1(a). A spinner has five sides numbered 1 to 5.
If the spinner is fair, the probability that it lands on the number 1 is 0.2.

A student spins the spinner 400 times.

Assuming the spinner is fair, use the information to work out how many times the spinner is expected to land on the number 1.

....**[2]**

(b). The spinner actually landed on the number 1 on 77 of the 400 spins.

Decide whether or not the result suggests this spinner is likely to be a fair spinner.
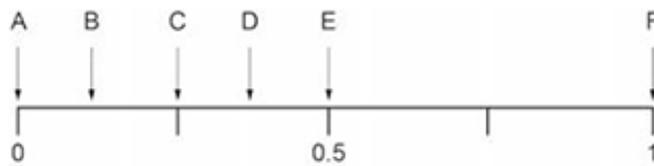Give a reason for your answer.

.... because

--**[1]**

2(a). There are 20 coins in a bag.

* Eight 5p coins.
* Five 10p coins.
* Four 20p coins
* Three 50p coins.

The diagram shows a probability scale.

One coin is taken at random from the bag.

Which arrow shows the probability that the coin:

  i.   is a £1 coin,

....**[1]**

  ii.   is a 10p coin,

....**[1]**

iii.   has a value less than £1?

....**[1]**

(b). More coins are added to the 20 coins already in the bag.
One coin is taken at random from the bag.

The probability of the coin being a 5p, a 10p, a 20p or a 50p coin are now all equal.

Find the **minimum** number of coins that must be in the bag.

....**[2]**

3(a). 60 students each chose two activities, one from Option 1 and one from Option 2.

Option	Activity
1	football or hockey
2	athletics or multigym

This frequency tree shows the number of students choosing some of the activities.

How many more students chose hockey and multigym rather than football and multigym?

....[1]
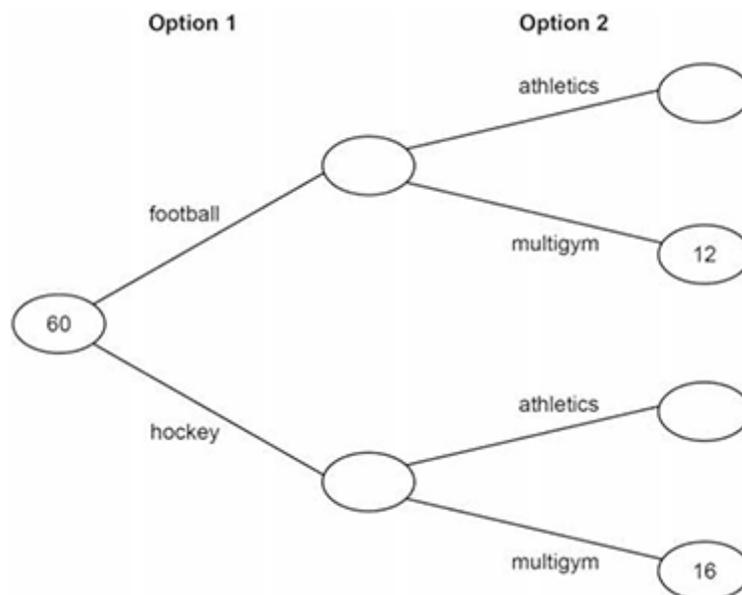
(b). Ten more students chose football rather than hockey.

Complete the frequency tree.

[4]

4. In a particular town last year:

*   it rained on 11 of the 30 days in November
*   it rained on 12 of the 31 days in December.

Jamal says,

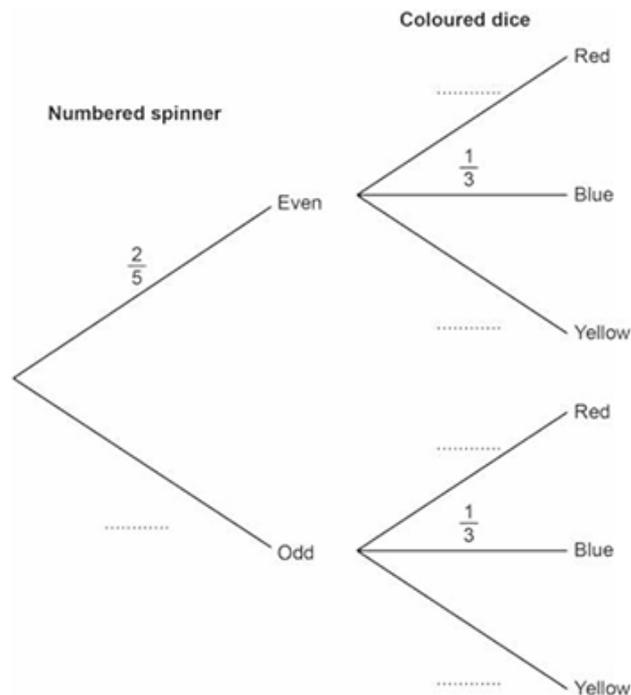I think the probability it will rain on December 25th next year is $\frac{12}{31}$.

What assumption has Jamal made?

---[1]

5(a). Taylor spins a fair five-sided spinner.
The sectors of the spinner are numbered 1, 2, 3, 4 and 5.

Taylor also throws a fair six-sided dice.
Three of the dice faces are red, two are blue, and one is yellow.
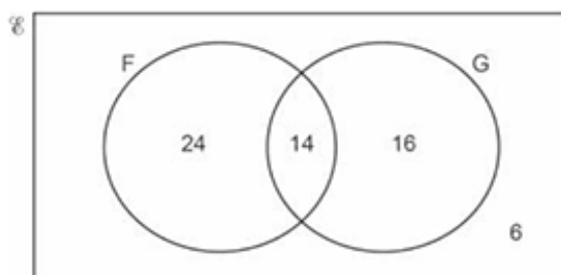
Complete this tree diagram.

[3]

(b). Calculate the probability that Taylor gets an even number on the spinner and a blue face on the dice.

.... **[2]**

6(a). 60 people are asked if they have visited France (F) and if they have visited Greece (G).

The Venn diagram shows the results.

How many of the 60 people have **not** visited either France or Greece?

.... **[1]**

(b). How many of the 60 people have visited Greece?

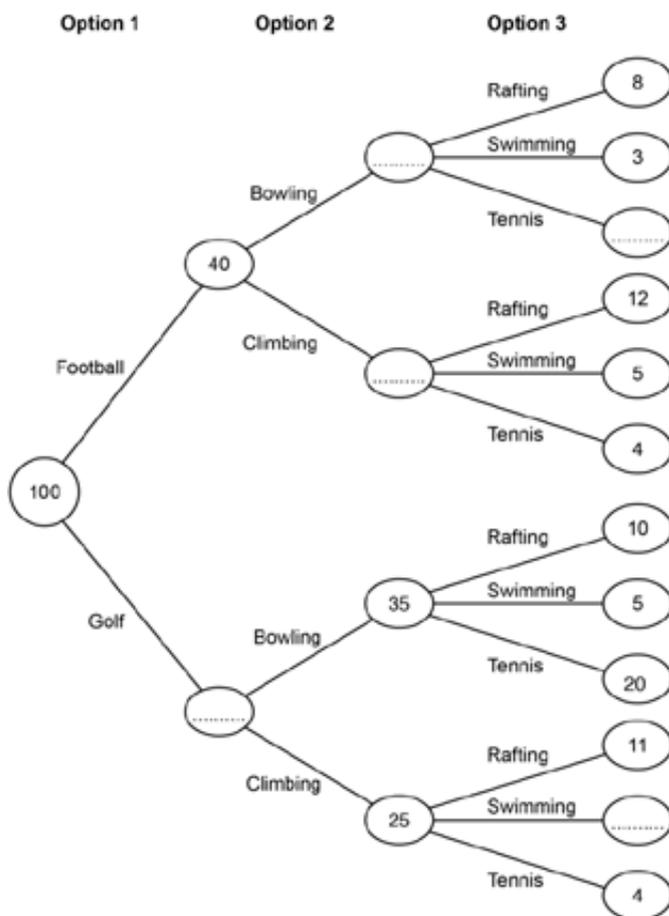.. **[1]**

7(a). At an adventure park, all children participate in three activities, choosing exactly one activity from each of three options.

Option	Activity
1	football or golf
2	bowling or climbing
3	rafting or swimming or tennis

On one Monday morning, 100 children visited the adventure park.

The frequency tree shows the number of children choosing some of the activities.

Complete the frequency tree.

[3]

(b). Which was the most popular activity out of rafting, swimming and tennis?
Show how you decide.

.... because --

--[3]

(c). One of the 100 children is picked at random.

Find the probability that this child chose climbing.

.... **[2]**

(d). Jane says

60% of all children coming to the adventure park choose golf.

What assumption has Jane made?

