**In the style of:**

## Edexcel GCSE

# Mathematics A
## Probability Tree

**Higher Tier**

Past Paper Style Questions
Arranged by Topic

Paper Reference
**1MA0/1H**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators must not be used.**

## Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

**1.** David goes to a club.
He has one go at Darts. He
has one go at Pool.

The probability that he wins at Darts is 0.3
The probability that he wins at Pool is 0.4
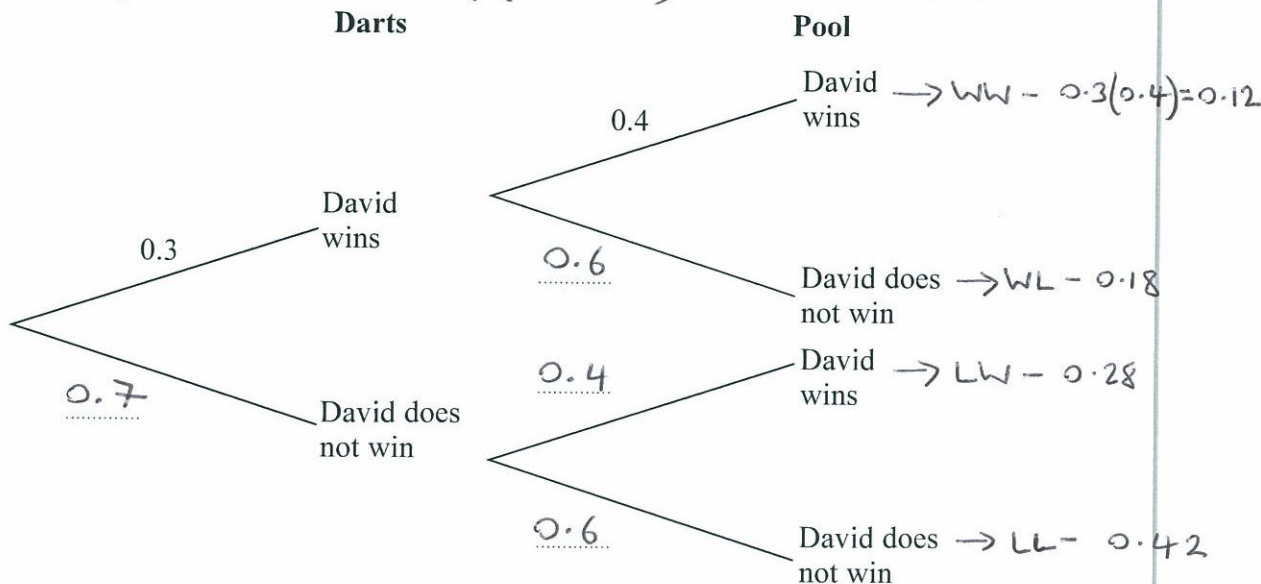
(a) Complete the probability tree diagram.

