

5MB1H/01

Edexcel GCSE

Mathematics B (Modular) – 2MB01

Paper 1H (Calculator)

Higher Tier

Practice Paper B

Time: 1 hour 15 minutes



You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.

Instructions

- Use **black** ink or ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.
Write your answers in the spaces provided.
You must write down all stages in your working.

1. Here is part of a train timetable for six trains from Birmingham to London.

Train	A	B	C	D	E	F
Birmingham	06 35	07 00	07 15	07 30	07 45	08 00
London	08 09	08 39	08 48	09 04	09 59	09 39

(a) Which train takes more than 2 hours to go from Birmingham to London?

..... **E**
 (1)

(b) Work out the number of **minutes** taken by **Train D** to go from Birmingham to London.

$$07:30 \rightarrow 09:04 = 30 + 60 + 4 = 94 \text{ min}$$

..... **94** minutes
 (2)

Paula has to go to a meeting in London.
 She will catch one of the six trains from Birmingham.
 She needs to arrive in London before 09 00

(c) Work out the latest train she can catch.

..... **C**
 (1)

(Total for Question 1 is 4 marks)

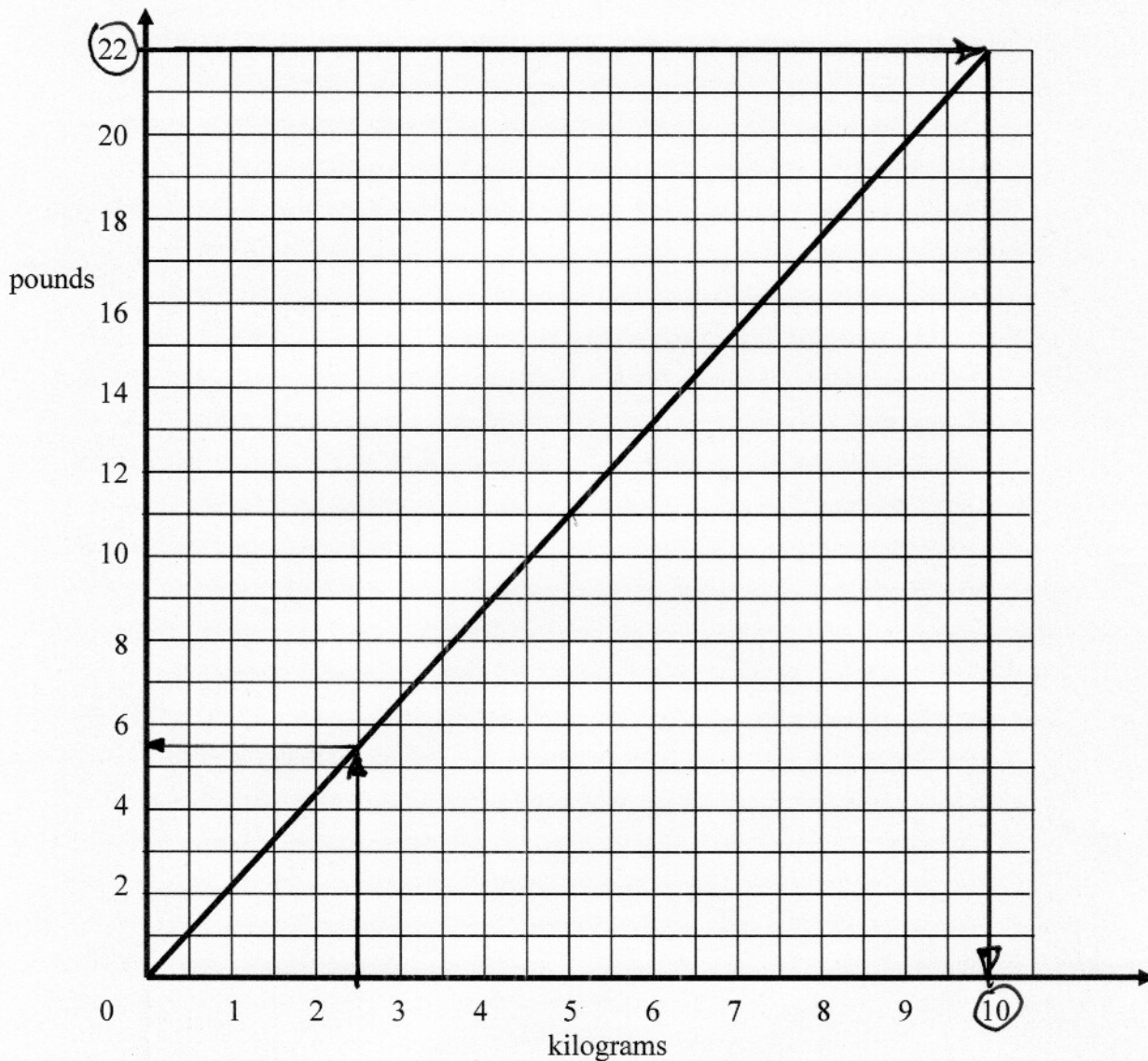
2. Write $\frac{18}{30}$ as a fraction in its simplest form.

