

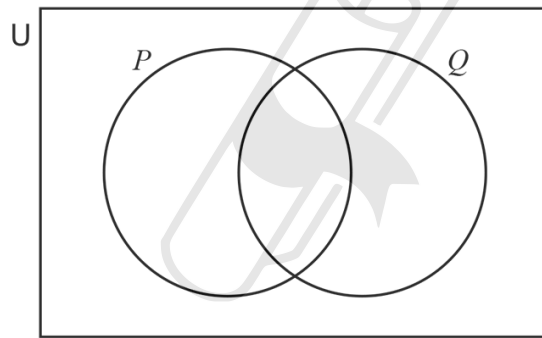
# Chapter 10

## Probability

01. 0607\_m24\_qp\_42 Q: 6

- (a)  $U = \{\text{integers from 1 to 15}\}$   
 $P = \{\text{factors of 12}\}$   
 $Q = \{\text{multiples of 3}\}$

(i) Complete the Venn diagram.



[2]

(ii) Write down the elements of  $P \cap Q$ .

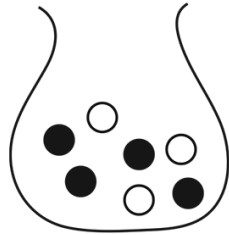
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..... [1]

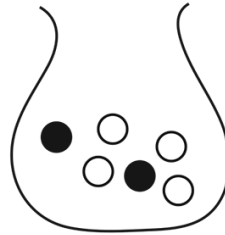
(iii) Find  $n((P' \cap Q) \cup (P \cap Q'))$ .

..... [1]

(b)



Bag *A*



Bag *B*

Bag *A* contains 4 black balls and 3 white balls.  
 Bag *B* contains 2 black balls and 4 white balls.

- (i) Amy picks a ball at random from bag *A*.  
 She notes the colour of the ball and replaces it in bag *A*.

Find the probability that Amy's ball is black.

..... [1]

- (ii) Basma picks two balls at random from bag *B*.  
 She notes the colour of each ball and replaces them in bag *B*.

Find the probability that both balls are white.

..... [2]

- (iii) Basma chooses one bag at random.  
 She picks one ball at random from this bag.

Find the probability that the ball is white.

..... [3]

02. 0607\_s24\_qp\_41 Q: 7

- (a)** Spinner A and spinner B are each fair 5-sided spinners.  
Spinner A is numbered 1, 2, 2, 3, 4.  
Spinner B is numbered 1, 2, 3, 4, 4.

The two spinners are each spun once and the number on each spinner is recorded.

Find the probability that

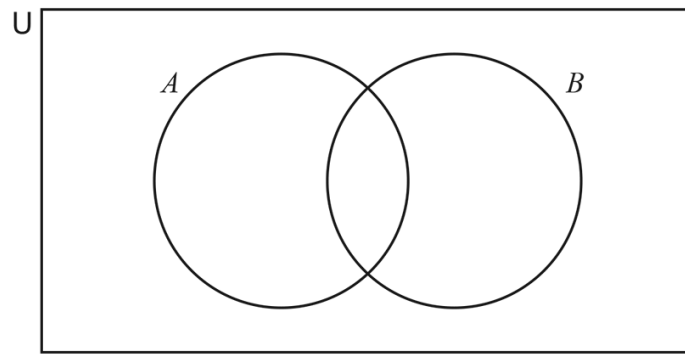
**(i)** the number on spinner A is 6  
..... [1]

**(ii)** the number on spinner B is not 4  
..... [1]

**(iii)** the number on spinner A is the same as the number on spinner B  
..... [3]

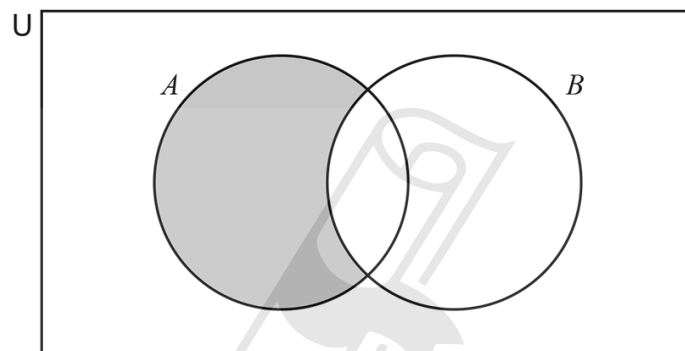
**(iv)** the sum of the two numbers is 6.  
..... [3]

(b) (i) On the Venn diagram, shade  $A \cup B$ .



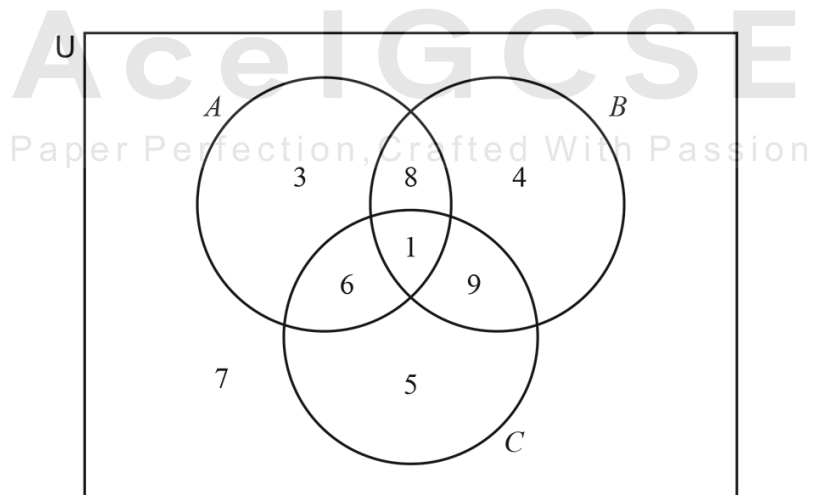
[1]

(ii) Describe the shaded region using set notation.



..... [1]

(iii) The Venn diagram below shows the number of elements in each subset.



Find  $n((A \cap B) \cap C')$ .

..... [1]

03. 0607\_s24\_qp\_42 Q: 10

A bag contains 5 red balls, 4 blue balls and 3 green balls.

(a) (i) Tina picks one ball at random, notes the colour and replaces it in the bag.

Find the probability that Tina picks a red ball.

..... [1]

(ii) Tina repeats this 60 times.

Find the number of times the ball she picks is expected to be red.

..... [1]

(b) Eli picks two balls at random without replacement.

Find the probability that

(i) both balls are blue

..... [2]

(ii) one ball is red and one ball is blue.

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(c) The balls are replaced in the bag.

Ida picks one ball at random, notes the colour and replaces it in the bag.  
She then picks another ball at random.

Find the probability that the two balls are the same colour.

..... [3]

04. 0607\_s24\_qp\_43 Q: 3

(a) Noora throws a fair 6-sided die numbered from 1 to 6.

Write down the probability that the die shows

(i) a number less than 5

..... [1]

(ii) an even number.

..... [1]

(b) Dilshan has two fair 6-sided dice each numbered from 1 to 6.  
He throws both dice.

Find the probability that

(i) both dice show a 6

..... [2]

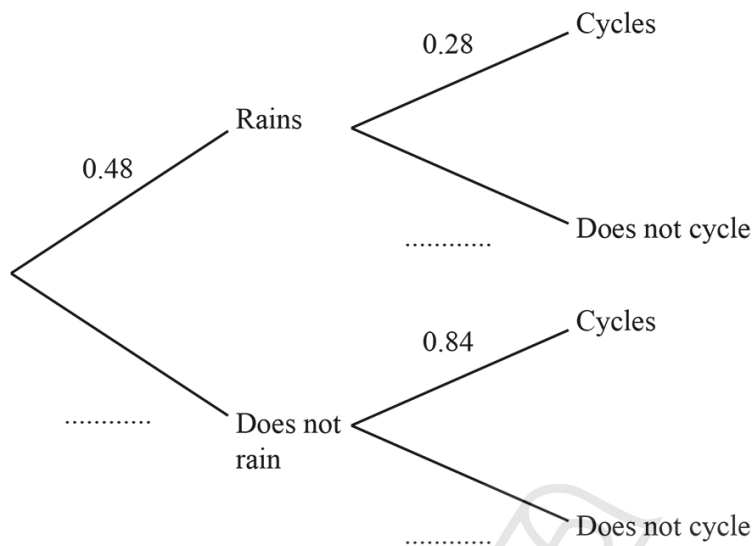
(ii) at least one die does not show a 6.

..... [1]



- (c) The probability that it rains on Wednesday is 0.48 .  
 If it rains, the probability that Hannah cycles to work is 0.28 .  
 If it does not rain, the probability that Hannah cycles to work is 0.84 .

(i) Complete this tree diagram.



[2]

(ii) Find the probability that, on Wednesday, it does not rain and Hannah cycles.

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[2]

05. 0607\_m23\_qp\_42 Q: 12

A bag contains  $x$  red balls,  $y$  blue balls and  $z$  green balls.

- (a) Paula chooses a ball at random from the bag, notes its colour and replaces it in the bag. She then chooses a ball from the bag a second time and notes its colour.

Giving your answers as unsimplified algebraic fractions, find the probability, in terms of  $x$ ,  $y$ , and  $z$ , that the two balls chosen are

- (i) both red

..... [2]

- (ii) one blue and one green.

..... [2]

- (b) All of the green balls are removed from the bag. Novak now chooses a ball at random from the bag, notes its colour and replaces it in the bag. He then chooses a ball from the bag a second time and notes its colour.

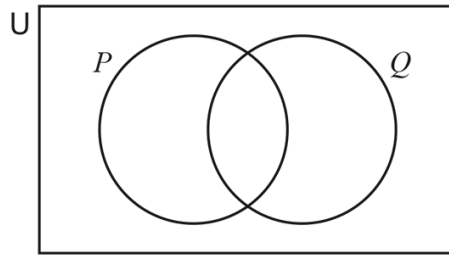
The probability that the two balls chosen are both red is  $\frac{49}{400}$ .

Find, as a fraction, the value of  $\frac{x}{y}$ .

$\frac{x}{y} =$  ..... [3]

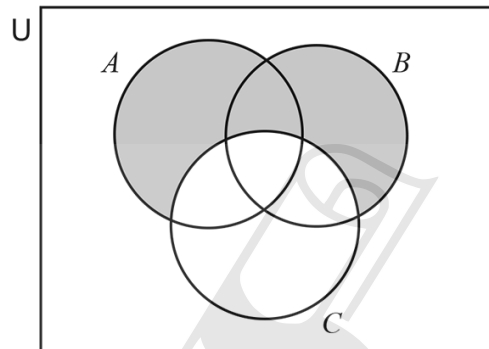


(a) (i) In the Venn diagram, shade the region  $P \cup Q'$ .



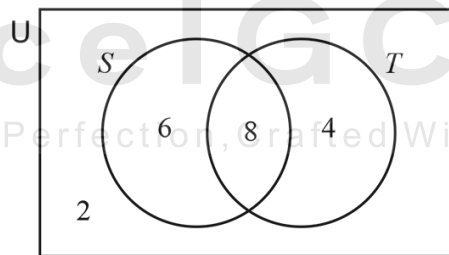
[1]

(ii) Use set notation to describe the shaded region in the Venn diagram.



..... [1]

(b) 20 students are asked if they like swimming ( $S$ ) and if they like tennis ( $T$ ). The Venn diagram shows the results.



(i) How many students like swimming or tennis but not both?

..... [1]

(ii) Find  $n(S \cup T)$ .

..... [1]

- (iii) One of the 20 students is chosen at random.

Find the probability that this student likes swimming and tennis.

..... [1]

- (iv) Two of the 20 students are chosen at random.

Find the probability that they both like tennis.

..... [2]

- (v) Two of the students who like swimming are chosen at random.

Find the probability that

- (a) they both like tennis

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- (b) one likes swimming only and one likes swimming and tennis.

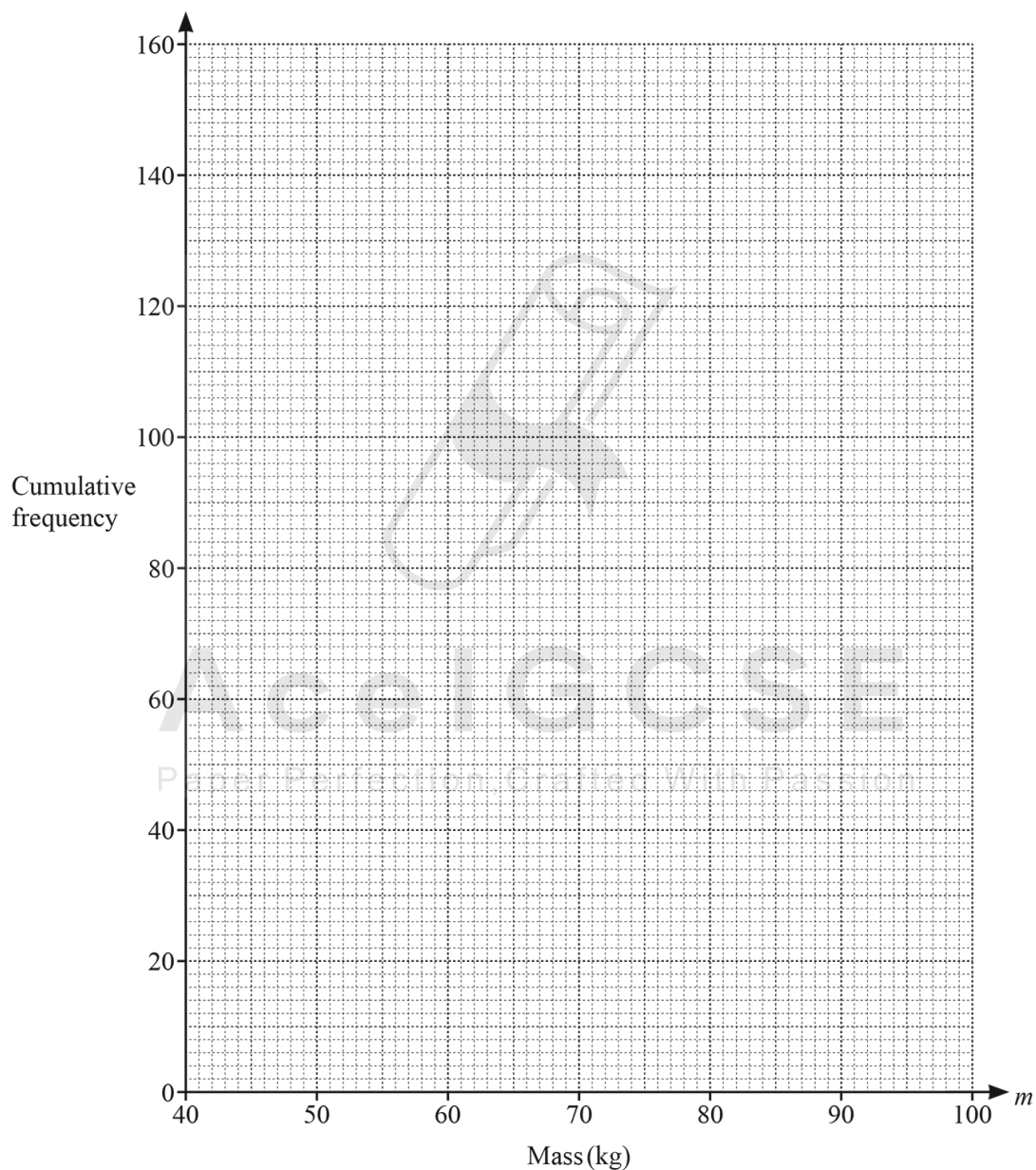
..... [3]

07. 0607\_s23\_qp\_42 Q: 4

The masses,  $m$  kg, of 160 students are recorded in the table.

Mass, $m$ kg	$40 < m \leq 50$	$50 < m \leq 60$	$60 < m \leq 70$	$70 < m \leq 80$	$80 < m \leq 90$	$90 < m \leq 100$
Frequency	6	18	66	40	18	12

(a) Draw a cumulative frequency curve for these results.



[4]

(b) Use your cumulative frequency curve to estimate

(i) the median

..... kg [1]

(ii) the interquartile range.

..... kg [2]

(c) The masses of 60% of the students lie in the range  $p \text{ kg} < m \text{ kg} \leq 80 \text{ kg}$ .

Use your cumulative frequency curve to estimate the value of  $p$ .

$p =$  ..... [3]



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Asa and Bernice have these 10 letter cards.  
A, E, I, O and U are vowels. All other letters are consonants.

- (a) Asa picks a card at random.

Write down the probability that Asa’s card shows the letter **T**.

..... [1]

- (b) Asa replaces his card.  
Bernice picks two cards at random without replacement.

Calculate the probability that both of Bernice’s cards are vowels.

..... [2]

- (c) Bernice replaces her cards.  
Asa picks 3 cards at random without replacement.

Calculate the probability that Asa’s cards can be arranged to spell the word **PEN**.