**Darts**                                    **Pool**

David wins → WW – $0.3(0.4) = 0.12$

0.4

David wins

0.3

0.6

David does not win → WL – $0.18$

0.7

David does not win

0.4

David wins → LW – $0.28$

0.6

David does not win → LL – $0.42$

(2)    $\Sigma$ : 1

(b) Work out the probability that David wins at Darts and also wins at Pool.
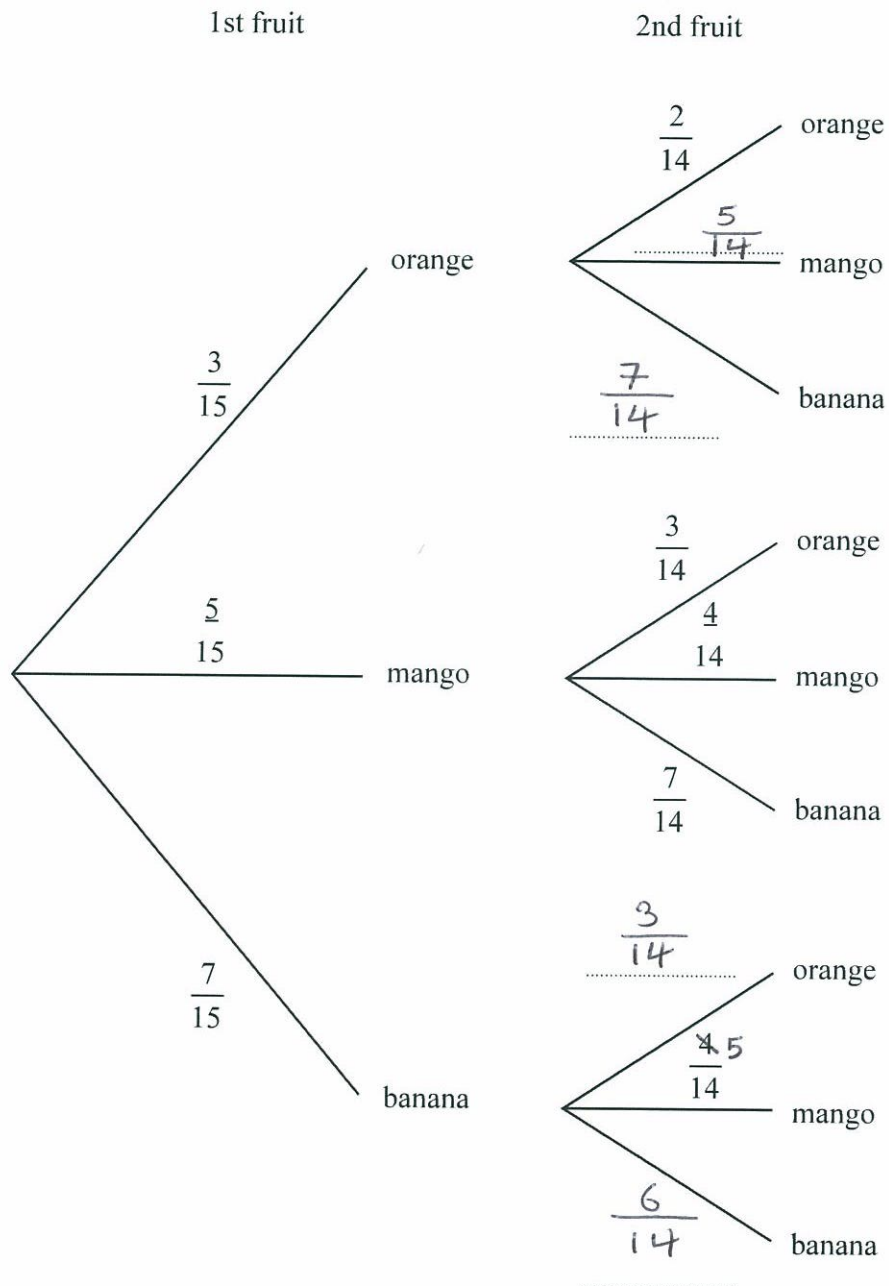
$P(WW) = P(W) \times P(W) = 0.3 \times 0.4 = 0.12$

(2)

**Total for Question 1 is 4 marks)**

**2.** A bowl contains 3 oranges, 5 mangoes and 7 bananas.

One fruit is taken, at random, from the bowl and **not** replaced. Another fruit is then taken, at random, from the bowl.

A tree diagram representing these two events is shown below.

1st fruit                                      2nd fruit

$\frac{2}{14}$ orange

$\frac{5}{14}$ mango

orange

$\frac{3}{15}$

$\frac{7}{14}$ banana

$\frac{3}{14}$ orange

$\frac{5}{15}$

$\frac{4}{14}$ mango

mango

$\frac{7}{14}$ banana

$\frac{3}{14}$ orange

$\frac{7}{15}$

$\frac{5}{14}$ mango

banana

$\frac{6}{14}$ banana

(a) Complete the tree diagram representing these two events.

**(2)**

(b) Find the probability that both fruit are bananas. Give your answer as a simplified fraction.

$P(BB) = \frac{7}{15}\left(\frac{6}{14}\right) = \frac{42}{210} = \frac{21}{105} = \frac{7}{35} = \frac{1}{5}$

**(2)**

**(Total 4 marks)**

**3.** Tara has 8 balls in a box.
5 of the balls are blue.
3 of the balls are red.

Tara takes at random a ball from the box and writes down its colour.
Tara puts the ball back in the box.

Then Tara takes at random a second ball from the box, and writes down its colour.

(a) Complete the probability tree diagram.

