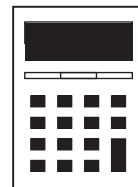# GCSE MATHEMATICS
Tree Diagrams

AQA These questions have been taken or modified from previous AQA GCSE Mathematics Papers.

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The quality of your written communication is specifically assessed in questions that are indicated with an asterisk (*).

Advice
- Read each question carefully before you start to answer it.
- In all calculations, show clearly how you work out your answer.
- Use the number of marks for the question as a guide to the amount of time you need to spend.
- Look at previous parts of the question, e.g. a), b), c) i) as there may be information there you need to answer later parts.
- Check your answer is realistic and appropriate.
- For calculator decimal numbers always write your full calculator display in the working out area and then, if you need to, round the answer on the answer line.

www.thecalculatorguide.com

1 An ordinary fair dice is rolled.
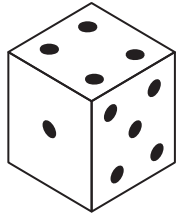
1 (a) Complete the tree diagram for the dice landing on 4

[1 mark]

First spin   **Second spin**

```
                                       ......... ⟋ 4
                         4 ⟋
         1/6 ⟋            ⟍
            ⟋              ......... ⟍ not 4
           ⟍
   .........⟍             ......... ⟋ 4
             not 4 ⟋
                   ⟍
                    ......... ⟍ not 4
```
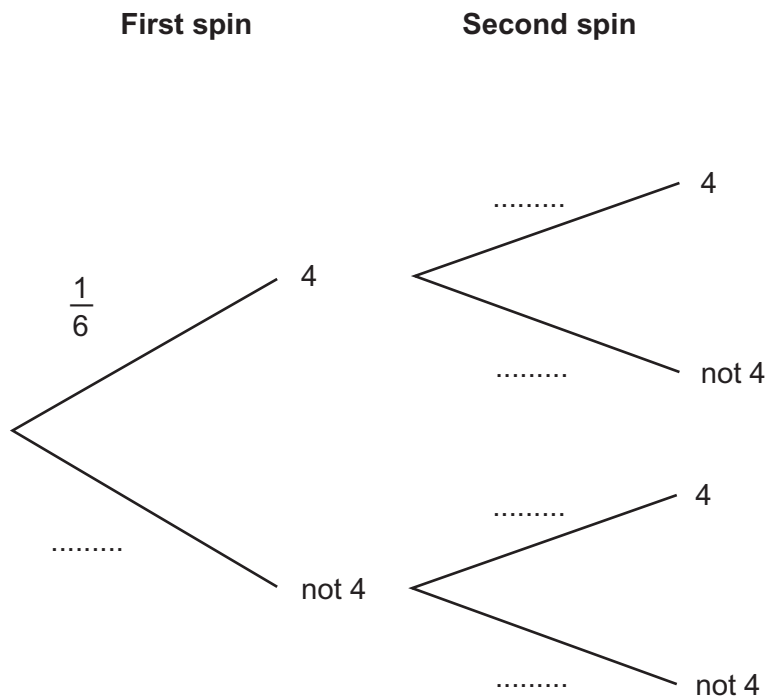
1 (b) Work out the probability of the dice landing on 4 both times.

[2 marks]

....

....

Answer ....

2   The probability that Martin gets to school on time is 0.9
         The probability that Brodie gets to school on time is 0.7

2 (a)   Complete the tree diagram to show this information.

Martin	Brodie

0.9 — Gets to school on time

0.7 — Gets to school on time

.... — Does **not** get to school on time

.... — Does **not** get to school on time

.... — Gets to school on time

.... — Does **not** get to school on time
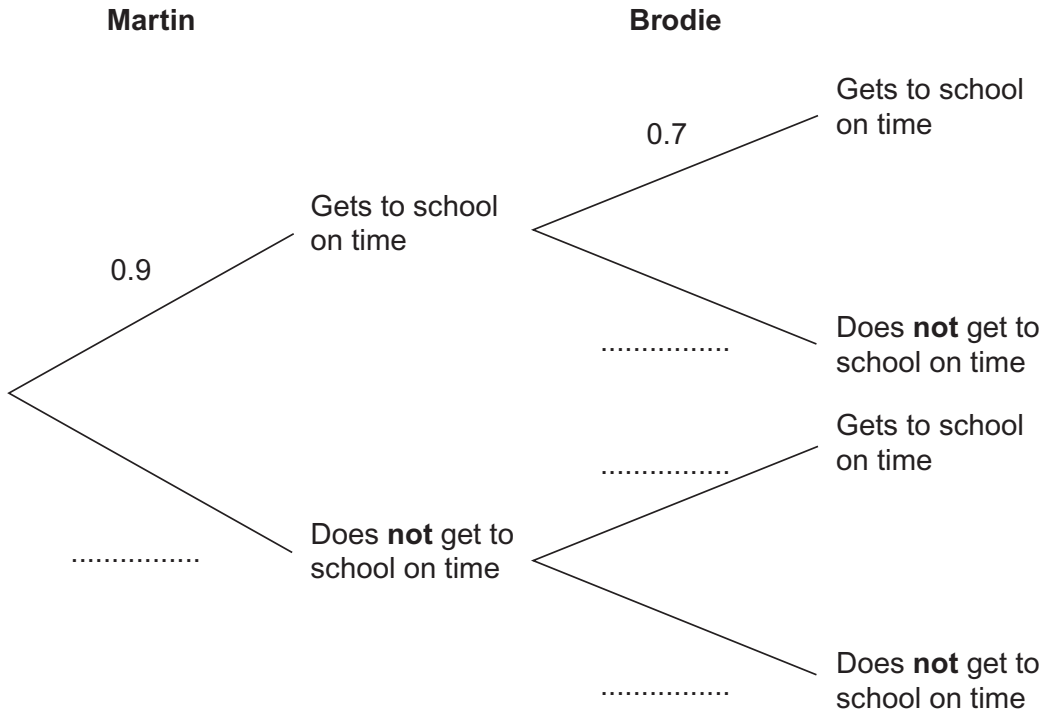
[1 mark]

2 (b)   Work out the probability that at least one of the students gets to school on time.