..... [3]

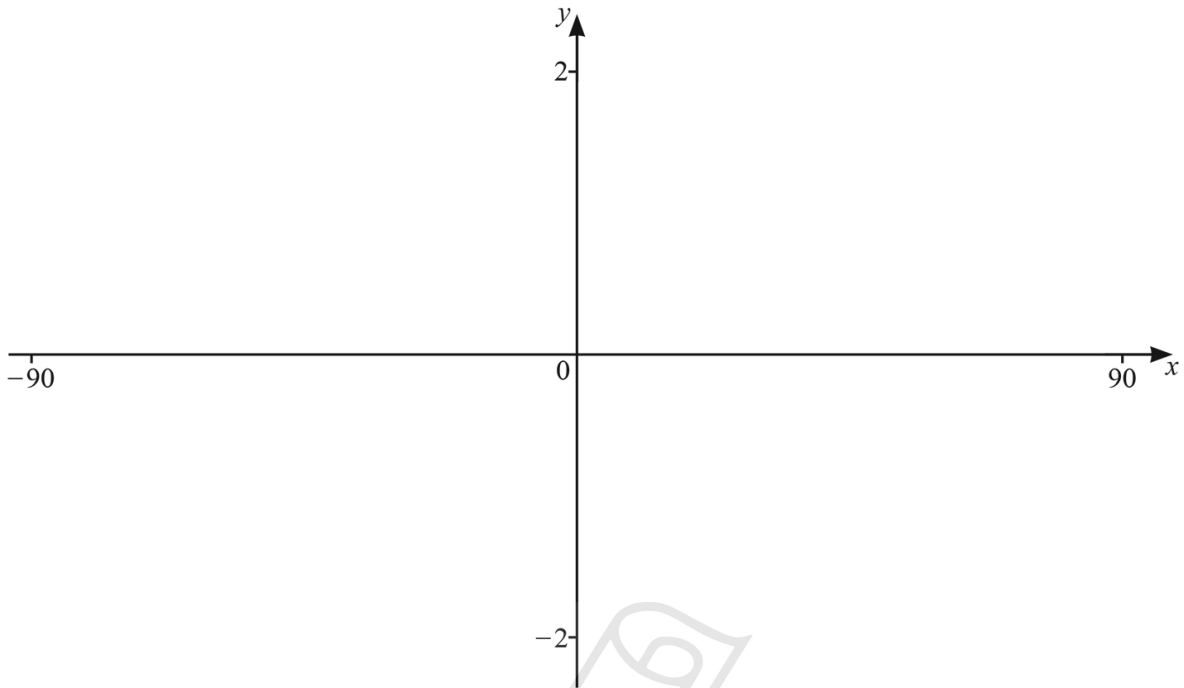
- (d) Asa replaces his cards.  
Bernice picks cards at random **with replacement** until she first gets a consonant.

The probability that she first gets a consonant on her  $n$ th pick is  $\frac{48}{3125}$ .

Find the value of  $n$ .

..... [3]

09. 0607\_s23\_qp\_43 Q: 7



$f(x) = |2 \cos(x - 45)^\circ| - 1$  for values of  $x$  between  $-90$  and  $90$ .

(a) On the diagram, sketch the graph of  $y = f(x)$ . [3]

(b) Write down the  $x$ -coordinates of the points where the curve meets the  $x$ -axis.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [2]

(c) Write down the coordinates of the local maximum point.

( $\dots\dots\dots$ ,  $\dots\dots\dots$ ) [1]

(d) The line  $y = 0.005x$  intersects the curve  $y = |2 \cos(x - 45)^\circ| - 1$  three times.

(i) Find the  $x$ -coordinates of the points of intersection.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(ii) Solve the inequality.

$|2 \cos(x - 45)^\circ| - 1 > 0.005x$

$\dots\dots\dots$  [2]

10. 0607\_s23\_qp\_43 Q: 9

There are 80 students in a school year, 44 boys and 36 girls.

Each student chooses their favourite sport.

The number of boys and the number of girls choosing each sport is shown in the table.

	Athletics	Football	Hockey	Swimming
Boys	12	16	8	8
Girls	5	3	17	11

(a) A student is chosen at random from the 80 students.

Find the probability that the student chosen is

(i) a girl whose favourite sport is athletics

..... [1]

(ii) a boy whose favourite sport is **not** football.

..... [1]

(b) One of the girls is chosen at random.

Find the probability that her favourite sport is hockey.

..... [2]

(c) Three of the boys are chosen at random.

(i) Find the probability that one of the boys chooses athletics, one of them chooses football and the other chooses swimming.

..... [1]

(ii) Calculate the probability that the three boys each have a different favourite sport.

..... [3]

11. 0607\_w23\_qp\_41 Q: 9

On any day the probability that Samira cycles to school is  $\frac{5}{6}$ .

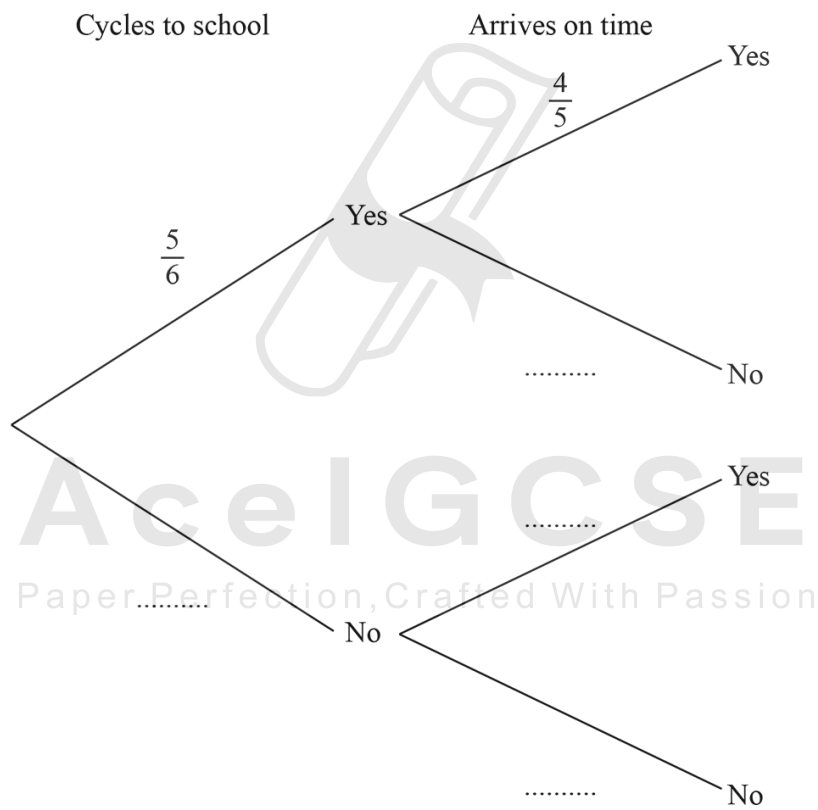
When Samira cycles to school the probability that she arrives on time is  $\frac{4}{5}$ .

When Samira does not cycle to school the probability that she arrives on time is  $\frac{2}{5}$ .

(a) Find the number of days Samira is expected to cycle to school in a school term of 54 days.

..... [1]

(b) Complete the tree diagram.



[2]

(c) Calculate the probability that on any day Samira arrives at school on time.

..... [3]

(d) In a school week of 5 days, find the probability that Samira cycles to school on exactly 1 day.



..... [3]

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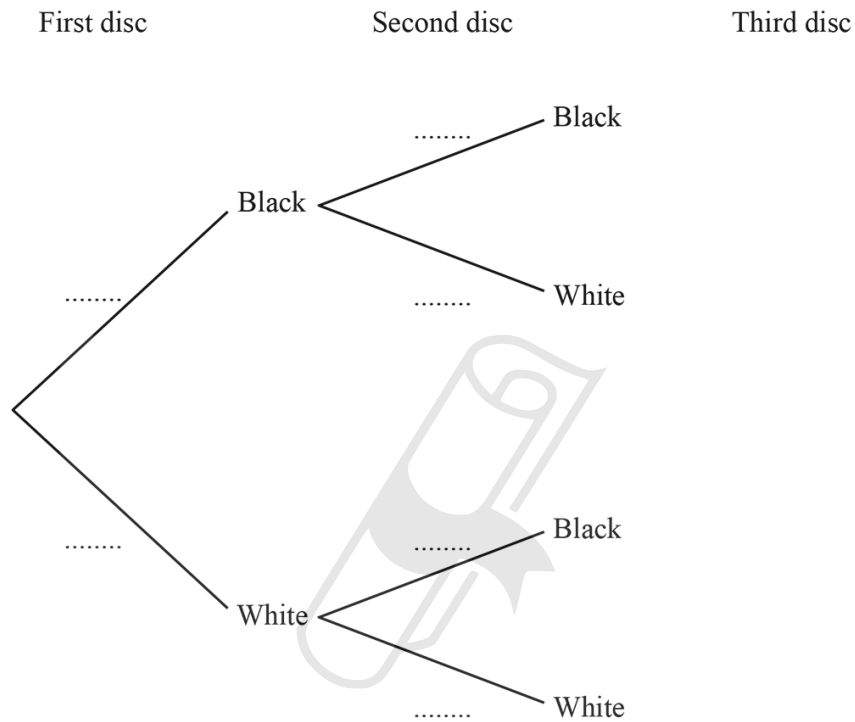
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12. 0607\_w23\_qp\_42 Q: 9

(a) A bag contains 3 black discs and 5 white discs.

Jani takes a disc from the bag at random.  
 When the disc is black, he does not replace it.  
 When the disc is white, he replaces it in the bag.  
 Jani then takes a second disc at random.

(i) Complete the tree diagram for the first and second discs.



[3]

(ii) Jani takes a third disc from the bag at random.

Find the probability that he takes 2 black discs and 1 white disc.

..... [4]

(b) Another bag contains 10 discs.  
 $x$  are red and the rest are green.

(i) Write down an expression for the number of green discs.

..... [1]

(ii)  $y$  blue discs are added to the bag.  
A disc is taken from the bag at random.

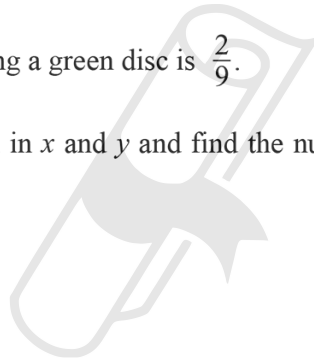
(a) The probability of taking a red disc from the bag is  $\frac{1}{3}$ .

Show that  $3x = 10 + y$ .

[1]

(b) The probability of taking a green disc is  $\frac{2}{9}$ .

Write another equation in  $x$  and  $y$  and find the number of red discs and the number of blue discs.



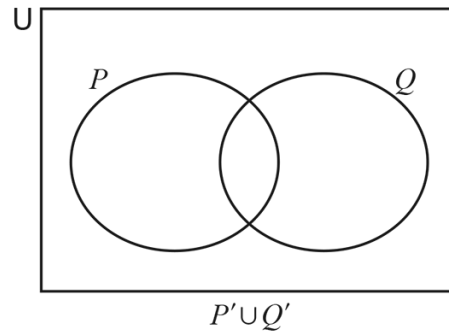
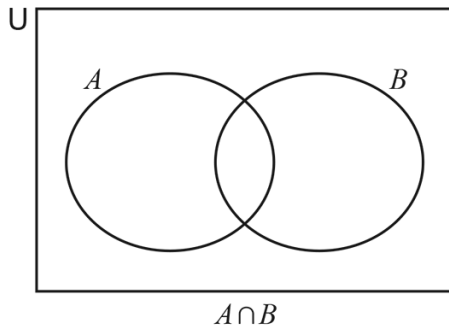
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number of red discs,  $x =$  .....

number of blue discs,  $y =$  ..... [5]

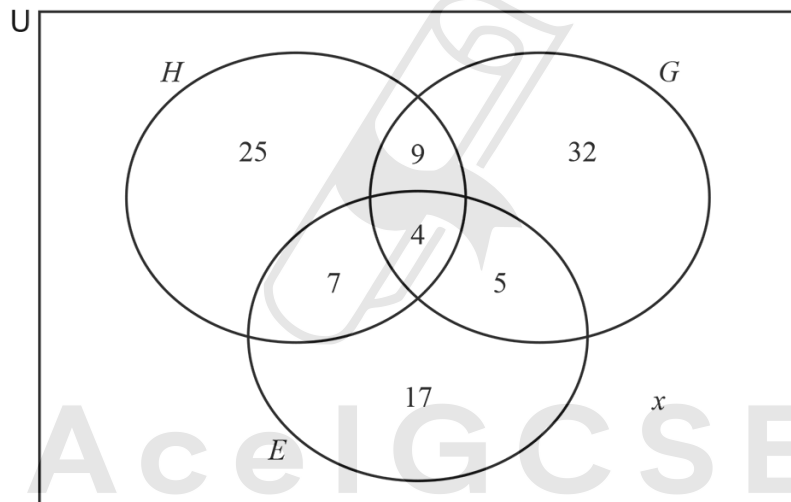
13. 0607\_w23\_qp\_43 Q: 9

(a) For each Venn diagram, shade the given set.



[2]

(b) There are 120 students in a year group.  
The Venn diagram below shows the number of students who study History ( $H$ ), Geography ( $G$ ) and Economics ( $E$ ).



(i) Find the value of  $x$ .

..... [1]

(ii) One of the 120 students is chosen at random.

Find the probability that this student studies both History and Geography.

..... [1]

(iii) Two of the students who study Economics are chosen at random.

Find the probability that one of these students also studies Geography but not History and the other student also studies History but not Geography.

..... [3]

(iv) Three of the 120 students are chosen at random.

Find the probability that two students study exactly two of the subjects and the other student studies all three subjects.



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14. 0607\_s21\_qp\_41 Q: 8

Spinner A is numbered 2, 3, 4, 5, 6, 7.

Spinner B is numbered 2, 3, 4, 5.

Each spinner is equally likely to stop on any of its numbers.

The two spinners are each spun once and the number that each spinner stops on is recorded.

Find the probability that

(a) spinner A stops on a number less than 4,

..... [1]

(b) spinner B stops on 6,

..... [1]

(c) spinner A and spinner B both stop on the same number,



..... [2]

(d) one number is prime and one number is not prime,

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..... [3]

(e) the sum of the numbers is a multiple of 3.

..... [2]

15. 0607\_s21\_qp\_43 Q: 10

- (a) Kris can go to school by bus or by taxi.  
On any day the probability that Kris goes by bus is 0.9 .

When Kris goes by bus, the probability that she is late for school is 0.06 .  
When she goes by taxi, the probability that she is late for school is 0.01 .

- (i) Find the probability that, on any day, Kris is late for school.

..... [3]

- (ii) Find the probability that, on any day, Kris is not late for school.

..... [1]

- (iii) In one year, Kris attends school on 200 days.

Find the number of days Kris is expected not to be late.

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- (b) Alex also goes to school by bus or by taxi.  
The probability that Alex goes by bus is 0.8 .

The probability that Alex goes by bus **and** is late is 0.12 .

Find the probability that Alex is late when he goes by bus.

..... [2]

16. 0607\_w21\_qp\_43 Q: 13

Two bags each contain only blue balls and red balls.  
Bag 1 contains 7 blue balls and 3 red balls.  
Bag 2 contains 3 blue balls and 7 red balls.

Maria chooses a ball at random from Bag 1 and puts it into Bag 2.

(a) Find the probability that the ball chosen is blue.

..... [1]

(b) Maria now chooses a ball at random from Bag 2 and puts it into Bag 1.

(i) Find the probability that both balls chosen are red.

..... [2]

(ii) Find the probability that one of the balls chosen is red and the other is blue.

..... [3]

(iii) Find the probability that there are now exactly 7 blue balls in Bag 1.

..... [3]



17. 0607\_s20\_qp\_42 Q: 5

Fifty students, 25 boys and 25 girls, were asked which sport they prefer. The results are shown in the table.

	Athletics	Football	Swimming	Tennis
Boy	4	9	2	10
Girl	3	3	12	7

(a) A student is selected at random.

Calculate the probability that the student chosen is

(i) a girl who prefers swimming,

..... [1]

(ii) a boy who **does not** prefer football,

..... [1]

(iii) a student who prefers athletics.

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..... [1]

(b) Two of the girls are chosen at random.

Calculate the probability they both prefer tennis.

..... [2]

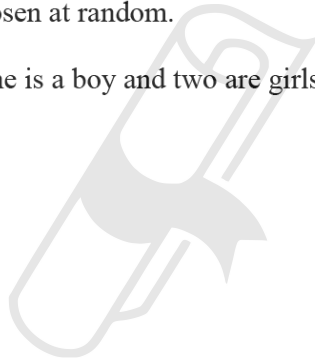
- (c) Two of the students who prefer athletics are chosen at random.

Calculate the probability that one is a boy and one is a girl.

..... [3]

- (d) Three of the 50 students are chosen at random.

Calculate the probability that one is a boy and two are girls and they all prefer swimming.



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..... [4]

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18. 0607\_w20\_qp\_41 Q: 11

A bag contains 4 red balls, 5 black balls and 3 white balls only.

(a) In an experiment, one ball is chosen at random.

(i) Find the probability that the ball chosen is **not** black.

..... [1]

(ii) This experiment is carried out 1440 times.

Find the expected number of times the ball chosen is not black.

..... [1]

(b) In a different experiment, one ball is chosen at random, the colour is noted, and the ball is replaced in the bag.

Another ball is then chosen at random and the colour is noted.

