2021 Assessment resources
GCSE Statistics

Probability

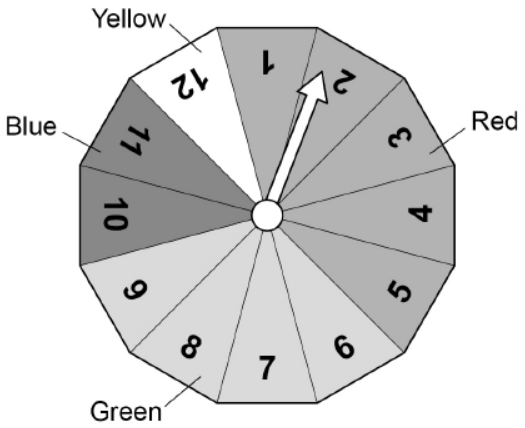
Answers and commentaries

The question numbers in this resource reflect the question numbers from the original papers and match the question numbers in the corresponding 2021 assessment materials.

Question 6(a)

6 The fair spinner shown has 12 equal sections.

The arrow is spun once.



6 (a) Work out the probability that the arrow stops on red or blue.

[2 marks]

Answer _____

Student A

6 (a) Work out the probability that the arrow stops on red or blue. [2 marks]

Red = $\frac{5}{12}$ Blue = $\frac{2}{12}$

and = x

or = +

Answer $\frac{7}{12}$

Commentary

A fully correct response.

2 marks

Student B

6 (a) Work out the probability that the arrow stops on red or blue. [2 marks]

Red = 5:12

Blue = 2:12 + 7:12

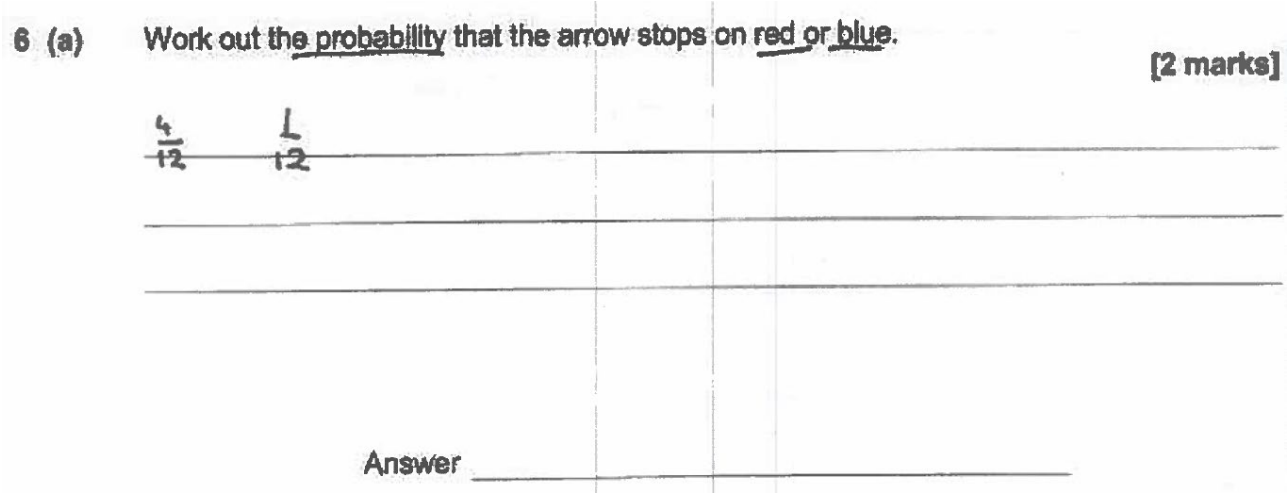
Answer 7:12

Commentary

A good indication that ratios are not accepted for probabilities and should be completely avoided.

0 marks

Student C



Commentary

One mark for a denominator of 12.

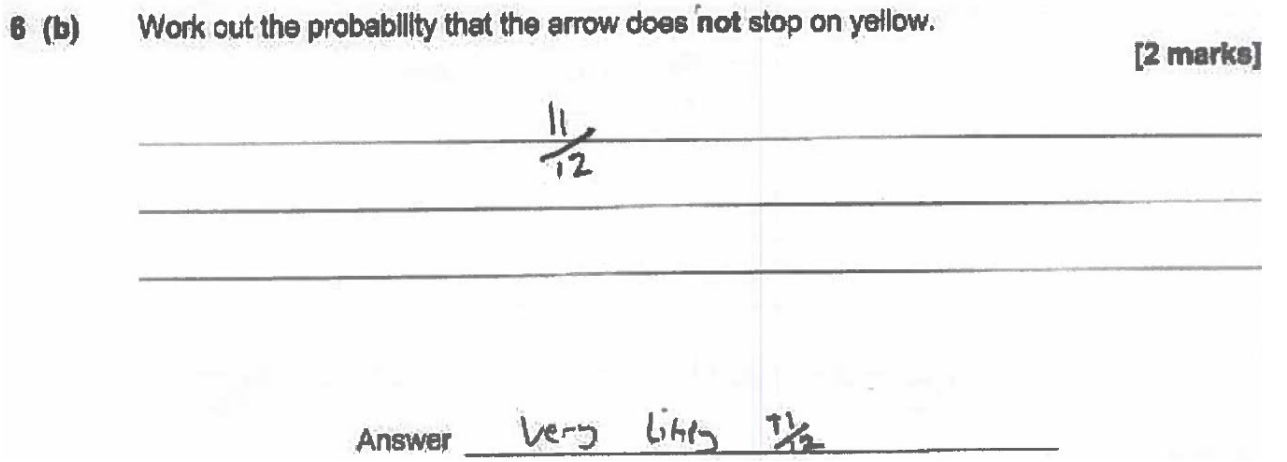
1 mark

Question 6(b)

6 (b) Work out the probability that the arrow does **not** stop on yellow.

