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

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) 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.

\[
\begin{array}{cccccccc}
3 & 3 & 4 & 5 & 3 & 4 & 3 & 5 & 4 \\
\end{array}
\]

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

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 \( 2n^2 - 2n - 60 = 0 \)
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1) Complete the probability tree diagram.

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\[ P(GB) = \frac{6}{11} \times \frac{5}{10} = \frac{30}{110} \]

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\[ P(B \cap G) = \frac{30}{110} + \frac{30}{110} = \frac{60}{110} = \frac{6}{11} \]

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

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

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

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

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

\[ P(\text{same}) = P(DD) + P(CC) + P(OO) \]

\[ P(\text{same}) = \frac{132}{380} + \frac{20}{380} + \frac{6}{380} = \frac{158}{380} \]

\[ P(\text{not same}) = 1 - P(\text{same}) \]

\[ P(\text{not same}) = 1 - \frac{158}{380} = \frac{222}{380} = \frac{111}{190} \]
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.

\[ \begin{array}{cccccccc}
3 & 3 & 3 & 3 & 4 & 4 & 4 & 5 & 5 \\
\end{array} \]

Calculate the probability that the number on Fawaz’s second tile is _LESS_ than the number on the first tile he took.

\[
P(5,4) = \frac{2}{9} \times \frac{3}{8} = \frac{6}{72} \\
P(5,3) = \frac{2}{9} \times \frac{4}{8} = \frac{8}{72} \\
P(4,3) = \frac{3}{9} \times \frac{4}{8} = \frac{12}{72}
\]

\[
P(\text{less than first tile}) = P(5,4) + P(5,3) + P(4,3)
\]

\[
P(\text{less than first tile}) = \frac{6}{72} + \frac{8}{72} + \frac{12}{72} = \frac{26}{72} = \frac{13}{36}
\]

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

\[
\text{P(less than first tile)} = \frac{13}{36}
\]

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 \( 2n^2 - 2n - 60 = 0 \)

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

Hence \[
\frac{12}{n^2 - n} = \frac{2}{5}
\]

\[
60 = 2n^2 - 2n
\]

Thus \[
0 = 2n^2 - 2n - 60
\]