Name: _____

GCSE (1 – 9)

Conditional Probability

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

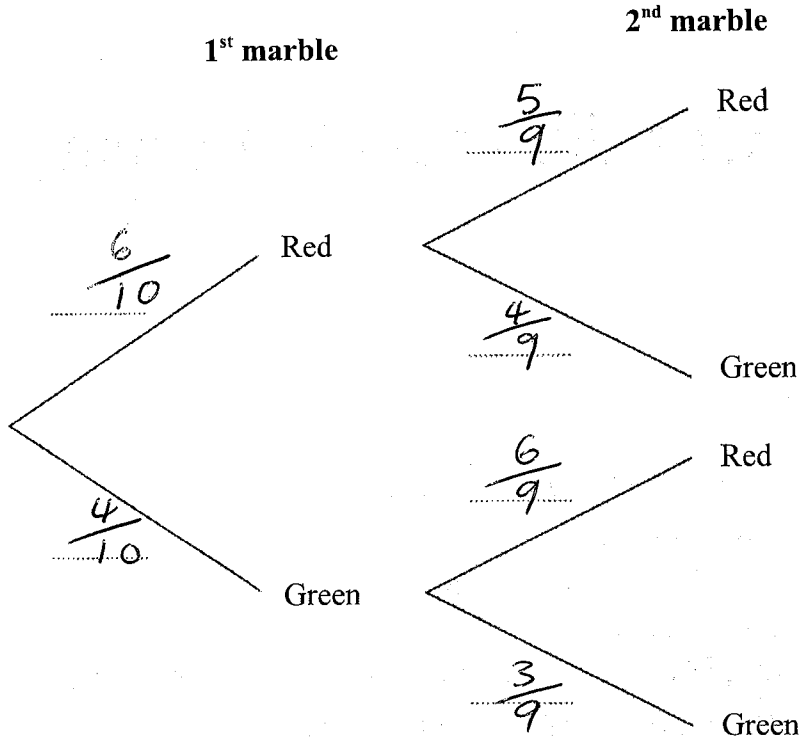
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 There are only red marbles and green marbles in a bag.
There are 6 red marbles and 4 green marbles.

Mason takes at random a marble from the bag.
He does not put the marble back in the bag.

Mason takes at random a second marble from the bag.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Mason takes two marbles the same colour.

$P(\text{Red, Red}) = \frac{6}{10} \times \frac{5}{9} = \frac{30}{90}$

$P(\text{Green, Green}) = \frac{4}{10} \times \frac{3}{9} = \frac{12}{90}$

$\frac{30}{90} + \frac{12}{90} = \frac{42}{90}$

$\frac{42}{90}$

(2)

(Total for Question 1 is 4 marks)

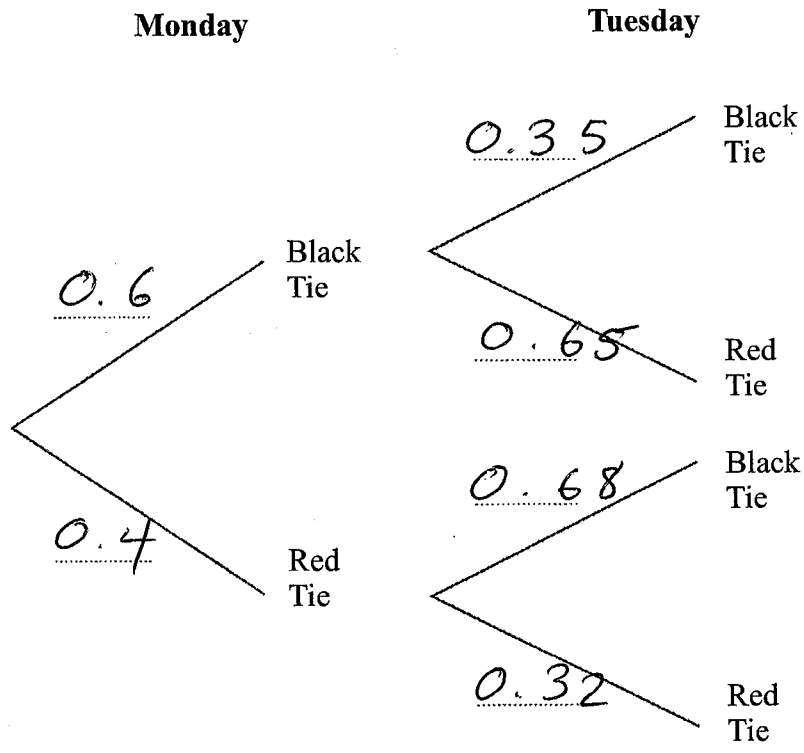
[OR $\frac{7}{15}$]

