

Non-Calculator

Q1.

A bag has only red, white, blue and yellow counters.
A counter is taken from the bag at random.

Here are some of the probabilities.

Colour	Red	White	Blue	Yellow
Probability	0.1		0.3	

- (a) The probability of taking a white counter is twice the probability of taking a yellow counter.

Complete the table.

(2)

- (b) There are 500 counters in the bag altogether.

Complete the table.

Colour	Red	White	Blue	Yellow	Total
Number of counters in the bag	500				500

(2)

- (c) All of the yellow counters are taken out of the bag.

Work out the probability of taking a red counter at random from the bag now.

Answer _____

(2)

(Total 6 marks)

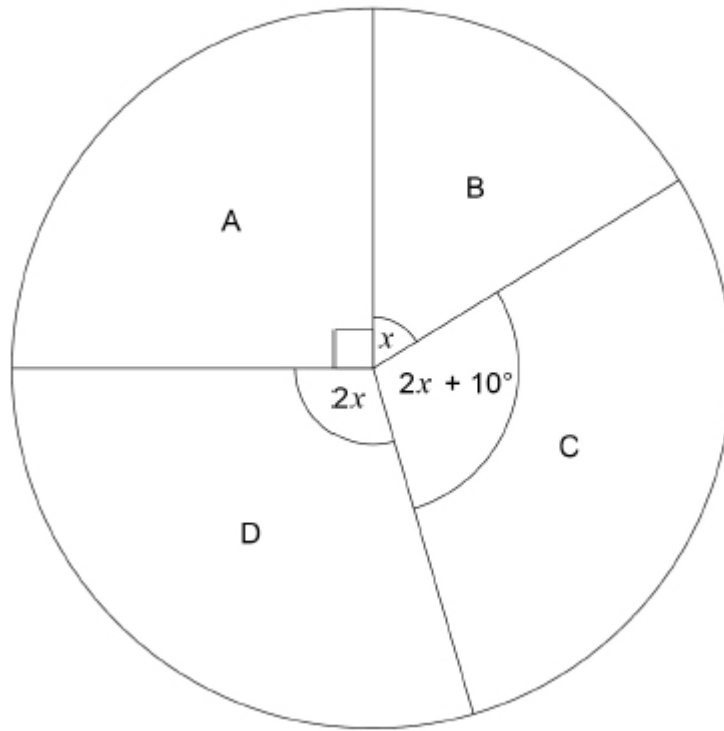
Q2.

The four candidates in an election were A, B, C and D.

The pie chart shows the proportion of votes for each candidate.

Proportion of votes

Not drawn accurately



Work out the probability that a person who voted, chosen at random, voted for C.

Answer _____

(Total 4 marks)

Q3.

Five friends want to raise at least £200 altogether for charity.
The pictogram shows how much they each raise.

Key:  represents £10



- (a) Do they reach their target of £200?
Tick a box.

Yes

No

You **must** show your working.

(4)

- (b) Sam raises £70 for the charity.
His father adds 25% to this.

Work out 25% of £70

Answer £ _____

(2)

(Total 6 marks)

Q4.

A bag contains 20 counters.
10 of the counters are red, 8 are blue and 2 are yellow.
Three counters are taken out at random.

- (a) If all three of these counters are the **same** colour, what is the probability that the next counter taken out at random is yellow?

Answer _____

(1)

- (b) If all three of these counters are **different** colours, what is the probability that the next counter taken out at random is yellow?

Answer _____

(1)

(Total 2 mark)

Q5.

A bag contains triangles and quadrilaterals in the ratio of the number of sides of each shape.

- (a) Explain why the least number of shapes that could be in the bag is 7.

(1)

- (b) A shape is taken at random from the bag and **replaced**.
Another shape is then taken from the bag.

Work out the probability that the two shapes taken from the bag are of the same type.

Answer _____

(4)

(Total 5 marks)

Q6.

Here are six cards.



Two cards are picked at random.

- (a) Assume that the first card chosen is not replaced.

Work out the probability that both cards are B.

Answer _____

(3)

- (b) In fact the first card was replaced.

How does this affect the answer to part (a)?

Tick a box

Show working to support your answer.

- Probability is now bigger
- Probability stays the same
- Probability is now smaller

(2)

(Total 5 marks)

Q7.

Fay is testing an ordinary six-sided dice to see if it is biased.

She throws the dice 120 times.

