

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Probability

Expected results from repeated experiments

v1.0

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14...	Allow answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q1.

- (a) $180 + 170 + 50$ or 400
may be seen as the denominator

$$\frac{50}{400}$$

oe

M1

A1

- (b) **Alternative method 1**

$$16 \times \frac{50}{180 + 170 + 50} \text{ or } 16 \times \frac{50}{400} \text{ or } 2$$

oe fraction, decimal or percentage $180 + 170 + 50$ may come from **(a)**

M1

Yes and 2

A1

Alternative method 2

$$(180 + 170 + 50) \div 16 \\ \text{or } 400 \div 16 \\ \text{or } 25 \\ \text{and} \\ 50 \div \text{their } 25 \\ \text{or } 2$$

oe

$180 + 170 + 50$ may come from **(a)**

M1

Yes and 2

A1

Alternative method 3

$$(180 + 170 + 50) \div 50 \\ \text{or } 400 \div 50 \\ \text{or } 8 \\ \text{and} \\ 16 \div \text{their } 8 \\ \text{or } 2$$

oe

$180 + 170 + 50$ may come from **(a)**

M1

Yes and 2

A1

[4]

Q2.

$\frac{10}{30}$ or $\frac{8}{20}$ seen

oe

0.33(...) or 0.4

or 33(...) % or 40%

B1

A correct probability from each bag, with attempt at a comparable form, with at least one correct

eg

$\frac{20}{60}$ and $\frac{24}{60}$

or 0.33(...) and 0.4

or 33(...) % and 40%

M1

No and both probabilities correct
and in the same format

eg

Incorrect and $\frac{20}{60}$ and $\frac{24}{60}$ seen

No and 0.33(...) and 0.4

No and 33(...) % and 40%

A1

[3]

Q3.

- (a) $250 + 230 + 120$ or 600

May be seen as a denominator

$$\frac{120}{600}$$

oe

M1

A1

- (b) **Alternative method 1**

$$15 \times \frac{120}{250 + 230 + 120} \text{ or}$$

$$15 \times \frac{120}{600} \text{ or } 3$$

oe fraction, decimal or percentage
250 + 230 + 120 may come from (a)

M1

Yes and 3

A1

Alternative method 2

$$(250 + 230 + 120) \div 15$$

$$\text{or } 600 \div 15$$

$$\text{or } 40$$

and

$$120 \div \text{their } 40$$

$$\text{or } 3$$

oe

250 + 230 + 120 may come from (a)

M1

Yes and 3

A1

Alternative method 3

$$(250 + 230 + 120) \div 120$$

$$\text{or } 600 \div 120$$

$$\text{or } 5$$

and

$$15 \div \text{their } 5$$

$$\text{or } 3$$

oe

250 + 230 + 120 may come from (a)

M1

Yes and 3

A1

[4]

Q4.

(a) 0.4 and 0.2

*B1 for $1 - (0.1 + 0.3)$ or 0.6
or total of White and Yellow = 0.6*

B2

Additional Guidance

Mark table but if table blank or scores zero look in script for working or answers

White (W) = 0.4 and Yellow (Y) = 0.2 must be clearly stated to get B2

$1 - (0.1 + 0.3) = 0.4$

White 0.8, Yellow 0.4

B1

No working

White 0.5, Yellow 0.1

B1

White blank, Yellow 0.6

B1

Table blank. W 0.4, Y 0.2 in script

B2

Table blank. W 0.2, Y 0.4 in script

B1

Table blank 0.4 and 0.2 in script

B1

White 0.8, Yellow 0.4

B0

White 0.6, Yellow 0.3

B0

(b) 200, 150 and 100

B2ft their probabilities in (a) but only for probabilities that total 1

B1 White 200 or Blue 150 or Yellow 100

*B1ft for **one** of*

their (a) for white $\times 500$

or their (a) for yellow $\times 500$

Do not allow B1ft for any probabilities that are greater than 1

B2ft

Additional Guidance

If answer of 200, 150 and 100 given do not check for ft even if table in (a) wrong. 2 marks. They could have started again