--**[1]**

8. In a survey, 40 people were asked whether they have a cat (C) or a dog (D).

The Venn diagram shows some of the results.
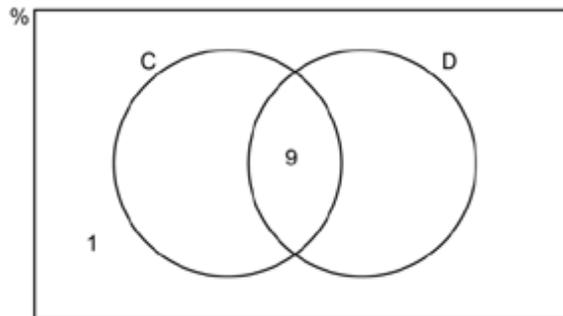
The ratio of those that **only** have a cat to those that **only** have a dog is 3 : 2.

One of the 40 people is chosen at random.

Find the probability that they have a **dog**.
You must show your working.

.... **[5]**

9(a). This probability scale shows the probability of picking a red crayon from a box of crayons.

Write down, as a fraction, the probability of picking a red crayon.

.... **[1]**

(b). On the probability scale, mark with an arrow (↑) the probability of **not** picking a red crayon.

[1]

10(a). A play group offers four activities to their children.

Colouring (C)   Painting (P)   Reading (R)   Skipping (S)

Complete the list below to show all the possible combinations of two **different** activities. You may not need all the answer lines.

C   P
.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

[2]

(b). Write down the fraction of the combinations that include Skipping (S).

.... **[1]**

11(a). 80 students each chose two activities, one from Option 1 and one from Option 2.

Option	Activity
1	football or hockey
2	athletics or multigym

This frequency tree shows the number of students choosing some of the activities.

Option 1   Option 2

athletics

football

multigym   12

80

athletics

hockey

multigym   14

How many more students chose hockey and multigym rather than football and multigym?

.... **[1]**

(b). Ten more students chose football rather than hockey.

Complete the frequency tree.

[4]

12(a). A spinner has five sides numbered 1 to 5.
If the spinner is fair, the probability that it lands on the number 1 is 0.2.

A student spins the spinner 300 times.

Assuming the spinner is fair, use the information to work out how many times the spinner is expected to land on the number 1.

.... **[2]**

(b). The spinner actually landed on the number 1 on 58 of the 300 spins.

Decide whether or not the result suggests this spinner is likely to be a fair spinner? Give a reason for your answer.

_____ because

_____

_____**[1]**

13(a). There are 16 coins in a bag.

- Six 5p coins.
- Two 10p coins.
- Eight 20p coins.

The diagram shows a probability scale.
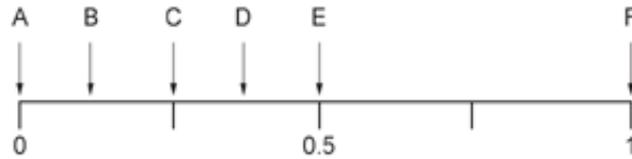
One coin is taken at random from the bag.

Which arrow shows the probability that the coin:

   i.   has a value of less than £1,

.... **[1]**

   ii.   is a 20p coin,

.... **[1]**

   iii. is a 50p coin?

.... **[1]**

(b). More coins are added to the 16 coins already in the bag.

One coin is taken at random from the bag.
The probability of the coin being a 5p, a 10p or a 20p coin are now all equal.

Find the **minimum** number of coins that must be in the bag.

.... **[2]**

14. In a particular town last year:

- it rained on 17 of the 30 days in November
- it rained on 18 of the 31 days in December.

Sam says,

I think the probability it will rain on December 25th next year is $\frac{18}{31}$.

What assumption has Sam made?

_____

--**[1]**

15(a). Kai spins a fair five-sided spinner.
The sectors of the spinner are numbered 1, 2, 3, 4 and 5.

Kai also throws a fair four-sided dice.
Two of the dice faces are red, one is blue, and one is yellow.

Complete this tree diagram.

Coloured dice

Numbered spinner

Even $\frac{2}{5}$

Red $\frac{1}{4}$

Blue

Yellow

Odd

Red $\frac{1}{4}$

Blue

Yellow

[3]
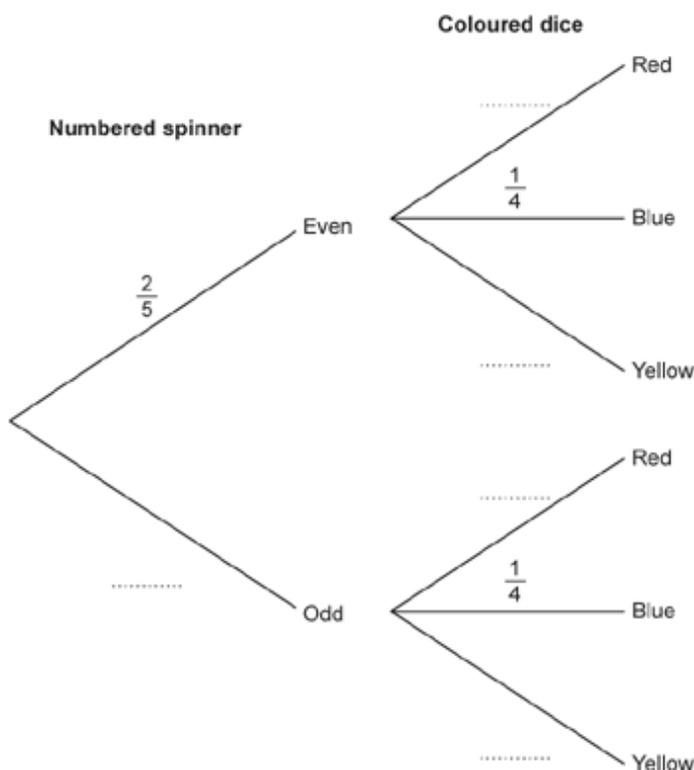
(b). Calculate the probability that Kai gets an even number on the spinner and a blue face on the dice.

.... **[2]**

16(a). 60 people are asked if they have visited France (F) and if they have visited Greece (G).

The Venn diagram shows the results.

How many of the 60 people have **not** visited either France or Greece?

.... **[1]**
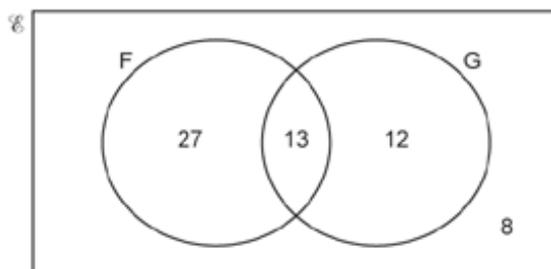
(b). How many of the 60 people have visited Greece?

.... **[1]**

17(a). Beth records the number of times a biased six-sided dice lands on each of its numbers.

Complete the table to show the relative frequencies.

Number on the dice	1	2	3	4	5	6
Frequency	14	18	3	4	6	5
Relative frequency				0.08	0.12	

[2]

(b). Use Beth's results to estimate the probability that the spinner lands on 4 or 5.

.... **[2]**

18(a). A fair spinner has four sides, numbered 1, 2, 3 and 4.

   i.   Write down the probability of the spinner landing on 2.

.... **[1]**

   ii.   Write down the probability of the spinner **not** landing on 2.

.... **[1]**

(b). Write down an outcome for the spinner that has a probability of 0.

[1]

19. A box contains only red, green and blue crayons.

- 5 of the crayons are red.
- 18 of the crayons are green.
- The rest of the crayons are blue.

Amos chooses one crayon at random from the box.

The probability that this is a green crayon is $\frac{3}{5}$.

Work out the number of blue crayons in the bag.

……………………..……………………… **[4]**

20(a). On a bus route there is a set of traffic lights and a level crossing.
The probability that the bus stops at the traffic lights is 0.6.
The probability that the bus stops at the level crossing is 0.3.

Use the information to complete the tree diagram.
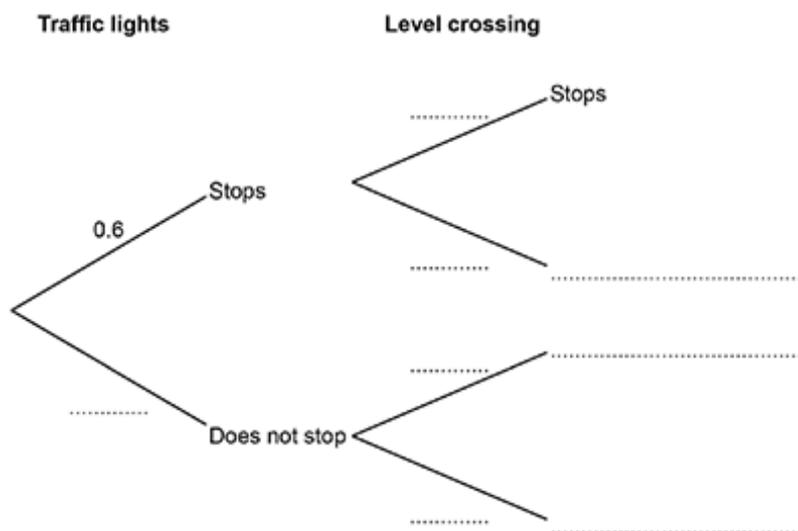
[3]

(b). Find the probability that the bus stops at either the traffic lights or at the level crossing but not both.