....

....

....

....

Answer ....   **[3 marks]**

2 (c)   The tree diagram above is for two students getting to school on time.
         It has six branches in total.

         How many branches in total would a tree diagram for five students have?

....

....

Answer ....   **[2 marks]**

3   Bag A has 2 black counters and 3 white counters.
Bag B has 3 orange counters and 4 green counters.

A counter is chosen at random from each bag.

3 (a)   Complete the tree diagram.

[2 marks]

Bag A   **Bag B**
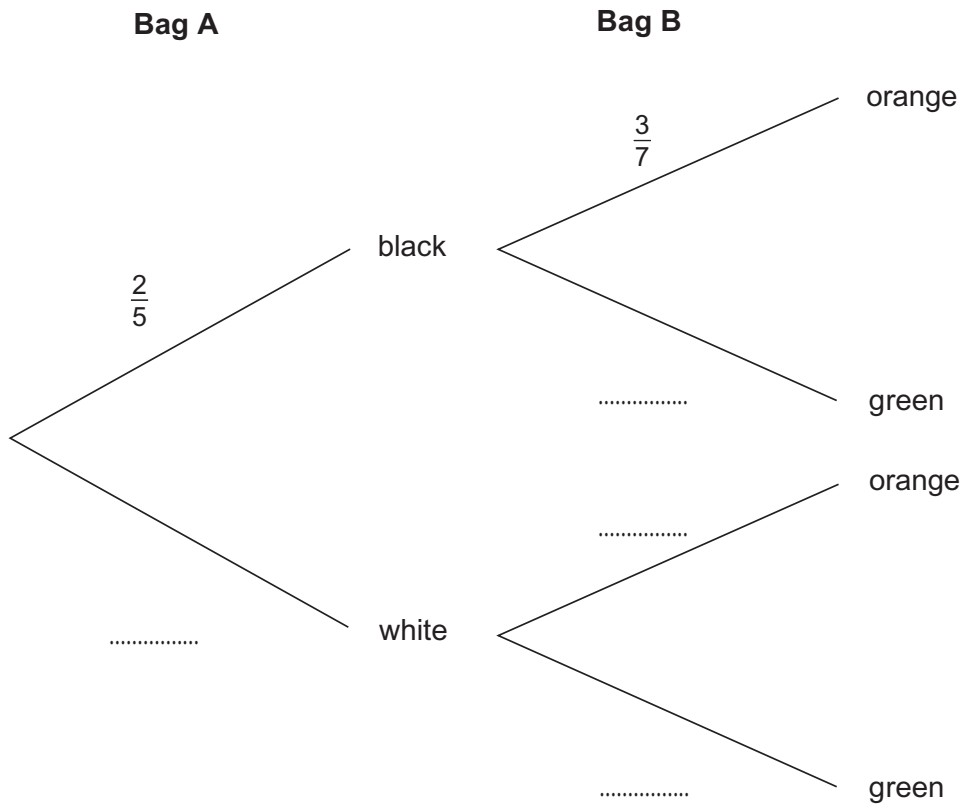
3 (b)   What is the probability of choosing a black counter and an orange counter?

[2 marks]

....

....

....

Answer ....

4 (a) The outcomes of two independent experiments are success and failure.

Complete the tree diagram.

[2 marks]

First experiment   **Second experiment**

```
                                        ........          Success
                        Success  <
              0.4                       0.25
                                                          Failure

                                        ........          Success
              ........
                        Failure  <
                                        ........          Failure
```
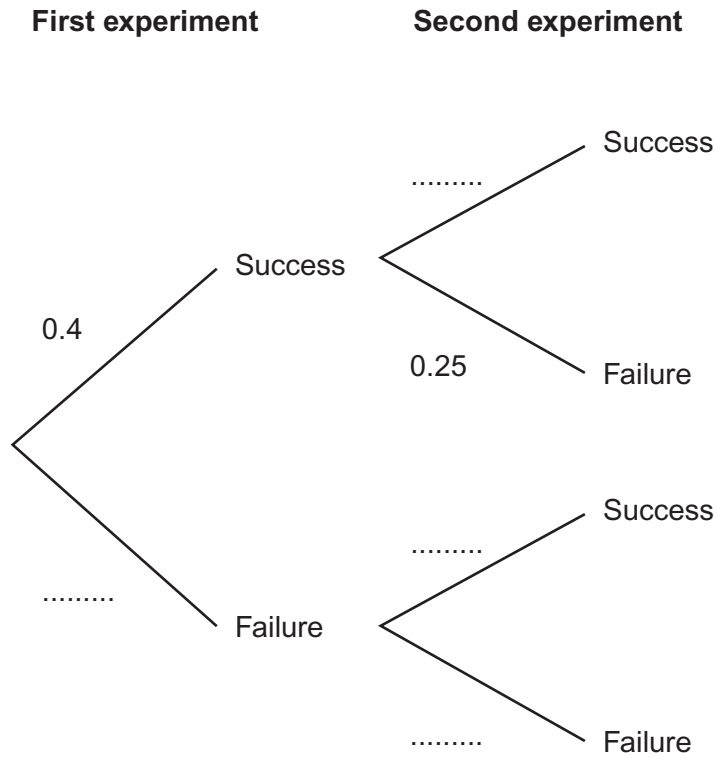
4 (b) Work out the probability of success in **both** experiments.

[2 marks]

....

....

Answer ....

5   The tree diagram shows the probabilities of two **independent** events.

Complete the tree diagram.

First event   Second event   Probability of
                                            both events

                                            ┌─────────┐
                          ....   │ 0.15   │
                                            └─────────┘

        0.3

                                            ┌─────────┐
                          ....   │   │
                                            └─────────┘

                                            ┌─────────┐
                          ....   │   │
                                            └─────────┘

        ....