In (a) Red 0.1, White 0.2, Blue 0.3, Yellow 0.4

Answers (50) 100, 150 and 200

B2ft

In (a) Red 0.1, White 0.5, Blue 0.3, Yellow 0.1

Answers (50) 250, 150 and 50

B2ft

In (a) Red 0.1, White 0.3, Blue 0.3, Yellow 0.3

Answers (50) 150, 150 and 150

B2ft

In (a) Red 0.1, White 1.2, Blue 0.3, Yellow 0.2

Answers (50) 600, 150 and 100

B1

In (a) Red 0.1, White 0.2, Blue 0.3, Yellow 0.1

Answers (50) 100, 250 and 100

B1ft

In (a) Red 0.1, White 1.2, Blue 0.3, Yellow 0.2

Answers (50) 600, 150 and 200

B1

(c) $\frac{50}{400}$

oe eg $\frac{1}{8}$, 0.125, 12.5%

ft their table in (b)

B2ft for numerator of 50 and denominator from their (b)

B1 for 50 out of 400

B1 for $50 \div 400$

B1ft for 50 out of their 400 from (b)

B0 for any ratio

Ignore any incorrect cancelling or change of form once correct answer seen

B2ft

Additional Guidance

For follow through from their (b) denominator is either 500 – their Yellow **or** 50 + their White + their Blue

$\frac{50}{300}$ oe

B2ft

$\frac{100}{400}$

B0

[6]

Q5.

(a) 20 or 20 out of 120 or 20 in 120 $\sqrt{36}$ (oe) is B0

B1

(b) Yes ticked If boxes blank, yes may be implied by wording

B1

Valid reason eg 1 should be (about) 20 (but it is much lower)
or 6 should be (about) 20 (but it is higher)
or 6 is much higher than 1
or frequencies should be all (about) the same
oe Strand (i) Only award if Yes ticked or implied

Q1

Additional Guidance

There are 4 ways to score the Q mark

Comparing frequency of 1 to 20

Comparing frequency of 6 to 20

Referring to significant difference between frequency of 1 and 6

Referring to the fact that all frequencies should be the same

Yes ticked and:

B1

6 has above the average which is 20

Q1

6 more, 1 a lot less

Q1

Lands more on 6. It should land on each side about the same number

Q1

The range of results is too large on specific numbers (1,6)
showing there is something making it land on a 6 and not a 1

Q1

The frequency of landing on 6 is over 7 times the frequency of
it landing on 1.

Q1

There is a large range of 33 between the highest and lowest frequency

Q1

Because the frequency is not all the same so it isn't fair

Q1

Frequency should be the same for all numbers

Q1

Lands more on 6

Q0

6 has appeared as the mode number whereas 1 is the least amount

Q0

Is heavier on number 6

Q0

Landed on 6 38 times

Q0

All number are about average except 1 and 6

Q0

Answers should be more evenly spaced out

Q0

Each time the number goes up, the frequency goes up

Q0

[3]

Q6.

(a) $\frac{3}{8}$ oe **B1**

(b) 0.2 + 0.4 or 0.6 oe (for bag B)
or
0.625 or 62.5(%) (for bag A) **M1**

0.62(5) or 0.63 and 0.6 and bag A oe
both probabilities correct in the same format and bag A
eg $\frac{25}{40}$ and $\frac{24}{40}$ and bag A **A1**

[3]

Q7.

(24 ÷ 3) + 5 or 13 or 24 + 15 or 39 oe *May be seen as a numerator /*
denominator of incorrect fraction eg $\frac{13}{24}$ **M1**

$\frac{13}{39}$ or
13 **and** 39 or
13, 13, 13 or
13 : 26 **A1**

Yes ticked and $\frac{13}{39} = \frac{1}{3}$ or
equivalent, eg $3 \times 13 = 39$,
or $39 \div 13 = 3$
Strand (ii)
ft on wrong calculation for $24 \div 3$ and No ticked
SC1 Yes ticked (incorrect or no working) **Q1ft**

Alternative method 1

$\frac{5}{15}$ **M1**

$\frac{5}{15} = \frac{1}{3}$ **A1**

Yes ticked and clear explanation that same proportion of blue added
Strand (ii)
SC1 Yes ticked (incorrect or no working) **Q1**

Alternative method 2

Yes ticked **B1**

Full explanation that the extra added are in the same proportion
eg As $\frac{1}{3}$ of the extra are blue
Strand (ii)
Q1 partial explanation
eg 5 of each colour **Q2**

[3]

Q8.