$$\frac{18}{30} = \frac{\cancel{6} \times 3}{\cancel{6} \times 5} = \frac{3}{5}$$

..... $\frac{3}{5}$

(Total for Question 2 is 2 marks)

3. Here is a conversion graph that can be used to change between kilograms and pounds.



(a) Use the graph to change 22 pounds to kilograms.

.....10..... kg
(1)

(b) Use the graph to change 2.5 kilograms to pounds.

.....5.5..... pounds
(1)

Fabio weighs 110 pounds.

(c) Change 110 pounds to kilograms.

$110 \text{ lb} = 5 \times 22 \text{ lb}$

$= 5 \times 10 \text{ kg}$ from (a)
 $= 50 \text{ kg}$

or $\frac{110}{22} \times 22 \text{ lb} = \frac{110}{22} \times 10 \text{ kg}$

.....50..... kg
(2)

(Total for Question 3 is 4 marks)

4. There are some coloured beads in a bag.
The beads are green, red, yellow or blue.

The table shows each of the probabilities that a bead is chosen at random will be green, red or blue.

Colour	Green	Red	Yellow	Blue
Probability	0.15	0.35	0.3	0.20

- (a) Work out the probability that a bead chosen at random will be yellow.

$$1 - (0.15 + 0.35 + 0.2) = 1 - 0.7 = 0.3$$

$$\begin{array}{r} 0.3 \\ \hline \end{array} \quad (2)$$

- (b) Work out the probability that a bead chosen at random will be red or green.

$$\begin{aligned} P(\text{red or green}) &= P(\text{red}) + P(\text{green}) \\ &= 0.35 + 0.15 \\ &= 0.5 \end{aligned}$$

$$\begin{array}{r} 0.5 \\ \hline \end{array} \quad (2)$$

There are 400 beads in the bag.

- (c) Work out an estimate for the number of blue beads.

$$0.2 \times 400 = 80$$

$$\begin{array}{r} 80 \\ \hline \end{array} \quad (2)$$

(Total for Question 4 is 6 marks)

- *5. Some students in a class weighed themselves.
Here are their results.

Boys' weights 70 65 45 52 63 72 63

Girls' weights 65 45 47 61 44 67 55 56 63

Compare fully the weights of these students.

Sorted lists:

Boys: 45, 52, 63, 63, 65, 70, 72

Girls: 44, 45, 47, 55, 56, 61, 63, 65, 67

Boys

Median (middle of 7) = 4th one, 63

For Q_1 , use $\left(\frac{7+1}{4}\right)^{\text{th}} = 2^{\text{nd}}$, $Q_1 = \underline{52}$ } IQR = 70 - 52 = 18

For Q_3 , use 6th, $Q_3 = \underline{70}$

Range = 72 - 45 = 27

Mean = $(45 + 52 + 63 + 63 + 65 + 70 + 72) / 7 = 61.4$ (1 d.p.)