[2 marks]

Student A

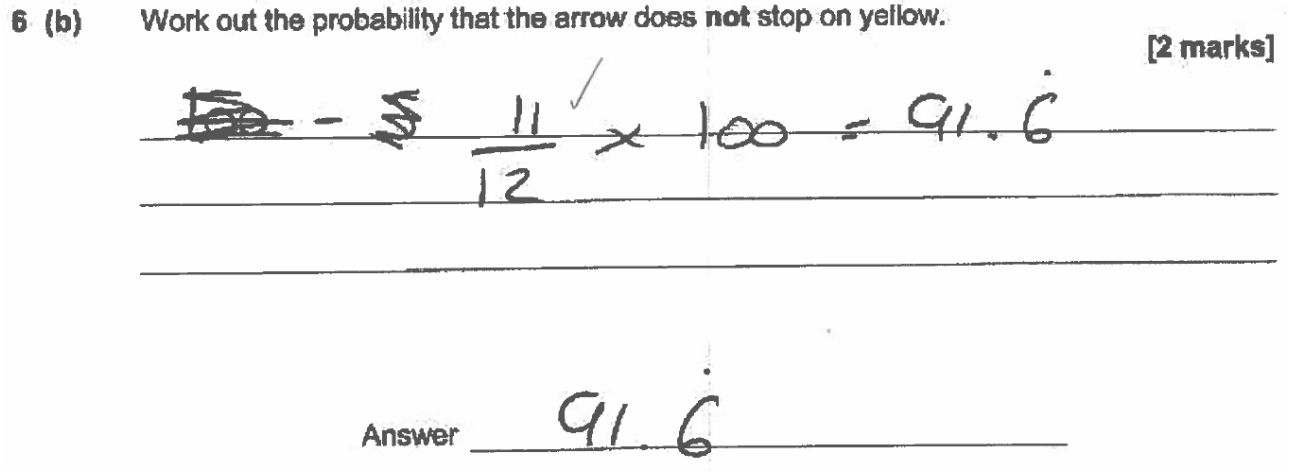


Commentary

The words ‘very likely’ are irrelevant though were they contradictory, this would lose one mark.

2 marks

Student B



Commentary

The student has converted to a percentage but has missed the % sign off. Once the correct fraction is seen any attempt at a conversion is ignored.

2 marks

Question 8(a)

8 Two ordinary fair dice are rolled and their scores are added to make a total.

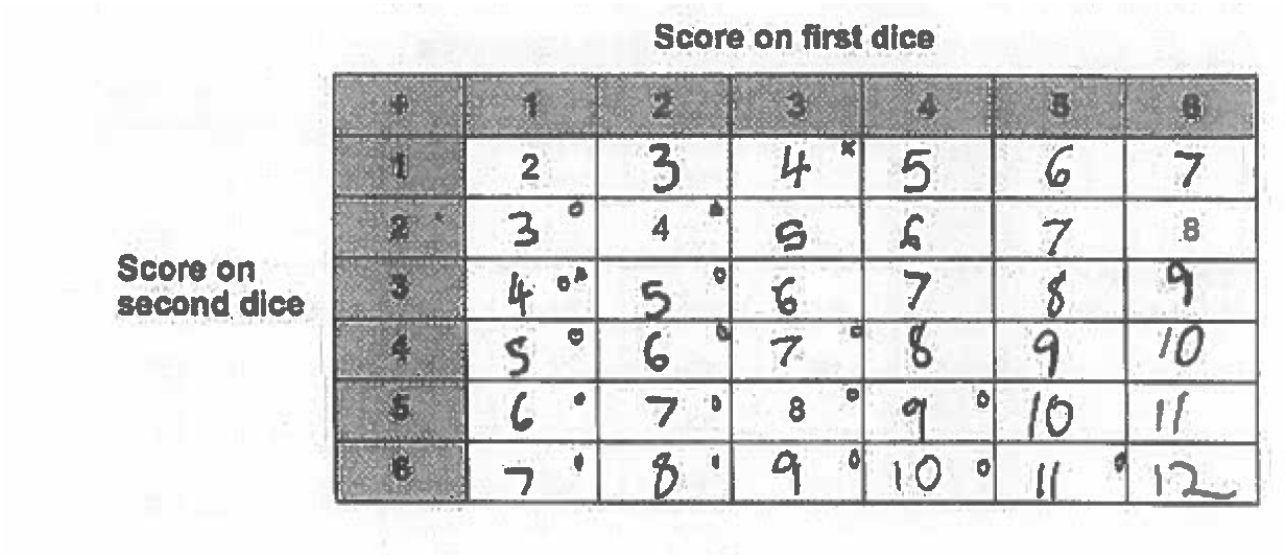
8 (a) Complete the sample space diagram below to show all the possible totals.

[2 marks]

Score on first dice

Score on second dice	**+**	**1**	**2**	**3**	**4**	**5**	**6**
	1	2					
	2		4				8
	3						
	4						
	5			8			
	6						

Student A



Commentary

A fully correct response. Note that the cells / numbers may be marked, highlighted or even crossed out due to the probability questions in part b and the students identifying outcomes. Mark what was originally there, using judgement in favour of the student.

2 marks

Question 8(b)(i)

8 (b) Using your diagram, or otherwise, work out

8 (b) (i) the probability of scoring a total of 4

[2 marks]

Answer _____

Student A

8 (b) Using your diagram, or otherwise, work out

8 (b) (i) the probability of scoring a total of 4

$\frac{3}{36} = \frac{1}{12}$

Answer $\frac{1}{12}$

Commentary

Both this and the next part are follow through from the student's completed table. The correct answer above is based on a correctly completed table. Note that cancelling to simplest form is **not** necessary, indeed, 3/36 followed by incorrect cancelling would still get 2 marks as cancelling is not being tested here.

2 marks

Question 8(b)(ii)

8 (b) (ii) the probability of scoring **more** on the first dice than on the second dice.

[2 marks]

Answer _____

Student A

8 (b) (ii) the probability of scoring **more** on the first dice than on the second dice.

$\frac{15}{36} = \frac{5}{12}$

Answer $\frac{5}{12}$

Commentary

Again, answers should be followed through from the table as completed by the student. This is the correct answer based on the correct completion of the table.

2 marks

Question 6(a)

No examples available

Commentary

In a live series, it is likely that the first mark would be awarded for **either** of the correct fractions not both.