Alternative method 1

1 – 0.38 or 0.62

oe

M1

their 0.62×150

$\frac{93}{150}$
oe implied by

M1dep

93

A1

Alternative method 2

0.38×150 or 57

oe

M1

150 – their 57

$\frac{93}{150}$
oe implied by

M1dep

93

A1

Additional Guidance

‘93 out of 150’ on answer line

M1M1A1

$\frac{93}{150}$
Ignore attempt to simplify

M1M1A0

$\frac{93}{150}$ and 93 both on answer line

M1M1A0

$\frac{57}{150}$

M1M0A0

Do not allow a misread of any probability

[3]

Q9.

$\frac{1}{6}$ or 0.16(6...) or 0.167 or 0.17 or 16(.6...) % or 16.7% or 17%
oe fraction

B1

Additional Guidance

Ignore conversion attempt to fraction, decimal or percentage (but not ratio) after correct probability seen

Do not allow eg 1 in 6 or 1 out of 6 unless the correct probability seen.

Do not allow ratio

Ignore words if correct probability seen

[1]

Q10.

- (a) All values correct
B1 1 or 2 rows correct

B2

Additional Guidance

	1	2	3	4	5	6
2x	2	4	6	8	10	12
3x	3	6	9	12	15	18
x ²	1	4	9	16	25	36

- (b) $\frac{8}{18}$ or $\frac{4}{9}$
or 0.44(4...) or 44(.4...) % oe fraction, decimal or percentage
ft their table with ≥ 12 values
must be using 18 for the total number of possible scores

B1ft

Additional Guidance

Ignore simplification or conversion attempt (not ratio) after correct probability seen
Ratio answer eg 8 : 18, even alongside a correct probability is B0
ft decimals or percentages must be correct to the same accuracy as in the scheme
eg 10 winning values in their table

$\frac{10}{18}$ or 0.55(5...) or 0.56 or 0.556 or 55(.5...) % or 56% or 55.6%

B1ft

- (c) $711 \times$ their $\frac{8}{18}$ oe
ft their probability from (b)
or if no probability in (b), ft their table with ≥ 12 values
where $0 < \text{their probability} < 1$
probabilities, if rounded in (c), must be truncated or rounded to at least 2 sf

M1

316 SC2 395

A1

Additional Guidance

Answer 316

M1A1

$\frac{316}{711}$ on answer line

M1A0

Condone 316 out of 711

M1A1

Do not treat estimating by rounding as a misread
eg1 700 used instead of 711

M0A0

eg2 (b) 0.44 (c) 0.4×711 (rounded to 1sf in (c) for the probability)

M0A0

eg3 (b) 0.4 (c) 0.4×711 (follows through their (b))

M1A0

Do not allow ft for a ratio from (b) but may ft their (a) instead
For 0.44×711 , accept $44\% \times 711$ but do not accept 44% of 711 unless recovered
The method mark may be implied by a ft answer (decimal or truncated to the nearest integer or rounded up to the nearest integer)

eg1 (b) $\frac{1}{18}$
(c) 276.5 or 276 or 277 (correct ft method implied using (b))

M1A0

eg2 (a) completed table has 7 winning values (b) no probability shown
(c) 276.5 or 276 or 277 (correct ft method implied using (a))

M1A0

[5]

Q11.

- (a) Valid reason

Any indication that actual outcomes do not always match theoretical probability

eg

*It's just chance**Might get two of one number***B1**

- (b)
- $7 + 12 + 9$

or $50 - (4 + 5 + 13)$

or 28

oe

M1

$$\frac{28}{50} \text{ or } \frac{14}{25} \text{ or } 0.56$$

A1**[3]****Q12.**

- (a) Box A
- $\rightarrow p(3) = \frac{1}{6}$
- and

Box B $\rightarrow p(3) = \frac{1}{3}$ andBox C $\rightarrow p(3) = \frac{2}{5}$ andBox D $\rightarrow p(3) = \frac{2}{4}$ or $\frac{1}{2}$ *Allow one incorrect probability***M1**

(Box) D and all probabilities correct

A1

- (b) (Box) A and (Box) B

B1**[3]****Q13.**

- (a) Yes she's asking people who own dogs so they prefer them

oe

*Yes she should ask people who don't own dogs / pets***B1**

- (b) No preference = 6

B1Cats = Dogs $\times$ 2**B1**

Dogs + Cats + No preference = 30

*8, 16, 6 scores B3***B1****[4]**

Q14.