Find the probability that the balls chosen are

(i) both white,

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..... [2]

(ii) both the same colour,

..... [3]

(iii) different colours.

..... [1]

(c) In another experiment, three balls are chosen at random without replacement.

(i) Find the probability that the first ball is **not** black, the second ball is black and the third ball is white.

..... [3]

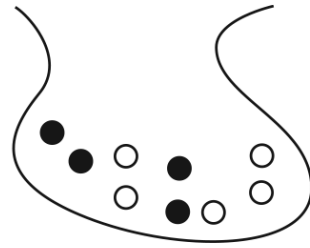
(ii) Find the probability that exactly two of the balls are red.

..... [4]





Bag *A*



Bag *B*

Bag *A* contains 5 black balls and 2 white balls.  
 Bag *B* contains 4 black balls and 5 white balls.

- (a) Gustav picks one ball at random from bag *A* and replaces it.

Write down the probability that the ball Gustav picks is black.

..... [1]

- (b) Sharia picks one ball at random from bag *A*, notes its colour, and places it in bag *B*.  
 She then picks a ball at random from bag *B*.

Find the probability that

- (i) both balls are white,

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- (ii) one ball is black and the other ball is white.

..... [3]

- (c) The balls are returned to their original bags.

Jean picks a ball at random from **bag A**.  
 He then replaces the ball.  
 He continues to do this until he gets a white ball.

Find the probability that the first time he gets a white ball is on the 5th pick.

..... [2]

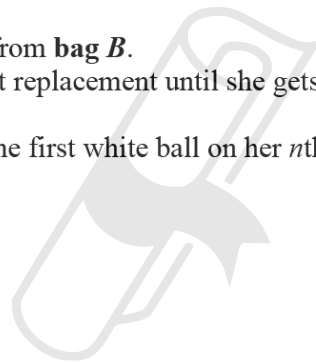
- (d) The balls are returned to their original bags.

Leanne picks a ball at random from **bag B**.  
 She continues to do this without replacement until she gets a white ball.

The probability that she picks the first white ball on her  $n$ th attempt is  $\frac{5}{126}$ .

Find the value of  $n$ .

..... [3]



20. 0607\_s19\_qp\_43 Q: 3

There are 120 students at a school.

There are 30 students in each class.

The number of boys and the number of girls in each class is shown in the table.

	Class 1	Class 2	Class 3	Class 4
Boys	16	19	12	13
Girls	14	11	18	17

(a) A student is chosen at random from the 120 students.

Calculate the probability that the student chosen is

(i) a boy from Class 2,

..... [1]

(ii) not from Class 3.

..... [1]

(b) A boy is chosen at random.

Calculate the probability that he is from Class 4.

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(c) Three students from Class 1 are chosen at random.

Calculate the probability 3 girls are chosen.

..... [3]

21. 0607\_w19\_qp\_41 Q: 6



The diagram shows a six-sided die and a coin.

The numbers on the faces of the die are 1, 1, 1, 2, 2, 3.

When the die is rolled it is equally likely for any of the six faces to be on the top.  
When the coin is spun it is equally likely to land showing heads or tails.

(a) Abi rolls the die.

Write down the probability that it shows the number 3 on the top.

..... [1]

(b) Beatrice rolls the die and spins the coin.

(i) Find the probability that the die shows the number 2 on the top and the coin shows heads.

..... [2]

(ii) Find the probability that the die shows the number 2 on the top or the coin shows heads or both.

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..... [2]

(c) Carl spins the coin 3 times.

Find the probability that the coin shows heads at least once.

..... [2]

(d) Drew rolls the die 3 times and records the numbers on the top.

Find the probability that the die shows each of the numbers, 1, 2 and 3, once.

..... [3]

(e) Eva spins the coin  $n$  times.

The probability that the coin shows tails each time is  $\frac{1}{64}$ .

Find the value of  $n$ .

$n =$  ..... [1]

(f) Frank rolls the die twice and records the two numbers.

The probability of these two numbers occurring is  $\frac{1}{3}$ .

Find these two numbers.

..... and ..... [2]

22. 0607\_w19\_qp\_42 Q: 6

Spinner A is numbered 1, 2, 3, 4.

Spinner B is numbered 1, 2, 3, 4, 5, 6.

Each spinner is equally likely to land on any of its numbers.

The two spinners are each spun once and the number that each spinner lands on is recorded.

Find the probability that

(a) the number on spinner A is greater than 4,

..... [1]

(b) the number on spinner B is not a 3,

..... [1]

(c) the number on spinner A is the same as the number on spinner B,



..... [2]

(d) one number is odd and one number is even,

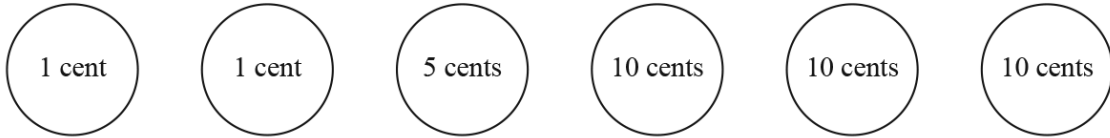
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..... [3]

(e) the sum of the numbers is 6.

..... [2]

23. 0607\_s18\_qp\_41 Q: 7



The diagram shows coins of values 1 cent, 5 cents and 10 cents.  
Two of these coins are chosen at random.

Find the probability that

(a) each coin has a value of less than 10 cents,

..... [2]

(b) the total value of the two coins is 11 cents,



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..... [3]

(c) the total value of the two coins is more than 2 cents.

..... [2]

24. 0607\_w17\_qp\_42 Q: 8

A fair 6-sided die is numbered 0, 1, 1, 2, 3, 3.

(a) The die is rolled and the number it shows is recorded.

Find the probability that the number is

(i) 3,

..... [1]

(ii) not 3,

..... [1]

(iii) an odd number.

..... [1]

(b) The die is rolled twice.

Find the probability that

(i) both numbers are 0,

..... [2]

(ii) one number is 2 and the other is 3.



..... [3]

(c) The die is rolled three times and the three numbers shown are added.

Find the probability that the total is **not** 0.

..... [2]

In this question, give all your answers as single fractions in terms of  $x$  and  $y$ .

A bag contains  $x$  red balls and  $y$  blue balls.

- (a) Rosario chooses a ball at random from the bag, notes its colour and replaces it in the bag. He then chooses a ball from the bag a second time, notes its colour and replaces it in the bag.

Find the probability, in terms of  $x$  and  $y$ , that the two balls chosen are

- (i) both red,

..... [2]

- (ii) one red and one blue.

..... [3]

- (b) Magda chooses a ball at random from the bag and does not replace it. She then chooses a ball from the bag a second time.

Find the probability, in terms of  $x$  and  $y$ , that the two balls chosen are

- (i) both red,

..... [3]

- (ii) one red and one blue.

..... [3]



26. 0607\_w16\_qp\_43 Q: 11

The 50 members of an activities group either go walking or cycling.  
The table shows the choices of the males and females.

	Walking	Cycling	Total
Male	16		29
Female			
Total		22	50

(a) Complete the table. [2]

(b) Two of the 50 members are chosen at random.

Calculate the probability that they both go cycling.

..... [2]

(c) Two of those who go walking are chosen at random.

Calculate the probability that one is a male and the other is a female.

..... [3]



- (b) If the second wristband is yellow, Gitte puts it back in the bag.  
If it is blue or pink she puts it on her other wrist.

After choosing the second wristband, find the probability that she is wearing

- (i) no wristbands,

*Answer(b)(i)* ..... [2]

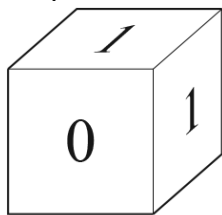
- (ii) a matching pair of wristbands,

*Answer(b)(ii)* ..... [3]

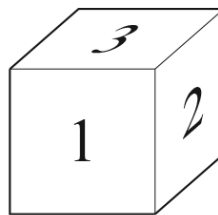
- (iii) only one wristband.

*Answer(b)(iii)* ..... [3]





*A*



*B*

The diagram shows two unbiased dice, *A* and *B*.

The numbers on die *A* are 0, 1, 1, 1, 2, 3.

The numbers on die *B* are 1, 2, 2, 3, 3, 3.

When a die is rolled, the number shown on the top face is recorded.

**(a)** Both dice are rolled.

Find the probability that

**(i)** both dice show 3,



*Answer(a)(i)* ..... [2]

**(ii)** the numbers showing on the two dice add up to 2.

*Answer(a)(ii)* ..... [3]

- (b) Die  $B$  is rolled until it shows 2.

Find the probability that this occurs when the die is rolled for the 4th time.

Answer(b) ..... [2]

- (c) Die  $A$  is rolled until it shows 3.

The probability that this occurs when the die is rolled for the  $n$ th time is  $\frac{3125}{46656}$ .

Find the value of  $n$ .



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Answer(c) ..... [2]

29. 0607\_w15\_qp\_42 Q: 10

A bag contains 3 red balls and 5 blue balls.

In an experiment, three balls are chosen at random without replacement.

(a) Find the probability that the three balls chosen are

(i) all red,

*Answer(a)(i)* ..... [2]

(ii) two red and one blue,

*Answer(a)(ii)* ..... [3]

(iii) at least one of each colour.

*Answer(a)(iii)* ..... [3]

(b) This experiment is to be carried out 1680 times.

Find the expected frequency of 3 red balls being chosen.

*Answer(b)* ..... [2]



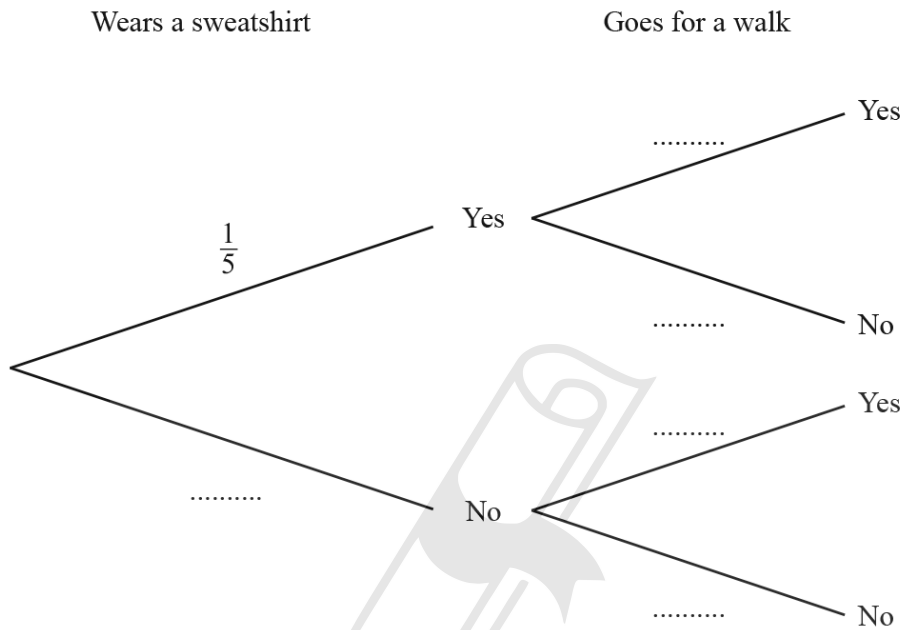
30. 0607\_m22\_qp\_42 Q: 10

When Zena wears a sweatshirt, the probability that she goes for a walk is  $\frac{7}{10}$ .

When Zena does not wear a sweatshirt, the probability that she goes for a walk is  $\frac{9}{10}$ .

On any day, the probability that she wears a sweatshirt is  $\frac{1}{5}$ .

(a) Complete the tree diagram.



[3]

(b) (i) Find the probability that on one day Zena does not wear a sweatshirt and she goes for a walk.

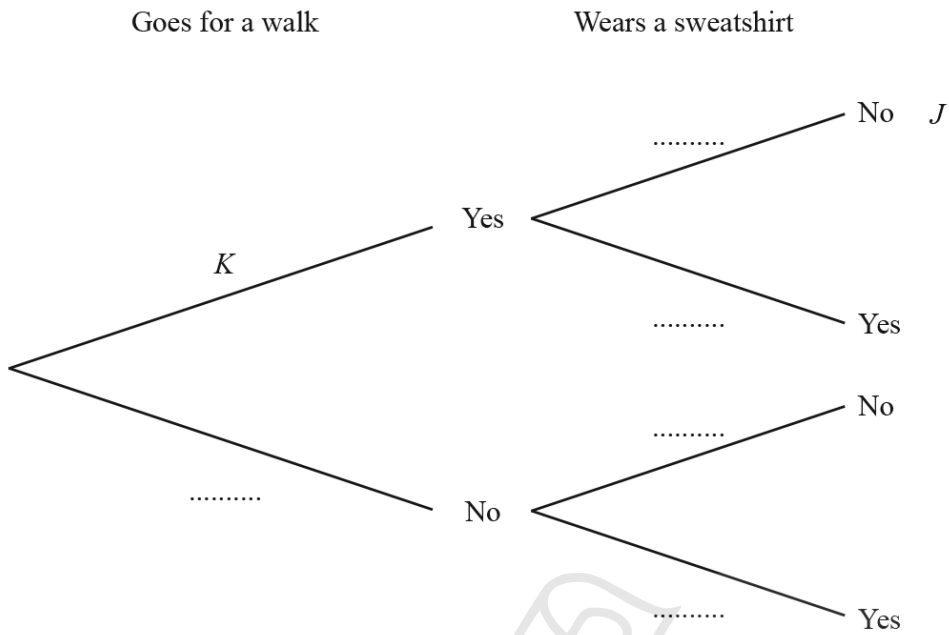
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..... [2]

(ii) Find the probability that on one day Zena goes for a walk.

..... [2]

- (c) In the tree diagram below, the value of  $J$  is the answer to **part (b)(i)** and the value of  $K$  is the answer to **part (b)(ii)**.



- (i) Find the probability that Zena does not wear a sweatshirt when she goes for a walk.

AcelGCSE ..... [2]

- (ii) Complete the tree diagram above.

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[3]

31. 0607\_s21\_qp\_42 Q: 10

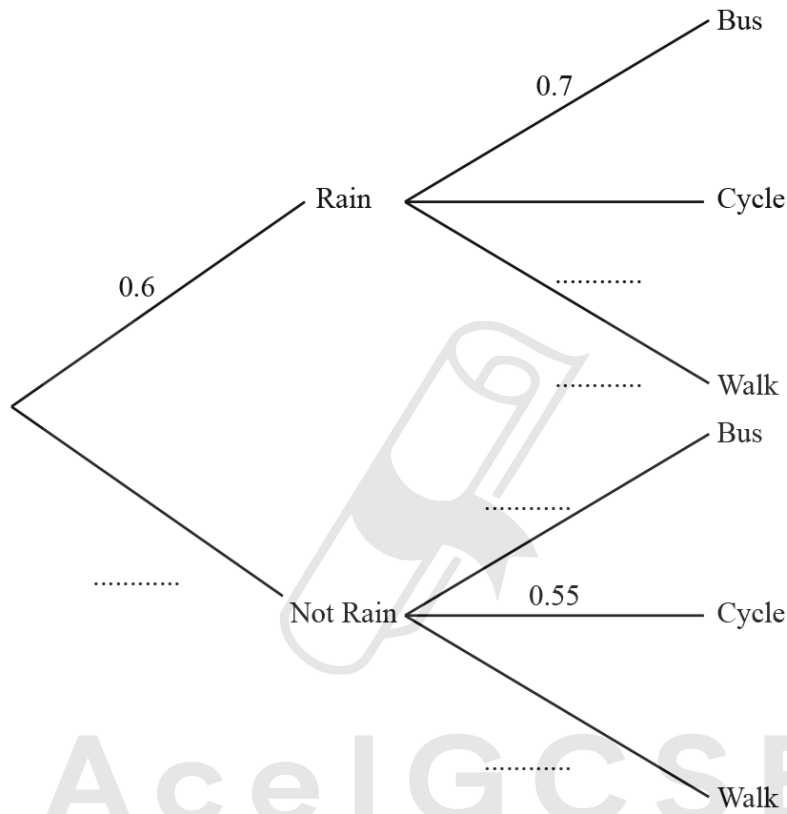
Hua travels to school by bus or she cycles or she walks.

If it rains, the probability that she travels by bus is 0.7 and the probability that she cycles is 0.25 .

If it does not rain, the probability that she cycles is 0.55 and the probability that she walks is 0.25 .

On any day, the probability that it rains is 0.6 .

(a) Complete the tree diagram to show the probabilities of the three methods of travel.



[2]

(b) Calculate the probability that, on any day,

(i) Hua walks to school,

..... [3]

(ii) Hua does not cycle.

..... [3]

(c) Last week it rained every day of the 5 school days.

Calculate the probability that Hua travelled by bus on exactly 4 of the 5 days.