2 Each day Paul wears either a black tie or a red tie to work.

On Monday the probability he wears a black tie is 0.6

If Paul wears a black tie on Monday, the probability that he will wear a black tie on Tuesday is 0.35
If he does **not** wear a black tie on Monday, the probability that he will wear a black tie on Tuesday is 0.68

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability Paul wears different coloured ties on Monday and Tuesday .

P(Black, Red) = 0.6 × 0.65 = 0.39

P(Red, Black) = 0.4 × 0.68 = 0.272

0.39 + 0.272 = 0.662 0.662

(3)

(Total for Question 2 is 5 marks)

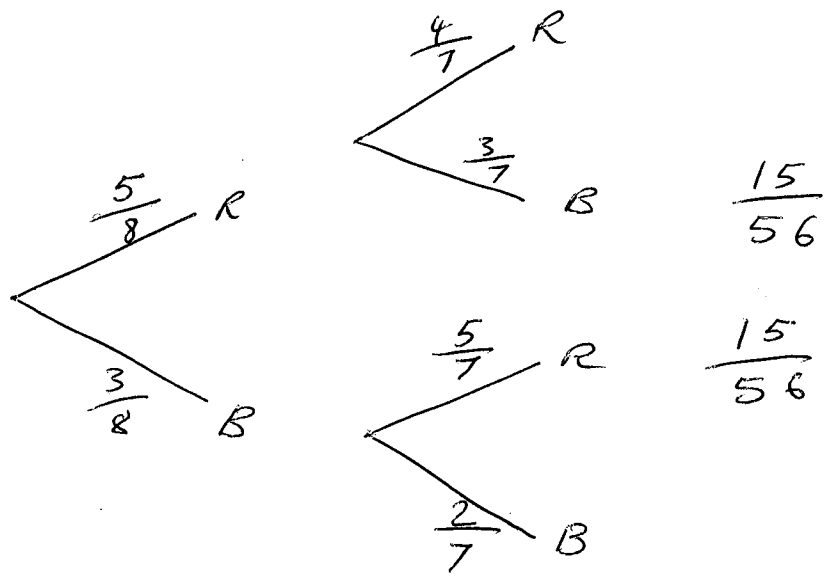
[331/500]

3 There are 8 counters in a bag.

5 of the counters are red.
3 of the counters are blue.

Two counters are taken at random from the bag.

Work out the probability that one counter of each colour are taken.
You must show your working.



$\frac{15}{56} + \frac{15}{56} = \frac{30}{56}$

$\frac{30}{56}$

(Total for Question 3 is 4 marks)

[OR $\frac{15}{28}$]

4 There are 10 counters in a bag.

5 of the counters are red.
3 of the counters are blue.
2 of the counters are green.

Billie takes two counters are taken at random from the bag.

Work out the probability that both of the counters Billie takes are the same colour.
You must show your working.

$$P(\text{Red, Red}) = \frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$$

$$P(\text{Blue, Blue}) = \frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$$

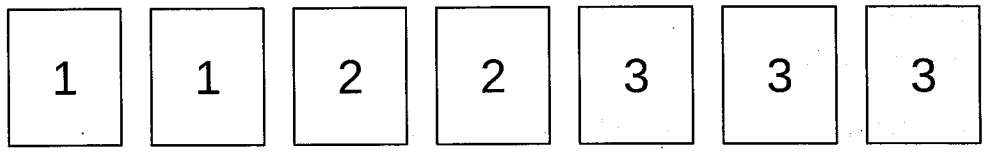
$$P(\text{Green, Green}) = \frac{2}{10} \times \frac{1}{9} = \frac{2}{90}$$

$$\frac{20}{90} + \frac{6}{90} + \frac{2}{90} = \frac{28}{90}$$

$\frac{28}{90}$ (or $\frac{14}{45}$)

(Total for Question 4 is 4 marks)

5 Here are seven number cards.



Helen takes a card at random.
She does not replace the card.

Helen then takes another card at random.

(a) Calculate the probability that both cards have the same number on them.