(a)

	1	2	7
4	4	4	7
5	5	5	7
8	8	8	8

B1 any row or column correct

B2

(b) 2 and 5 on spinner C
and 3 and 4 on spinner D

*B1 2, 3, 4 and 5 used but in the wrong position
or all sections completed so that at least three probabilities are correct*

B2

[4]

Q15.

$$\frac{3}{4} - \frac{1}{4} \left(= \frac{1}{2} \right)$$

M1

$6 \div 2 \times 3$ *3 and 9 chosen*

M1

9 *SC2 blue = 3 or red + blue = 12*

A1

Alternative method 1

Pair of integers with a difference of 6 eg 2 and 8

1:3 or 3:1

or Pair of integers with $P(\text{blue}) = \frac{1}{4}$

$$\frac{2}{8}, \frac{3}{12}$$

eg 1 and 3, 2 and 6,

M1

3 and 9 chosen *3:9 or 9:3 chosen*

M1

9 *SC2 blue = 3 or red + blue = 12*

A1

Algebraic methods are not expected on Unit 1 but, if seen, apply the following schemes

Alternative method 2

$$b + 6 = 3b \quad r - 6 = \frac{r}{3}$$

M1

$$2b = 6 \text{ or } b = 3 \quad 3r - 18 = r \text{ or } 2r = 18$$

M1

9 *SC2 blue = 3 or red + blue = 12*

A1

Alternative method 3

$$x \text{ red, } (x - 6) \text{ blue, } \frac{x - 6}{x + x - 6} = \frac{1}{4} \text{ oe}$$

M1

$$4x - 24 = 2x - 6 \quad \text{Expanding and eliminating fractions}$$

M1

9 *SC2 blue = 3 or red + blue = 12*

A1

[3]

Q16.

- (a) 0.4 (relative frequency of white) or
1 (pink) oe

B1

their $5 \div 10 (= 0.5)$

or

$1 - \text{their } 0.4 - 0.1 = (0.5)$ oe

M1

Fully correct table ie

(4)	1	5
0.4	(0.1)	0.5

oe accept equivalent fractions or percentages for relative frequencies throughout

A1

- (b) Comment about increasing the sample size

eg she should repeat it more times or sample more balls oe

B1**[4]****Q17.**

$300 \div 6 (= 50)$

or

$120 \times 6 (= 720)$

oe $\frac{1}{6}$ oe and $\frac{120}{300} (= \frac{2.4}{6})$

M1

No and 50

or

No and 36 (average of the other numbers)

or

No and 720

No and any sensible comment linking the theoretical probability and experimental outcome with accurate calculation(s)

SC1 States or implies that 120 is too large a proportion

A1**[2]****Q18.**

3, 3, 4, 4, 2

B2 for two criteria met

eg 3, 3, 3, 4, 4

B1 for one criteria met

eg 3, 3, 4, 4, 4

B3**[3]**

Q19.

(a) $\frac{2}{3} \times 40$ oe $\frac{1}{3} \times 40$

26.(...) or 26 or 27
13.(...) or 13

M1

their 27 **and** No
or
their 13 **and** No

A1

Strand (iii)
Supporting answers with explanation and evidence
Must have scored M1

Q1 ft

Alternative method

Can swim:

$\frac{24}{40}$ oe or 60% or 0.6

Proportions in the same format

eg 60% **and** 66.(...)% or 67%

or 0.6 **and** 0.66(...) or 0.67

or two comparable fractions

equivalent to $\frac{24}{40}$ **and** $\frac{2}{3}$

eg $\frac{72}{120}$ **and** $\frac{80}{120}$
or $\frac{9}{15}$ **and** $\frac{10}{15}$

or $\frac{120}{15}$ **and** $\frac{10}{15}$

Cannot swim:

$\frac{16}{40}$ oe or 40% or 0.4

M1

Proportions in the same format

eg 40% **and** 33.(...)%

or 0.4 **and** 0.33(...)

or two comparable fractions

equivalent to $\frac{16}{40}$ **and** $\frac{1}{3}$

eg $\frac{48}{120}$ **and** $\frac{40}{120}$

or $\frac{6}{15}$ **and** $\frac{5}{15}$

A1

their two comparable proportions
and No

Strand (iii)
Supporting answers with explanation and evidence

Q1 ft

- (b) A valid suggestion for improvement
eg ask people not at leisure centre oe
Condone ask more / bigger sample

B1

[4]

Q20.