First ball

Second ball

$\frac{5}{8}$

Blue

$\frac{5}{8}$

$\frac{3}{8}$

Blue

Red $\qquad \frac{15}{64}$

$\frac{3}{8}$

Red

$\frac{5}{8}$

$\frac{3}{8}$

Blue $\qquad \frac{15}{64}$

Red

**(2)**

(b) Work out the probability that Tara takes exactly one ball of each colour from the box.

$$P\left(BR \ \underline{OR} \ RB\right) = \frac{5}{8}\left(\frac{3}{8}\right) + \frac{3}{8}\left(\frac{5}{8}\right)$$

$$= \frac{15}{64} + \frac{15}{64} = \frac{30}{64} = \frac{15}{32}$$

$\frac{15}{32}$
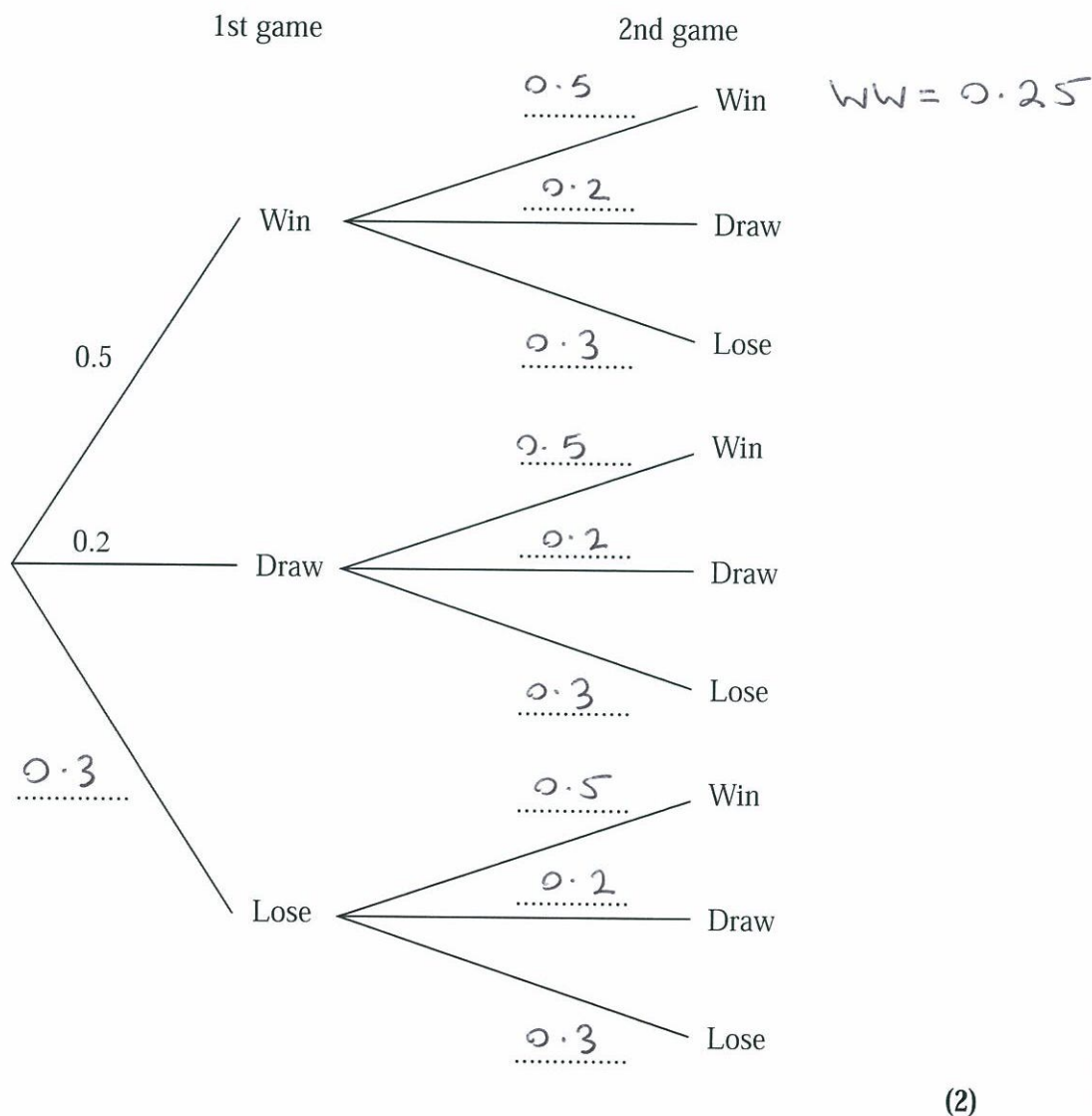..............................

**(3)**

**(Total 5 marks)**

**4.** In a game of chess, a player can either win, draw or lose.

The probability that Sophie wins any game of chess is 0.5

The probability that Sophie draws any game of chess is 0.2

Sophie plays 2 games of chess.