                                            ┌─────────┐
                          ....   │   │
                                            └─────────┘
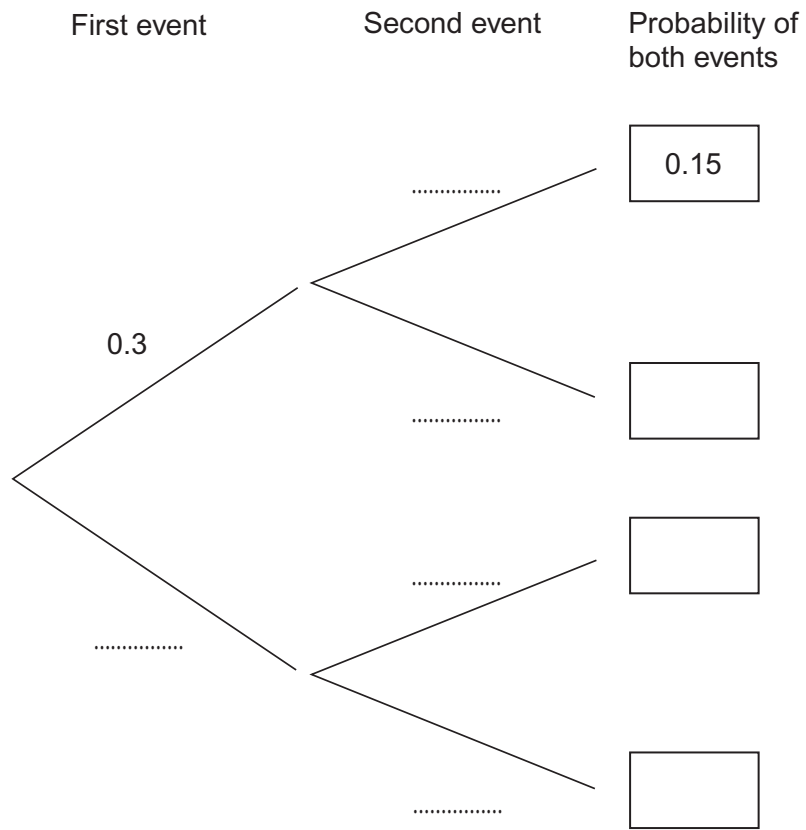
(4 marks)

6   A and B are independent events.

Fill in **all** eight missing probabilities in the diagram below.

[4 marks]

1st event	**2nd event**	**Outcome**	**Probability**

B   A, B   0.12

....

A

0.3

....   Not B   A, Not B   ....

....   B   Not A, B   ....

....

Not A

....   Not B   Not A, Not B   ....

....

....

....

....
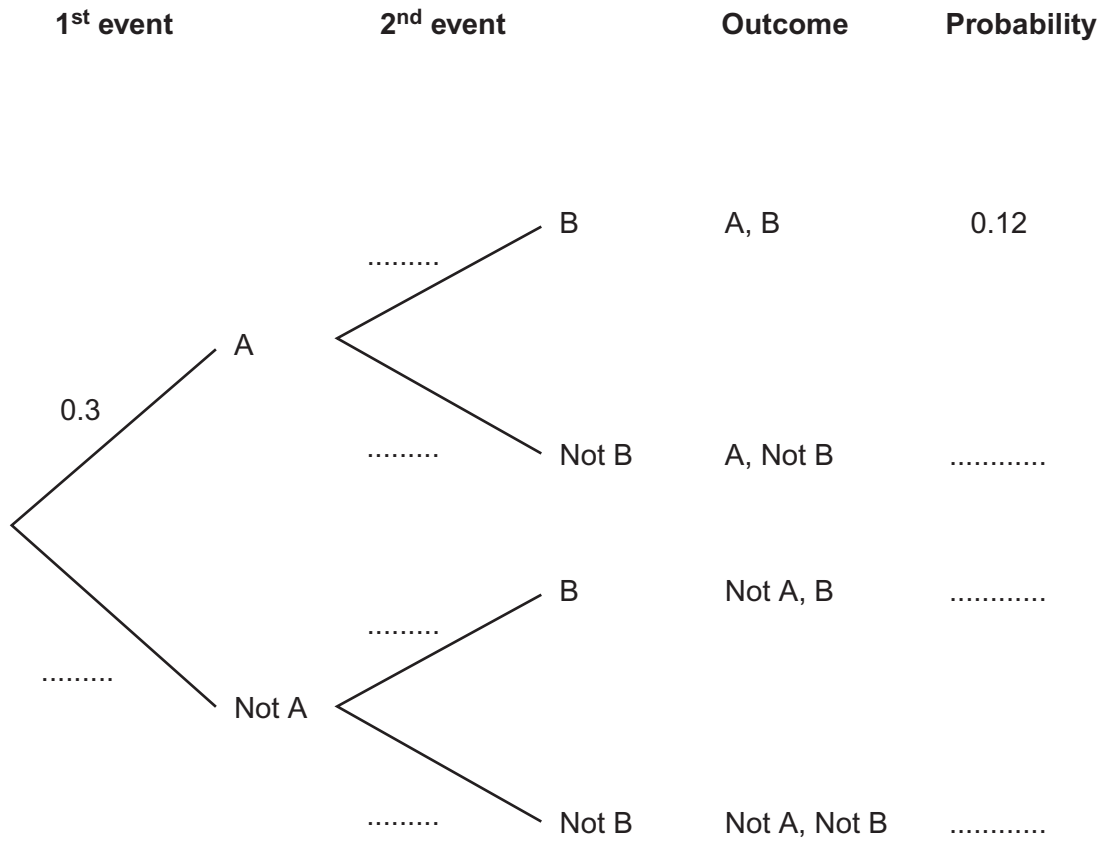
7 Bag A and Bag B each contain only white tickets and pink tickets.

One ticket is picked at random from each bag.

7 (a) Complete the tree diagram.

