \frac{111}{190}$

/4

Answers

4) Below are the 9 tiles, Fawaz takes a tile at random and he does **not** replace the tile. Fawaz then takes a second random tile.

3	3	3	3	4	4	4	5	5

Calculate the probability that the number on Fawaz's second tile is **LESS** than the number on the first tile he took.

$p(5,4) = \frac{2}{9} \times \frac{3}{8} = \frac{6}{72}$

$P(5,3) = \frac{2}{9} \times \frac{4}{8} = \frac{8}{72}$

$P(4,3) = \frac{3}{9} \times \frac{4}{8} = \frac{12}{72}$

P(less than first tile)=P(5,4)+P(5,3)+ P(4,3)

$$P(a > b) = \frac{6}{72} + \frac{8}{72} + \frac{12}{72} = \frac{26}{72} = \frac{13}{36}$$

/3

5) There are n smarties in a tube. 4 of the smarties are blue. The rest are pink. Lina takes at random a sweet from the bag and eats it. She then takes a second sweet out of the bag and eats it.

The probability Lina eats two blue sweets is $\frac{2}{5}$

Show that $2n^2 - 2n - 60 = 0$

$$P(BB) = \frac{4}{n} \times \frac{3}{n-1} = \frac{12}{n^2 - n}$$

Hence

$$\frac{12}{n^2 - n} = \frac{2}{5}$$

$$60 = 2n^2 - 2n$$

Thus

$$0 = 2n^2 - 2n - 60$$

/3

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	Total Marks		**15**