.... **[3]**

21(a). 120 children are asked if they have a scooter (S) or a bicycle (B).

- 53 children only have a scooter.
- 28 children only have a bicycle.
- 23 children have both a scooter and a bicycle.

Show this information on the Venn diagram.
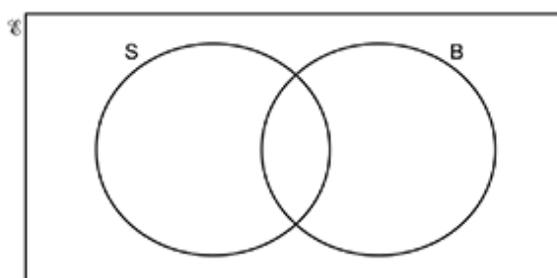
[1]

(b).

  i.   How many children do not have a scooter or a bicycle?

……..………….……………… **[1]**

  ii.   Write your answer in the correct place on the Venn diagram.

[1]

(c). One of the 120 children is chosen at random.

Work out the probability they have a bicycle.

…….……………….………………. **[2]**

22(a). At an adventure park, all children participate in three activities, choosing exactly one activity from each of three options.

Option	Activity
1	football or golf
2	bowling or climbing
3	rafting or swimming or tennis

On one Monday morning, 100 children visited the adventure park.

The frequency tree shows the number of children choosing some of the activities.

Complete the frequency tree.

[3]

(b). Which was the most popular activity out of rafting, swimming and tennis?
Show how you decide.

_____ because _____

_____

_____ **[3]**
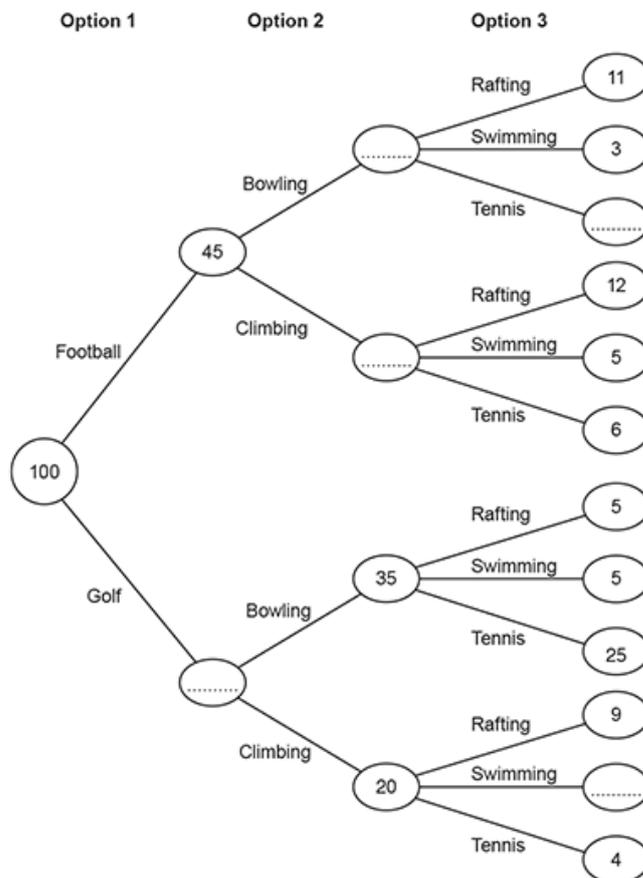
(c). One of the 100 children is picked at random.

Find the probability that this child chose bowling.

.... **[2]**

(d). Alex says

45% of all children coming to the adventure park choose football.

What assumption has Alex made?

_____

_____**[1]**

23. In a survey, 50 people were asked whether they have a car (C) or a bicycle (B).

The Venn diagram shows some of the results.
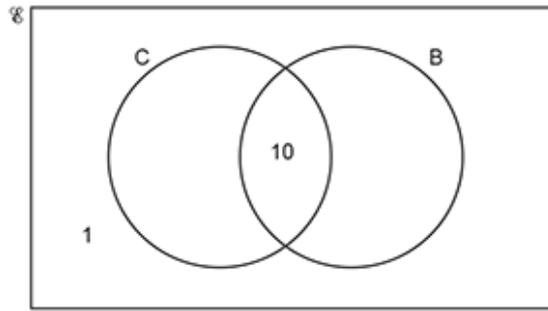
The ratio of those that **only** have a car to those that **only** have a bicycle is 2 : 1.
One of the 50 people is chosen at random.

Find the probability that they have a **bicycle**.
You must show your working.

.... **[5]**

24(a). This probability scale shows the probability of picking a blue counter from a bag of counters.

Write down, as a fraction, the probability of picking a blue counter.

.... **[1]**

(b). On the probability scale, mark with an arrow (↑) the probability of **not** picking a blue counter.

[1]

25(a). A play group offers four activities to their children.

Baking (B)   Drawing (D)   Exercise (E)   Reading (R)

Complete the list below to show all the possible combinations of two **different** activities.
You may not need all the answer lines.

.................B................. and ....D............

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

.... and ....

[2]

(b). Write down the fraction of the combinations that include Reading (R).

.... **[1]**

26(a). A breakfast menu consists of a drink, an egg dish and toast chosen from these lists.

Drink	Egg dish	Toast
Tea (T)	Fried eggs (F)	White (W)
Coffee (C)	Scrambled eggs (S)	Brown (B)
	Poached eggs (P)	

Some of the possible meal deals are shown in this table.

Complete the table to show all the possible meal deals.
You may not need all the rows.

Drink	Egg dish	Toast
T	F	W
T	F	B
T	S	W

[2]

(b). Write down the fraction of the meal deals that include poached eggs (P).

……..…………….………………. **[1]**

27(a). Azmi has a bag of marbles that are red or blue or green or yellow.

Azmi takes a marble at random, records the colour and returns the marble to the bag.
Azmi does this 900 times.

The table shows some of the results.

Colour	Red	Blue	Green	Yellow
Frequency	72	90	315	
Relative frequency	0.08	0.10	0.35	0.47

Complete the table to show the number of times a yellow marble is taken.

[2]

(b).

i.   There are 50 marbles in the bag.

Work out how many blue marbles are likely to be in the bag.

…….……………….…………….. **[2]**

ii.   Is your answer to **part (b)(i)** likely to be the actual number of blue marbles in the bag? Give a reason for your answer.

_____ because _____

_____ **[1]**

28. Blake has a bag containing 5 red counters and 2 yellow counters.
There are no other counters in the bag.

Blake takes a counter at random from the bag, puts it back, and then takes another counter.

Blake says

The probability that the two counters are the same colour is less than 50%.

Is Blake correct?
Show how you decide.
You may use this tree diagram if you wish.

First counter   **Second counter**
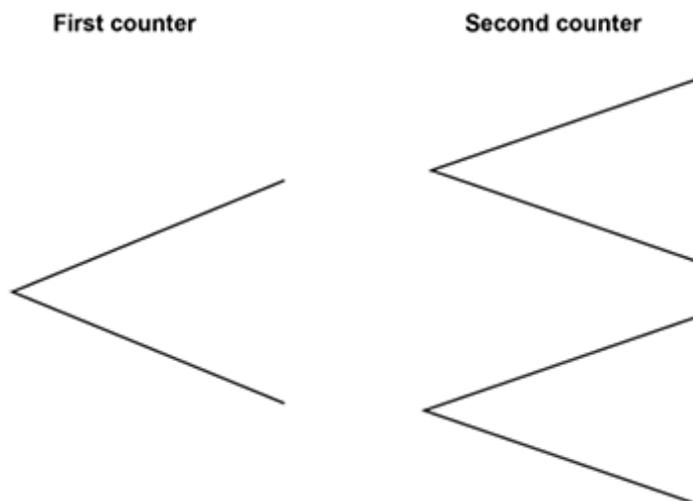
_____ because _____

_____ **[5]**

29. One morning Jack records the first 50 vehicles to pass the school gate.
Jack's results are shown in this table.

Type of vehicle	Number
Car	27
Lorry	7
Motorbike	10
Van	6

Use Jack's results to estimate the probability that the next vehicle will **not** be a lorry.