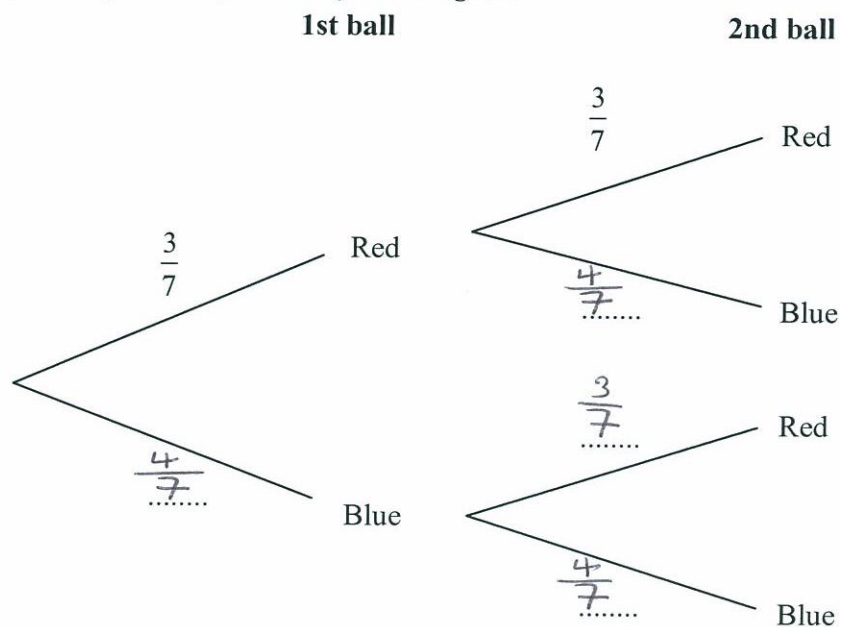(a)  Complete the probability tree diagram.

1st game                          2nd game

Win

0.5 ............... Win          WW = 0.25

0.2 ............... Draw

0.3 ............... Lose

0.5

0.2

Draw

0.5 ............... Win

0.2 ............... Draw

0.3 ............... Lose

0.3 ...............

Lose

0.5 ............... Win

0.2 ............... Draw

0.3 ............... Lose

(2)

(b)  Work out the probability that Sophie will win both games.

$P(WW) = 0.5 \times 0.5 = 0.25$

.................................

(2)

**(Total 4 marks)**

**5.** Louis puts 3 red balls and 4 blue balls in a bag.
He takes at random a ball from the bag.
He writes down the colour of the ball.
He puts the ball in the bag again.
He then takes at random a second ball from the bag.

(a) Complete the probability tree diagram.

**1st ball**                                        **2nd ball**

$$\frac{3}{7}$$ — Red

$$\frac{3}{7}$$ — Red

$$\frac{4}{7}$$ — Blue

$$\frac{4}{7}$$ — Blue

$$\frac{3}{7}$$ — Red

$$\frac{4}{7}$$ — Blue

(2)

(b) Work out the probability that Louis takes two red balls.

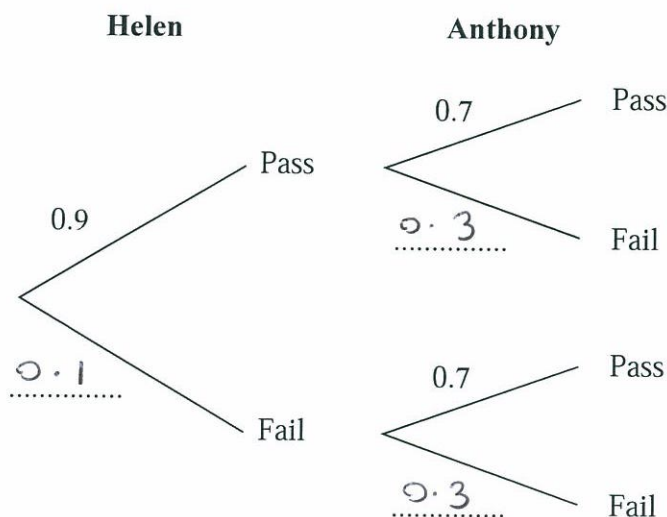$$P(RR) = \frac{3}{7} \times \frac{3}{7} = \frac{9}{49}$$

$$\frac{9}{49}$$

(2)

**(Total 4 marks)**

**6.** Helen and Anthony each take a medical.

The probability that Helen will pass the medical is 0.9 The

probability that Anthony will pass the medical is 0.7

(a) Complete the probability tree diagram.