Girls

Median (5th of 9) = 56

Q_1 , $\left(\frac{9+1}{4}\right)^{\text{th}}$, mean of 2nd & 3rd, $\frac{45+47}{2} = \underline{46}$ } IQR = 64 - 46

Q_3 mean of 7th & 8th, $\frac{63+65}{2} = \underline{64}$ } 18

Range = 67 - 44 = 23

Mean = $(44 + 45 + \dots + 67) / 9 = 55.9$ (1 d.p.)

The girls are generally ^{slightly} lighter than the boys - lighter median (56 of 63 kg), mean (55.9 of 61.4), minimum (44 < 45), max (67 < 72).

The interquartile ranges are the same (18 kg).

(Total for Question 5 is 6 marks)

6. The table shows some information about the lengths, in minutes, of 40 films.

Time, T, in minutes	Frequency	Mid-point x	fx
$60 \leq T \leq 80$	8	70	560
$80 \leq T \leq 100$	12	90	1080
$100 \leq T \leq 120$	6	110	660
$120 \leq T \leq 140$	14	130	1820

$$\Sigma f = 40$$

$$\Sigma fx = 4120$$

Calculate an estimate for the mean length of a film.

$$\Sigma fx = 4120$$

$$\Sigma f = 40$$

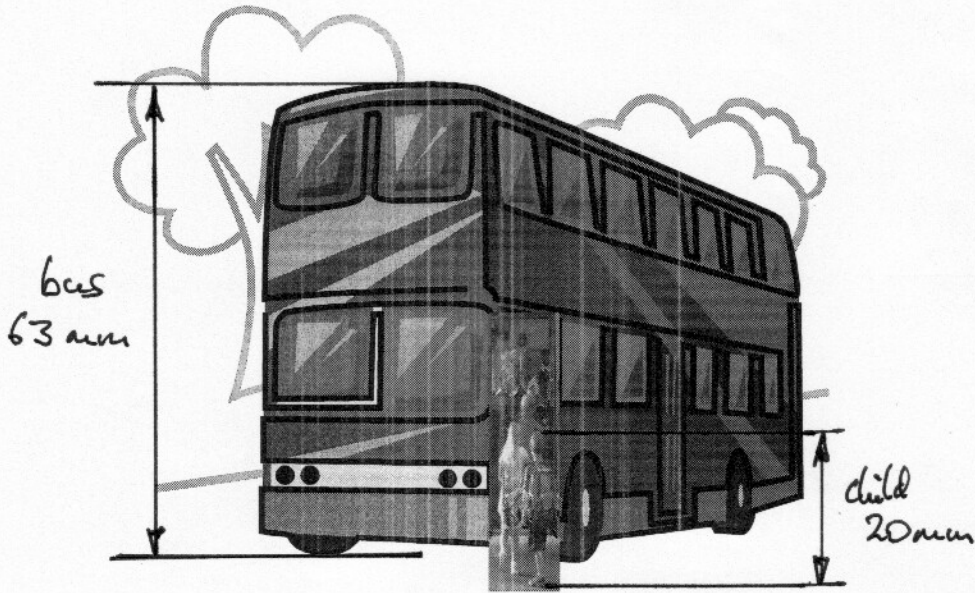
$$\bar{x} = \frac{4120}{40} \quad \left(= \frac{\Sigma fx}{\Sigma f} \right)$$

$$= 103 \text{ minutes.}$$

..... 103 minutes

(Total for Question 6 is 4 marks)

7. Here is a picture of a some children getting onto a double-decker bus.



(a) Estimate the height of the children.

.....^{1.4}..... m
 [1.2 to 1.5 m allowed] (1)

(b) Estimate the height of the double-decker bus.

$$\frac{63}{20} \times 1.4 = 4.41 \text{ m}$$

$$\approx 4.4 \text{ m}$$

[4 → 5.5 m allowed]

.....^{4.4 m}.....
 Don't forget units! _____ ↑ (2)

(Total for Question 7 is 3 marks)

8. Trevor measures the length of his maths book as 27 cm correct to the nearest cm.

(a) Write down the greatest length this could be.