Question 10(a)

10 Matilda sells drinks from her beach café.

She sells,

- tea (T)
- coffee (C)
- orange (O)
- blackcurrant (B)

Matilda believes that, over time, she sells equal numbers of each drink.

Assume she is correct and that every customer's choice is independent.

10 (a) Write down the probability that she sells the next customer a tea.

[1 mark]

Answer _____

Student A

10 (a) Write down the probability that she sells the next customer a tea.

[1 mark]

Answer 0·25

Commentary

This shows the correct answer, ignore attempts to convert or simplify once a correct answer seen.
1 mark

Question 10(b)

10 (b) Work out the probability that she sells each of the next **two** customers a tea.

[2 marks]

Answer _____

Student A

10 (b) Work out the probability that she sells each of the next **two** customers a tea.

$\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

Answer $\frac{1}{6}$

Commentary

Note that this part should follow through from part (a). Here this is based on (a) being correct and the student has correctly calculated the answer within the working lines. We would not then penalise them for copying the answer wrongly into the answer line – there is no good reason to believe they have started again and think the answer is 1/6.

2 marks

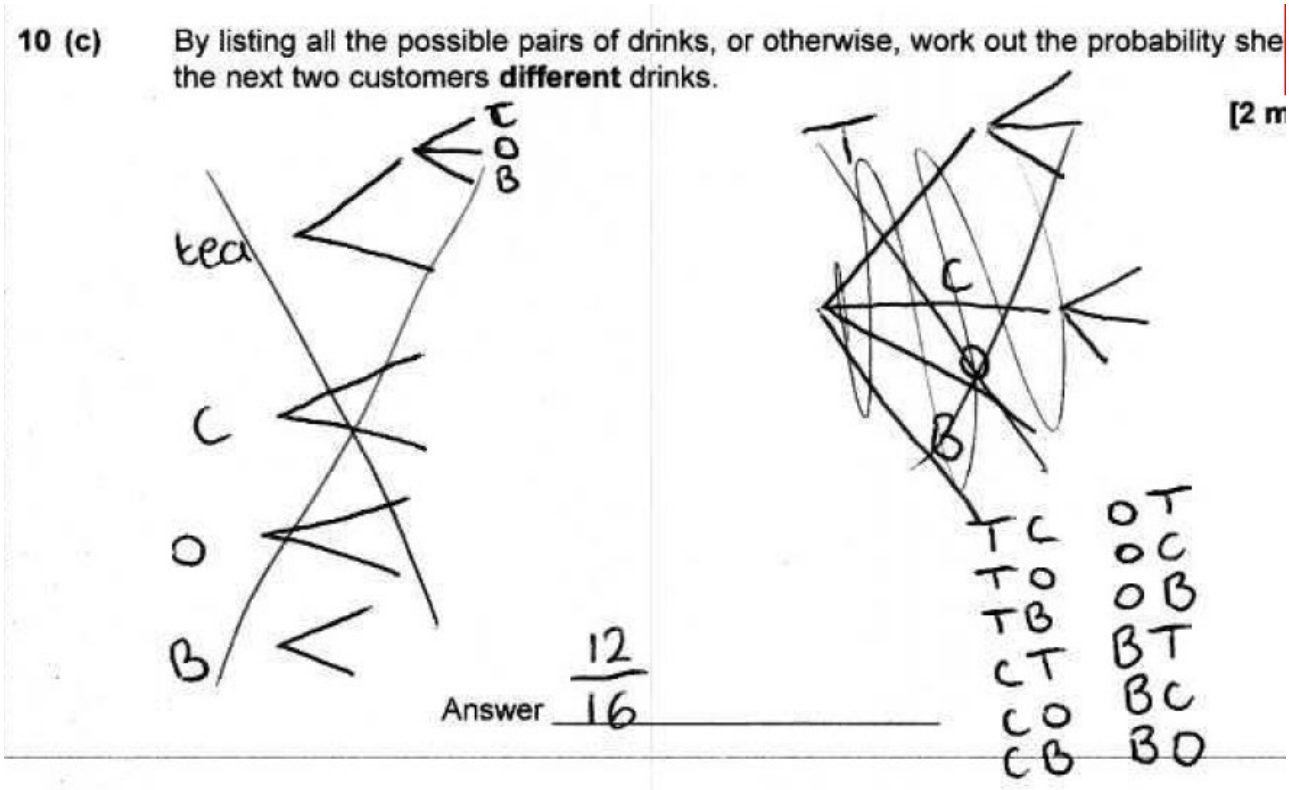
Question 10(c)

10 (c) By listing all the possible pairs of drinks, or otherwise, work out the probability she sells the next two customers **different** drinks.

[2 marks]