……..………………..………………. **[2]**

30(a). A researcher asked 58 customers leaving a fish and chip shop what they had bought.
The Venn diagram shows some of the results.
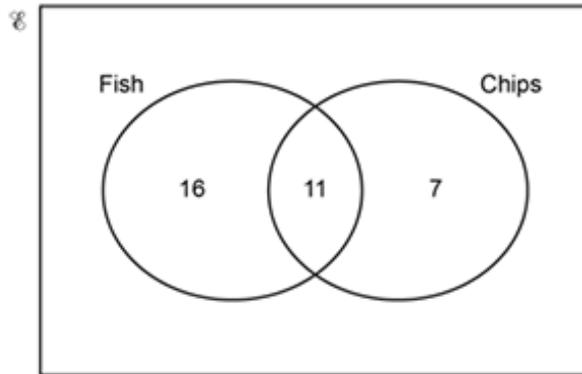
How many customers bought fish but not chips?

……..………………..………………. **[1]**

(b). Complete the Venn diagram to show the number of customers who did not buy fish or chips.

[2]

(c). One of the 58 customers is chosen at random.

Write down the probability that this customer bought fish.

....……… **[2]**

31(a). Ling has 10 toy cars in a box.
1 is red, 2 are blue, 3 are white and 4 are black.
Ling takes a toy car at random.
Mark with an arrow (↑) the probability that the toy car is

black,

```
┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
0            0.5           1
```

[1]

(b). yellow.

```
┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
0            0.5           1
```

[1]
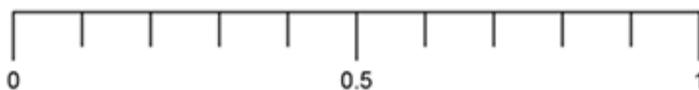
32(a). ℰ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
T = {2, 4, 6, 8, 10, 12}
F = {5, 10}

The elements 1 and 2 have been entered on this Venn diagram.

Complete the Venn diagram to show **all** of the elements.
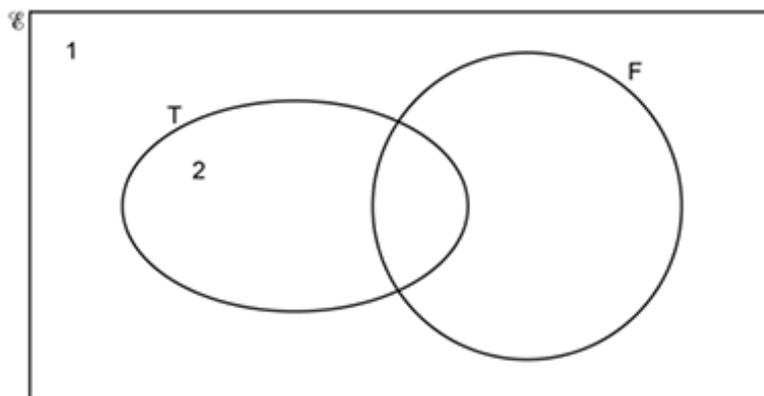
[2]

(b). Sam picks one of the 12 elements in the universal set, ε, at random.

Write down the probability that the element is a member of both set T and set F.

……..…………….………………… **[1]**

(c). Sundip picks one of the 12 elements in the universal set , ε, at random.

Sundip says

The probability the element is in set T is $\dfrac{6}{12}$.

The probability the element is in set F is $\dfrac{2}{12}$.

Therefore, the probability the element is in set T or set F is $\dfrac{6}{12} + \dfrac{2}{12} = \dfrac{8}{12}$.

Sundip is wrong.

Explain Sundip's error and give the correct answer.

Sundip's error: _____

_____   correct answer : _____ **[2]**

33(a). Taylor is trying to remember a 4-digit pin number.
Taylor knows it has the following digits and that **the last digit is 7**.

$$\boxed{9} \quad \boxed{3} \quad \boxed{2} \quad \boxed{7}$$

Write down all of the possible orders for Taylor's 4-digit pin number.

[2]

(b). Taylor tries one of these orders at random.

Write down the probability that the first digit of the pin number that Taylor tries is 3.

……………………………………………………… **[1]**

34(a). The probability that Charlie works from home on Monday is 0.3.
The probability that Charlie works from home on Friday is 0.6.
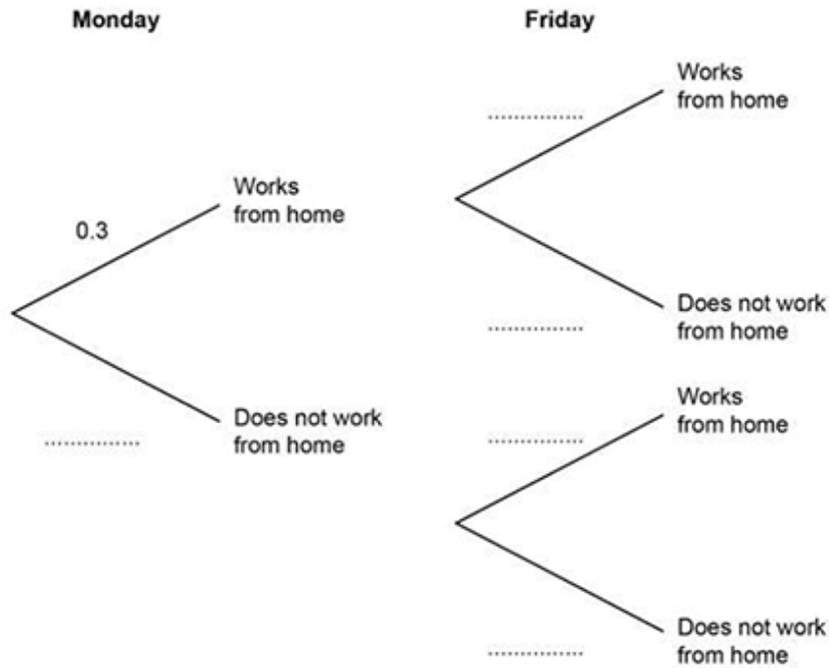
Monday   Friday

Complete the tree diagram.

[2]

(b). Work out the probability that Charlie works from home on Monday but does not work from home on Friday.

…….…………………….…………… **[2]**

35(a). A fair six-sided dice, numbered 1 to 6, is rolled.

The diagram shows a probability scale.

Which arrow shows the probability that the dice

lands on 4,

……………………….……………… **[1]**

(b). lands on 0,

………………….…..………………..… **[1]**

(c). lands on a number less than 3?

………………….…..………………..… **[1]**

36(a). Amaya travels to school by either walking, cycling or using a bus.
The probability that Amaya walks is always 0.4.
The probability that Amaya cycles is always 0.45.

Complete the tree diagram for Monday and Tuesday.

[3]
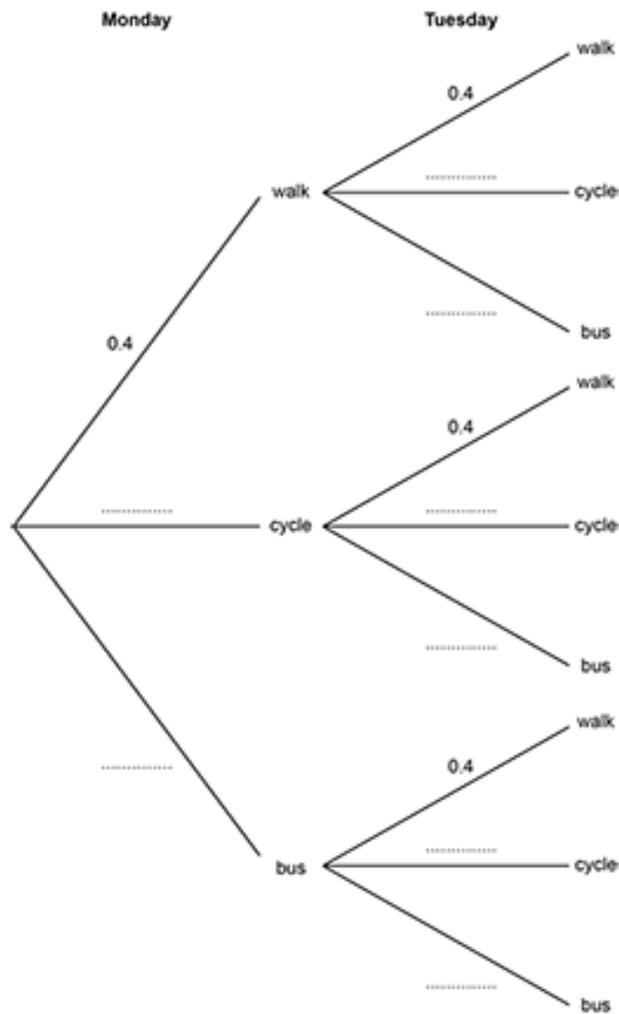
(b). Show that the probability that Amaya travels to school by the same method on Monday and Tuesday is 0.385.

[3]

37(a). A student flips a fair coin and rolls a fair five-sided dice.
The coin can land on heads (H) or on tails (T).
The dice has sides numbered from 5 to 9.

Complete this table to show all the possible outcomes.