- (a) Work out the number of times the dice is expected to land on 1

Answer _____

(1)

- (b) Here are the actual results.

Number on dice	1	2	3	4	5	6	Total
Frequency	5	19	17	20	21	38	120

Is the dice biased?

Tick a box.

Yes

No

Cannot tell

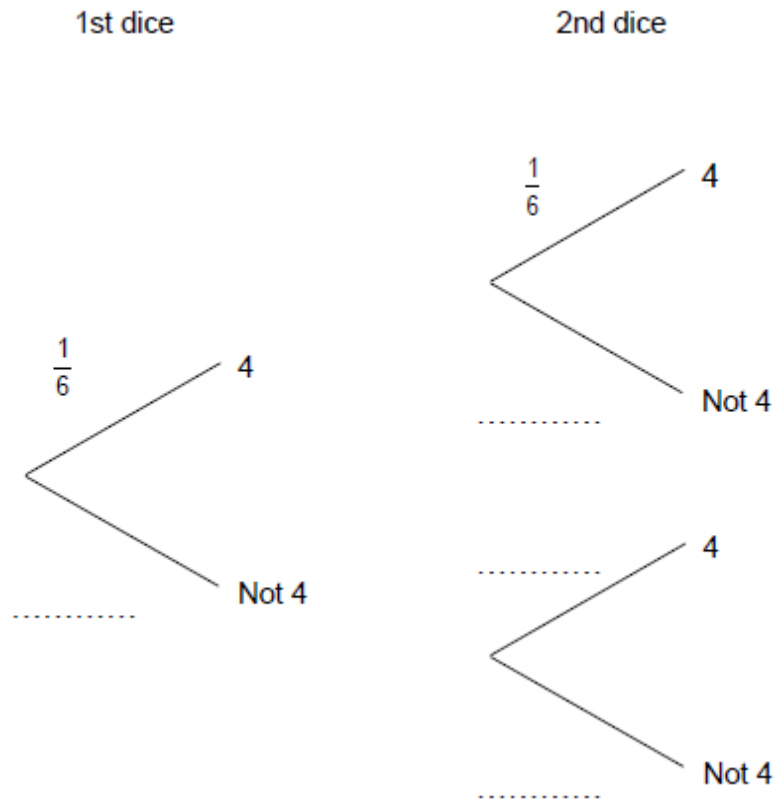
(2)

(Total 3 marks)

Q8.

Two ordinary fair dice are rolled.

(a) Complete the tree diagram.



(1)

(b) Circle the probability that **both** dice land on 4

$\frac{1}{4}$ $\frac{2}{12}$ $\frac{2}{6}$ $\frac{1}{12}$ $\frac{1}{36}$

(1)

(c) Work out the probability that at least one of the dice does **not** land on 4

Answer _____

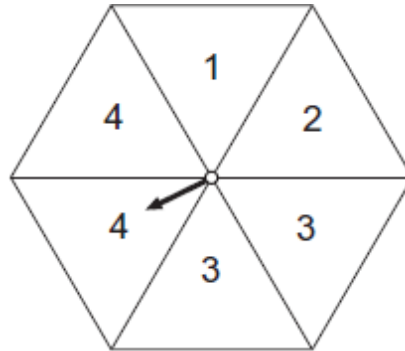
(2)

(Total 4 marks)

Calculator

Q9.

- (a) The arrow on this spinner is equally likely to land on each section.



The arrow is spun 72 times.

How many times do you expect the arrow to land on 4?

Answer _____

(2)

- (b) An arrow on a different spinner is spun 250 times.
Some of the results are shown below.

Number shown	1	2	3	4	5
Frequency	25	53	62		

The relative frequency of landing on a 4 is the same as the relative frequency of landing on a 5

Work out the relative frequency of landing on a 4

Answer _____

(3)

(Total 5 marks)

Q10.

The four possible outcomes of an experiment are A, B, C and D.

$$P(A) = 0.28$$

$$P(B) = 2P(A)$$

$$P(C) = P(D)$$

Work out $P(D)$

Answer _____

(Total 3 marks)

Q11.

- (a) In a statistical experiment a fair, ordinary dice is rolled.

Tick a box to show the correct ending to the sentence below.

When this statistical experiment is repeated you will

always get the same outcome

usually get the same outcome

usually get a different outcome

always get a different outcome

(1)

- (b) Tick a box to show the correct ending to the sentence below.