**Helen**          **Anthony**

```
                           0.7        Pass
                    Pass <
         0.9              0. 3        Fail

         0.1              0.7         Pass
                    Fail <
                          0.3         Fail
```

(2)

(b) Work out the probability that both Helen and Anthony will pass the medical.

P( Pass AND Pass ) = 0.9 × 0.7 = 0.63

0.63

(2)

(c) Work out the probability that only one of them will pass the medical.

P(1 pass only) = P(PF or FP)

= 0.9(0.3) + 0.1(0.7)

= 0.27 + 0.07

= 0.34

0.34

(3)

**(Total 7 marks)**

**7.** There are 3 red sweets, 2 purple sweets and 5 orange sweets in a bag.

Georgina takes a sweet at random.
She eats the sweet.
She then takes another sweet at random.

Work out the probability that both the sweets are the same colour.

$$P\left(\text{same colour}\right) = P\left(RR \text{ OR } PP \text{ OR } OO\right)$$

$$= \frac{3}{10}\left(\frac{2}{9}\right) + \frac{2}{10}\left(\frac{1}{9}\right) + \frac{5}{10}\left(\frac{4}{9}\right)$$

$$= \frac{6}{90} + \frac{2}{90} + \frac{20}{90}$$

$$= \frac{28}{90} = \frac{14}{45}$$

$\dfrac{14}{45}$

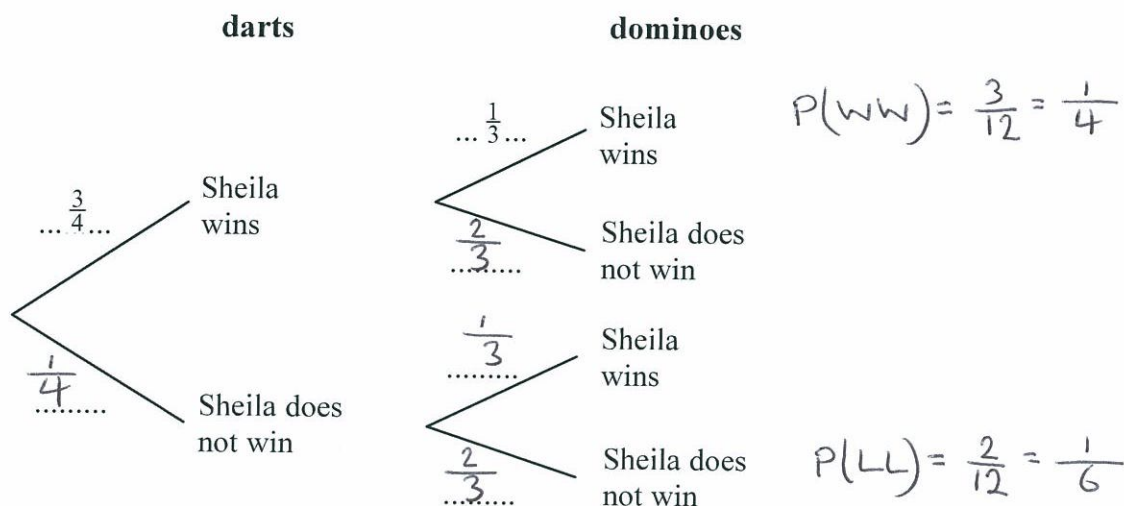...............................

**(Total 4 marks)**

**8.** Sheila is going to play one game of darts and one game of dominoes.

The probability that she will win the game of darts is $\frac{3}{4}$

The probability that she will win the game of dominoes $\frac{1}{3}$

is (a) Complete the probability tree diagram.

**darts**          **dominoes**

$\dots\frac{1}{3}\dots$ Sheila wins

$\frac{3}{4}$ Sheila wins

$\frac{2}{3}$ Sheila does not win

$P(WW) = \frac{3}{12} = \frac{1}{4}$

$\frac{1}{4}$ Sheila does not win

$\frac{1}{3}$ Sheila wins

$\frac{2}{3}$ Sheila does not win

$P(LL) = \frac{2}{12} = \frac{1}{6}$

**(2)**

(b) Work out the probability that Sheila will win **exactly** one game.

$P(\text{exactly 1 win}) = P(WL \text{ OR } LW)$

$= \frac{3}{4}\left(\frac{2}{3}\right) + \frac{1}{4}\left(\frac{1}{3}\right)$

$= \frac{6}{12} + \frac{1}{12} = \frac{7}{12}$

$\dfrac{7}{12}$

**(3)**

Sheila played one game of darts and one game of dominoes on a number of Fridays.
She won at **both** darts and dominoes on 21 Fridays.