Dice

Coin		5	6	7	8	9
	H			H7		
	T					

[2]

(b). Find the probability of getting a tail with an even number.
Give your answer as a fraction in its simplest form.

.... **[2]**

38(a). Each edge of a fair spinner is coloured either red or blue.

The scale shows the probability of the spinner landing on red and of landing on blue.

0   1

Red   Blue

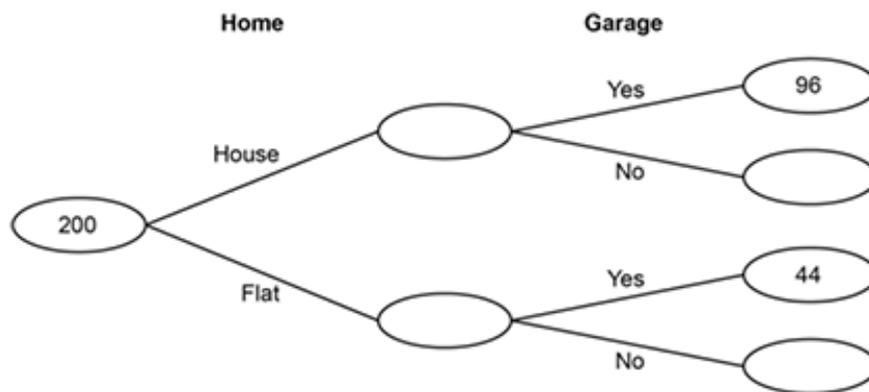Write down, as a fraction, the probability of the spinner landing on red.

.... **[1]**
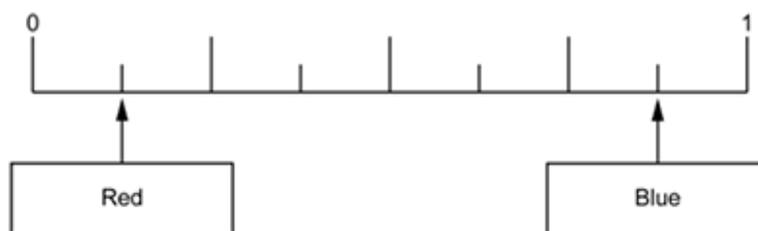
(b). Show that the spinner could not have 15 edges.

[2]

39(a). 200 new homes are built in a village.
Each home is either a house or a flat.
Each home either has a garage or does not have a garage.
96 of the houses have a garage and 44 of the flats have a garage.

This frequency tree shows the above information.
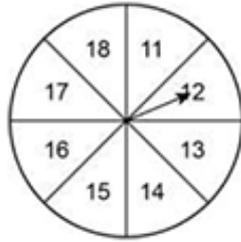

$\frac{3}{8}$ of the homes are flats.

Complete the frequency tree.

[4]

(b). Show that 70% of the homes have a garage.

[2]

40(a). A student makes a fair 8-sided spinner.
They write the numbers 11, 12, 13, 14, 15, 16, 17 and 18 on the spinner.

Write down the probability of the student's spinner landing on a number which is more than 13.

…….…………….……………… **[1]**

(b). Find the probability of the student's spinner landing on a multiple of 6.

…….…………….……………… **[2]**

41(a). Ben (B), Kai (K), Reece (R) and Sundip (S) are in a relay team.

Ben always runs first in the team.
The order for the other three is chosen at random.

Complete this table to show all the possible orders for the team.
The first row has been completed for you.
You may not need to use all the rows.

First	Second	Third	Fourth
B	K	R	S

[2]

(b). Find the probability that Kai will run last.

……..………………………………… **[2]**

42. A biased five-sided spinner is numbered 1, 2, 3, 4 and 5.

The table shows the probability of the spinner landing on 2, 4 and 5.

Number	1	2	3	4	5
Probability		0.30		0.20	0.30

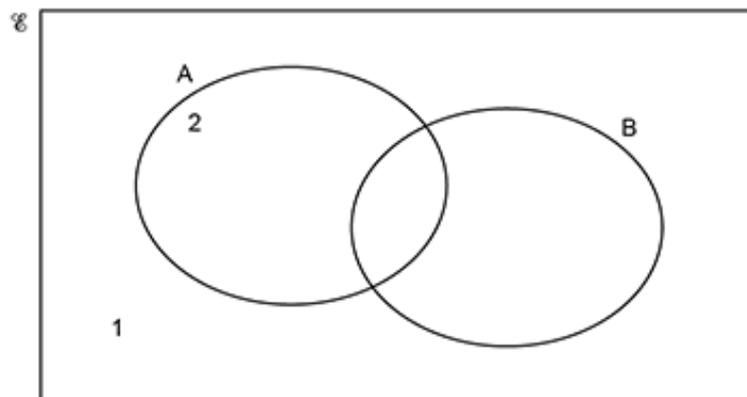The spinner is three times more likely to land on 1 than on 3.

Complete the table.

[4]

43(a). ℰ= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}
Set A = {even numbers}
Set B = {multiples of 3}

The elements 1 and 2 have been entered on this Venn diagram.

Complete the Venn diagram to show **all** of the elements.
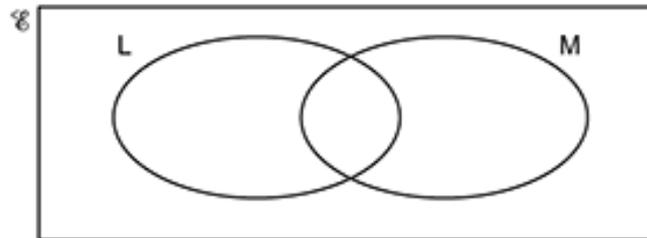

[3]

(b). ℰ= {all positive integers}
Set L = {even numbers}
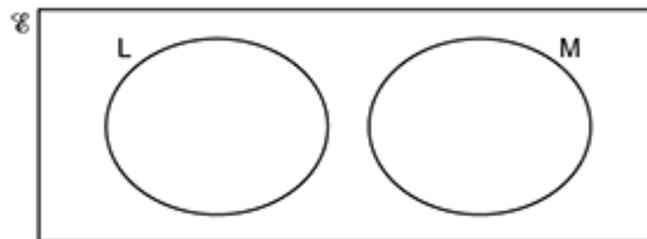
Set M = {multiples of 4}

Three Venn diagrams, numbered 1 to 3, are shown below.

Which diagram best shows the relationship between Set L and Set M?
Give a reason for your choice.

Venn diagram 1:

Venn diagram 2:
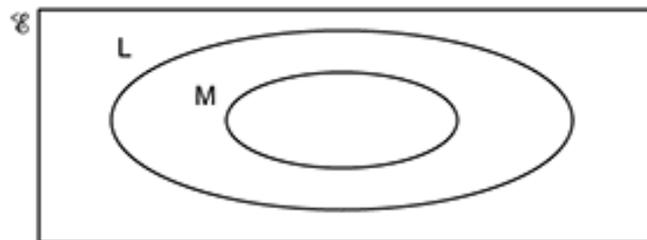
Venn diagram 3:

Venn
diagram _____   because _____

_____**[2]**

44(a). Gabi records the number of times a biased six-sided dice lands on each of its numbers.

Complete the table to show the relative frequencies.

Number on the dice	1	2	3	4	5	6
Frequency	10	21	7	4	3	5
Relative frequency					0.06	0.10

[2]

(b). Use Gabi's results to estimate the probability that the spinner lands on 5 or 6.

.... **[2]**

45(a). A fair spinner has five sides, numbered 1, 2, 3, 4 and 5.

    i.   Write down the probability of the spinner landing on 2.

.... **[1]**

    ii.   Write down the probability of the spinner **not** landing on 2.

.... **[1]**

(b). Write down an outcome for the spinner that has a probability of 0.

---**[1]**

46. A bag contains only red, green and blue counters.

- 8 of the counters are red.
- 15 of the counters are green.
- The rest of the counters are blue.

Sam chooses one counter at random from the bag.

The probability that this is a green counter is $\dfrac{3}{8}$.

Work out the number of blue counters in the bag.

.... **[4]**

47(a). On a bus route there is a set of traffic lights and a level crossing.
The probability that the bus stops at the traffic lights is 0.7.
The probability that the bus stops at the level crossing is 0.2.