Answer _____

Student A

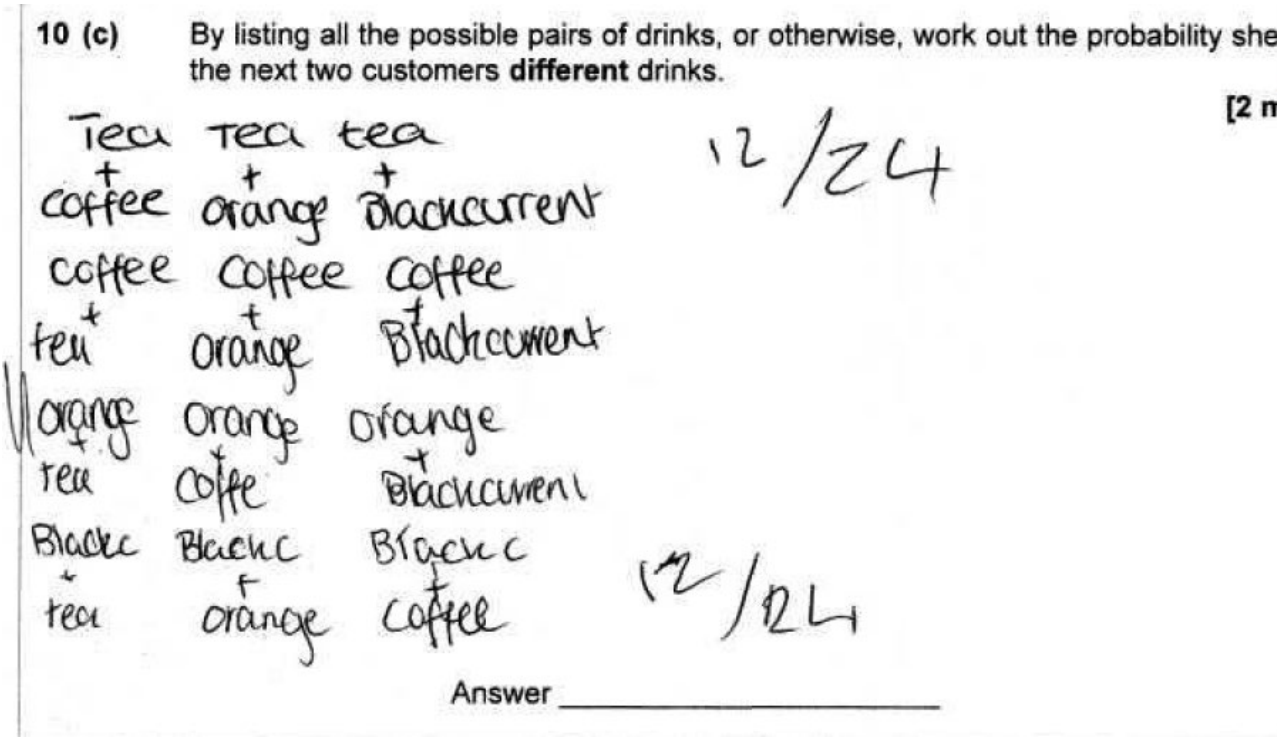


Commentary

A good listing technique using the abbreviations suggested in the stem of the question. There is no requirement to cancel down the answer as that is not asked for in the question.

2 marks

Student B



10 (c) By listing all the possible pairs of drinks, or otherwise, work out the probability she the next two customers **different** drinks.

[2 n

Tea + coffee
Tea + orange
tea + Blackcurrent
12/24
coffee + tea
coffee + orange
coffee + Blackcurrent
orange + tea
orange + coffee
orange + Blackcurrent
Blackc + tea
Blackc + orange
Blackc + coffee
12/24

Answer _____

Commentary

Scores for listing at least 10 of the possible combinations but would have been advised to use the initial letters.

1 mark

Question 7(a)

7 Gareth has a washing machine and a dishwasher.

W is the event that his washing machine breaks down next year.

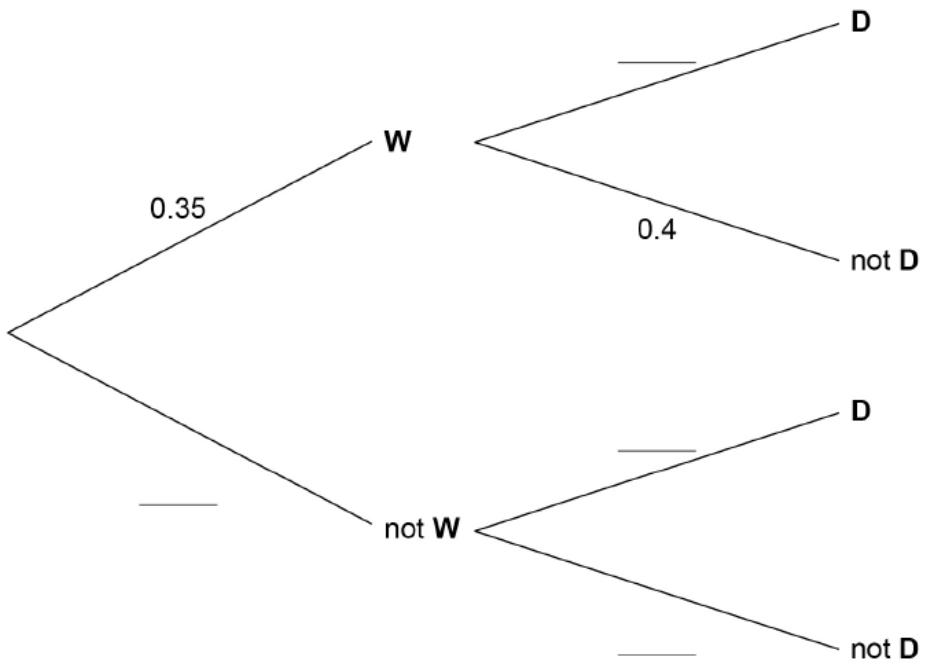
D is the event that his dishwasher breaks down next year.

Assume that the events **W** and **D** are independent.

7 (a) The tree diagram shows some of the probabilities.

Complete the tree diagram.

[2 marks]

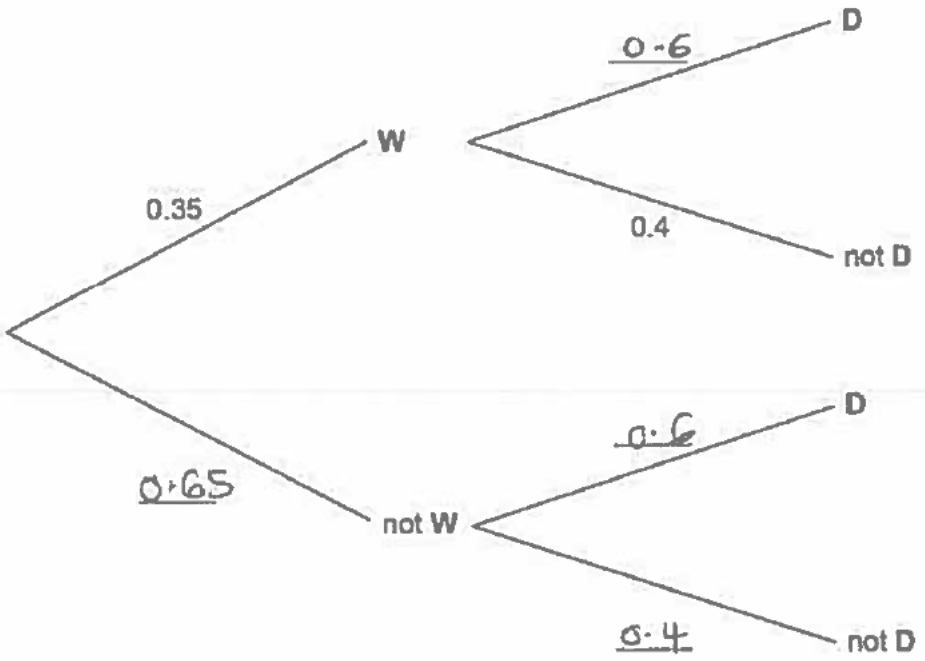


Student A

7 (a) The tree diagram shows some of the probabilities.