An estimate of probability based on a statistical experiment is more reliable with

more trials

fewer trials

more time between trials

less time between trials

(1)

- (c) A statistical experiment has 400 trials.

After 300 trials the relative frequency of success is 0.38
In the next 100 trials there are 42 successes.

Work out the relative frequency of success for all 400 trials.

Answer _____

(3)

(Total 5 marks)

Q12.

The universal set contains the whole numbers 1 to n .

n is an even number greater than 100

O is the set of odd numbers.

P is the set of prime numbers.

S is the set of square numbers.

- (a) Explain why there are no numbers in $P \cap S$

(1)

- (b) How many numbers are there in $O \cup P$?

$$\frac{n}{2} - 1 \qquad \frac{n}{2} \qquad \frac{n}{2} + 1 \qquad n$$

(1)

(Total 2 marks)

Q13.

- (a) A shop sells red roses and white roses in the ratio 7 : 2
One day 392 red roses are sold.

How many white roses are sold?

Answer _____

(2)

- (b) A different shop sells red roses and white roses in the ratio 8 : 3

What is the probability that a rose, sold at random, is red?

Answer _____

(1)

(Total 3 marks)

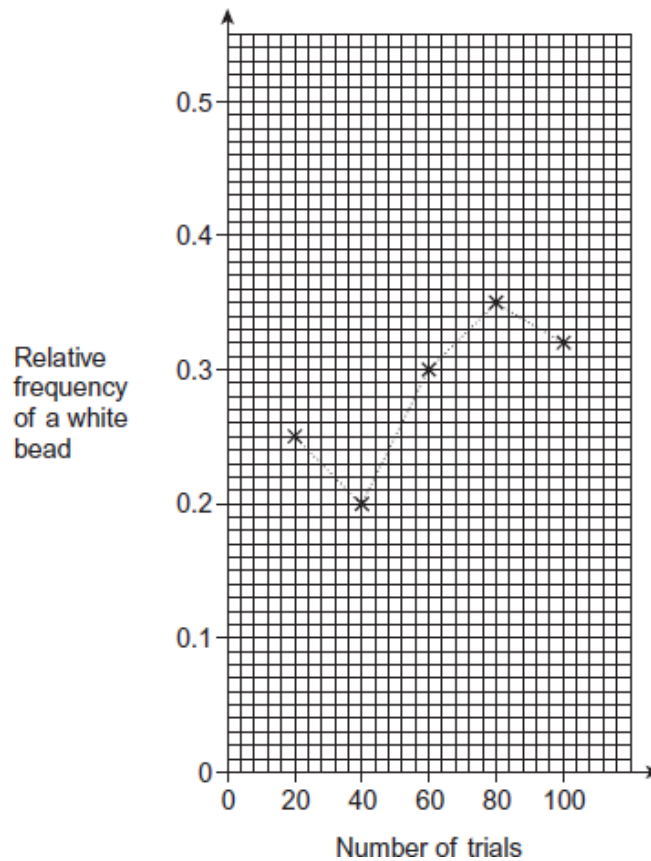
Q14.

A bag contains white beads, black beads and red beads.

The following trial is repeated 100 times.

- Pick a bead at random.
- Record the colour.
- Put the bead back in the bag.

The graph shows the relative frequency of a white bead after every 20 trials.



- (a) Work out the number of times a white bead was picked in the first 20 trials.

Answer _____

(2)

- (b) What is the best estimate for the probability of picking a white bead?
Give a reason for your answer.

Answer _____

Reason _____

(2)

(c) There are a total of 1000 beads in the bag.

Estimate the number of beads that are white.

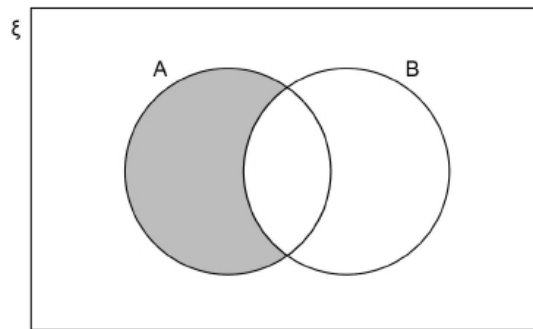
Answer _____

(2)

(Total 6 marks)

Q15.

(a)



Which of these represents the shaded region?

Circle your answer.