..... [3]

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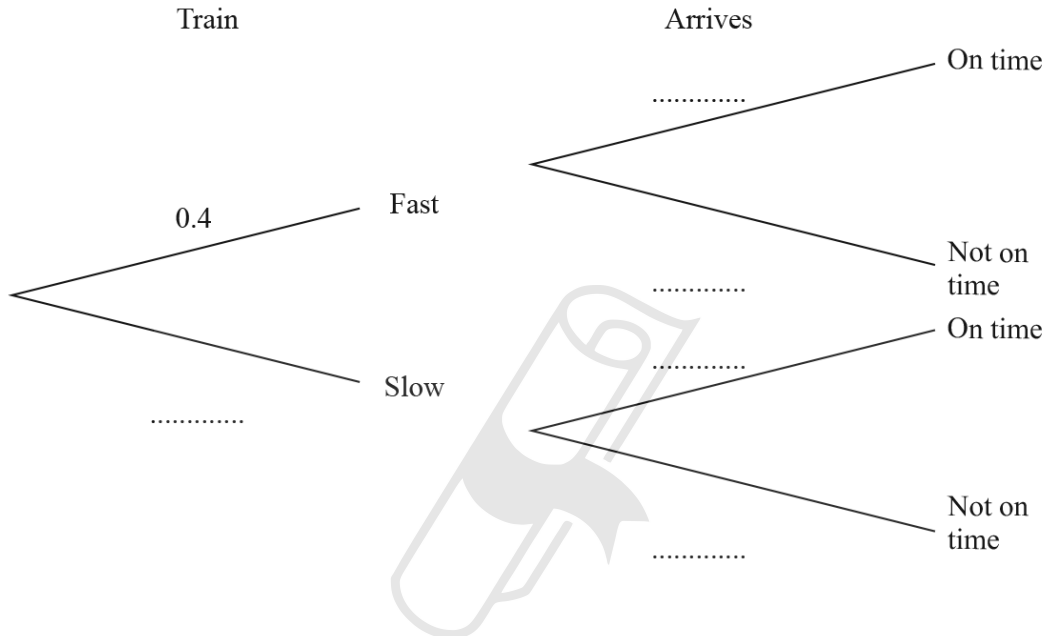
32. 0607\_w21\_qp\_42 Q: 10

Fast trains and slow trains travel from City A to City B.  
40% of the trains from City A to City B are fast trains.

The probability that a fast train arrives in City B on time is 0.9 .  
The probability that a slow train arrives in City B on time is 0.95 .

Manuela goes to the station in City A and takes the next train to City B.

(a) Complete the tree diagram.



[3]

(b) Find the probability that Manuela arrives in City B on time.

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..... [3]

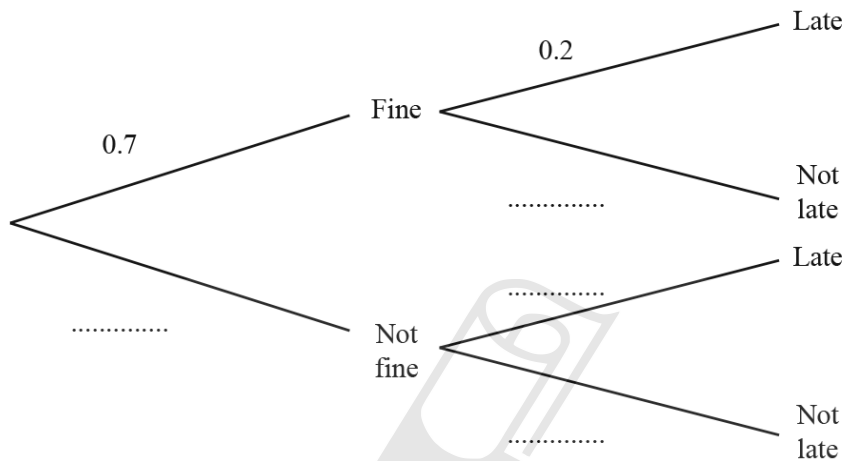
33. 0607\_s19\_qp\_42 Q: 3

Jono walks to school when the weather is fine.  
When the weather is not fine, Jono takes the bus.

If Jono walks to school, the probability that he is late is 0.2 .  
If Jono takes the bus, the probability that he is late is 0.05 .

On any day, the probability that the weather is fine is 0.7 .

(a) Complete the tree diagram.



[3]

(b) (i) Find the probability that, on any day, Jono is late.

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..... [3]

(ii) Jono attends school on 200 days.

Find the expected number of days that Jono is late.

..... [1]

34. 0607\_s18\_qp\_43 Q: 8

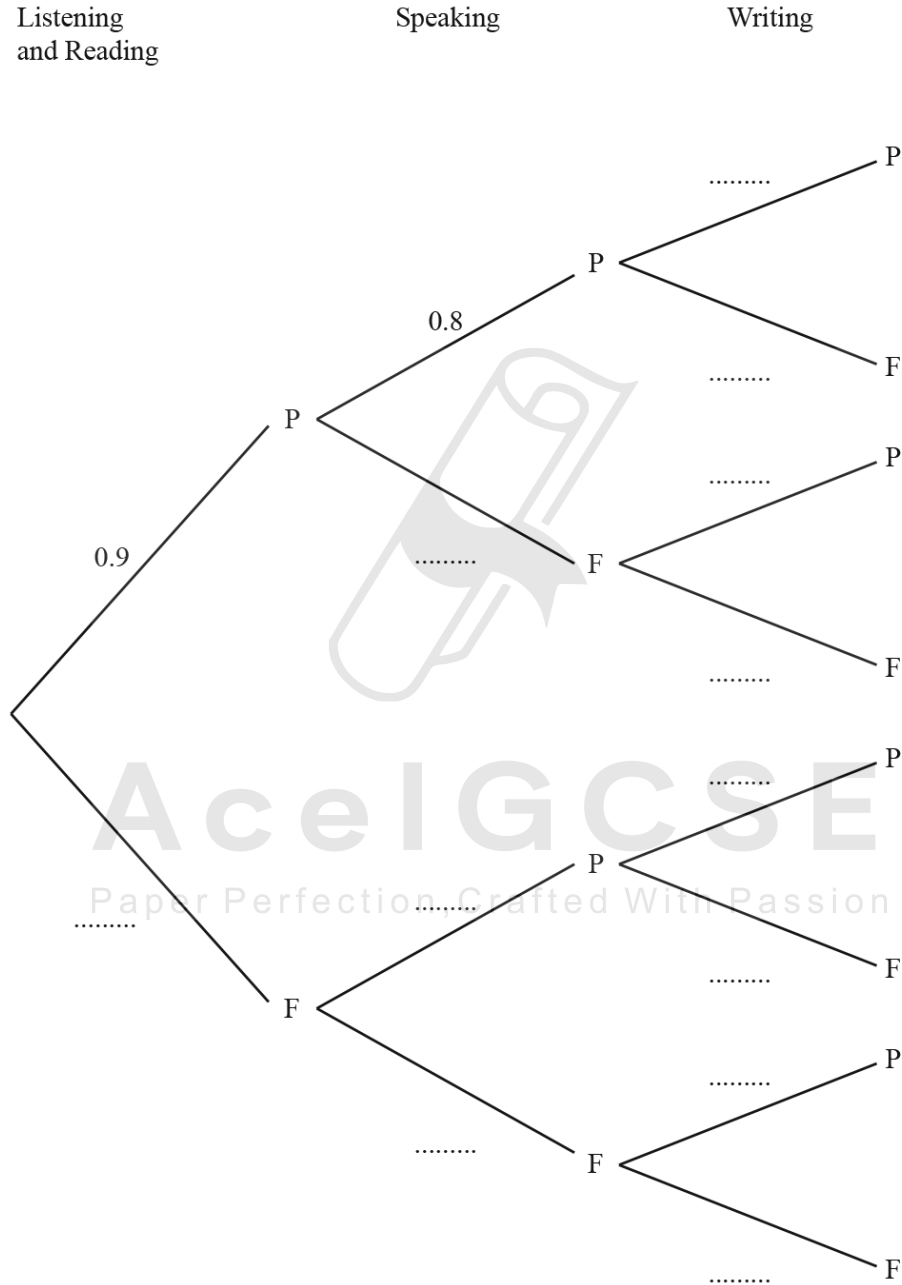
Rashid takes a language examination that has three tests.

The probability that Rashid passes the Listening and Reading test is 0.9 .

The probability that Rashid passes the Speaking test is 0.8 .

The probability that Rashid passes the Writing test is 0.7 .

(a) Complete the tree diagram to show the probabilities of passing (P) and failing (F) each part.



[3]

(b) To pass the whole examination Rashid has to pass all three tests.

Calculate the probability that he passes the whole examination.

.....[2]

(c) If Rashid only fails one test, he can take that test again.

Calculate the probability that Rashid needs to take one test again.



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.....[4]

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35. 0607\_w18\_qp\_43 Q: 9

When Helena goes for a walk, she walks  $d$  kilometres.

The probability that  $0 < d \leq 2$  is  $\frac{1}{5}$  and the probability that  $2 < d \leq 4$  is  $\frac{1}{4}$ .

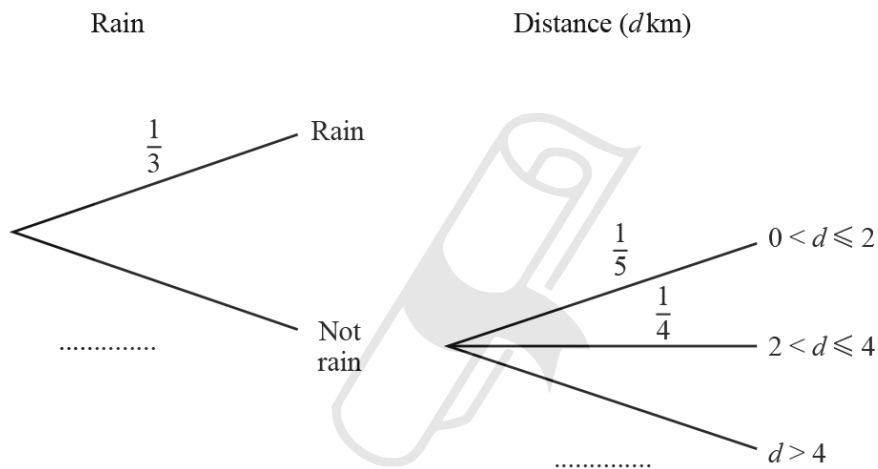
(a) Find the probability that  $d > 4$ .

..... [2]

(b) If it rains, Helena never goes for a walk.  
If it does not rain, Helena always goes for a walk.

On any day, the probability that it rains is  $\frac{1}{3}$ .

(i) Complete the tree diagram showing the probabilities of the two events.



[1]

(ii) Find the probability that, on any day, Helena walks more than 2 km.

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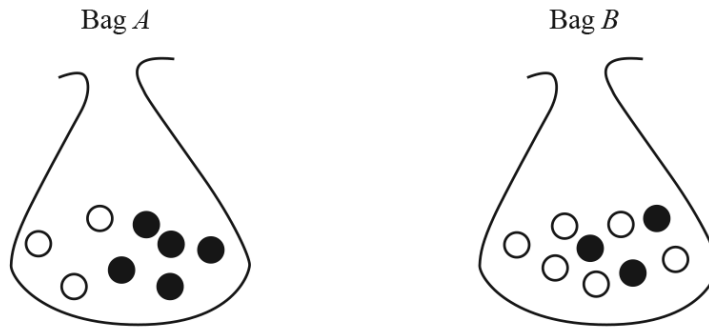
..... [3]

(iii) Find the expected number of days that Helena walks more than 2 km, during a period of 90 days.

..... [1]

36. 0607\_w17\_qp\_41 Q: 9

Two bags each contain white balls and black balls only.



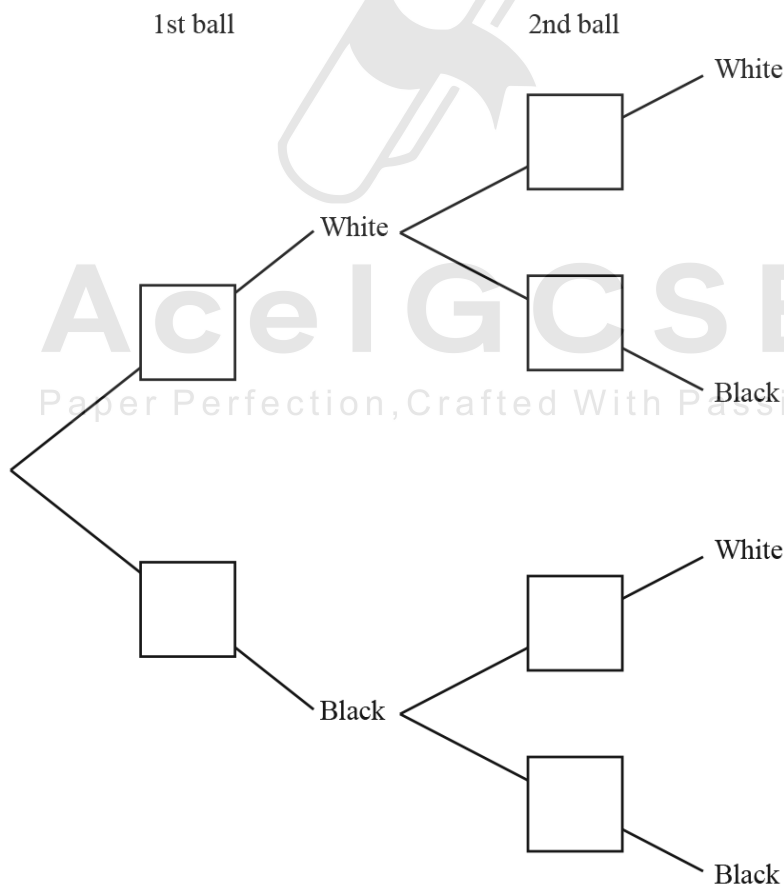
Bag *A* contains 3 white balls and 5 black balls.

Bag *B* contains 6 white balls and 3 black balls.

A ball is picked at random from the 8 balls in Bag *A*.

- If it is white, the ball is not replaced and a second ball is picked at random from Bag *A*.
- If it is black, a second ball is picked at random from the 9 balls in Bag *B*.

(a) Complete the tree diagram.



[3]

**(b)** Find the probability that

**(i)** both balls are white,

..... [2]

**(ii)** exactly one of the two balls is black.

..... [3]



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37. 0607\_s15\_qp\_41 Q: 12

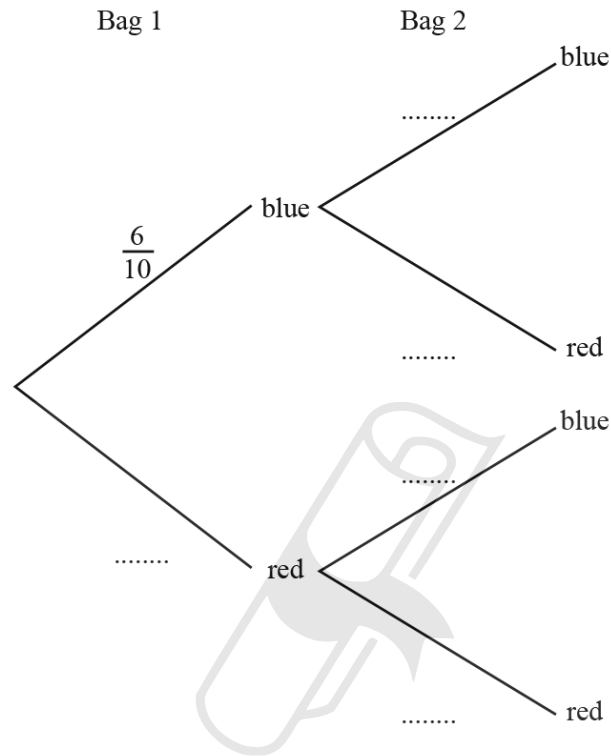
Bag 1 only contains 6 blue balls and 4 red balls.

Bag 2 only contains 8 blue balls and 2 red balls.

Marco chooses a ball at random from Bag 1 and puts it in Bag 2.

He then chooses a ball at random from Bag 2 and puts it in Bag 1.

(a) Complete the tree diagram.



[2]

(b) Find the probability that the two balls chosen are

(i) both blue,

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Answer(b)(i) ..... [2]

(ii) one red and one blue.

Answer(b)(ii) ..... [3]

(c) Find the probability that, after Marco chooses the two balls, there are exactly 6 blue balls in Bag 1.

Answer(c) ..... [3]



**(b)** Calculate the probability that Tricia's two balls are

**(i)** both white,

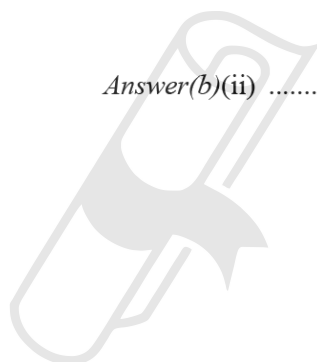
*Answer(b)(i)* ..... [2]

**(ii)** one white and one red,

*Answer(b)(ii)* ..... [3]

**(iii)** of different colours.

*Answer(b)(iii)* ..... [3]



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39. 0607\_w15\_qp\_43 Q: 10

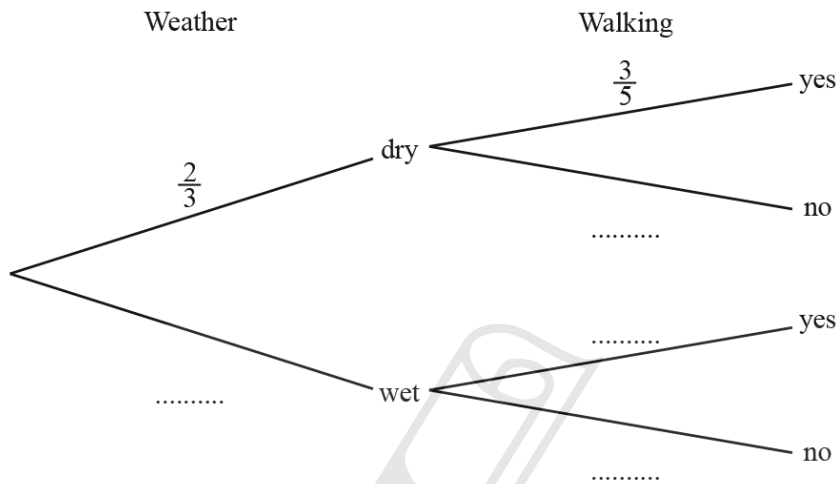
In this question, the weather is only considered to be either wet or dry.