$P(1,1) = \frac{2}{7} \times \frac{1}{6} = \frac{2}{42}$

$P(2,2) = \frac{2}{7} \times \frac{1}{6} = \frac{2}{42}$

$P(3,3) = \frac{3}{7} \times \frac{2}{6} = \frac{6}{42}$

$\frac{2}{42} + \frac{2}{42} + \frac{6}{42} = \frac{10}{42}$

$\frac{10}{42}$ (or $\frac{5}{21}$) **(3)**

(b) Calculate the probability that the number on the second card Helen takes is greater than the number on the first card she takes.

$P(1,2) = \frac{2}{7} \times \frac{2}{6} = \frac{4}{42}$

$P(1,3) = \frac{2}{7} \times \frac{3}{6} = \frac{6}{42}$

$P(2,3) = \frac{2}{7} \times \frac{3}{6} = \frac{6}{42}$

$\frac{4}{42} + \frac{6}{42} + \frac{6}{42} = \frac{16}{42}$

$\frac{16}{42}$ (or $\frac{8}{21}$)

(3)

(Total for Question 5 is 6 marks)

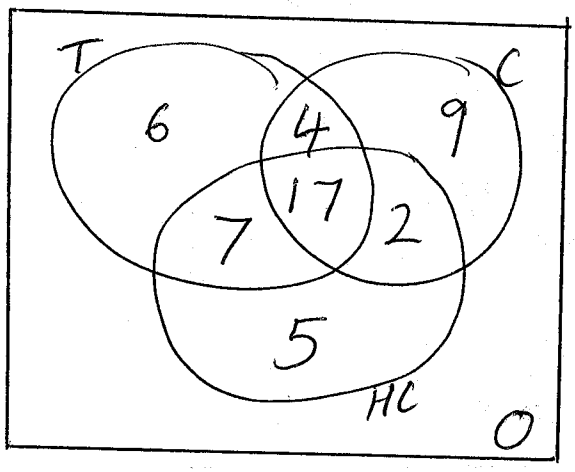
6 50 people were asked if they like tea, coffee and hot chocolate.

Every person liked at least one of the drinks.
17 of the people like all three drinks.

31 of the people like hot chocolate
34 of the people like tea.
21 of the people like tea and coffee.

7 of the people like tea and hot chocolate but not coffee
2 of the people like coffee and hot chocolate but not tea

Two of the 50 people are chosen at random.
Work out the probability that they both like coffee.



32 like coffee

$\frac{32}{50} \times \frac{31}{49} = \frac{496}{1225}$

$\frac{496}{1225}$

(Total for Question 6 is 5 marks)

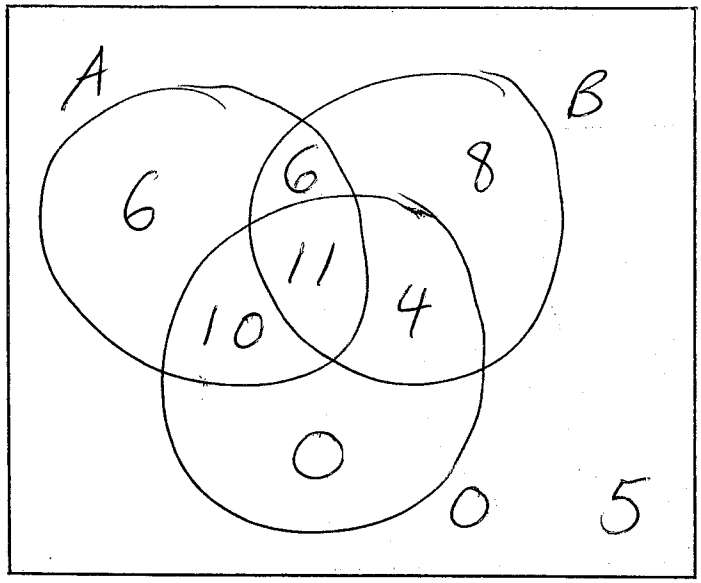
OR 0.405

OR $\frac{992}{2450}$

7 **50** people were asked which fruits they liked from apples, bananas and oranges.

11 people like all three fruits.
33 people like apples.
6 like apples and bananas but not oranges.
15 like bananas and oranges.
5 of the people do not like any of the fruits.
All 25 people who like oranges like at least one other fruit.

Two of the 50 people are chosen at random.
Work out the probability that they both like bananas.