A

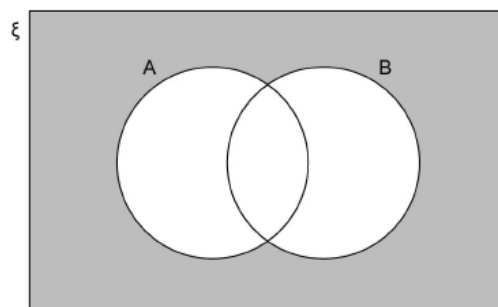
B'

$A \cap B'$

$A \cup B'$

(1)

(b)



Which of these represents the shaded region?

Circle your answer.

$(A \cup B)'$

$(A \cap B)'$

$A' \cap B$

$A' \cup B'$

(1)

(Total 2 marks)

Q16.

- (a) In a statistical experiment a fair, ordinary dice is rolled.

Tick a box to show the correct ending to the sentence below.

When this statistical experiment is repeated you will

always get the same outcome

usually get the same outcome

usually get a different outcome

always get a different outcome

(1)

- (b) Tick a box to show the correct ending to the sentence below.

An estimate of probability based on a statistical experiment is more reliable with

more trials

fewer trials

more time between trials

less time between trials

(1)

(Total 2 marks)

Q17.

An ordinary fair dice is rolled 120 times.

How many times would you expect to roll a 6?

Answer _____

(Total 2 marks)

Q18.

An ordinary six-sided dice is rolled 300 times.
It lands on five 120 times.



Do you think the dice is fair?
Give a reason for your answer.

(Total 2 marks)

Q19.

In a tennis tournament,

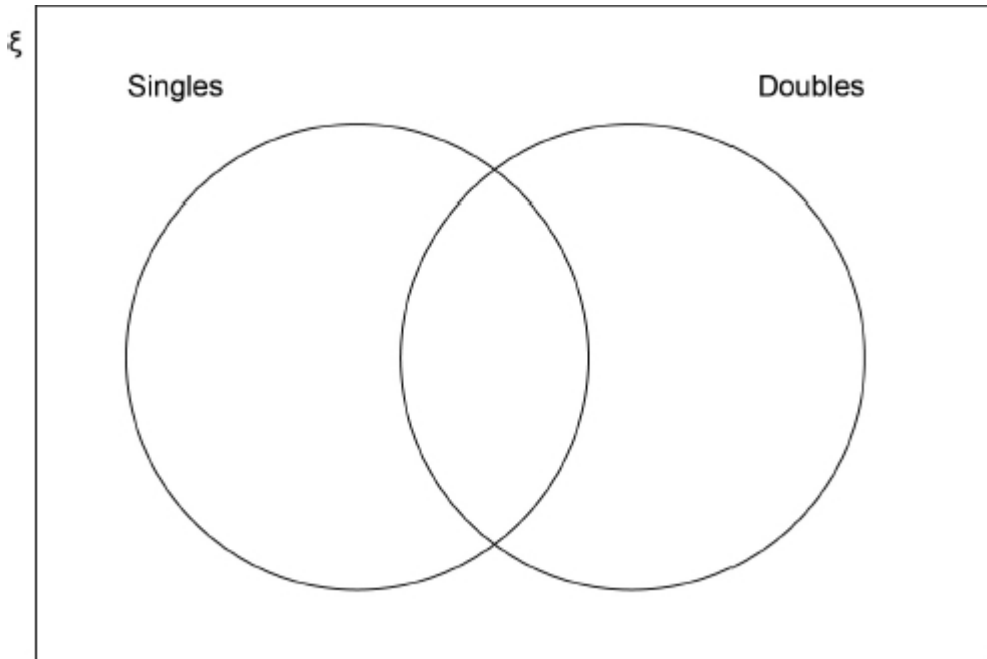
98 players took part in the singles only

34 players took part in the doubles only

twice as many players took part in the singles as took part in the doubles.

How many players took part in both the singles **and** the doubles?

You may use the Venn diagram to help you.