When the weather is dry the probability that Sara will go walking is  $\frac{3}{5}$ .

When the weather is wet the probability that Sara will go walking is  $\frac{1}{10}$ .

The probability of a dry day is  $\frac{2}{3}$ .

(a) Complete the tree diagram.



[3]

(b) Show that the probability that Sara goes walking is  $\frac{13}{30}$ .

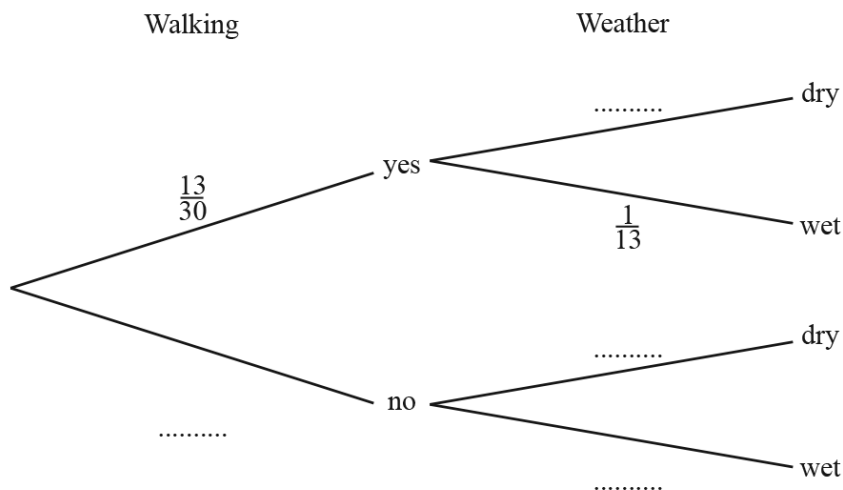
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[2]

(c) The probability that Sara does not go walking when the weather is wet is  $\frac{9}{30}$ .

Complete this tree diagram.

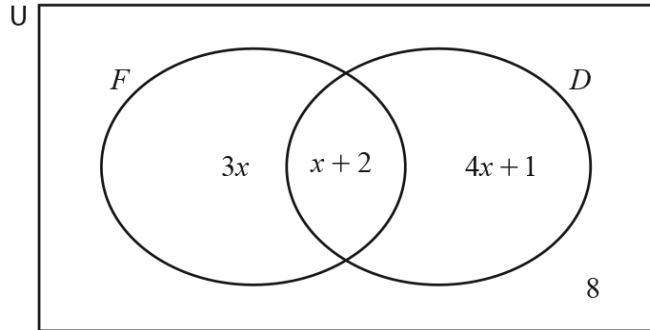


[3]

(a) The Venn diagram shows information about 115 people who play musical instruments.

$F = \{\text{people who play the flute}\}$

$D = \{\text{people who play the drums}\}$



(i) Calculate the number of people who play both the flute and the drums.

..... [3]

(ii) On the Venn diagram, shade  $F' \cap D$ . [1]

(iii) Briony plays both the flute and the drums.

Use set notation to complete the statement.

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Briony ..... ( $F \cap D$ ) [1]

(b) Briony has 6 red socks, 4 green socks and 8 white socks.

(i) She picks a sock at random.

Find the probability that the sock is green.

..... [1]

(ii) Briony replaces the sock.

She now picks two socks at random, without replacement.

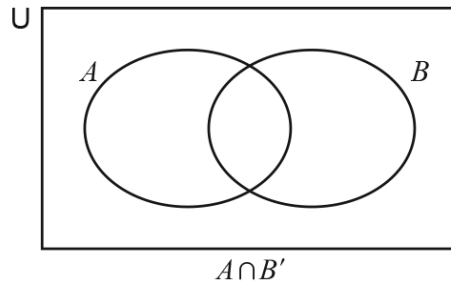
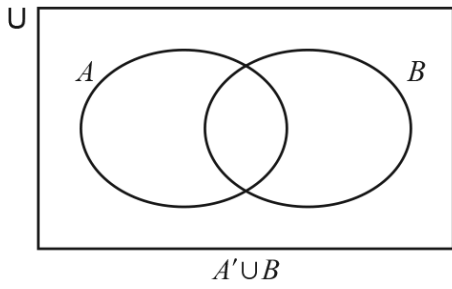
Calculate the probability that the two socks are different colours.



..... [4]

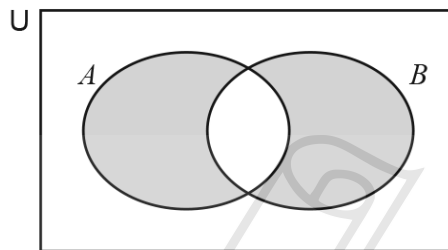
41. 0607\_w21\_qp\_41 Q: 12

(a) (i) For each Venn diagram, shade the given set.



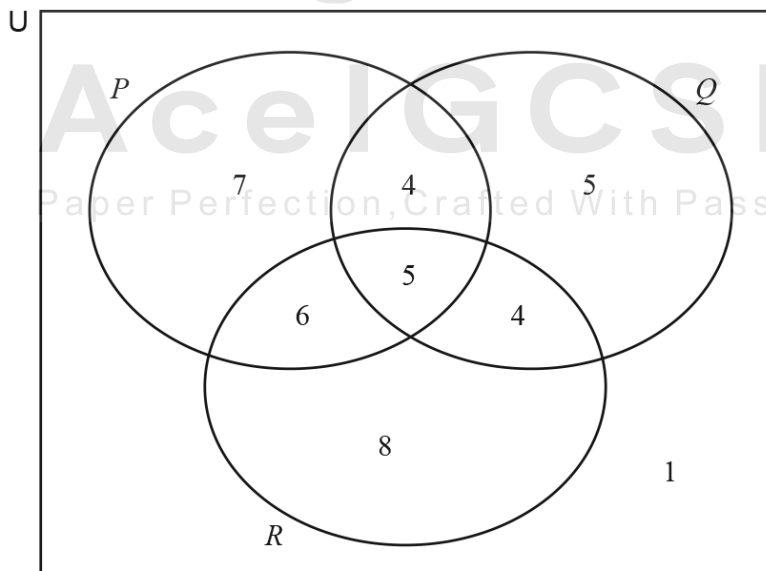
[2]

(ii) Use set language to describe the shaded set.



..... [1]

(b) 40 people are asked which of 3 television programmes,  $P$ ,  $Q$  and  $R$ , they watch. The results are shown in the Venn diagram.



- (i) Two of the 40 people are chosen at random.

Find the probability that they both watch exactly 2 of the 3 programmes.

..... [2]

- (ii) Two of the people who watch programme  $P$  are chosen at random.

Find the probability that one of them watches both other programmes and one watches just one of the other programmes.

..... [3]

- (iii) Three of the 40 people are chosen at random.

Find the probability that two of them watch only programme  $Q$  and one of them watches only programme  $R$ .

..... [3]

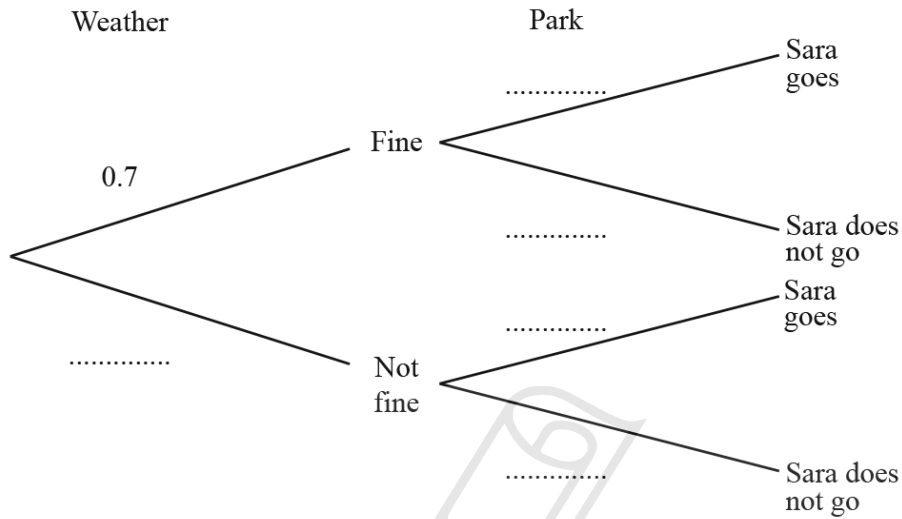
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42. 0607\_s20\_qp\_41 Q: 8

- (a) When the weather is fine, the probability that Sara goes to the park is 0.9 .  
When the weather is not fine, the probability that Sara goes to the park is 0.2 .

On any day, the probability that the weather is fine is 0.7 .

- (i) Complete the tree diagram.



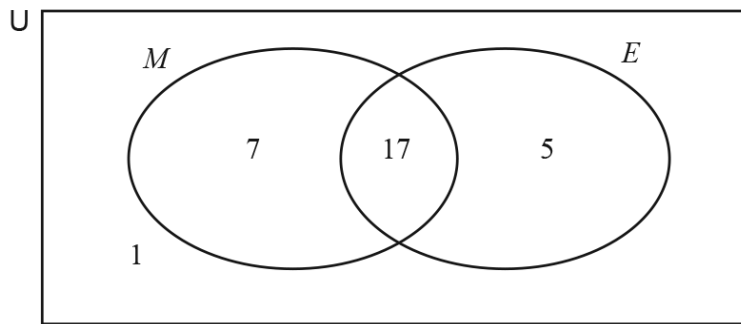
[3]

- (ii) Find the probability that, on any day, Sara goes to the park.

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..... [3]

- (b) 30 students are asked if they like Mathematics ( $M$ ) and if they like English ( $E$ ). The Venn diagram shows the number of students in each subset.



- (i) Find  $n(M \cup E')$ .

..... [1]

- (ii) Two students are chosen at random.

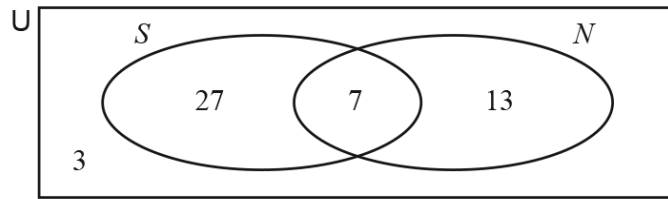
Find the probability that they both like Mathematics but not English.



..... [3]

43. 0607\_w20\_qp\_43 Q: 4

The Venn diagram shows the number of students who like sweets ( $S$ ) and the number of students who like nuts ( $N$ ).



(a) (i) Find the number of students who like nuts.

..... [1]

(ii) Find the number of students who like sweets or nuts but not both.

..... [1]

(b) (i) Find  $n(U)$ .

..... [1]

(ii) Find  $n(S \cup N)$ .

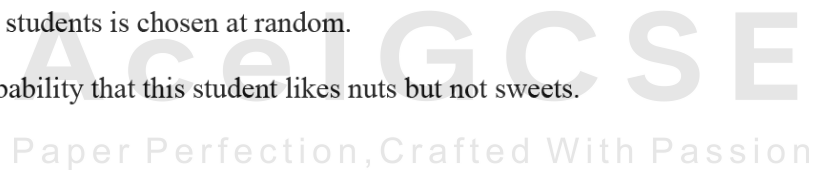
..... [1]

(iii) Find  $n(S' \cup N)$ .

..... [1]

(c) One of these students is chosen at random.

Find the probability that this student likes nuts but not sweets.



..... [1]

(d) Two of these students are chosen at random.

Find the probability that they both like sweets and nuts.

..... [2]

- (e) Two students who like sweets are chosen at random.

Find the probability that they both also like nuts.

..... [3]



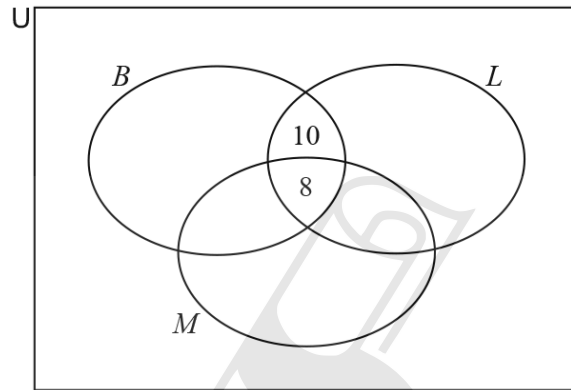
44. 0607\_w19\_qp\_43 Q: 8

A dance club has 90 members.

Here is some information about types of dancing members like.

- 50 like Ballroom ( $B$ )
- 37 like Latin ( $L$ )
- 47 like Modern ( $M$ )
- 18 like Ballroom and Latin
- 15 like Ballroom and Modern
- 22 like Latin and Modern
- 8 like Ballroom, Latin and Modern

(a) Complete the Venn diagram.



[2]

(b) Write down the number of members who do not like any of these three types of dancing.

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[1]

(c) Two of the 90 members are chosen at random.

Find the probability that they both like Ballroom and Latin but not Modern.

..... [2]

- (d) Two of the members who like Ballroom are chosen.

Find the probability that one of these members likes Latin but not Modern and the other likes Modern but not Latin.

..... [3]

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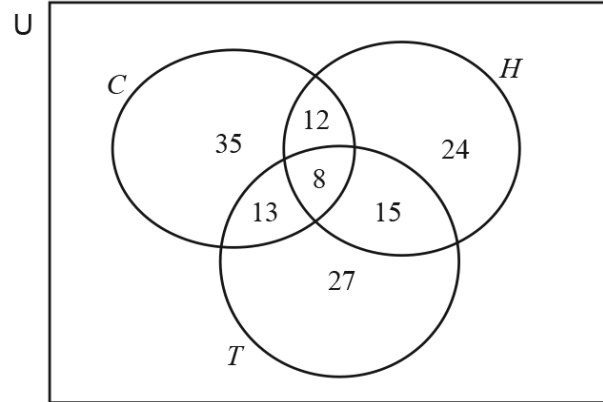


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45. 0607\_w18\_qp\_42 Q: 8

The 150 members of a sports club were asked if they played cricket ( $C$ ), hockey ( $H$ ) or tennis ( $T$ ). Some members play none of the three sports.

The Venn diagram shows the numbers of members who play the three sports.



(a) Calculate the number of members who play none of the three sports.

..... [1]

(b) Two of the 150 members are picked at random.

Calculate the probability that

(i) they both play hockey and tennis but not cricket,

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..... [2]

(ii) they are both members of the set  $(C \cup H) \cap T'$ .

..... [3]

- (c) Three of the members who play tennis are chosen at random.

Calculate the probability that none of them play cricket.

..... [3]

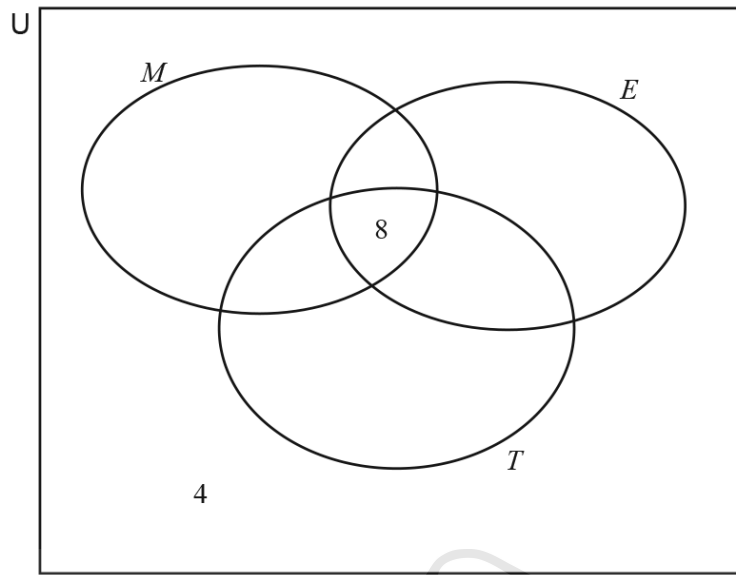
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46. 0607\_s17\_qp\_41 Q: 8

The Venn diagram shows the sets  $M$ ,  $E$  and  $T$ .