[4 marks]

Bag A	**Bag B**	**Outcome**	**Probability**

$\dfrac{4}{11}$ White

$\dfrac{3}{8}$ White — White, White — $\dfrac{12}{88}$

.... Pink — White, Pink — ....

.... Pink

.... White — Pink, White — ....

.... Pink — Pink, Pink — ....
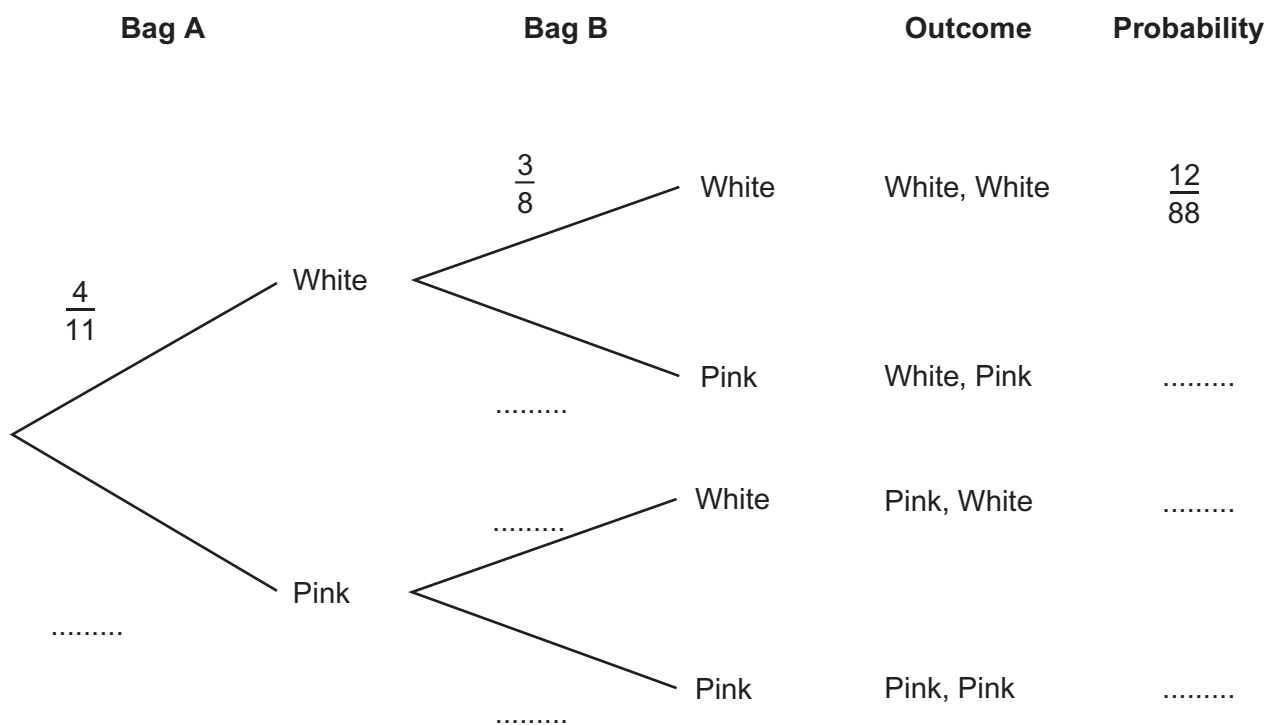
7 (b) Work out the probability of one ticket of each colour being picked.

[1 mark]

....

....

Answer ....

8 The probability of rolling a six on a biased dice is $\frac{1}{5}$

The dice is rolled twice.

8 (a) Complete the tree diagram.

First roll   **Second roll**
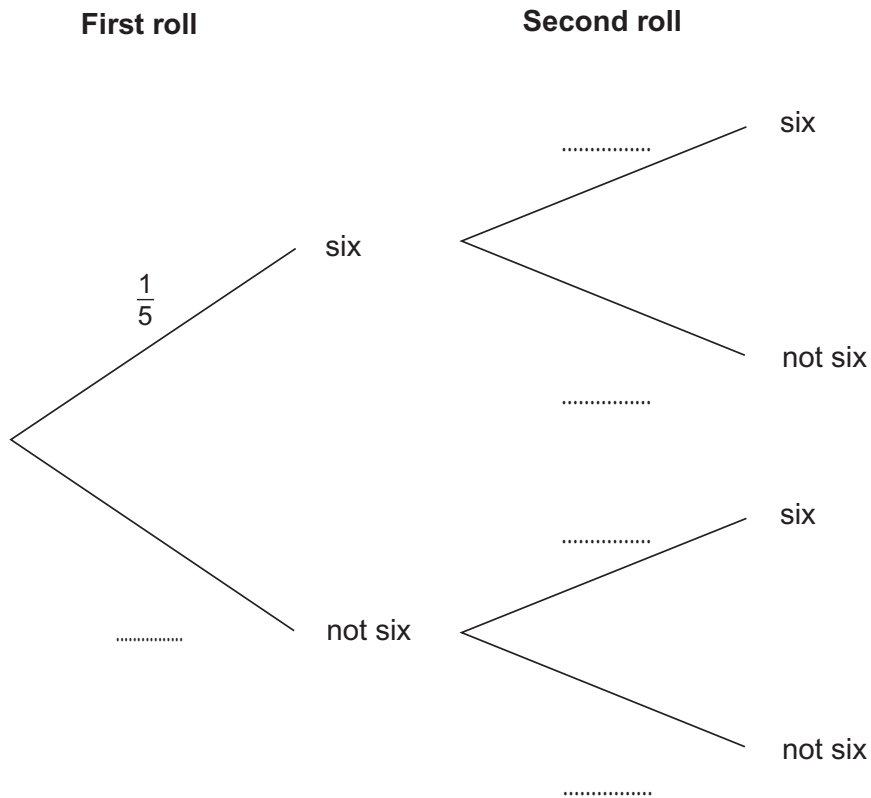
(2 marks)

8 (b) Work out the probability of rolling exactly one six.