Answer _____

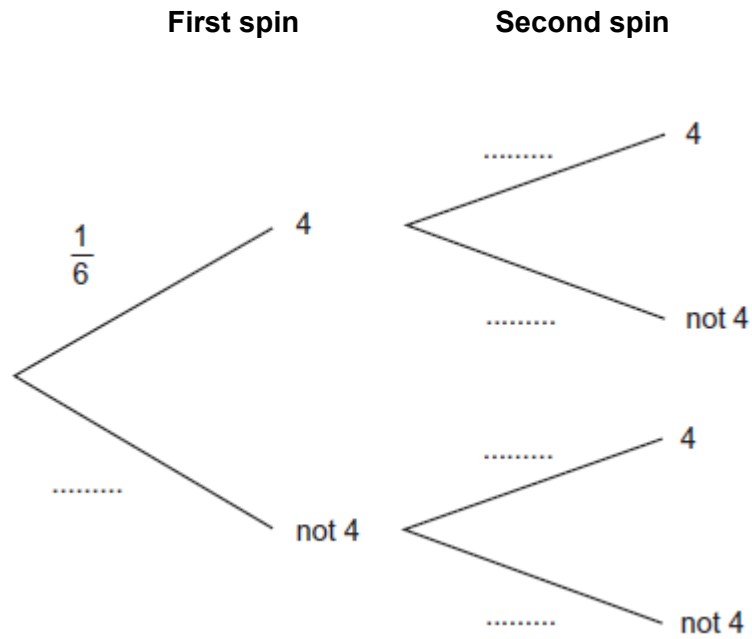
(Total 4 marks)

Q20.

An ordinary fair dice is rolled.



- (a) Complete the tree diagram for the dice landing on 4



(1)

- (b) Work out the probability of the dice landing on 4 both times.

Answer _____

(2)

(Total 3 marks)

Q21.

A bag only contains black counters and white counters.
A counter is chosen from the bag at random and replaced.
Another counter is then chosen from the bag at random.
The probability of choosing two black counters is 0.36

- (a) Show that the probability of choosing a black counter each time is 0.6

_____ (1)

- (b) Work out the probability of choosing two white counters.

Answer _____ (2)

- (c) Work out the probability of choosing at least one white counter.

Answer _____ (2)

(Total 5 marks)

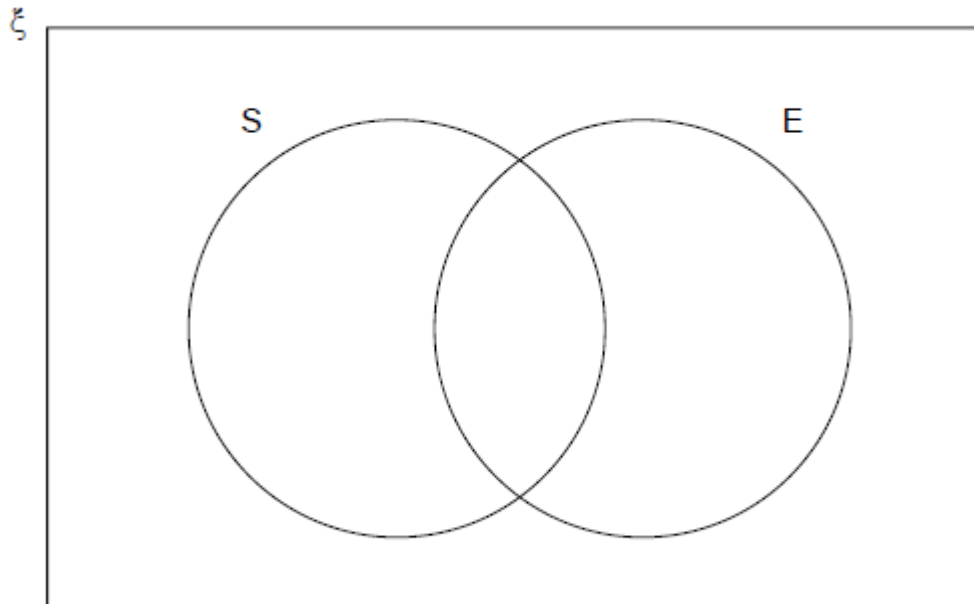
Q22.

$$\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$

S = square numbers

E = even numbers

(a) Complete the Venn diagram.



(3)

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

Write down $P(S \cap E)$

Answer _____

(1)

(Total 4 marks)

Q23.

A coin is rolled onto a grid of squares.

It lands randomly on the grid.

To win, the coin must land completely within one of the squares.

Meera and John each roll the coin a number of times and record their results.

	Number of wins	Number of losses
Meera	6	44
John	28	72

- (a) Work out **two** different estimates for the probability of winning.

Answer _____ and _____

(2)

- (b) Which of your estimates is the better estimate for the probability of winning?

Give a reason for your answer.

Answer _____

Reason _____

(1)

(Total 3 marks)