- $U = \{\text{students at a school}\}$
- $M = \{\text{students who study mathematics}\}$
- $E = \{\text{students who study English}\}$
- $T = \{\text{students who study technology}\}$

$$n(M \cap E \cap T) = 8$$

$$n(M \cup E \cup T)' = 4$$

$$n(M \cap E) = 12, \quad n(M \cap T) = 14 \quad \text{and} \quad n(E \cap T) = 20$$

$$n(M) = 25, \quad n(E) = 30, \quad n(T) = 35 \quad \text{and} \quad n(U) = 56$$

(a) Complete the Venn diagram. [3]

(b) Find

(i)  $n(M \cap (E' \cup T'))$ ,  
 ..... [1]

(ii)  $n(M \cap T')$ .  
 ..... [1]

- (c) One of these students is chosen at random.

Find the probability that this student studies English and mathematics but not technology.

..... [2]

- (d) Two of the 56 students are chosen at random.

Find the probability that they both study technology.

..... [2]

- (e) A student who studies mathematics is chosen at random.

Find the probability that this student also studies technology but not English.

..... [2]

- (f) Two students who study English are chosen at random.

Find the probability that they both study mathematics but not technology.

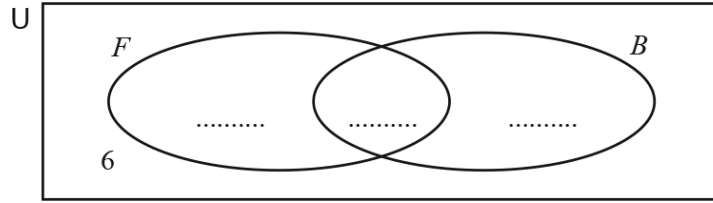
..... [3]



47. 0607\_s17\_qp\_43 Q: 9

In a survey, 40 students are asked if they like football,  $F$ , and if they like baseball,  $B$ .  
 22 like football, 19 like baseball and 6 do not like either football or baseball.

(a) Complete the Venn diagram to show this information.



[2]

(b) How many of these students

(i) like both football and baseball,

..... [1]

(ii) either like football or do not like baseball?

..... [1]

(c) Find  $n(F \cap B)$ .

..... [1]

(d) Two of these students are chosen at random.

Find the probability that they both like football.

..... [2]

- (e) (i) One of the 19 students who like baseball is chosen at random.

Find the probability that this student also likes football.

..... [1]

- (ii) Two of the 19 students who like baseball are chosen at random.

Find the probability that one likes football and one does not like football.

..... [3]

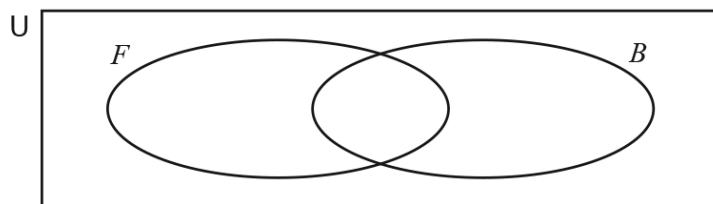
- (f) Another  $n$  students take part in the survey.  
They all like both baseball and football.  
A student is then chosen at random from the  $(40 + n)$  students.

The probability that a student likes both football and baseball is  $\frac{5}{16}$ .

Find the value of  $n$ .

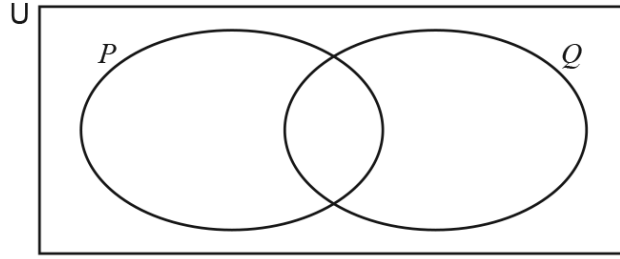
$n =$  ..... [3]

- (g)



On the Venn diagram, shade the region  $F' \cup B'$ .

[1]



$n(U) = 25$        $n(P) = 18$        $n(Q) = 12$        $n(P \cup Q)' = 3.$

(a) Show that  $n(P \cap Q) = 8.$

[2]

(b) An element is chosen at random from U.

Find the probability that the element is a member of

(i)  $P \cup Q,$

..... [1]

(ii)  $P \cup Q'.$

..... [1]

(c) An element is chosen at random from P.

Find the probability that this element is also a member of Q.



..... [1]

(d) The probability of a single event is  $\frac{2}{3}.$

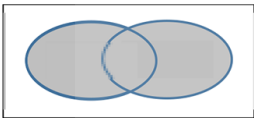
Describe this event in terms of P and Q.

..... [1]

01. 0607\_m24\_ms\_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)		2	<b>B1</b> for 1 or 2 elements misplaced or omitted.
(a)(ii)	3, 6, 12	1	<b>FT</b> <i>their</i> Venn diagram
(a)(iii)	5	1	<b>FT</b> <i>their</i> Venn diagram
(b)(i)	$\frac{4}{7}$		
(b)(ii)	$\frac{2}{5}$ oe	2	<b>M1</b> for $\frac{4}{6} \times \frac{3}{5}$ oe
(b)(iii)	$\frac{23}{42}$ oe	3	<b>M2</b> for $\frac{1}{2} \times \frac{3}{7} + \frac{1}{2} \times \frac{4}{6}$ or <b>M1</b> for one of above products

Question	Answer	Marks	Partial Marks
(a)(i)	0	1	
(a)(ii)	$\frac{3}{5}$ oe	1	
(a)(iii)	$\frac{6}{25}$ oe	3	<p><b>M2</b> for <math>\left(\frac{1}{5} \times \frac{1}{5}\right) + \left(\frac{2}{5} \times \frac{1}{5}\right) + \left(\frac{1}{5} \times \frac{1}{5}\right) + \left(\frac{1}{5} \times \frac{2}{5}\right)</math>  or correct sample space showing all 6 points</p> <p>or <b>M1</b> for 2 correct products  or correct sample space showing at least 3 points  or list of all correct pairs</p> <p>If 0 scored, <b>SC1</b> for <math>\frac{12}{25}</math></p>

Question	Answer	Marks	Partial Marks
(a)(iv)	$\frac{6}{25}$	3	<p><b>M2</b> for <math>\left(\frac{2}{5} \times \frac{2}{5}\right) + \left(\frac{1}{5} \times \frac{1}{5}\right) + \left(\frac{1}{5} \times \frac{1}{5}\right)</math>  or correct sample space showing all 6 points</p> <p>or <b>M1</b> for 2 correct products  or correct sample space showing at least 3  or for listing pairs that sum to 6</p>
(b)(i)		1	
(b)(ii)	$A \cap B'$	1	
(b)(iii)	8	1	

03. 0607\_s24\_ms\_42 Q: 10

Question	Answer	Marks	Partial Marks
	For all parts accept decimals or percentages with the usual rules for 3sf Do not penalise incorrect cancelling or converting Do not accept ratios or words		
(a)(i)	$\frac{5}{12}$	1	
(a)(ii)	25	1	<b>FT</b> 60 $\times$ <i>their(a)(i)</i> but must be an integer
(b)(i)	$\frac{1}{11}$ oe	2	<b>M1</b> for $\frac{4}{12} \times \frac{3}{11}$
(b)(ii)	$\frac{10}{33}$ oe	3	<b>M2</b> for $\frac{5}{12} \times \frac{4}{11} \times 2$ oe or <b>M1</b> for $\frac{5}{12} \times \frac{4}{11}$ oe  If 0 scored, <b>SC1</b> for $\frac{5}{18}$ oe
(c)	$\frac{25}{72}$ oe	3	<b>M2</b> for $\frac{5}{12} \times \frac{5}{12} + \frac{4}{12} \times \frac{4}{12} + \frac{3}{12} \times \frac{3}{12}$ oe or <b>M1</b> for two of these products  If 0 scored, <b>SC1</b> for $\frac{19}{66}$ oe

04. 0607\_s24\_ms\_43 Q: 3

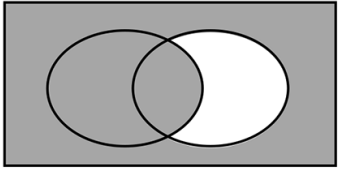
Question	Answer	Marks	Partial Marks
	For all parts accept decimals or percentages with the usual rules for 3sf. Do not penalise incorrect cancelling or converting. Do not accept ratios or words		
(a)(i)	$\frac{2}{3}$ oe	1	
(a)(ii)	$\frac{1}{2}$ oe	1	
(b)(i)	$\frac{1}{36}$ oe	2	<b>M1</b> for $\frac{1}{6} \times \frac{1}{6}$
(b)(ii)	$\frac{35}{36}$ oe	1	<b>FT 1</b> – their (b)(i)
(c)(i)	0.52 oe 0.72 oe 0.16 oe Correctly placed	2	<b>B1</b> for one correctly placed
(c)(ii)	0.4368 oe	2	<b>M1</b> for their $0.52 \times 0.84$ oe

05. 0607\_m23\_ms\_42 Q: 12

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{x^2}{(x+y+z)^2}$ oe final answer	2	<b>M1</b> for $\frac{x}{(x+y+z)}$
(a)(ii)	$\frac{2yz}{(x+y+z)^2}$ oe final answer	2	<b>M1</b> for $\frac{y}{x+y+z} \times \frac{z}{x+y+z}$

Question	Answer	Marks	Partial Marks
(b)	$\frac{7}{13}$	3	<b>M2</b> for $\frac{x}{x+y} = \frac{7}{20}$ oe soi or <b>M1</b> for $\frac{x^2}{(x+y)^2} = \frac{49}{400}$

06. 0607\_s23\_ms\_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)		1	
(a)(ii)	$(A \cup B) \cap C'$ oe	1	
(b)(i)	10	1	
(b)(ii)	18	1	
(b)(iii)	$\frac{8}{20}$ oe	1	
(b)(iv)	$\frac{33}{95}$ oe	2	M1 for $\frac{n}{20} \times \frac{n-1}{19}$ , $n < 20$
(b)(v)(a)	$\frac{4}{13}$	2	M1 for $\frac{n}{14} \times \frac{n-1}{13}$ , $n < 14$
(b)(v)(b)	$\frac{48}{91}$	3	M2 for $\frac{6}{14} \times \frac{8}{13} + \frac{8}{14} \times \frac{6}{13}$ oe or M1 for $[2 \times] \frac{n}{14} \times \frac{14-n}{13}$ oe $n < 14$

07. 0607\_s23\_ms\_42 Q: 4

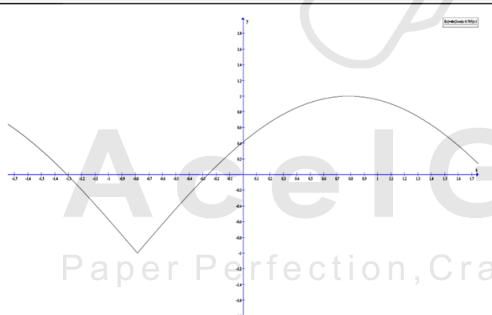
Question	Answer	Marks	Partial Marks
(a)	Correct cumulative frequency curve	4	B2 for 5 or 6 correct heights or B1 for 6, 24, 90, 130, 148, 160 soi B1 for points plotted at right hand end of interval.
(b)(i)	66 to 69	1	FT <i>their</i> curve
(b)(ii)	10 to 15	2	B1 for [lq] = 62 to 64 or [uq] = 74 to 77 FT <i>their</i> curve for B1
(c)	61 to 63 nfw	3	B2 for 34 soi or M1 for $160 \times 0.6$ oe soi by 96

08. 0607\_s23\_ms\_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$\frac{1}{10}$ oe	1	
(b)	$\frac{2}{15}$ oe	2	M1 for $\frac{4}{10} \times \frac{3}{9}$

Question	Answer	Marks	Partial Marks
(c)	$\frac{1}{40}$ oe	3	M2 for $k \times \frac{1}{10} \times \frac{3}{9} \times \frac{1}{8}$ oe, $k = 3, 4, 5$ or $6$ or M1 for $\frac{1}{10} \times \frac{3}{9} \times \frac{1}{8}$ oe  If 0 scored SC1 for indicating 6 possibilities
(d)	5	3	M2 for $\left(\frac{4}{10}\right)^{n-1} \times \left(\frac{6}{10}\right) = \frac{48}{3125}$ oe or M1 for $\left(\frac{4}{10}\right)^k \times \left(\frac{6}{10}\right)$ , $k \geq 2$ oe

09. 0607\_s23\_ms\_43 Q: 7

Question	Answer	Marks	Partial Marks
(a)		3	Correct graph  B1 for 1 max in first quadrant  B1 for V shape at approx $x = -45$

Question	Answer	Marks	Partial Marks
(b)	-75, -15	2	<b>B1</b> for each
(c)	(45, 1)	1	
(d)(i)	-64.8 or -64.76... -17.9 or -17.92... 88.8 or 88.78...	3	<b>B1</b> for each or for -65, -18, 89 If 0 scored <b>SC1</b> for sketch of $y = 0.005x$
(d)(ii)	$x < -64.8$ $-17.9 < x < 88.8$	2	<b>FT</b> <b>B1</b> for one correct

10. 0607\_s23\_ms\_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{5}{80}$ oe	1	
(a)(ii)	$\frac{28}{80}$ oe	1	
(b)	$\frac{17}{36}$ oe	2	<b>M1</b> for $\frac{k}{36}$ where $k < 36$ or $\frac{17}{m}$ where $17 < m < 80$
(c)(i)	$\left[ \frac{12}{44} \times \frac{16}{43} \times \frac{8}{42} \times 6 \right] = \frac{384}{3311}$ oe	1	

Question	Answer	Marks	Partial Marks
(c)(ii)	$\frac{3648}{9933}$ or $\frac{1216}{3311}$ oe or 0.367 or 0.3672 to 0.3673	3	<b>M2</b> for $\left( \frac{12}{44} \times \frac{16}{43} \times \frac{8}{42} + \frac{12}{44} \times \frac{16}{43} \times \frac{8}{42} \right)$ $\left( + \frac{12}{44} \times \frac{8}{43} \times \frac{8}{42} + \frac{16}{44} \times \frac{8}{43} \times \frac{8}{42} \right) \quad [\times k < 6]$ or <b>M1</b> for any two of these products seen

11. 0607\_w23\_ms\_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	45	1	
(b)	$\frac{1}{6}$ and $\frac{1}{5}$ correctly placed  $\frac{2}{5}$ and $\frac{3}{5}$ correctly placed	2	<b>B1</b>  <b>B1</b>
(c)	$\frac{11}{5}$ oe	3	<b>M2</b> for $\frac{5}{6} \times \frac{4}{5} + \text{their } \frac{1}{6} \times \text{their } \frac{2}{5}$ or <b>M1</b> for $\frac{5}{6} \times \frac{4}{5}$ or $\text{their } \frac{1}{6} \times \text{their } \frac{2}{5}$

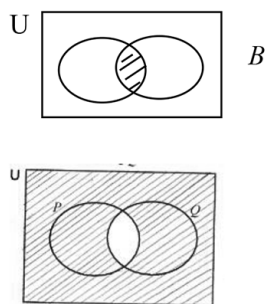
Question	Answer	Marks	Partial Marks
(d)	$\frac{25}{7776}$ oe	3	<b>M2</b> for $\left(\frac{5}{6}\right)\left(\text{their } \frac{1}{6}\right)^4$ [ $\times 5$ ] oe or <b>M1</b> for $\left(\frac{5}{6}\right)\left(\text{their } \frac{1}{6}\right)^k, k > 1$

12. 0607\_w23\_ms\_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{3}{8}, \frac{5}{8}, \frac{2}{7}, \frac{5}{7}, \frac{3}{8}, \frac{5}{8}$	3	<b>B1</b> for each correct pair in correct position
(a)(ii)	$\frac{365}{1568}$ or 0.233	4	<b>FT</b> <i>their</i> tree diagram probabilities for method marks  <b>M3</b> for $\frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$ [+] $\frac{3}{8} \times \frac{5}{7} \times \frac{2}{7}$ [+] $\frac{5}{8} \times \frac{3}{8} \times \frac{2}{7}$ soi without extras  or <b>M2</b> for two correct products soi  or <b>M1</b> for one correct product soi or for clear indication on tree diagram of all three combinations. or list of the options
(b)(i)	$10 - x$	1	
(b)(ii)(a)	$\frac{x}{10+y} = \frac{1}{3}$ oe seen leading to $3x = 10 + y$	1	

Question	Answer	Marks	Partial Marks
(b)(ii)(b)	[x = or red =] 6 [y = or blue =] 8	5	<b>B2</b> for $9x + 2y = 70$ oe or <b>B1</b> for $\frac{10-x}{10+y} = \frac{2}{9}$  <b>M1</b> for correct method to eliminate one variable  <b>A1</b> for [x = or red =] 6 or [y = or blue =] 8

13. 0607\_w23\_ms\_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)		2	<b>B1</b> for each
(b)(i)	21	1	
(b)(ii)	$\frac{13}{120}$ oe	1	
(b)(iii)	$\frac{35}{528}$ oe	3	<b>M2</b> for $\frac{5}{33} \times \frac{7}{32} + \frac{7}{33} \times \frac{5}{32}$ oe or <b>M1</b> for either product correct
(b)(iv)	$\frac{3}{1003}$ oe	3	<b>M2</b> for $k \times \frac{21}{120} \times \frac{20}{119} \times \frac{4}{118}$ oe $k = 1, 3$ or $6$ or <b>M1</b> for $\frac{p}{120} \times \frac{p-1}{119} \times \frac{4}{118}$ oe