- (a) (i) White or W

B1

- (ii) $\frac{1}{4}$ or (0).25 or 25%

*B1 sight of $\frac{1}{8}$ or $\frac{25}{100}$
B1 1 out of 4 or 1 in 4*

B2

- (b) All labelled red or R

B1

- (c) 1 white, 1 green, 4 red, 4 blue

*B1 all four colours used and 2 of other 3 criteria met
eg 2W 2G 3R 3B*

B2

[6]

Q21.

- (a) Yes $\frac{3}{5}$ and No $\frac{2}{5}$ for Bag A
oe fraction, decimal or percentage

B1

Yes $\frac{1}{10}$ and No $\frac{9}{10}$ for both pairs of branches on Bag B
oe fraction, decimal or percentage

B1

- (b) their $\frac{3}{5} \times$ their $\frac{1}{10}$ or $\frac{3}{50}$
*oe may be on tree diagram
ft their tree diagram if their
 $\frac{3}{5}$ and their $\frac{1}{10}$ are > 0 and < 1*

M1

their $\frac{3}{5} \times$ their $\frac{1}{10} \times 450$
or $\frac{3}{50} \times 450$

oe

their $\frac{3}{50} \times 450$ must be > 0 and

M1dep

27

ft their tree diagram if their $\frac{3}{5}$ and their $\frac{1}{10}$ are > 0 and < 1

A1ft

Additional Guidance

For the first mark, accept the correct probability shown on the tree diagram and ignore other probabilities

For the first mark, do not allow $\frac{3}{5} \times \frac{1}{10}$ seen as part of a longer multiplication string of probabilities

eg $\frac{3}{5} \times \frac{1}{10} \times \frac{9}{10}$

M0

Check tree diagram for working

$\frac{27}{450}$ implies

M1M1A0

Students with incorrect probabilities on the tree diagram can score marks for follow through in part (b) or from the correct probabilities recovered

eg probabilities of $\frac{3}{4}$ and $\frac{9}{10}$ on the top row of the tree diagram but an answer of 27 in part (b)

B0B0 in (a)

M1M1A1 in (b)

Allow follow through from values rather than probabilities on the branches, with denominator 5 for Bag A and 10 for Bag B

eg from 2 on Bag A and 9 on Bag B allow $\frac{2}{5} \times \frac{9}{10} \times 450 = 162$

M1M1A1ft

For A1ft allow a correct decimal answer or the answer truncated or rounded up to the nearest integer

eg from $\frac{3}{4}$ and $\frac{1}{10}$ leading to $\frac{3}{40} \times 450$ accept 33 or 33.75 or 34

M1M1A1ft

[5]

Q22.

0.2 + 0.4 or 0.6 oe (for bag B)

or

0.625 or 62.5(%) (for bag A)

M1

0.62(5) or 0.63 and 0.6 and bag A

oe

both probabilities correct in the same format and bag A

eg $\frac{25}{40}$ and $\frac{24}{40}$ and bag A

A1

[2]

Q23.

(a) $0.1 \times 400 (=40)$ **or** $0.2 \times 500 (=100)$

M1

40 **and** 100

A1

140 or 140/900 but not 140 : 900

SC2 for 760

SC1 for digits 14...

ft on their 40 + their 100 if complete correct method seen.

A1ft

(b) $\frac{4}{10}$ and $\frac{3}{9}$ identified as probabilities

May be on branches of a tree diagram.

M1

$$\left(\frac{4}{10} \times \frac{3}{9}\right) = \frac{12}{90} = \frac{2}{15}$$

Evidence of cancelling is necessary

but $\frac{12}{90} = \frac{2}{15}$ is enough.

NB $\frac{2}{5} \times \frac{1}{3}$ is 2 marks

A1

[5]

Q24.