....

....

....

....

Answer .... *(2 marks)*

9 Here are two fair spinners.

Spinner A   **Spinner B**

red | blue
blue | blue

red | blue
blue | red
red
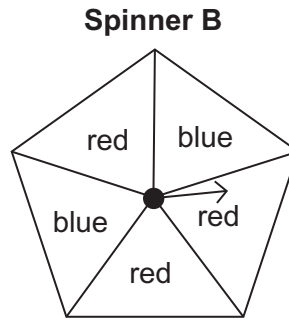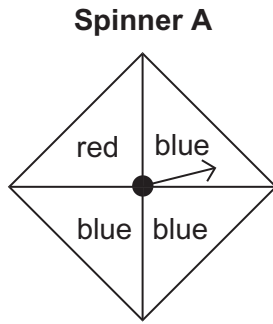
Both arrows are spun.

9 (a) Complete the tree diagram.

[2 marks]

Spinner A   **Spinner B**

red

....

$\frac{1}{4}$ red

....   blue

red   red

....

blue

....

....   blue
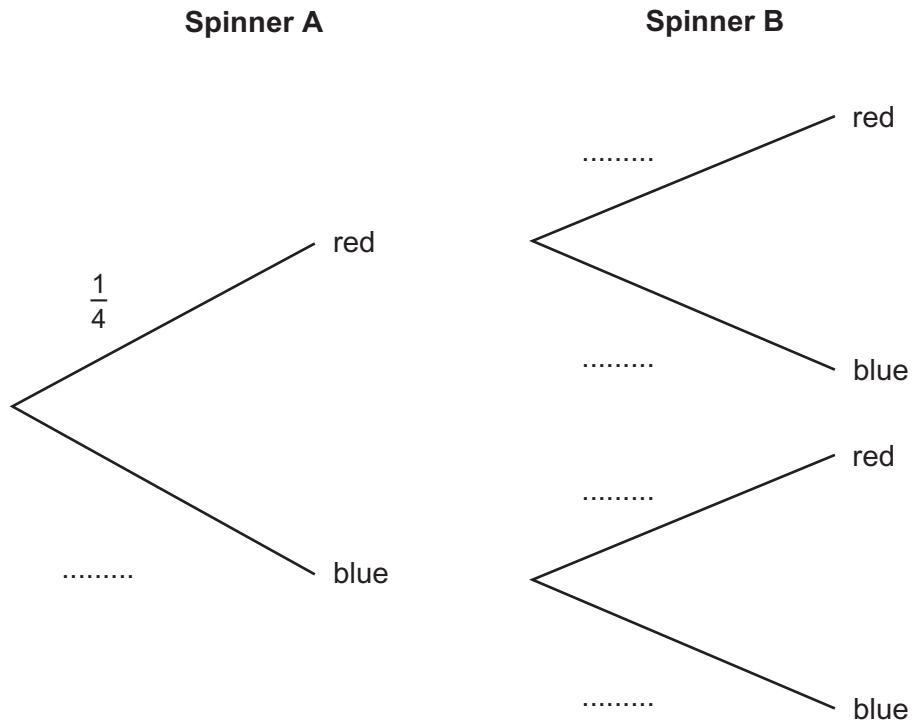
9 (b) Work out the probability that both arrows land on the same colour.

[3 marks]

....

....

....

Answer ....

10   The probability of a biased coin landing on heads is $\frac{2}{5}$

The coin is tossed twice.

Complete the tree diagram.

First toss   **Second toss**

                                                              head
                                              ....
                              head
                  ....   tail
                                              ....
                                                              head
                                              ....
                  .... tail
                                              ....   tail
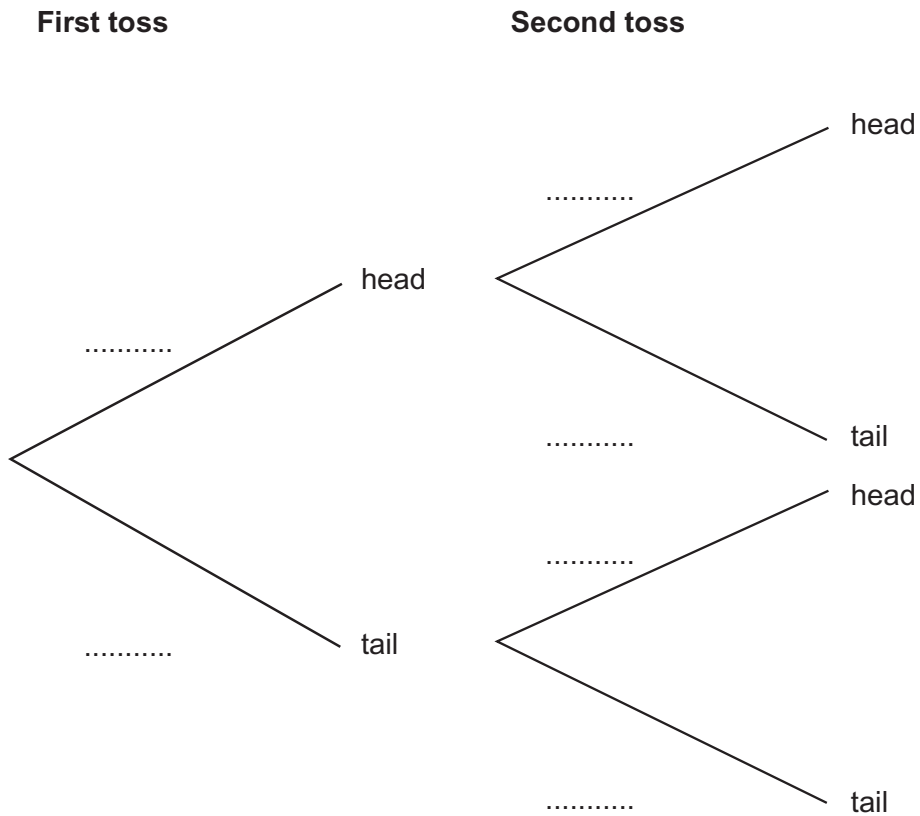
(3 marks)

11   In two **independent** experiments

the probability of success in the first experiment is 0.8

the probability of success in the second experiment is 0.1

Complete the tree diagram.