Use the information to complete the tree diagram.
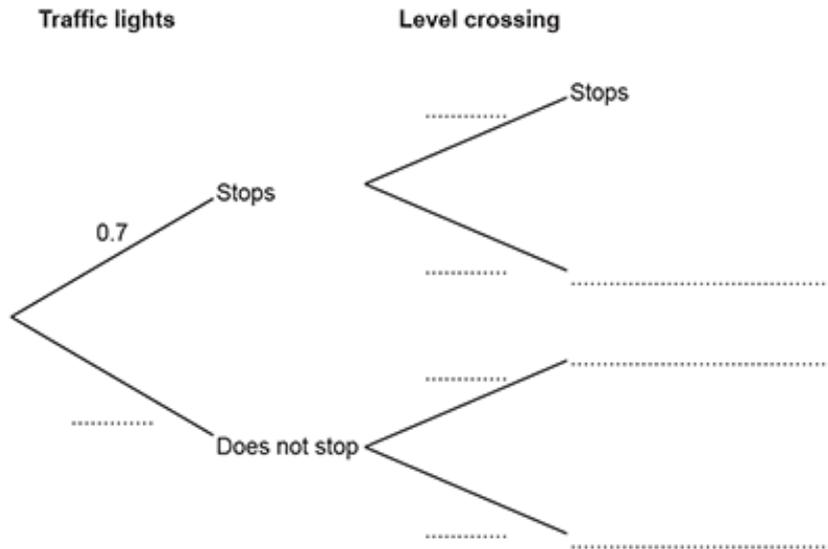
Traffic lights   Level crossing

.... Stops

Stops

0.7

....

....

....

....

Does not stop

....

....

[3]

(b). Find the probability that the bus stops at either the traffic lights or at the level crossing but not both.

.... **[3]**

48(a). 140 people are asked if they have a bicycle (B) or a car (C).

- 22 people only have a bicycle.
- 72 people only have a car.
- 29 people have both a bicycle and a car.

Show this information on the Venn diagram.

ε

B   C
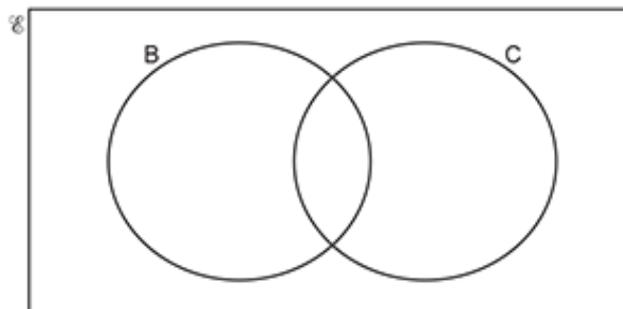
[1]

(b).

  i.   How many people do not have a bicycle or a car?

.... **[1]**

  ii.   Write your answer in the correct place on the Venn diagram.

[1]

(c). One of the 140 people is chosen at random.

Work out the probability they have a car.

.... **[2]**

49(a). ℰ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13}
T = {2, 4, 6, 8, 10, 12}
F = {5, 10}

The elements 1 and 2 have been entered on this Venn diagram.

Complete the Venn diagram to show **all** of the elements.
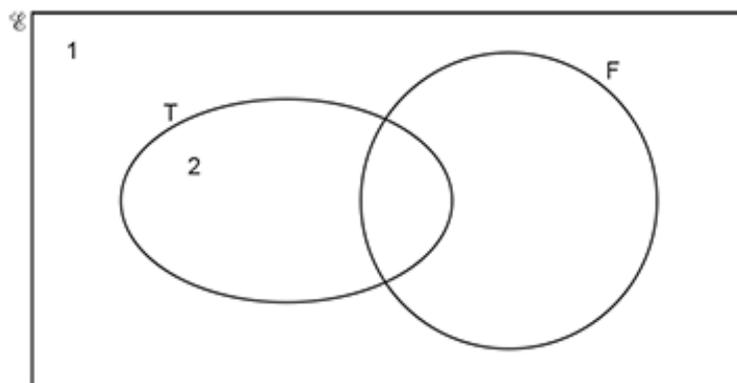
[2]

(b). Finley picks one of the 13 elements in the universal set, ℰ, at random.

Write down the probability that the element is a member of both set T and set F.

.... **[1]**

(c). Sam picks one of the 13 elements in the universal set, ε, at random.

Sam says

The probability the element is in set T is $\frac{6}{13}$.

The probability the element is in set F is $\frac{2}{13}$.

Therefore, the probability the element is in set T or set F is $\frac{6}{13} + \frac{2}{13} = \frac{8}{13}$.

Sam is wrong.

Explain Sam's error and give the correct answer.

Sam's error : _____

_____   correct answer : _____ **[2]**

50(a). Sasha is trying to remember a 4-digit pin number.
Sasha knows it has the following digits and that **the first digit is 9**.

9   3   2   7

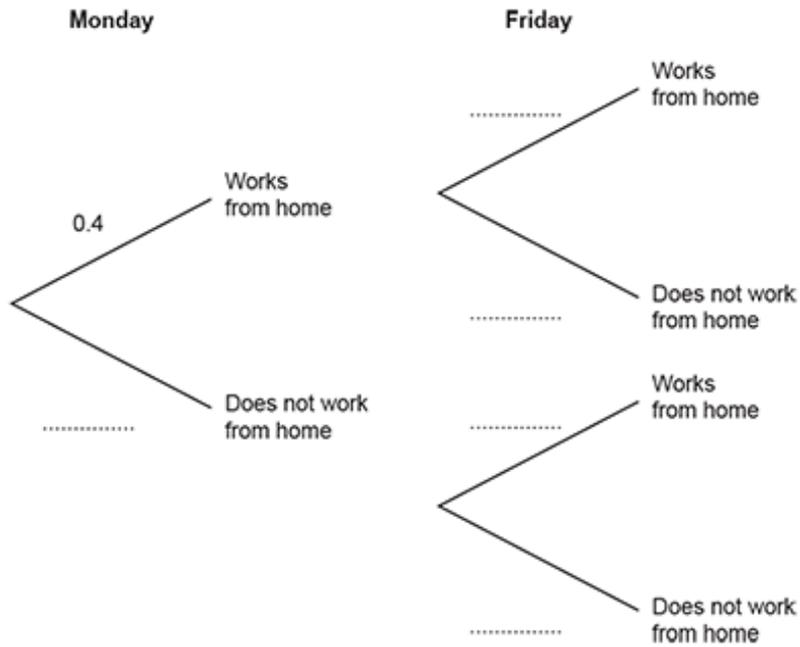Write down all of the possible orders for Sasha's 4-digit pin number.

[2]

(b). Sasha tries one of these orders at random.

Write down the probability that the last digit of the pin number that Sasha tries is 2.

.... **[1]**

51(a). The probability that Sam works from home on Monday is 0.4.
The probability that Sam works from home on Friday is 0.2.

Monday   Friday

                                                    Works
                                                    from home
                        ....
              Works
              from home
    0.4
                                                    Does not work
                        ....   from home

                                                    Works
                                                    from home
              Does not work   ....
    .... from home

                                                    Does not work
                        ....   from home

Complete the tree diagram.

[2]

(b). Work out the probability that Sam works from home on Monday but does not work from home on Friday.

.... **[2]**

52(a). A fair six-sided dice, numbered 1 to 6, is rolled.

The diagram shows a probability scale.

0   1

A   B   C   D   E   F   G

Which arrow shows the probability that the dice

lands on 5,

.... **[1]**

(b). lands on 7,

.... **[1]**

(c). lands on a number greater than 2?

.... **[1]**

53(a). Kai has a bag of marbles that are red or blue or green or yellow.

Kai takes a marble at random, records the colour and returns the marble to the bag.
Kai does this 800 times.

The table shows some of the results.

Colour	Red	Blue	Green	Yellow
Frequency	48	80	296	
Relative frequency	0.06	0.10	0.37	0.47

Complete the table to show the number of times a yellow marble is taken.

[2]

(b).

   i.   There are 40 marbles in the bag.

      Work out how many blue marbles are likely to be in the bag.

.... **[2]**

ii.   Is your answer to **part (i)** likely to be the actual number of blue marbles in the bag?
      Give a reason for your answer.

_____ because _____

---**[1]**

54(a). A meal deal consists of a burger, a side dish and a drink chosen from these lists.

Burgers	Side dish	Drink
Hamburger (H)	Baked beans(B)	Cola (C)
Veggie burger (V)	Fries (F)	Lemonade (L)
	Sweetcorn (S)	

Some of the possible meal deals are shown in this table.

Complete the table to show all the possible meal deals.
You may not need all the rows.

Burger	Side dish	Drink
H	B	C
H	B	L
H	F	C

[2]

(b). Write down the fraction of the meal deals that include baked beans (B).