- (a) 0.85 (Pass) and 0.15 (Fail) for Section A
oe fractions, decimals or percentages

B1

0.22 (Fail) on top branch for Section B
and

0.64 (Pass) and 0.36 (Fail) on bottom branches for Section B
oe fractions, decimals or percentages

B1

- (b) **Alternative method 1**

their $0.85 \times \text{their } 0.78$ or 0.663

or

their $0.85 \times \text{their } 0.22$ or 0.187

or

their $0.15 \times \text{their } 0.64$ or 0.096

or

their $0.15 \times \text{their } 0.36$ or 0.054

oe

ft their tree diagram provided all probabilities are > 0 and < 1

M1

$1 - \text{their } 0.663$

or

their $0.187 + \text{their } 0.096 + \text{their } 0.054$

or

their $0.187 + 0.15$

or 0.337

oe

their 0.663, their 0.187, their 0.096 and their 0.054 must be from correct methods

M1dep

their 0.337×0.4 or 0.1348

or

their 0.337×5000 or 1685

oe fraction, decimal or percentage

dep on M2

M1dep

674

ft their tree diagram provided all probabilities are > 0 and < 1

A1ft

Alternative method 2

their $0.85 \times \text{their } 0.78 \times 5000$ or 3315
M1 their 0.85×5000 or 4250

or
 their $0.85 \times \text{their } 0.22 \times 5000$ or 935
implied by 374

or
 their $0.15 \times \text{their } 0.64 \times 5000$ or 480
implied by 192

or
 their $0.15 \times \text{their } 0.36 \times 5000$ or 270
implied by 108

or
 their 0.15×5000 or 750
ft their tree diagram provided all probabilities are > 0 and < 1

M2

5000 – their 3315
 or their 935 + their 480 + their 270
 or their 935 + their 750
 or 1685
 or 374 and 192 and 108
dep on M2

M1dep

674
ft their tree diagram provided all probabilities are > 0 and < 1

A1ft**Additional Guidance**

Working for part (b) may be seen in part (a)

[6]**Q25.**

0.4×700 or 280
 or
 $(1 - 0.4) \times 900$ or 0.6×900
 or 540
 or
 30×0.4 or 12
 or
 $30 \times (1 - 0.4)$ or 30×0.6 or 18
oe
implied by 820

M1

$30 \times 0.4 \times 700$ or 8400
 or
 $30 \times (1 - 0.4) \times 900$ or 16 200
oe
implied by 820×30

M1dep

24 600

A1**Additional Guidance**

Up to M2 may be awarded for correct work, with no or incorrect answer,
 even if this is seen amongst multiple attempts

[3]

Q26.

(a) $\frac{1}{3}$ or $\frac{2}{6}$ or 0.33(...)

or $72 \div 6$ or 12

or $72 \div 6 \times 2$

oe

M1

24

oe

A1

Additional Guidance

24 out of 72

M1A1

$$\frac{24}{72}$$

M1A0

2 out of 6 or 1 out of 3

M0

(b) $250 - 25 - 53 - 62$ or 110

$$(25 + 53 + 62) \div 250 \text{ or } \frac{140}{250} \text{ or } 0.56$$

M1

their $110 \div 2$ or 55

$$1 - \text{their } \frac{140}{250}$$

or $1 - 0.56$ or 0.44

M1dep

$$\frac{55}{250} \text{ or } 0.22 \text{ or } 22\%$$

ignore fw

oe

$$\frac{11}{50}$$

A1

Additional Guidance

$\frac{55}{250}$ followed by error eg = 0.2

M1M1A1

55 in table

M1M1A0

Do not allow misreads for 250

[5]

Q27.

1 1 2 2 2 2 2 3

Any order

B1 for two conditions met

ie

Used 8 cards and at least five 2s

eg 1 2 2 2 2 2 3 3

Used 8 cards and twice as many 1s as 3s

eg 1 1 1 1 2 2 3 3

B2

[2]

Q28.

(a) (i) 0.9

oe

B1

(ii) (10, 0.9) plotted

$\pm \frac{1}{2}$ square
ft their 0.9

B1 ft

(b) $0.55 \times 20 (-9)$ or $11 (-9)$

oe

M1

2

A1

(c) $0.6 \times 130 (= 78)$

oe $60 + 0.6 \times 30$

Must use 0.6

M1

78 and no

Yes as 78 is nearly 80 oe

A1

Alternative method 1

$$\frac{80}{130} (\times 100)$$

M1

0.61... or 0.62 **and** 0.6 and No

61.(...) or 62 **and** 60 and No

Yes as 60 is nearly 61.(...) or 62

Yes as 0.6 is nearly 0.61 (...) or 0.62

Must use 0.6 or 60

A1

Alternative method 2

Full explanation that you cannot tell because the sample size is only one packet

oe

B2

[6]