[3 marks]

First experiment   Second experiment

```
                                        ............    Success
                          Success  <
             ............                ............    Failure


                                        ............    Success
                          Failure  <
             ............                ............    Failure
```
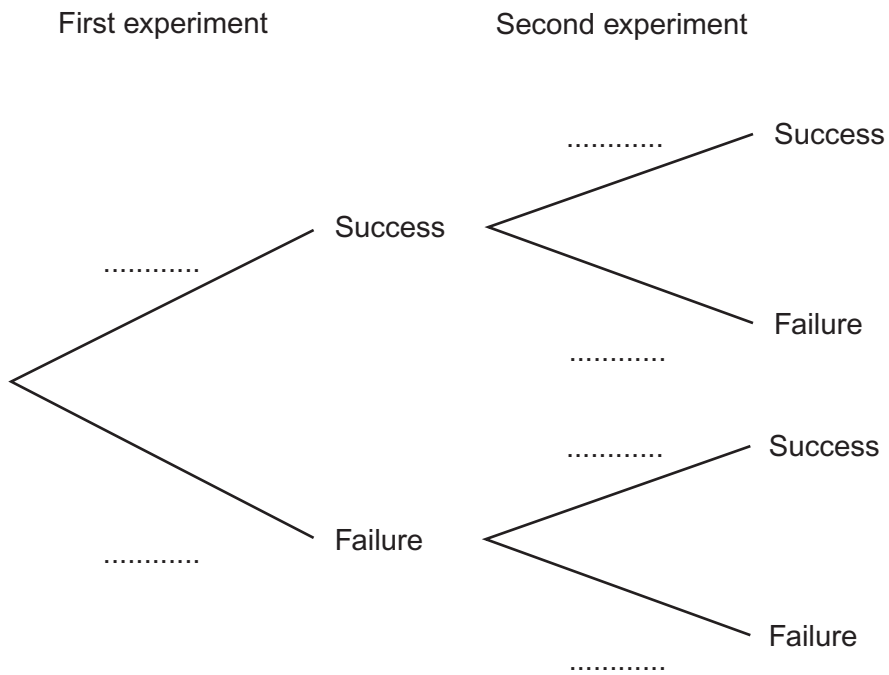
12 In a game, a player chooses a card at random from an ordinary pack of cards.

If the player chooses a spade, they lose.

If they do **not** choose a spade, they throw a fair coin.

If they throw a tail, they win.

If they throw a head, they lose.

12 (a) Complete the tree diagram to show this information.

[1 mark]

Card   **Coin**

$\frac{1}{4}$ Spade (lose)

.... Tail (win)

Not a spade

....

Head (lose)

....
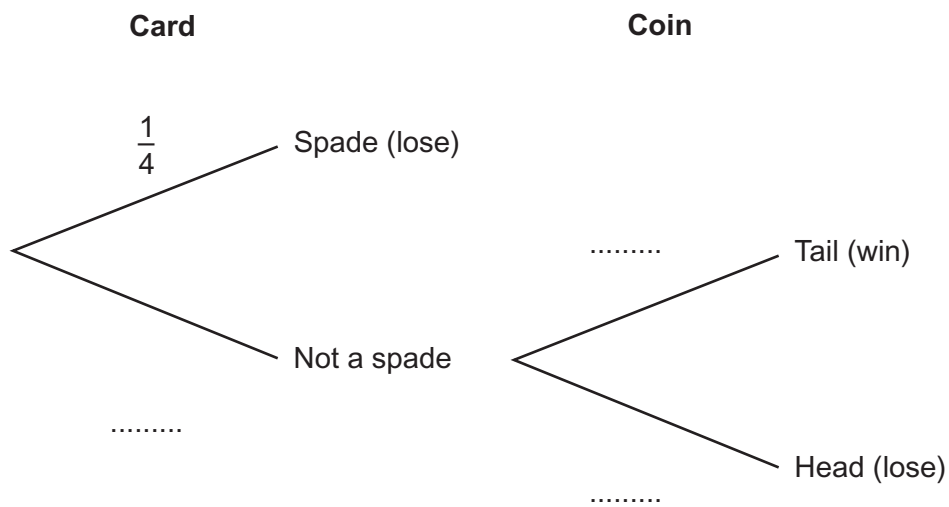
12 (b) Work out the probability that the player **loses** the game.

[3 marks]

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....

....

....

Answer ....

13 The tree diagram shows the probabilities of success and failure in two independent experiments.
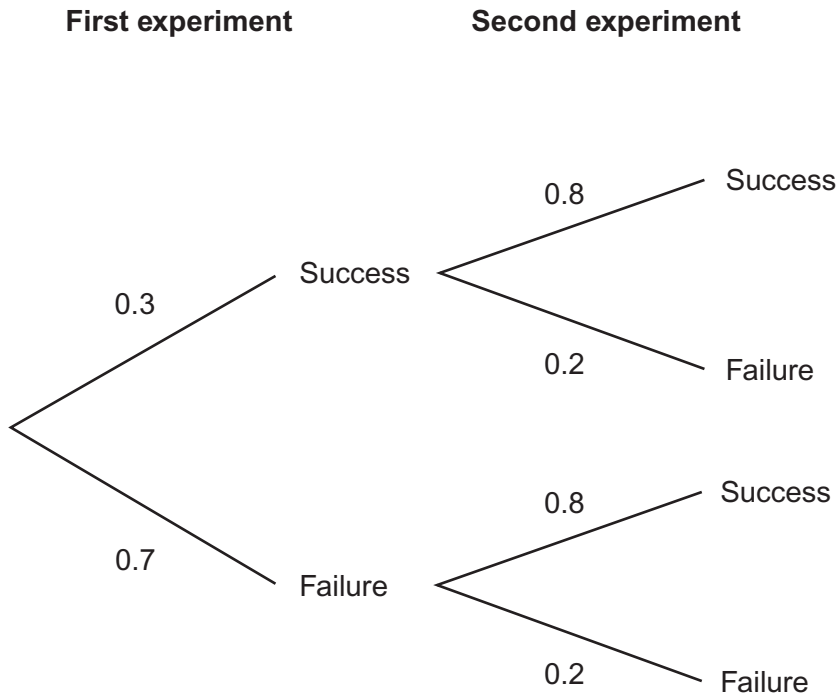
First experiment   **Second experiment**

Work out the probability of success in **exactly one** experiment.