Complete the tree diagram.

[2 marks]



Commentary

A fully correct solution.

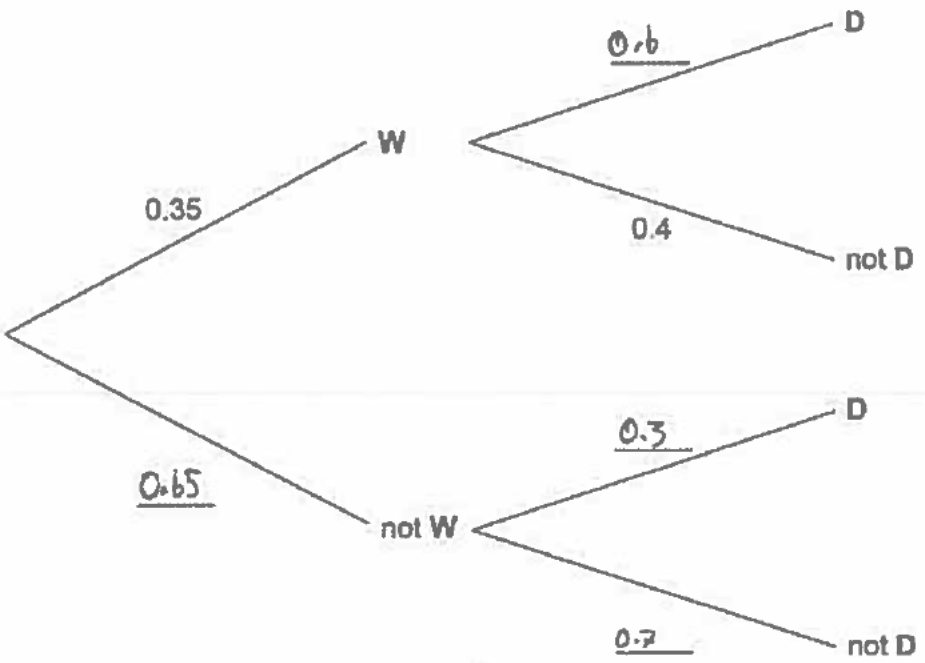
2 marks

Student B

7 (a) The tree diagram shows some of the probabilities.

Complete the tree diagram.

[2 marks]



Commentary

The 0.65 and one of the 0.6s are correct, but the right hand bottom pair are incorrect.
1 mark

Question 7(b)

7 (b) Find the probability that **at least one** of these machines breaks down next year.

[3 marks]

Answer _____

Student A

7 (b) Find the probability that **at least one** of these machines breaks down next year.

[3 marks]

$0.35 \times 0.4 = 0.14$

$0.65 \times 0.6 = 0.39$ +

$0.35 \times 0.6 = 0.21$

0.74

Answer 0.74

Commentary

A fully correct answer by combining the three routes which have at least one breakdown on them. Note that the answer is dependent again on following through the probabilities on the tree diagram when awarding marks in this part.

3 marks

Student B

7 (b) Find the probability that **at least one** of these machines breaks down next year.

[3 marks]

$(0.35 \times 0.6) + (0.35 \times 0.4) + (0.65 \times 0.6)$

$= 0.2646 = 0.26$

Answer ~~0.2646~~ 0.26

Commentary

Seems to have the correct product pairs but calculates the final answer of none breaking down.

2 marks

Student C

7 (b) Find the probability that **at least one** of these machines breaks down next year.

[3 marks]

$0.65 \times 0.4 = 0.26$

$1 - 0.26 = 0.74$

Answer 0.74

Commentary

An excellent, efficient solution taking the probability that none break down away from 1.

3 marks

Question 12(a)

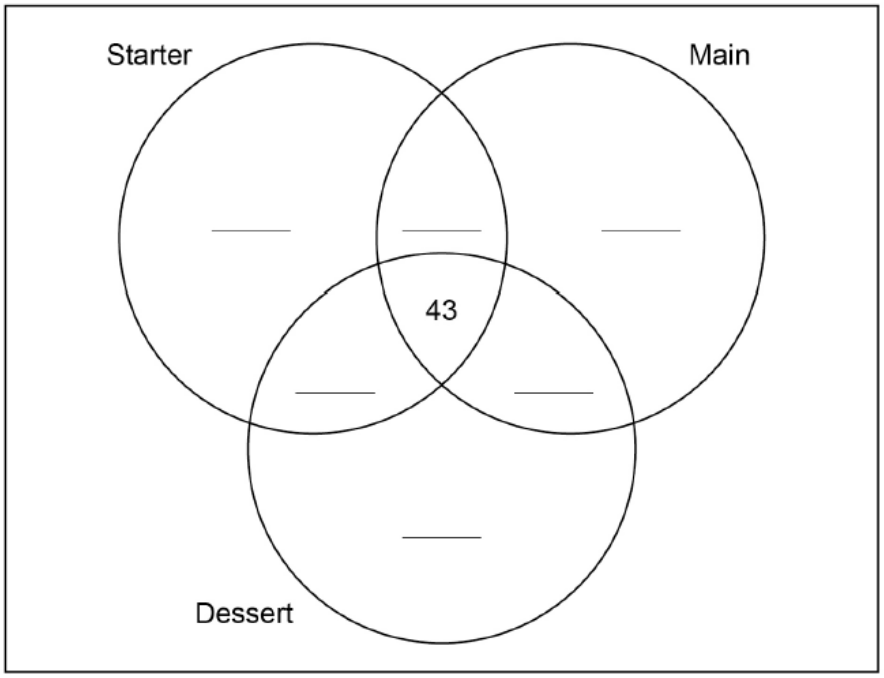
12 A restaurant serves three courses, starters, mains and desserts.

The manager records the choices of 100 people.