14. 0607\_s21\_ms\_41 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$\frac{1}{3}$ oe	1	
(b)	0	1	
(c)	$\frac{1}{6}$ oe	2	<b>M1</b> for $\frac{1}{6} \times \frac{1}{4} + \frac{1}{6} \times \frac{1}{4} + \frac{1}{6} \times \frac{1}{4} + \frac{1}{6} \times \frac{1}{4}$ oe or for $\frac{k}{6 \times 4}$ where $k < \text{their } (6 \times 4)$ or for table of outcomes with correct 4 identified
(d)	$\frac{5}{12}$ oe	3	<b>M2</b> for $\frac{4}{6} \times \frac{1}{4} + \frac{2}{6} \times \frac{3}{4}$ or <b>M1</b> for either of these products seen  OR <b>M2</b> for table of outcomes with correct 10 identified or <b>M1</b> for table of outcomes with 8 or 9 correct identified
(e)	$\frac{1}{3}$ oe	2	<b>M1</b> for at least 6 of (2, 4) (3, 3) (4, 2) (4, 5) (5, 4) (6, 3) (7, 2) (7, 5) identified

15. 0607\_s21\_ms\_43 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)	0.055 oe	3	<b>M2</b> for $0.9 \times 0.06 + 0.1 \times 0.01$ oe or <b>M1</b> for $0.9 \times 0.06$ oe or $0.1 \times 0.01$ oe
(a)(ii)	0.945 oe	1	<b>FT</b> 1 – <i>their</i> (a)(i)
(a)(iii)	189	1	<b>FT</b> $200 \times \text{their}$ (a)(ii)
(b)	0.15 oe	2	<b>M1</b> for $0.8 \times p = 0.12$ oe

16. 0607\_w21\_ms\_43 Q: 13

Question	Answer	Marks	Partial Marks
	For all parts accept decimals or percentages with the usual rules for 3sf Do not penalise incorrect cancelling or converting Do not accept ratios or words		
(a)	$\frac{7}{10}$ oe	1	

Question	Answer	Marks	Partial Marks
(b)(i)	$\frac{12}{55}$ oe	2	<b>M1</b> for $\frac{3}{10} \times \frac{8}{11}$
(b)(ii)	$\frac{29}{55}$ oe	3	<b>M2</b> for $\frac{3}{10} \times \frac{3}{11} + \frac{7}{10} \times \frac{7}{11}$ or <b>M1</b> for either of these products seen
(b)(iii)	$\frac{26}{55}$ oe	3	<b>M2</b> for 1 – <i>their</i> (b)(ii)  OR <b>M2</b> for $\frac{7}{10} \times \frac{4}{11} + \frac{3}{10} \times \frac{8}{11}$ or <b>M1</b> for either of these products seen

17. 0607\_s20\_ms\_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{12}{50}$ oe	1	
(a)(ii)	$\frac{16}{50}$ oe	1	
(a)(iii)	$\frac{7}{50}$ oe	1	
(b)	$\frac{42}{600}$ oe	2	<b>M1</b> for $\frac{7}{25}$ soi
(c)	$\frac{24}{42}$ oe	3	<b>M2</b> for $\left(\frac{4}{7} \times \frac{3}{6}\right) + \left(\frac{3}{7} \times \frac{4}{6}\right)$ or <b>M1</b> for $\frac{4}{7} \times \frac{3}{6}$ or $\frac{3}{7} \times \frac{4}{6}$
(d)	$\frac{792}{117600}$ or $\frac{33}{4900}$ oe	4	<b>M3</b> for $\left(\frac{2}{50} \times \frac{12}{49} \times \frac{11}{48}\right) + \left(\frac{12}{50} \times \frac{2}{49} \times \frac{11}{48}\right)$ $+ \left(\frac{11}{50} \times \frac{12}{49} \times \frac{2}{48}\right)$ oe or <b>M2</b> for any two products or <b>M1</b> for any one of above products

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{7}{12}$ oe	1	
(a)(ii)	840	1	FT <i>their (i)</i>
(b)(i)	$\frac{1}{16}$ oe	2	M1 for $\frac{3}{12} \times \frac{3}{12}$
(b)(ii)	$\frac{25}{72}$ oe	3	M2 for $\frac{3}{12} \times \frac{3}{12} + \frac{4}{12} \times \frac{4}{12} + \frac{5}{12} \times \frac{5}{12}$ or M1 for any one of these products seen
(b)(iii)	$\frac{47}{72}$ oe	1	FT 1 – <i>their (ii)</i> or $\frac{4}{12} \times \frac{8}{12} + \frac{5}{12} \times \frac{7}{12} + \frac{3}{12} \times \frac{9}{12}$
(c)(i)	$\frac{3}{44}$ oe	3	M2 for $\frac{4}{12} \times \frac{5}{11} \times \frac{3}{10}$ or $\frac{3}{12} \times \frac{5}{11} \times \frac{2}{10}$ or M1 for any product of three proper fractions with denominators 12, 11 and 10
(c)(ii)	$\frac{12}{55}$ oe	4	M3 for $\frac{4}{12} \times \frac{3}{11} \times \frac{8}{10} \times 3$ oe  or M2 for $\frac{4}{12} \times \frac{3}{11} \times \frac{8}{10}$ oe  or M1 for product of three fractions with numerators 4, 3, 8 oe

19. 0607\_w20\_ms\_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$\frac{5}{7}$ oe	1	
(b)(i)	$\frac{6}{35}$ oe	2	M1 for $\frac{6}{10}$ seen
(b)(ii)	$\frac{33}{70}$ oe	3	M2 for $\frac{5}{7} \times \frac{5}{10} \times \frac{2}{7} \times \frac{4}{10}$ or M1 for one of above products
(c)	$\frac{1250}{16807}$	2	M1 for $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{2}{7}$
(d)	4 nfw	3	M2 for $\frac{4}{9} \times \frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$ or M1 for a correct trial with black(s) then white

20. 0607\_s19\_ms\_43 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{19}{120}$ oe	1	
(a)(ii)	$\frac{3}{4}$ oe	1	
(b)	$\frac{13}{60}$ oe	2	M1 for $\frac{k}{16+19+12+13}$
(c)	$\frac{13}{145}$ or $\frac{2184}{24360}$ oe	3	M2 for $\frac{14}{30} \times \frac{13}{29} \times \frac{12}{28}$ or M1 for $14 \times 13 \times 12$ oe seen or $30 \times 29 \times 28$ oe seen

21. 0607\_w19\_ms\_41 Q: 6

Question	Answer	Marks	Partial Marks
(a)	$\frac{1}{6}$ oe	1	
(b)(i)	$\frac{2}{12}$ oe	2	M1 for $\frac{2}{6} \times \frac{1}{2}$ oe
(b)(ii)	$\frac{8}{12}$ oe	2	M1 for $\frac{2}{6} + \frac{1}{2} - \frac{2}{6} \times \frac{1}{2}$ or indicating all 8 outcomes or $\frac{2}{6} \times \frac{1}{2} + \frac{4}{6} \times \frac{1}{2} + \frac{2}{6} \times \frac{1}{2}$ oe
(c)	$\frac{7}{8}$ oe	2	M1 for $1 - \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ oe
(d)	$\frac{36}{216}$ oe	3	M2 for $\frac{3}{6} \times \frac{2}{6} \times \frac{1}{6} \times 6$ oe or M1 for one product
(e)	6	1	
(f)	1, 2	2	M1 for probability of 1 then 2 or 2 then 1 is $\frac{1}{2} \times \frac{1}{3}$ or $\frac{1}{3} \times \frac{1}{2}$ or for $2 \times \frac{1}{2} \times \frac{1}{3}$ or $2 \times \frac{1}{3} \times \frac{1}{2}$ seen or for clear list

22. 0607\_w19\_ms\_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)	0 cao	1	
(b)	$\frac{5}{6}$ oe	1	
6(c)	$\frac{4}{24}$ oe	2	M1 for $\frac{1}{4} \times \frac{1}{6}$ or B1 for $\frac{k}{24}$ soi $k$ integer from 1 to 23
(d)	$\frac{12}{24}$ oe	3	M2 for $\frac{2}{4} \times \frac{3}{6} + \frac{2}{4} \times \frac{3}{6}$ oe or for 12 pairs listed or indicated or M1 for $\frac{2}{4} \times \frac{3}{6}$ oe or for 10 or 11 pairs listed or indicated
(e)	$\frac{4}{24}$ oe	2	M1 for $\frac{1}{4} \times \frac{1}{6}$ or for (1, 5) (2, 4) (3, 3) (4, 2) listed or indicated

23. 0607\_s18\_ms\_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	$\frac{6}{30}$ oe	2	M1 for $\frac{3}{6} \times \frac{2}{5}$ oe
(b)	$\frac{12}{30}$ oe	3	M2 for $\frac{2}{6} \times \frac{3}{5} \times 2$ oe or M1 for $\frac{2}{6} \times \frac{3}{5}$ oe
(c)	$\frac{28}{30}$ oe	2	M1 for $1 - \frac{2}{6} \times \frac{1}{5}$ oe

24. 0607\_w17\_ms\_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{2}{6}$ oe	1	
(a)(ii)	$\frac{4}{6}$ oe	1	
(a)(iii)	$\frac{4}{6}$ oe	1	
(b)(i)	$\frac{1}{36}$ oe	2	M1 for $\frac{1}{6} \times \frac{1}{6}$
(b)(ii)	$\frac{4}{36}$ oe	3	M2 for $\frac{1}{6} \times \frac{2}{6} + \frac{2}{6} \times \frac{1}{6}$ oe or M1 for one product soi by $\frac{1}{18}$ oe
(c)	$\frac{215}{216}$ oe	2	M1 for $1 - \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$ oe

25. 0607\_s16\_ms\_43 Q: 14

Question	Answer	Mark	Part Marks
(a) (i)	$\left(\frac{x}{x+y}\right)^2$ oe final answer	2	<b>B1</b> for $\frac{x}{x+y}$
(ii)	$2 \times \frac{xy}{(x+y)^2}$ oe final answer	3	<b>M2</b> for $\frac{x}{(x+y)} \times \frac{y}{(x+y)}$ oe or <b>B1</b> for $\frac{y}{x+y}$ seen
(b) (i)	$\frac{x(x-1)}{(x+y)(x+y-1)}$ oe final answer	3	<b>B2</b> for $\frac{x-1}{x+y-1}$ or <b>B1</b> for $x+y-1$ seen
(ii)	$2 \times \frac{xy}{(x+y)(x+y-1)}$ oe final answer	3	<b>M2</b> for $\frac{x}{(x+y)} \times \frac{y}{(x+y-1)}$ oe or <b>B1</b> for $\frac{y}{x+y-1}$ seen

26. 0607\_w16\_ms\_43 Q: 11

Question	Answer	Mark	Part Marks																
(a)	<table border="1"> <thead> <tr> <th></th> <th>Walking</th> <th>Cycling</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Male</th> <td>[16]</td> <td>13</td> <td>[29]</td> </tr> <tr> <th>Female</th> <td>12</td> <td>9</td> <td>21</td> </tr> <tr> <th>Total</th> <td>28</td> <td>[22]</td> <td>[50]</td> </tr> </tbody> </table>		Walking	Cycling	Total	Male	[16]	13	[29]	Female	12	9	21	Total	28	[22]	[50]	2	<b>B1</b> for 3 or 4 correct
	Walking	Cycling	Total																
Male	[16]	13	[29]																
Female	12	9	21																
Total	28	[22]	[50]																
(b)	$\frac{462}{2450}$ oe	2	<b>M1</b> for $\frac{22}{50} \times \frac{21}{49}$ oe																
(c)	$\frac{384}{756}$ oe	3	<b>M2</b> for $\frac{16}{\text{their } 28} \times \frac{\text{their } 12}{\text{their } 28-1} + \frac{\text{their } 12}{\text{their } 28} \times \frac{16}{\text{their } 28-1}$ oe or <b>M1</b> for one of above products																

27. 0607\_s15\_ms\_42 Q: 9

Qu.	Answer	Mark	Part Marks
(a) (i)	$\frac{4}{10}, \frac{2}{10}, \frac{4}{10}$	1	
	$\frac{5}{11}, \frac{2}{11}, \frac{4}{11}$	1	
	$\frac{5}{10}, \frac{2}{10}, \frac{3}{10}$	1	
(b) (i)	$\frac{4}{121}$ oe	2	M1 for $\frac{2}{11} \times \text{their } \frac{2}{11}$
(ii)	$\frac{32}{110}$ oe	3	M2 for $\frac{5}{11} \times \text{their } \frac{4}{10} + \frac{4}{11} \times \text{their } \frac{3}{10}$ oe or M1 for one of above products without incorrect extras
(iii)	$\frac{189}{605}$ oe	3	M2 for $\frac{5}{11} \times \text{their } \frac{2}{10} + \frac{2}{11} \times \text{their } \frac{5}{11} + \frac{2}{11} \times \text{their } \frac{4}{11} + \frac{4}{11} \times \text{their } \frac{2}{10}$ oe or M1 for 2 of above products or one of $\left(\frac{5}{11} + \frac{4}{11}\right) \times \text{their } \frac{2}{10}, \frac{2}{11} \times \left(\text{their } \frac{5}{11} + \text{their } \frac{4}{11}\right)$

28. 0607\_w15\_ms\_41 Q: 9

Question	Answer	Mark	Part Marks
(a) (i)	$\frac{3}{36}$ oe	2	M1 for $\frac{1}{6} \times \frac{3}{6}$ oe
(ii)	$\frac{5}{36}$ oe	3	M2 for $\frac{1}{6} \times \frac{2}{6} + \frac{3}{6} \times \frac{1}{6}$ oe or M1 for $\frac{1}{6} \times \frac{2}{6}$ or $\frac{3}{6} \times \frac{1}{6}$ oe or for list or space diagram showing at least 3 combinations
(b)	$\frac{128}{1296}$ oe	2	M1 for $\frac{4}{6} \times \frac{4}{6} \times \frac{4}{6} \times \frac{2}{6}$ oe
(c)	6	2	M1 for $\left(\frac{5}{6}\right)^k \times \frac{1}{6}$ or SC1 for answer 5

29. 0607\_w15\_ms\_42 Q: 10

Question	Answer	Mark	Part Marks
(a) (i)	$\frac{6}{336}$ oe	2	M1 for $\frac{3}{8} \times \frac{2}{7} \times \frac{1}{6}$
(ii)	$\frac{90}{336}$ oe	3	M2 for $3 \times \frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$ or M1 for $\frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$ If M0 scored, then B1 for RRB, RBR, BRR
(iii)	$\frac{270}{336} \frac{45}{56}$ oe	3	M2 for $3 \times \frac{3}{8} \times \frac{5}{7} \times \frac{4}{6} + \text{their (a)(ii)}$ or for $1 - \text{their (a)(i)} - \frac{5}{8} \times \frac{4}{7} \times \frac{3}{6}$ or M1 for $\frac{5}{8} \times \frac{4}{7} \times \frac{3}{6} + \text{their (a)(i)}$ or for $\frac{3}{8} \times \frac{5}{7} \times \frac{4}{6} + \frac{3}{8} \times \frac{2}{7} \times \frac{5}{6}$
(b)	30	2FT	M1 for $1680 \times \text{their (a)(i)}$

30. 0607\_m22\_ms\_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$\frac{4}{5}$ oe $\frac{7}{10}, \frac{3}{10}$ oe $\frac{9}{10}, \frac{1}{10}$ oe	3	B1 for each pair of branches
(b)(i)	$\frac{18}{25}$ oe	2	M1 for $\text{their } \frac{4}{5} \times \text{their } \frac{9}{10}$
(b)(ii)	$\frac{43}{50}$ oe	2	M1 for $\text{their (b)(i)} + \frac{1}{5} \times \text{their } \frac{7}{10}$ oe
(c)(i)	$\frac{36}{43}$ oe	2	M1 for $\text{their (b)(ii)} \times p = \text{their (b)(i)}$ or better
(c)(ii)	$\text{their (b)(ii)}, 1 - \text{their (b)(ii)}$ oe $\text{their (c)(i)}, 1 - \text{their (c)(i)}$ oe $\frac{4}{7}, \frac{3}{7}$ oe	3	B1 for each pair of branches

31. 0607\_s21\_ms\_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	(0.7) 0.25 oe 0.05 oe	<b>B1</b>	
	0.2 oe 0.4 oe (0.55) 0.25 oe		
(b)(i)	0.13 oe	<b>3</b>	<b>M2</b> for $0.6 \times \text{their } 0.05 + \text{their } 0.4 \times \text{their } 0.25$ oe or <b>M1</b> for one of above products