29
~~34~~ like bananas

$$\frac{\overset{29}{\cancel{34}}}{50} \times \frac{\overset{28}{\cancel{33}}}{49} = \frac{561}{1225}$$

$$\begin{array}{r} 58 \\ 175 \overline{)561} \\ \cancel{1225} \end{array}$$

(Total for Question 7 is 5 marks)

OR ~~0.458~~ 0.331

OR $\frac{\cancel{1122}812}{2450}$

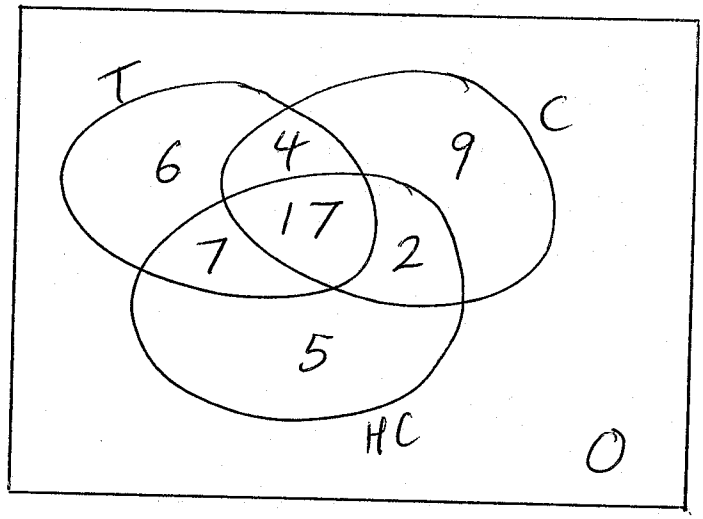
6 50 people were asked if they like tea, coffee and hot chocolate.

Every person liked at least one of the drinks.
17 of the people like all three drinks.

31 of the people like hot chocolate
34 of the people like tea.
21 of the people like tea and coffee.

7 of the people like tea and hot chocolate but not coffee
2 of the people like coffee and hot chocolate but not tea

Two of the 50 people are chosen at random.
Work out the probability that they both like coffee.



32 like coffee

$\frac{32}{50} \times \frac{31}{49} = \frac{496}{1225}$

$\frac{496}{1225}$

(Total for Question 6 is 5 marks)

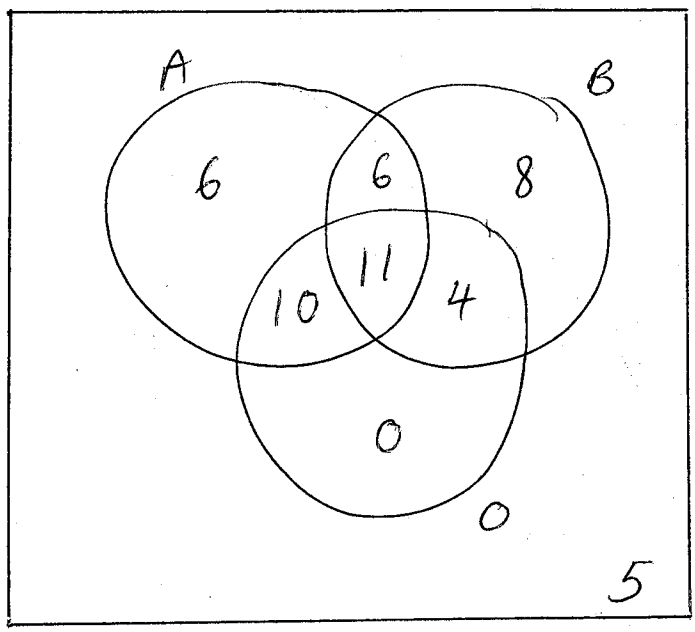
or $\frac{992}{2450}$

or 0.405

7 50 people were asked which fruits they liked from apples, bananas and oranges.

11 people like all three fruits.
33 people like apples.
6 like apples and bananas but not oranges.
15 like bananas and oranges.
5 of the people do not like any of the fruits.
All 25 people who like oranges like at least one other fruit.

Two of the 50 people are chosen at random.
Work out the probability that they both like bananas.



29 like bananas

$\frac{29}{50} \times \frac{28}{49} = \frac{\cancel{5}\cancel{6}1}{\cancel{1}\cancel{2}25} = \frac{58}{175}$

$\frac{58}{175}$

(Total for Question 7 is 5 marks)

OR $\frac{812}{2450}$

OR 0.331