- 43 people had all 3 courses.
- 17 had **only** a starter and a main.
- 22 had **only** a main course and a dessert.
- The remaining people **only** had a main.

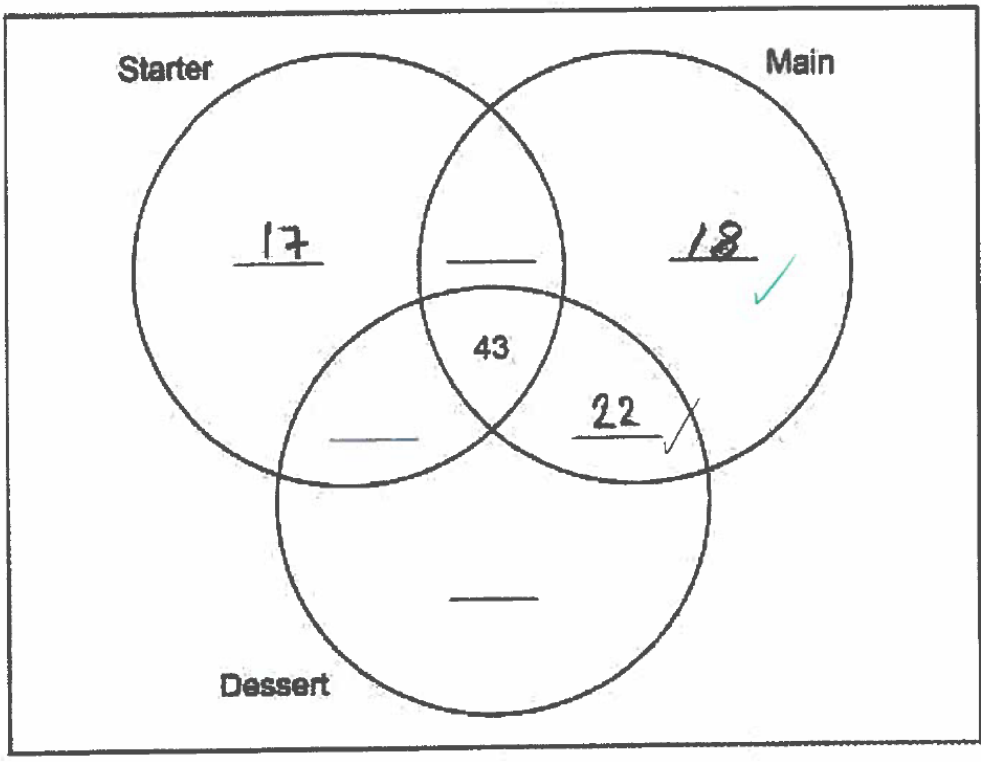
12 (a) Write the **six** missing numbers in the Venn diagram to show this information.

[4 marks]



Student A

12 (a) Write the six missing numbers in the Venn diagram to show this information.



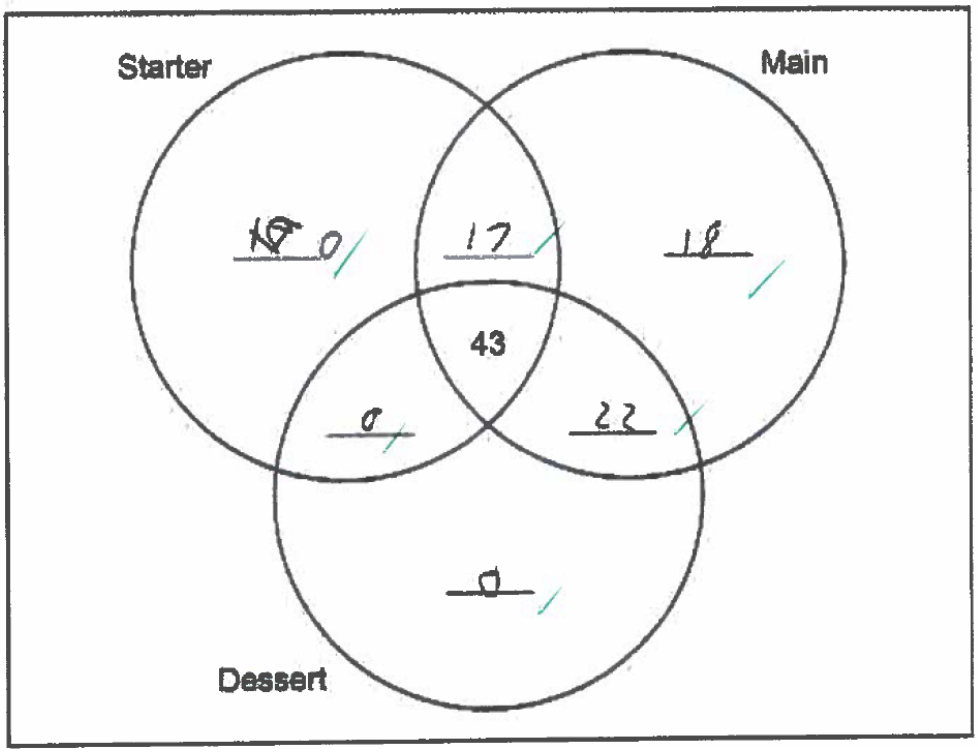
Commentary

Scores B0, B1, M1 A0. Zeros must be inserted and not left blank.

2 marks

Student B

12 (a) Write the six missing numbers in the Venn diagram to show this information.