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____

14 Some animals are **twice** as likely to have male babies as female babies.

14 (a) Explain why the probability of a male baby is $\frac{2}{3}$.

....

....

(1 mark)

14 (b) One of these animals is expecting two babies.

Complete the tree diagram to show all possible outcomes.

First baby   **Second baby**

$\frac{2}{3}$ Male

.... Male

.... Female

.... Male

.... Female

.... Female
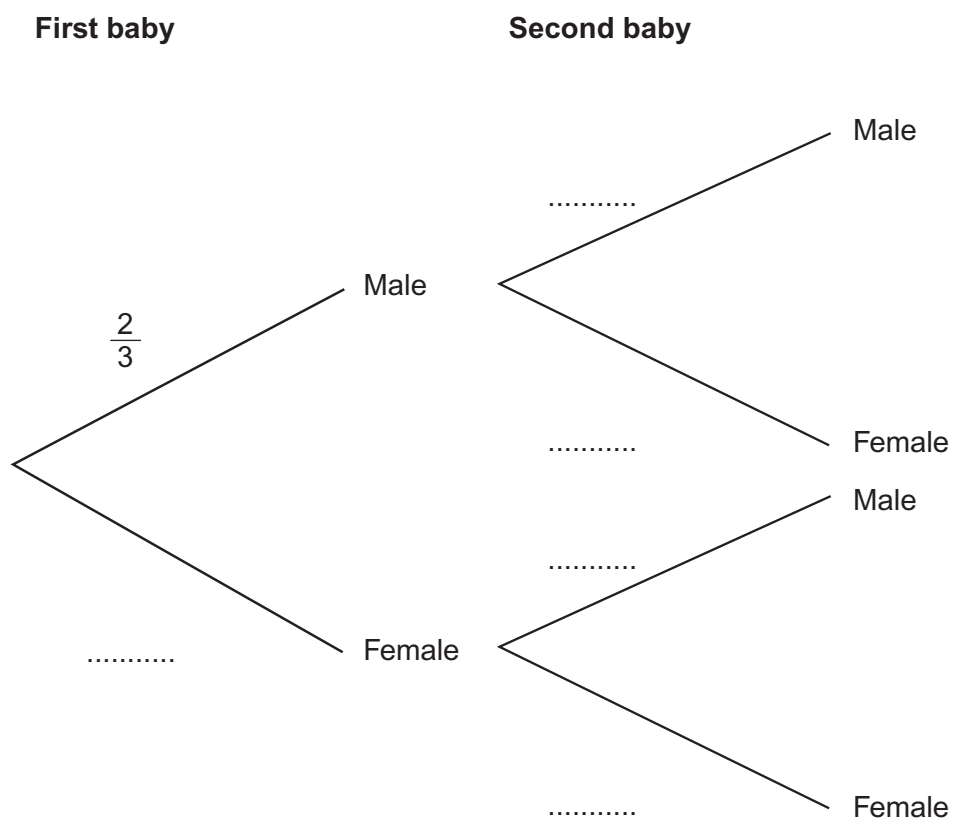
(2 marks)

14 (c)   A scientist wants to predict the likely outcomes for the babies' genders.

Which is more likely, two of the same gender or one of each?
You **must** show your working.

....

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....

....

....

....

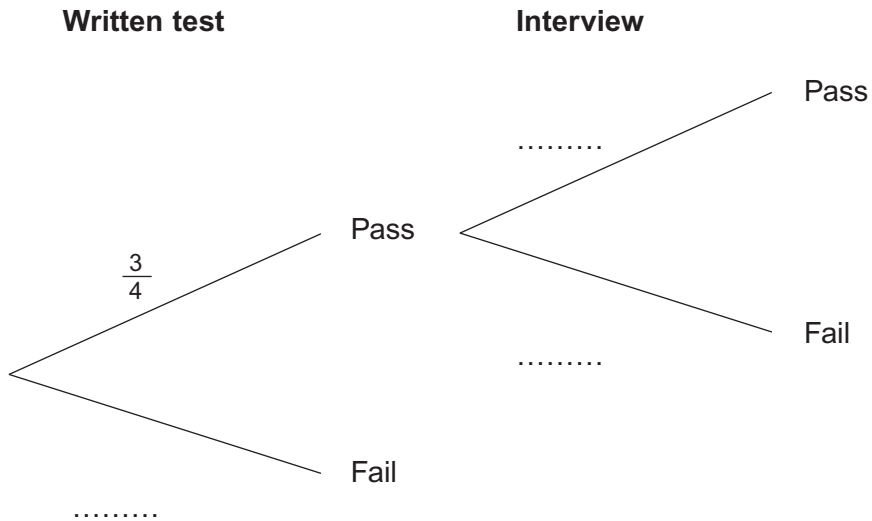Answer ....   *(4 marks)*

15   To join a club, applicants have to pass a written test and an interview.

$\frac{3}{4}$ of applicants pass the written test.

Those who pass go on to have the interview.

$\frac{5}{8}$ of applicants who have an interview are successful.

15 (a)   Complete the tree diagram to show this information.

Written test   **Interview**

(1 mark)

15 (b)   Work out the probability that an applicant, chosen at random, will fail to join the club.