.....^{27.5 cm}.....
 (1)

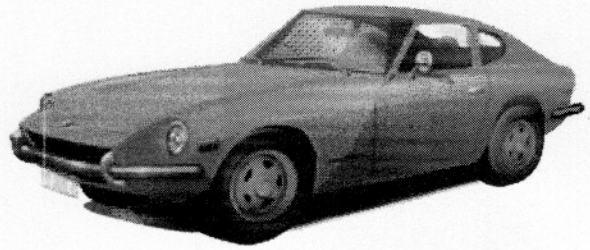
(b) Write down the least length this could be.

.....^{26.5 cm}.....
 (1)

(Total for Question 8 is 2 marks)

9. Jodi bought a car for £12 000
She bought the car 3 years ago.

The car depreciated at a rate of 10% each year.



- (a) How much is the car worth now?

Depreciating at 10% per year
∴ × 0.9 each year.

$$12000 \times 0.9^3 = 8748$$

£ 8748
(3)

Mia also bought a car for £12 000
Her car also depreciated at 10% a year.

- (b) After how many years will her car be worth £6000

$$12000 \times 0.9^4 = 7873.2$$

$$12000 \times 0.9^5 = 7085.88$$

$$12000 \times 0.9^6 = 6377.29$$

$$12000 \times 0.9^7 = 5739.56 \quad \leftarrow \text{now } < 6000 \text{ (and closer to 6000 than 6377)}.$$

or $12000 =$ (puts in calculator memory as ANS)

ANS × 0.9 =
=
=
=
=
=
=
= } press = 7 times
until get < 6000

.....7..... years
(3)

(Total for Question 9 is 6 marks)

10. Mary recorded the heights (h) in cm, of the girls in her class. She put the heights in order.

Check the list is sorted ✓.

132	144	150	152	160	162	162	167
167	170	172	177	181	182	182	

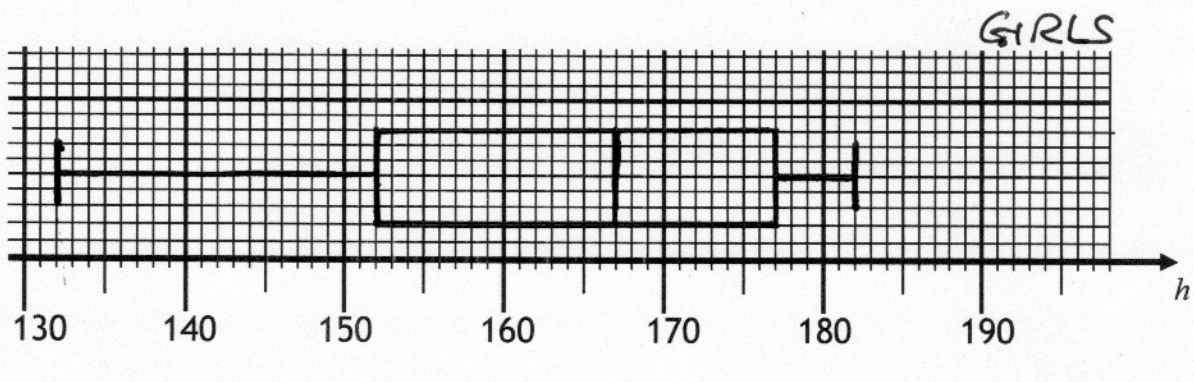
(a) Calculate *15 girls, $n = 15$.*

(i) the lower quartile, *use $(\frac{n+1}{4})^{\text{th}} = (\frac{16}{4})^{\text{th}} = 4^{\text{th}}$ value,*