.... **[1]**

55. Alex has a bag containing 3 blue beads and 5 green beads.
There are no other beads in the bag.

Alex takes a bead at random from the bag, puts it back, and then takes another bead.
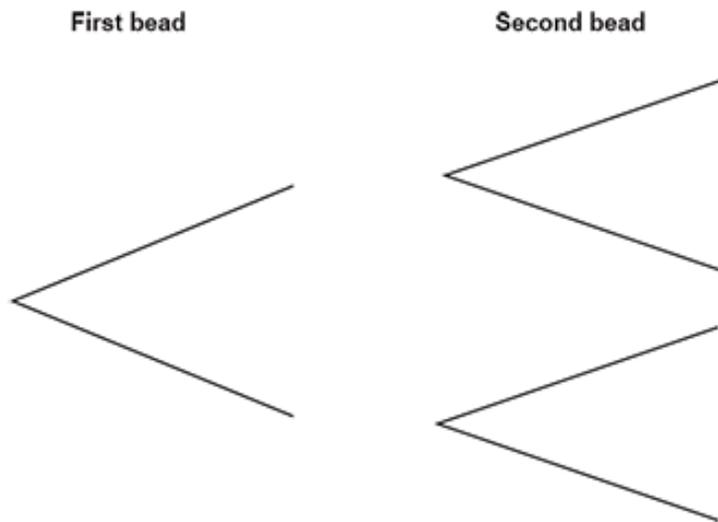
Alex says

The probability that the two beads are the same colour is less than 50%.
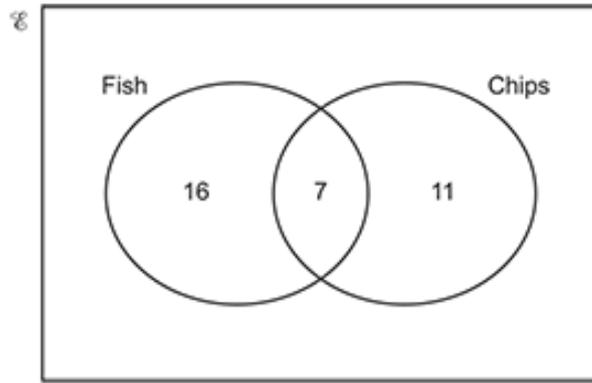
Is Alex correct?
Show how you decide.
You may use this tree diagram if you wish.

First bead   **Second bead**

because
------------------   ---

--**[5]**

56(a). A researcher asked 53 customers leaving a fish and chip shop what they had bought.
The Venn diagram shows some of the results.

Complete the Venn diagram to show the number of customers who did not buy fish or chips.
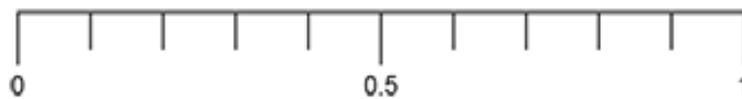
[2]

(b). One of the 53 customers is chosen at random.

Write down the probability that this customer bought fish.

.... [2]

57. Amit has 10 toy cars in a box.
4 are red, 3 are blue, 2 are white and 1 is black.
Amit takes a toy car at random.

Mark with an arrow (↓) the probability that the toy car is green.

[1]

58.

One morning Harper records the first 50 vehicles to pass the school gate.
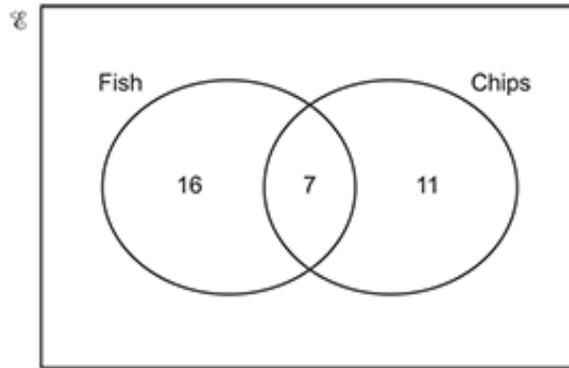Harper's results are shown in this table.

Type of vehicle	Number
Car	31
Lorry	3
Motorbike	7

Van	9

Use Harper's results to estimate the probability that the next vehicle will **not** be a motorbike.

.... **[2]**

59. A researcher asked 53 customers leaving a fish and chip shop what they had bought.
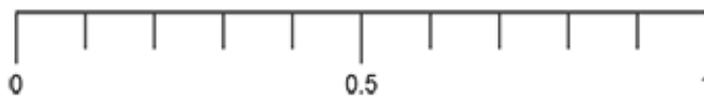The Venn diagram shows some of the results.

How many customers bought chips but not fish?

.... **[1]**

60. Amit has 10 toy cars in a box.
4 are red, 3 are blue, 2 are white and 1 is black.
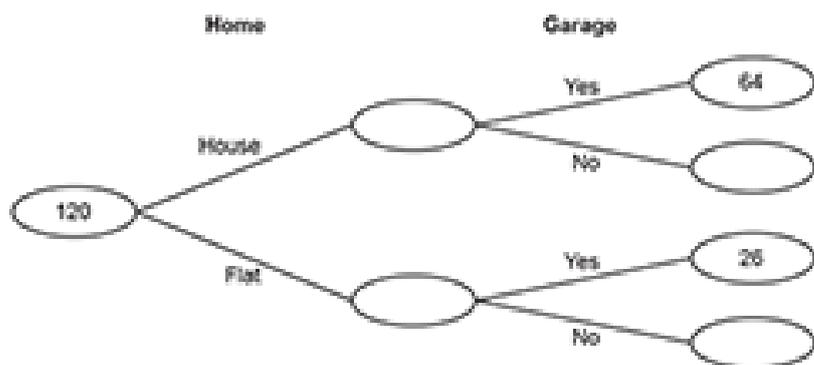Amit takes a toy car at random.

Mark with an arrow (↓) the probability that the toy car is red,

[1]

61(a). 120 new homes are built in a village.
Each home is either a house or a flat.
Each home either has a garage or does not have a garage.
64 of the houses have a garage and 26 of the flats have a garage.

This frequency tree shows the above information.

$\frac{5}{8}$ of the homes are houses.

Complete the frequency tree.

[4]

(b). Show that 75% of the homes have a garage.

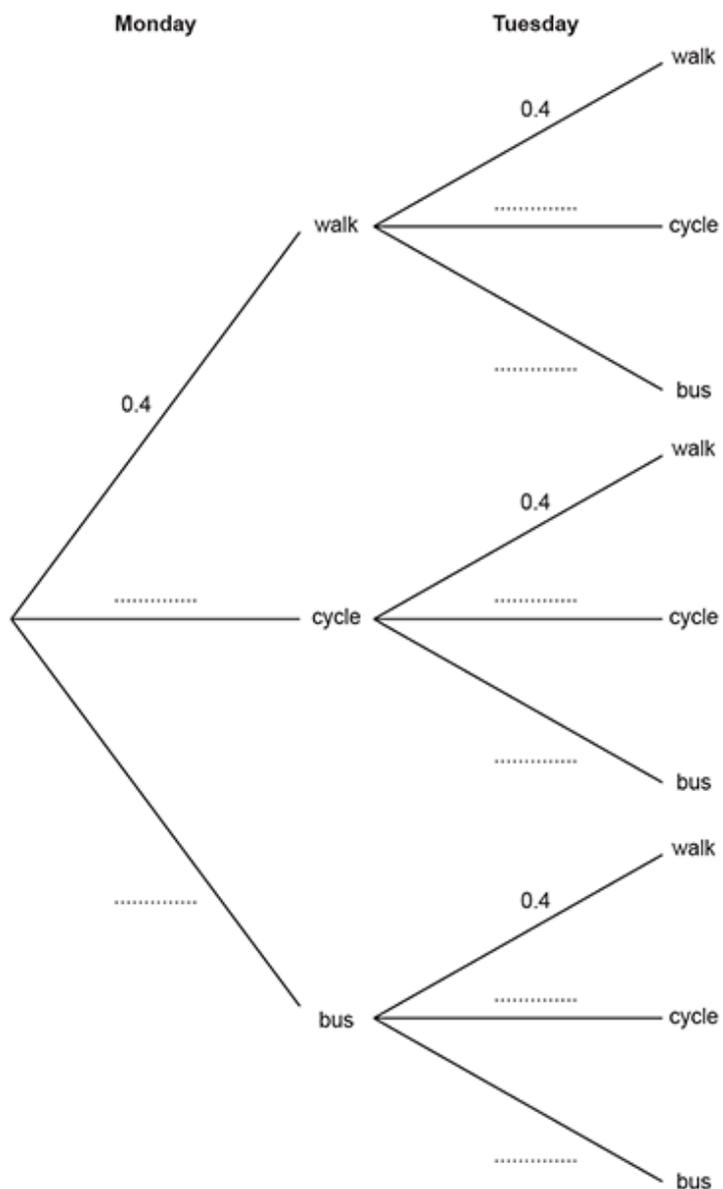
[2]

62(a). Reece travels to school by either walking, cycling or using a bus.
The probability that Reece walks is always 0.4.
The probability that Reece cycles is always 0.55.

Complete the tree diagram for Monday and Tuesday.

[3]

(b). Show that the probability that Reece travels to school by the same method on Monday and Tuesday is 0.465.

[3]

63(a). A student flips a fair coin and rolls a fair four-sided dice.
The coin can land on heads (H) or on tails (T).
The dice has sides numbered from 5 to 8.

Complete this table to show all the possible outcomes.