(c) Work out an estimate for the number of Fridays on which Sheila did not win either game.

Let $E(E)$ = Expected Frequency of Event, $P(E)$ = Probability of Event
and $n$ = total no. of trials or attempts.

$E(E) = P(E) \times n$

$\Rightarrow E(WW) = P(WW) \times n$

$\Rightarrow 21 = \frac{1}{4} \times n$

$\Rightarrow n = \frac{21}{1/4} = 84.$

$E(LL) = P(LL) \times n$

$= \frac{1}{6} \times 84$

$= \frac{84}{6} = \frac{42}{3} = 14$

$\underline{14}$

**(3)**

**(Total 8 marks)**

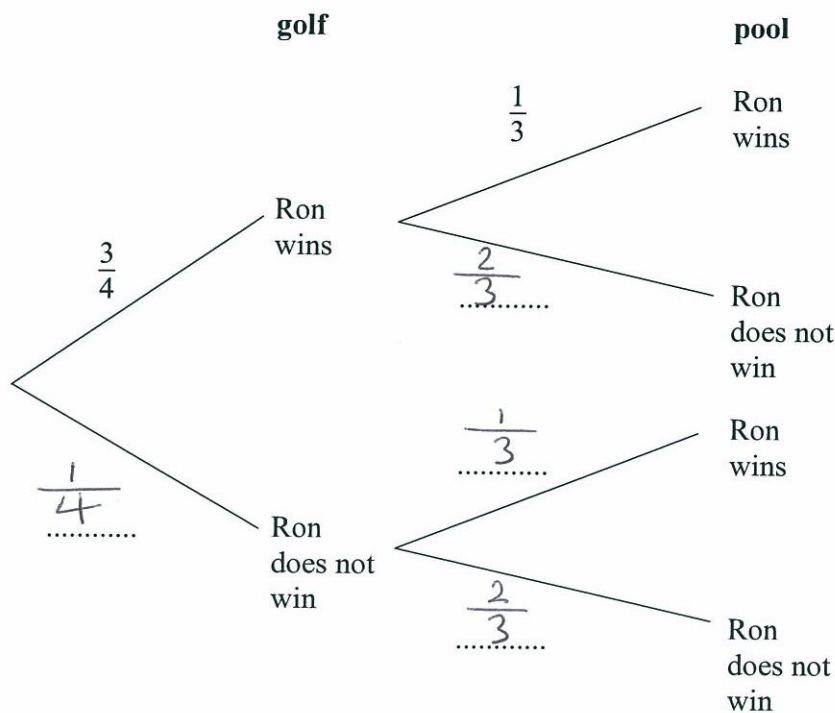ALSO, $P(WW) : P(LL) = E(WW) : E(LL)$

$\Rightarrow \frac{1}{4} : \frac{1}{6} = 21 : E(LL)$

$\Rightarrow \frac{1/6}{1/4} = \frac{E(LL)}{21} \Rightarrow \frac{2}{3} = \frac{E(LL)}{21} \Rightarrow 42 = 3 E(LL)$

$\Rightarrow E(LL) = \frac{42}{3} = 14$

**9.** Ron plays one game of golf and one game of pool.

The probability that Ron will win at golf is $\frac{3}{4}$   The

probability that Ron will win at pool is $\frac{1}{3}$

(a)  Complete the probability tree diagram below.

**golf**                                    **pool**

$$\frac{1}{3}$$   Ron wins

Ron wins

$$\frac{3}{4}$$

$$\frac{2}{3}$$   Ron does not win

$$\frac{1}{3}$$   Ron wins

$$\frac{1}{4}$$

Ron does not win

$$\frac{2}{3}$$   Ron does not win

**(2)**

(b)  Work out the probability that Ron wins both games.

$$P(WW) = \frac{3}{4} \times \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$$

$$\frac{1}{4}$$

**(2)**

(c)  Work out the probability that Ron will win only one game.

$$P(\text{exactly } 1 \text{ win}) = P(WL \text{ OR } LW)$$

$$= \frac{3}{4}\left(\frac{2}{3}\right) + \frac{1}{4}\left(\frac{1}{3}\right)$$

$$= \frac{6}{12} + \frac{1}{12} = \frac{7}{12}$$

$$\frac{7}{12}$$

**(3)**

**(Total 7 marks)**