Question	Answer	Marks	Partial Marks
(b)(ii)	0.63 oe	<b>3</b>	<b>M2</b> for $\text{their (b)(i)} + 0.6 \times 0.7 + \text{their } 0.4 \times \text{their } 0.2$ or <b>M1</b> for $0.6 \times 0.7 + \text{their } 0.4 \times \text{their } 0.2$ OR <b>M2</b> for $0.6 \times \text{their } 0.75 + \text{their } 0.4 \times \text{their } 0.45$ oe or <b>M1</b> for one of above products OR <b>M2</b> for $1 - 0.6 \times \text{their } 0.25 - \text{their } 0.4 \times 0.55$ or <b>M1</b> for $0.6 \times \text{their } 0.25$ and $\text{their } 0.4 \times 0.55$
(c)	0.36[0] or 0.3601 to 0.3602 oe	<b>3</b>	<b>M2</b> for $5 \times 0.7^4 \times 0.3$ oe or <b>M1</b> for $0.7^4 \times 0.3$ oe

32. 0607\_w21\_ms\_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	Correct tree diagram 0.6 oe 0.9 and 0.1 oe 0.95 and 0.05 oe	3	<b>B1</b> for each
(b)	0.93 oe	3	<b>M2</b> for $0.4 \times 0.9 + 0.6 \times 0.95$ or <b>M1</b> for $0.4 \times 0.9$ or $0.6 \times 0.95$
11(a)	502 or 502.1 to 502.3 nfw	7	<b>M2</b> for $8^2 + 5^2 - 2 \times 8 \times 5 \times \cos 100$ or <b>M1</b> for $\cos 100 = \frac{8^2 + 5^2 - BP^2}{2 \times 8 \times 5}$ <b>M1</b> for $[2 \times] \frac{1}{2} \times 8 \times 5 \times \sin 100$ <b>M1</b> for $20 \times 8$ <b>M1</b> for $20 \times 5$ <b>M1</b> for <i>their</i> $BP \times 20$

33. 0607\_s19\_ms\_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)	0.3 0.8 0.05 and 0.95	3	<b>B1</b> <b>B1</b> <b>B1</b>
(b)(i)	0.155 oe	3	<b>M2</b> for $0.7 \times 0.2 + \textit{their} 0.3 \times \textit{their} 0.05$ or <b>M1</b> for $0.7 \times 0.2$ or $\textit{their} 0.3 \times \textit{their} 0.05$
(b)(ii)	31	1	<b>FT</b> $200 \times \textit{their} (i)$

34. 0607\_s18\_ms\_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Fully correct tree diagram	3	<b>B1</b> for each column correct of 0.9 and 0.1 correctly placed (L & R) 0.8 and 0.2 correctly placed (S) 0.7 and 0.3 correctly placed (W)
(b)	0.504	2	<b>M1</b> for $0.9 \times 0.8 \times 0.7$
(c)	0.398	4	<b>M3</b> for $0.9 \times 0.8 \times 0.3 + 0.9 \times 0.2 \times 0.7$ $+ 0.1 \times 0.8 \times 0.7$ or <b>M2</b> for 2 of above products or <b>M1</b> for 1 of above products

35. 0607\_w18\_ms\_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$\frac{11}{20}$ oe	2	M1 for $1 - \frac{1}{5} - \frac{1}{4}$
(b)(i)	$\frac{2}{3}$ and $\frac{11}{20}$ correctly placed	1	FT <i>their</i> (a)
(b)(ii)	$\frac{8}{15}$ oe	3	M2 for $\frac{2}{3} \times \left( \frac{1}{4} + \textit{their} \frac{11}{20} \right)$ or $\frac{2}{3} \times \left( 1 - \frac{1}{5} \right)$ oe or $1 - \frac{1}{3} - \left( \frac{2}{3} \times \frac{1}{5} \right)$ or M1 for $\frac{2}{3} \times \left( \frac{1}{4} \right)$ or $\frac{2}{3} \times \left( \textit{their} \frac{11}{20} \right)$ or $\frac{1}{3} + \left( \frac{2}{3} \times \frac{1}{5} \right)$ or $\frac{1}{4} + \frac{11}{20}$
(b)(iii)	48 final answer	1	FT <i>their</i> (b)(ii)

36. 0607\_w17\_ms\_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$\frac{3}{8}, \frac{5}{8}$ correctly placed $\frac{2}{7}, \frac{5}{7}$ correctly placed $\frac{6}{9}, \frac{3}{9}$ correctly placed	3	B1 for each pair
(b)(i)	$\frac{6}{56}$ oe	2	M1 for <i>their</i> $\frac{3}{8} \times \textit{their} \frac{2}{7}$
(b)(ii)	$\frac{115}{168}$ oe	3	M2 for <i>their</i> $\frac{3}{8} \times \textit{their} \frac{5}{7} + \textit{their} \frac{5}{8}$ $\times \textit{their} \frac{6}{9}$ oe or M1 for 1 of above products

37. 0607\_s15\_ms\_41 Q: 12

Qu.	Answer	Mark	Part Marks
(a)	$\frac{4}{10}, \frac{9}{11}, \frac{2}{11}, \frac{8}{11}, \frac{3}{11}$	2	<b>B1</b> for one correct pair on 2nd bag
(b) (i)	$\frac{54}{110}$ oe cao	2	<b>M1FT</b> for $\frac{6}{10} \times \text{their } \frac{9}{11}$
(ii)	$\frac{44}{110}$ oe cao	3	<b>M2FT</b> for $\frac{6}{10} \times \text{their } \frac{2}{11} + \frac{4}{10} \times \text{their } \frac{8}{11}$ oe or <b>M1FT</b> for one of above products
(c)	$\frac{66}{110}$ oe cao	3	<b>M2FT</b> for $\frac{6}{10} \times \text{their } \frac{9}{11} + \frac{4}{10} \times \text{their } \frac{3}{11}$ or <b>(b)(i)</b> + $\frac{4}{10} \times \text{their } \frac{3}{11}$ or $1 - \text{their } \text{(b)(ii)}$ oe or <b>M1FT</b> for $\frac{6}{10} \times \text{their } \frac{9}{11}$ or $\frac{4}{10} \times \text{their } \frac{3}{11}$

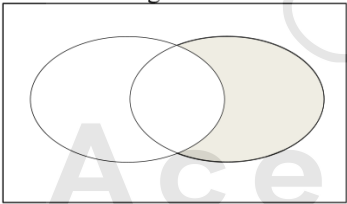
38. 0607\_s15\_ms\_43 Q: 10

Qu.	Answer	Mark	Part Marks
(a)	$\frac{6}{10}, \frac{4}{10}$ oe	1	
	$\frac{4}{9}, \frac{3}{9}, \frac{2}{9}$ correctly positioned twice	1	
(b) (i)	$\frac{18}{90}$ oe	2	<b>M1</b> for $\frac{6}{10} \times \frac{3}{10}$
(ii)	$\frac{24}{90}$ oe	3	<b>M2 for</b> $\frac{6}{10} \times \frac{2}{9} + \frac{4}{10} \times \frac{2}{9}$ or <b>M1</b> for one of above products
(iii)	$\frac{64}{90}$ oe	3	<b>M2</b> for $1 - \text{their } \text{(b)(i)} - \frac{4}{10} \times \frac{3}{9}$ oe  <b>M1</b> for one of $\frac{6}{10} \times \frac{4}{9}, \frac{6}{10} \times \frac{2}{9}, \frac{4}{10} \times \frac{4}{9}, \frac{4}{10} \times \frac{3}{9}$

39. 0607\_w15\_ms\_43 Q: 10

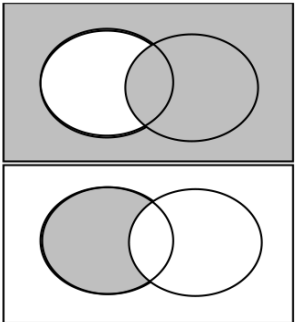
Question	Answer	Mark	Part Marks
(a)	$\frac{1}{3}$	1	
	$\frac{2}{5}$	1	
	$\frac{1}{10}$ and $\frac{9}{10}$	1	
(b)	$\frac{2}{3} \times \frac{3}{5} + \frac{1}{3} \times \frac{1}{10}$	M2	M1 for one of these FT from (a)
(c)	$\frac{17}{30}$ and $\frac{12}{13}$	1	
	$\frac{8}{17}$ and $\frac{9}{17}$	2	M1 for $\frac{17}{30} \times x = \frac{9}{30}$ oe

40. 0607\_m21\_ms\_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	15 nfw	3	M2 for $8x = 104$ or better or M1 for $3x + x + 2 + 4x + 1 + 8 [=115]$ oe If 0 scored, SC1 for 16 as final answer
(a)(ii)	correct shading 	1	
(a)(iii)	$\in$	1	
(b)(i)	$\frac{2}{9}$ oe	1	

Question	Answer	Marks	Partial Marks
(b)(ii)	$\frac{104}{153}$ oe	4	<p><b>M3</b> for <math>\frac{6}{18} \times \frac{4}{17} + \frac{6}{18} \times \frac{8}{17} + \frac{4}{18} \times \frac{6}{17} + \frac{4}{18} \times \frac{8}{17} + \frac{8}{18} \times \frac{6}{17} + \frac{8}{18} \times \frac{4}{17}</math> oe or <b>M2</b> for 4 or 5 correct products added or <b>M1</b> for 2 or 3 correct products added</p> <p>OR</p> <p><b>M3</b> for <math>\frac{6}{18} \times \frac{12}{17} + \frac{4}{18} \times \frac{14}{17} + \frac{8}{18} \times \frac{10}{17}</math> or <b>M2</b> for 2 correct products added or <b>M1</b> for 1 correct product</p> <p>OR</p> <p><b>M3</b> for <math>1 - \left( \frac{6}{18} \times \frac{5}{17} + \frac{4}{18} \times \frac{3}{17} + \frac{8}{18} \times \frac{7}{17} \right)</math> or <b>M2</b> for 1 – (two correct products added) or <b>M1</b> for 1 – one correct product</p> <p>If 0 scored <b>SC1</b> for final answer <math>\frac{52}{81}</math> oe</p>

41. 0607\_w21\_ms\_41 Q: 12

Question	Answer	Marks	Partial Marks
(a)(i)		2	<b>B1</b> for each
(a)(ii)	$(A \cap B') \cup (A' \cap B)$ oe	1	
(b)(i)	$\frac{7}{60}$ oe	2	<b>M1</b> for $\frac{14}{40} \times \frac{13}{39}$
(b)(ii)	$\frac{50}{231}$ oe	3	<b>M2</b> for $\frac{5}{22} \times \frac{10}{21}$ or $\frac{10}{22} \times \frac{5}{21}$ oe or <b>M1</b> for $\frac{a}{22} \times \frac{b}{21}$ or $\frac{5}{k} \times \frac{10}{k-1}$ oe
(b)(iii)	$\frac{2}{247}$ oe	3	<b>M2</b> for $[k \times] \frac{5}{40} \times \frac{4}{39} \times \frac{8}{38}$ oe or <b>M1</b> for $\frac{a}{40} \times \frac{a-1}{39} \times \frac{b}{38}$ oe any integer $k$ oe

42. 0607\_s20\_ms\_41 Q: 8

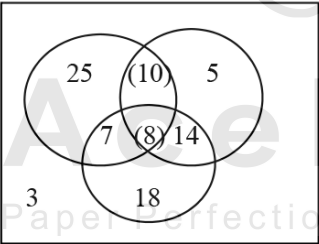
Question	Answer	Marks	Partial Marks
(a)(i)	0.3 0.9 and 0.1 0.2 and 0.8	3	<b>B1</b> for each

Question	Answer	Marks	Partial Marks
(a)(ii)	0.69 oe	3	<b>M2</b> for $0.7 \times 0.9 + 0.3 \times 0.2$ or <b>M1</b> for one correct product
(b)(i)	25	1	
(b)(ii)	$\frac{42}{870}$ oe	3	<b>M2</b> for $\frac{7}{30} \times \frac{6}{29}$ or <b>M1</b> for $\frac{p}{q} \times \frac{p-1}{q-1}$

43. 0607\_w20\_ms\_43 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	20	1	
(a)(ii)	40	1	
(b)(i)	50	1	
(b)(ii)	47	1	
(b)(iii)	23	1	
(c)	$\frac{13}{50}$	1	<b>FT</b> <i>their</i> <b>(b)(i)</b>
(d)	$\frac{3}{175}$ oe	2	<b>M1</b> for $\frac{7}{\text{their } 50} \times \frac{6}{\text{their } 50 - 1}$
(e)	$\frac{7}{187}$ oe	3	<b>M2</b> for $\frac{7}{34} \times \frac{6}{33}$ or <b>M1</b> for $\frac{7}{p} \times \frac{6}{p-1}$

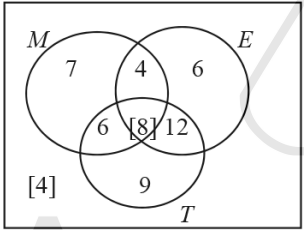
44. 0607\_w19\_ms\_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct Diagram 	2	Condone 3 omitted from outside region <b>B1</b> for 3 subsets correct
(b)	3	1	
(c)	$\frac{90}{8010}$ oe	2	<b>M1</b> for $\frac{10}{90} \times \frac{9}{89}$
(d)	$\frac{140}{2450}$	3	<b>M2</b> for $\frac{10}{50} \times \frac{\text{their } 7}{49} + \frac{\text{their } 7}{50} \times \frac{10}{49}$ oe or <b>M1</b> for one of these products

45. 0607\_w18\_ms\_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	16	1	
(b)(i)	$\frac{7}{745}$ oe	2	<b>M1</b> for $\frac{15}{150} \times \frac{14}{149}$ oe with no extra products
(b)(ii)	$\frac{497}{2235}$ oe	3	<b>M2</b> for $\frac{71}{150} \times \frac{70}{149}$ oe with no extra products or <b>M1</b> for $35 + 12 + 24$ soi by 71
(c)	$\frac{1640}{5673}$ oe	3	<b>M2</b> for $\frac{42}{63} \times \frac{41}{62} \times \frac{40}{61}$ oe with no extra products or <b>M1</b> for $\frac{15+27}{15+27+8+13}$ soi by $\frac{42}{63}$

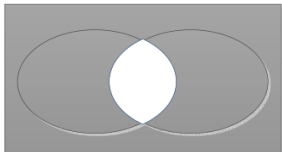
46. 0607\_s17\_ms\_41 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct values inside circles 	3	<b>B2</b> for 4 or 5 regions correct <b>B1</b> for 2 or 3 regions correct
(b)(i)	17	1	<b>FT</b> their diagram
(b)(ii)	11	1	<b>FT</b> their diagram

Question	Answer	Marks	Partial Marks
(c)	$\frac{4}{56}$ oe	2	<b>FT</b> <i>their 4</i> <b>M1</b> for $\frac{\text{their 4}}{k}$ ( $k > \text{their 4}$ ) or $\frac{p}{56}$ ( $p < 56$ )
(d)	$\frac{1190}{3080}$ oe	2	<b>M1</b> for $\frac{35}{56} \times \frac{34}{55}$
(e)	$\frac{6}{25}$ oe	2	<b>FT</b> <i>their 6</i> <b>M1</b> for $\frac{\text{their 6}}{k}$ ( $k > \text{their 6}$ ) or $\frac{p}{25}$ ( $p < 25$ )
(f)	$\frac{12}{870}$ oe	3	<b>M2</b> for $\frac{\text{their 4}}{30} \times \frac{(\text{their 4})-1}{29}$ ( <i>their 4</i> < 30) or <b>M1</b> for $\frac{a}{30} \times \frac{a-1}{29}$ ( <i>their a</i> < 30)

47. 0607\_s17\_ms\_43 Q: 9

Question	Answer	Marks	Part Marks
(a)	15, 7, 12 correctly placed	2	<b>B1</b> for two correctly placed or <b>M1</b> for $41 - (40 - 6)$ seen oe or correct equation
(b)(i)	7	1	<b>FT</b> <i>their</i> Venn diagram
(b)(ii)	28	1	<b>FT</b> <i>their</i> Venn diagram
(c)	15	1	<b>FT</b> <i>their</i> Venn diagram
(d)	$\frac{462}{1560}$ oe	2	<b>M1</b> for $\frac{22}{40} \times \frac{21}{39}$
(e)(i)	$\frac{7}{19}$	1	<b>FT</b> <i>their</i> Venn diagram
(e)(ii)	$\frac{168}{342}$ oe	3	<b>M2</b> for $\frac{\text{their 7}}{19} \times \frac{\text{their 12}}{18} + \frac{\text{their 12}}{19} \times \frac{\text{their 7}}{18}$ oe or <b>M1</b> for one of these products
(f)	8	3	<b>M2</b> for $\frac{\text{their 7} + n}{40 + n} = \frac{5}{16}$ oe or <b>M1</b> for at least two trials

Question	Answer	Marks	Part Marks
(g)		1	

48. 0607\_w16\_ms\_41 Q: 5

Qu.	Answer	Mark	Part Marks
(a)	$18 - x + x + 12 - x + 3 = 25$ oe Completion to $x = 8$ with at least one step	<b>M1</b> <b>A1</b>	<b>B1</b> for Venn diagram completed with the 10, 8, 4 and 3
(b) (i)	$\frac{22}{25}$ oe	<b>1</b>	0.88
(ii)	$\frac{21}{25}$ oe	<b>1</b>	0.84

Qu.	Answer	Mark	Part Marks
(c)	$\frac{8}{18}$ oe	<b>1</b>	$\frac{4}{9}$ , 0.4444...
(d)	element chosen from $Q$ is also in $P$ oe	<b>1</b>	



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