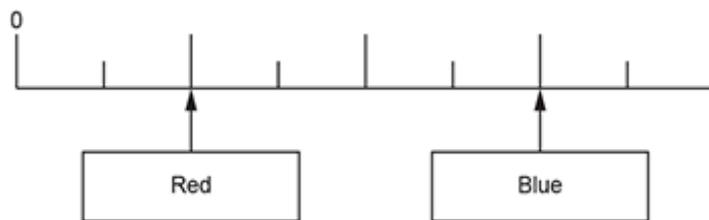|		Dice			
		5	6	7	8
Coin	H			H7	
	T				

[2]

(b). Find the probability of getting a tail with an even number.
Give your answer as a fraction in its simplest form.

.... **[2]**

64(a). Each edge of a fair spinner is coloured either red or blue.

The scale shows the probability of the spinner landing on red and of landing on blue.

Write down, as a fraction, the probability of the spinner landing on red.
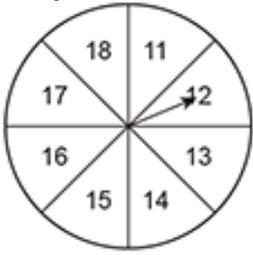
.... **[1]**

(b).

Show that the spinner could not have 15 edges. **[2]**

65(a). A student makes a fair 8-sided spinner.
They write the numbers 11, 12, 13, 14, 15, 16, 17 and 18 on the spinner.

Write down the probability of the student's spinner landing on a number which is less than 12.

.... **[1]**

(b). Find the probability of the student's spinner landing on a multiple of 3.

.... **[2]**

66(a). Ling throws a six-sided dice 300 times.
The table shows the frequencies of their results.

Complete the table to show the relative frequencies.

Number on dice	1	2	3	4	5	6
Frequency	42	27	57	60	39	75
Relative frequency			0.19			

[2]

(b). Ling thinks that the dice may be biased.

i.   Explain why evidence from the table could support their opinion.

_____

_____

[1]

ii.   Explain why the dice may, in fact, **not** be biased.

_____

_____

[1]

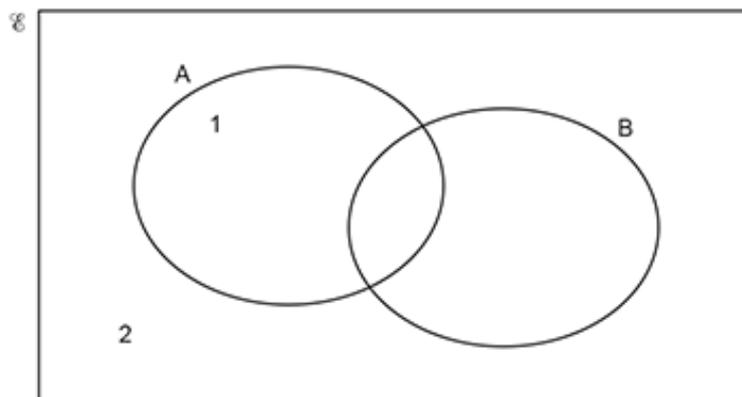**67(a).** ℰ= {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}
Set A = {odd numbers}
Set B = {multiples of 5}

The elements 1 and 2 have been entered on this Venn diagram.

Complete the Venn diagram to show **all** of the elements.

[3]

(b). ℰ= {all positive integers}
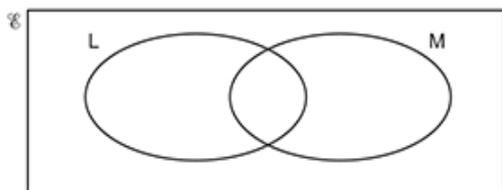Set L = {odd numbers}
Set M = {multiples of 2}

Three Venn diagrams, numbered 1 to 3, are shown below.
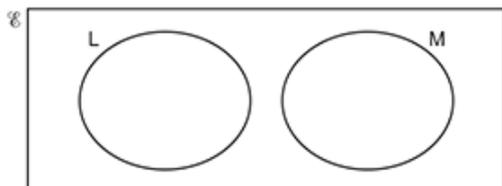
Which diagram best shows the relationship between Set L and Set M?
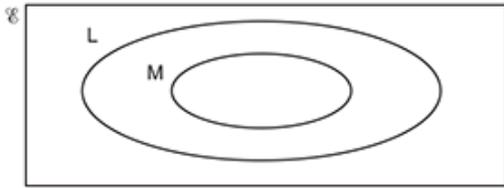Give a reason for your choice.

Venn diagram 1:

Venn diagram 2:

Venn diagram 3:

Venn diagram _____ because

_____ **[2]**

68. A biased five-sided spinner is numbered 1, 2, 3, 4 and 5.

The table shows the probability of the spinner landing on 1, 2 and 4.

Number	1	2	3	4	5
Probability	0.10	0.10		0.20	

The spinner is four times more likely to land on 5 than on 3.

Complete the table.

[4]

69. Li throws two fair four-sided dice, each numbered 1, 2, 3 and 4.
Li multiplies together the two numbers that the dice land on to produce a score.

Find the probability that Li's score is a prime number.

.... **[4]**

70(a). Over a long period of time, it is found that the probability of a train from Bewford to London being late is 0.2.

  i.   One morning there are two trains from Bewford to London.
       Use the information to complete the tree diagram.
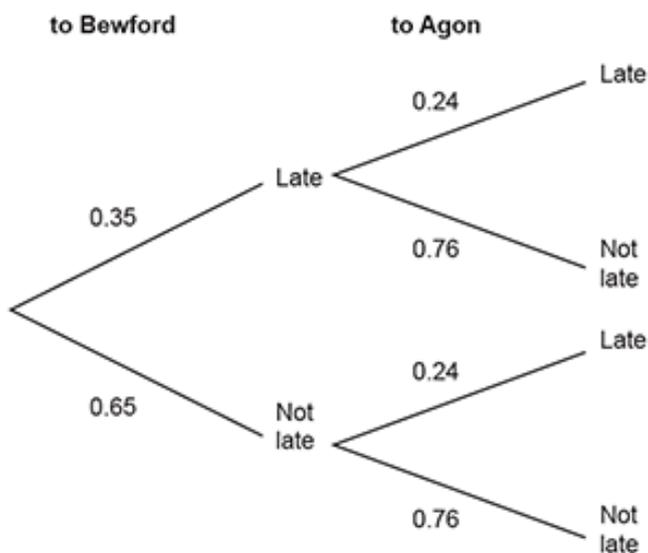
First train   Second train

                                                              Late
                                        ....
                              Late
              0.2

                                        ....   Not
                                                             late

                                                             Late
                                        ....
                              Not
                              late
              ....

                                        ....   Not
                                                             late
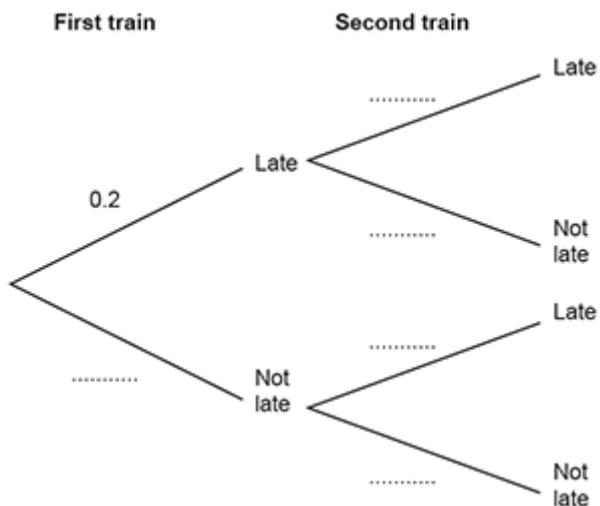
[2]

ii.   Work out the probability that both trains are **not late**.

(ii) ....[2]

iii.   Give a reason why the probabilities used in the tree diagram for the second train may **not** be reliable.

[1]

(b). Morgan takes a train from London to Bewford and then another train to Agon.
The tree diagram shows the probabilities of Morgan's trains being late or not late.

to Bewford   to Agon

                                                             Late
                                        0.24
                              Late
              0.35

                                        0.76   Not
                                                             late

                                                             Late
                                        0.24
              0.65   Not
                              late

                                        0.76   Not
                                                             late

Morgan will **not catch** the train to Agon if the train to Bewford is late and the train to Agon is not late.

Work out the probability that Morgan will **catch** the train to Agon.

.... **[3]**

71(a). Ali (A), Blake (B), Rowan (R) and Sam (S) are in a relay team.
Sam always runs fourth in the team.
The order for the other three is chosen at random.

Complete this table to show all the possible orders for the team.
The first row has been completed for you.
You may not need to use all the rows.

First	Second	Third	Fourth
A	B	R	S

[2]

(b). Find the probability that Ali will run first.

.... [2]

END OF QUESTION PAPER