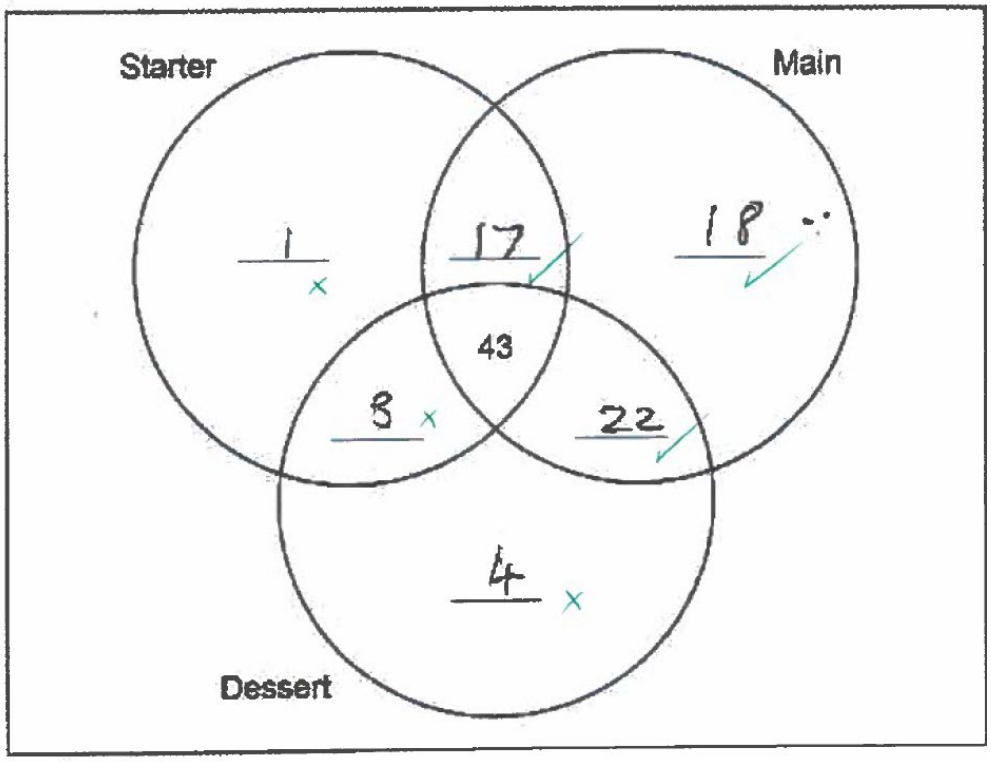
Commentary

A fully correct solution.

4 marks

Student C

12 (a) Write the six missing numbers in the Venn diagram to show this information.



Commentary

Scores B1, B1, M1, A0

3 marks

Question 12(b)

No examples available

Commentary

The responses for this part are to be followed through from the numbers in the students' Venn diagram.

Question 4

Please see the mark scheme

Question 9

9 In an experiment, Paulo throws three fair coins.

He repeats the experiment 120 times.

How many times should he expect to throw three heads?

[2 marks]

Answer _____

Student A

9 In an experiment, Paulo throws three fair coins.

He repeats the experiment 120 times.

How many times should he expect to throw three heads?

[2 ma

$p(h) = 0.5$

$p(3 \text{ heads}) = 0.125$

$0.125 \times 120 = 15$

Answer 15

Commentary

Fully correct response.

2 marks

Student B

9 In an experiment, Paulo throws three fair coins.

He repeats the experiment 120 times.

How many times should he expect to throw three heads?

[2 mar

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{6}$

$\frac{1}{6} \times 120 = 20$

Answer 20 times

Commentary

Correct method shown but unfortunately contains a calculation error.

1 mark

Question 14(a)

No examples available

Commentary

Expected references are either to the fixed number of experiments (days) or the constant probability of 'success' (delayed).

Question 14(b)

No examples available

Commentary

When an answer is given like this to 2 decimal places, it would be expected that the student would show the answer to 3 or more decimal places to prove they had the correct value. However, as this is only two marks, it is sufficient on this occasion to show the completely correct formula being used.

Question 12(a)

12 The table shows some information about people with **hearing loss** in the UK.

Age	Number with hearing loss	UK population
60 years and over	8 290 000	15 590 000
Under 60 years	2 750 000	50 450 000
Total	11 040 000	66 040 000

Sources: ONS and actiononhearingloss.org.uk

12 (a) Mike says,

> "The risk of hearing loss for people aged 60 years and over is about 10 times greater than the risk for people aged under 60 years."

Comment on Mike's statement.

You **must** show your working.

[3 marks]

Student A

12 (a) Mike says,

"The risk of hearing loss for people aged 60 years and over is about 10 times greater than the risk for people aged under 60 years."

Comment on Mike's statement.

You **must** show your working.

[3 marks]

$\frac{8,240,000}{15,540,000} \times 100 = 53.3\%$ Hearing loss

60 and over $\frac{2750,000}{50,450,000} \times 100 = 5.45\%$

have hearing loss under. Mikes statement is correct because 5% x 10 = 50% so the chance of hearing loss over 60 is 10x higher than under 60.

Commentary

An excellent response but a slight inaccuracy on the first fraction and therefore the first percentage. This is classed as a 'misread' and the student can still obtain the first two marks but loses the accuracy mark unfortunately.