....

....

....

....

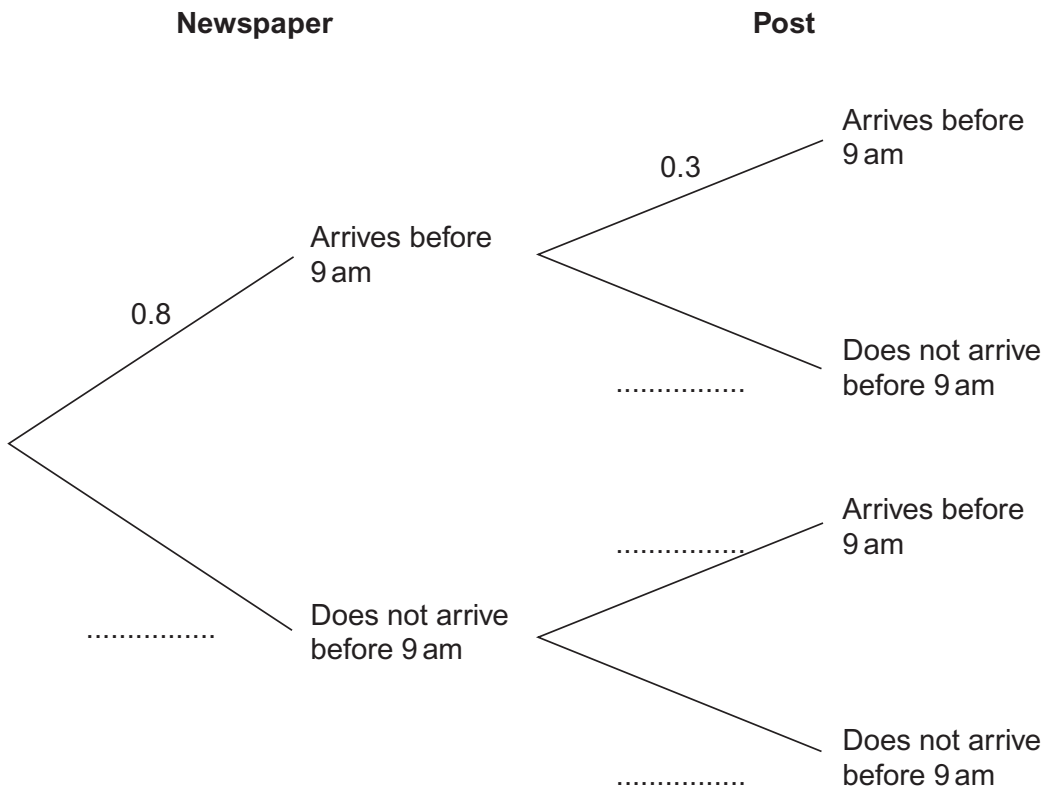Answer .... *(3 marks)*

16   The probability that Mr Smith's newspaper arrives before 9 am is 0.8
          The probability that his post arrives before 9 am is 0.3

16 (a) Complete the tree diagram to show this information.

Newspaper   **Post**

                                                      Arrives before
                                                      9 am
                                         0.3
                      Arrives before
                      9 am
          0.8   Does not arrive
                                         ....   before 9 am

                                                      Arrives before
                                         ....   9 am
          ....   Does not arrive
                      before 9 am
                                                      Does not arrive
                                         ....   before 9 am

                                                              (2 marks)

16 (b) Work out the probability that both arrive before 9 am.

          ....

                      Answer ....   *(2 marks)*

17   Bag A contains 3 red balls and 7 blue balls.

Bag B contains 8 red balls and 2 blue balls.

Bag A   **Bag B**

17 (a)   A ball is picked at random from each bag.

Complete the tree diagram to show all the probabilities.

[3 marks]

Bag A   **Bag B**

Red

....

Red

....

....

Red

....

Blue

....

Red

Blue

....

Blue

17 (b)   Work out the probability of picking a **red** ball from Bag A
and a **blue** ball from Bag B.

[2 marks]

_____

_____

_____

_____
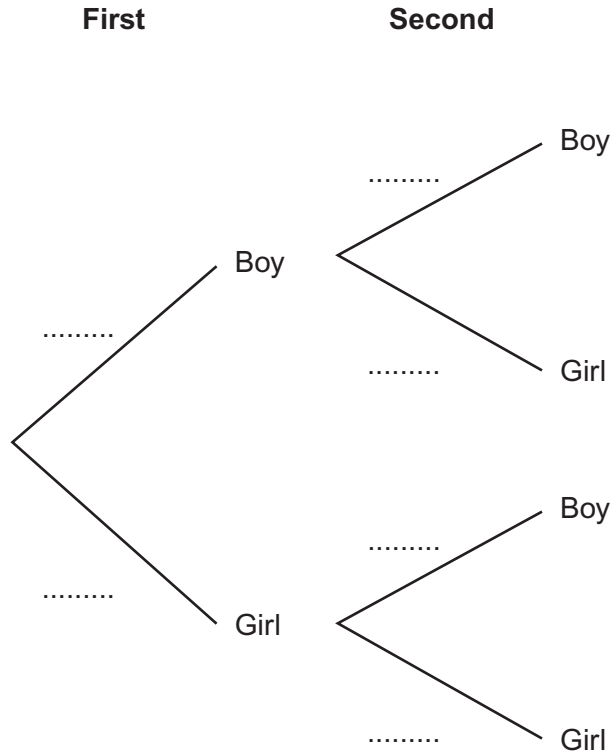
Answer   _____

18 A team has 7 boys and 3 girls.
Stevie chooses two of the team at random.

18 (a) Complete the probability tree diagram.

[3 marks]

First   Second

Boy

.... Boy

....

.... Girl

.... Girl

.... Girl

.... Boy

....

.... Girl

18 (b) Work out the probability that he chooses one boy and one girl.

[3 marks]

....

....

....

....

Answer ....