2 marks

Student B

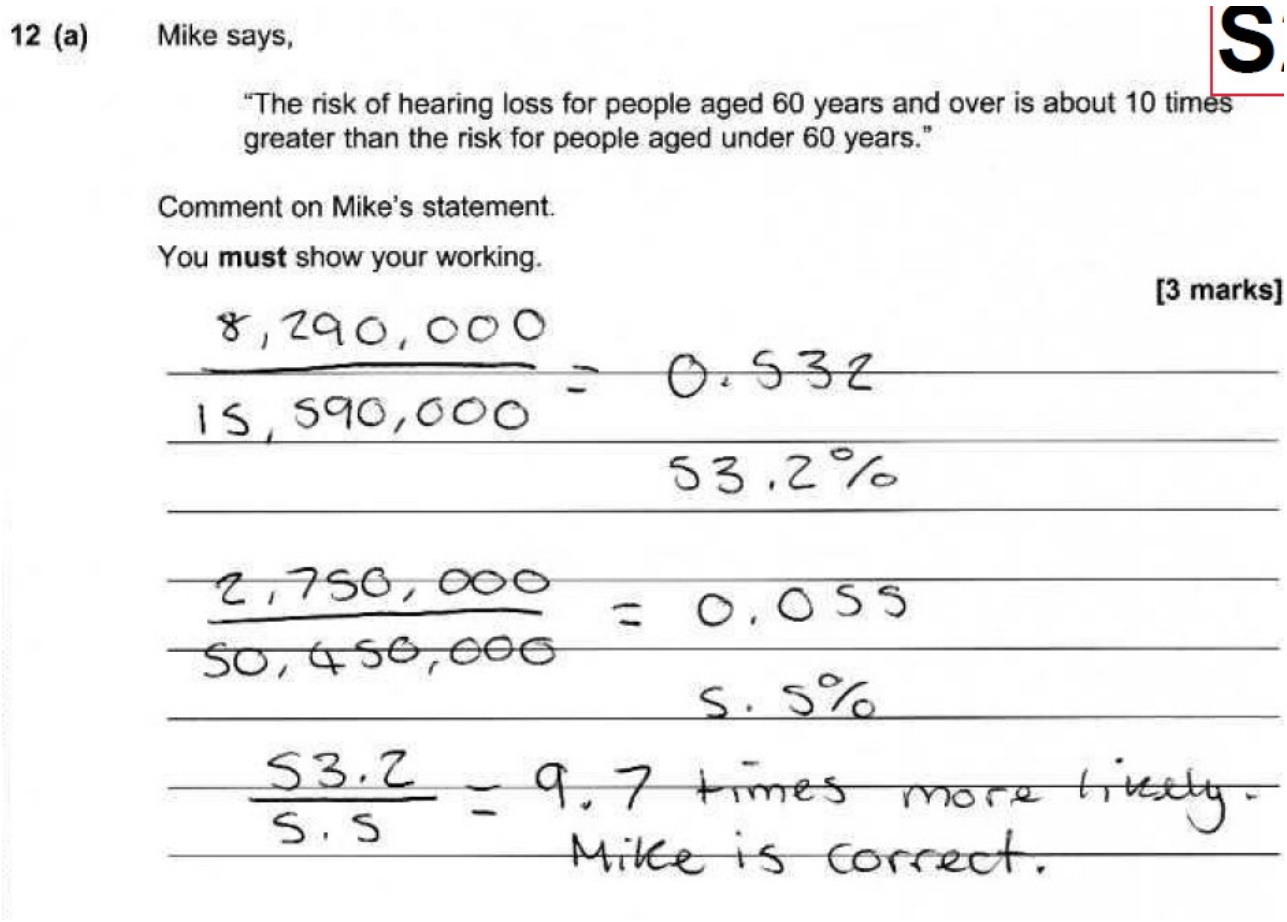
12 (a) Mike says,

> "The risk of hearing loss for people aged 60 years and over is about 10 times greater than the risk for people aged under 60 years."

Comment on Mike's statement.

You **must** show your working.

[3 marks]



Commentary

A good solution which shows the multiplicative factor is 9.7. There's no need to directly comment on the proximity to 10 to obtain the final mark.

3 marks

Student C

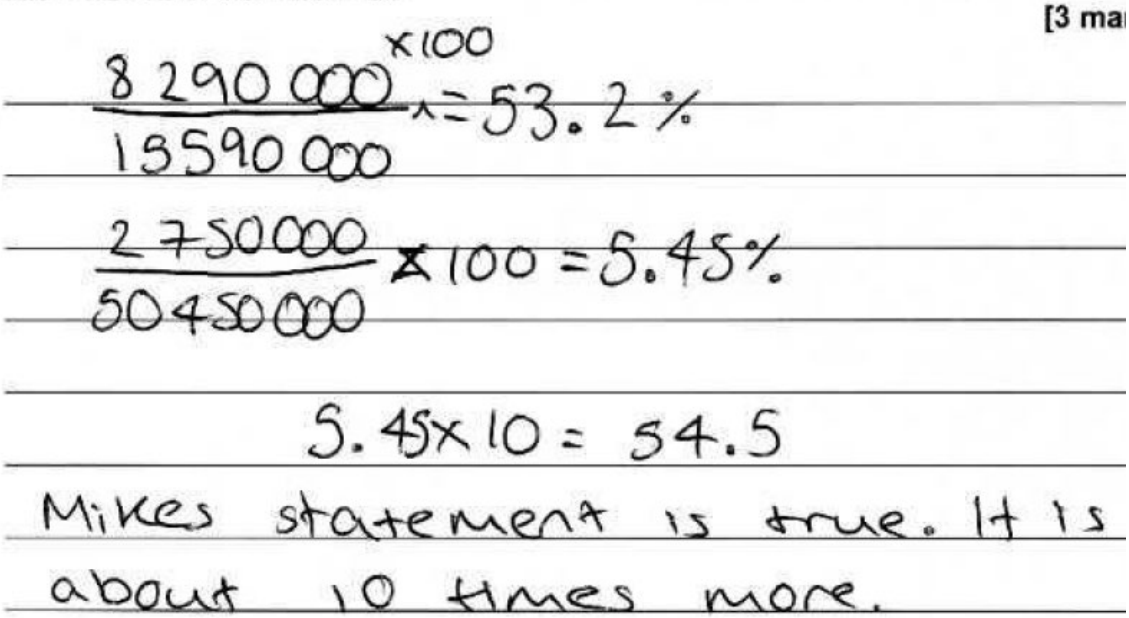
12 (a) Mike says,

> "The risk of hearing loss for people aged 60 years and over is about 10 times greater than the risk for people aged under 60 years."

Comment on Mike's statement.

You **must** show your working.

[3 ma



Commentary

Another successful but slightly different way of showing that the factor of 10 is appropriate.

3 marks

Question 12(b)

12 (b) About one in nine people in the UK aged over 60 years have **sight loss**.

Calculate an estimate of the number of people in the UK aged over 60 years who have sight loss.

[1 mark]

Answer _____

Student A

12 (b) About one in nine people in the UK aged over 60 years have **sight loss**.

Calculate an estimate of the number of people in the UK aged over 60 years who ha
sight loss.

[1 ma

$\frac{1}{9} \times 15590000 = 1732222.22 \approx 1732222$

Answer 1732222

Commentary

A correct answer showing the required change of the calculated answer to an integer due to the context of the question.

1 mark

Student B

12 (b) About one in nine people in the UK aged over 60 years have **sight loss**.

Calculate an estimate of the number of people in the UK aged over 60 years who have sight loss.

[1 mark

15,590,000 ÷ 9 = 1732222.222

Answer 1,732,222.222

Commentary

There is only one mark for this question at this level and unfortunately the student has not given their answer as an integer.

0 marks