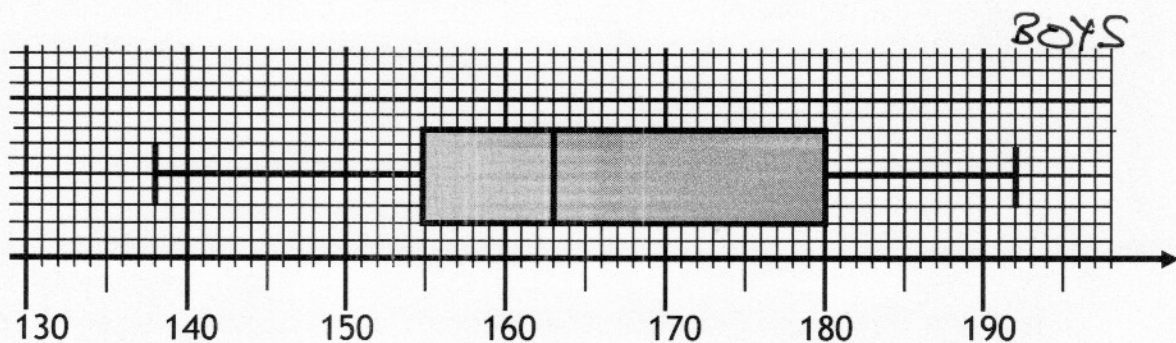
(ii) the upper quartile. *Use $3(\frac{n+1}{4})^{\text{th}} = 3 \times 4^{\text{th}} = 12^{\text{th}}$ value* 152 cm

[Median = $(\frac{n+1}{2})^{\text{th}}$ value, 8th value = 167] 177 cm
(2)

(b) On the grid, draw a box plot for this data.



Here is a box plot showing some information about the heights of the boys in Mary's class.

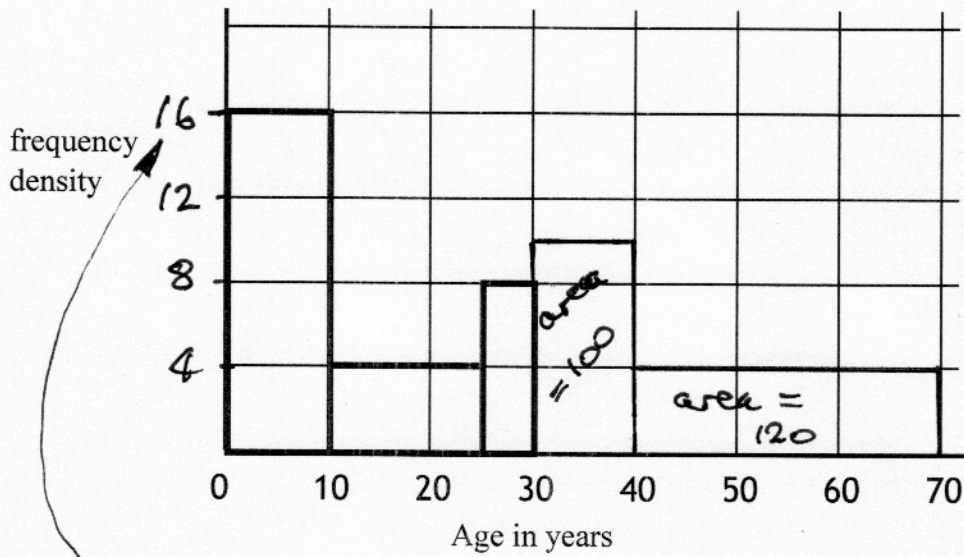


Compare the distribution of the heights of the boys and the girls in Mary's class.

The median height of the girls (167 cm) is taller than the median of the boys (163 cm) [but minimum, Q_1 , Q_3 and maximum are all shorter for the girls than the boys]. Boys and girls have the same interquartile range (25). (2)

(Total for Question 10 is 7 marks)

11. The incomplete table and histogram give some information about the ages of the people who live in a village.



- (a) Use the information in the histogram to complete the frequency table below.

Age (x) in years	Frequency	class width	freq. density
$0 < x \leq 10$	160	10	$\frac{160}{10} = 16$
$10 < x \leq 25$	$15 \times 4 = 60$	15	4
$25 < x \leq 30$	$5 \times 8 = 40$	5	8
$30 < x \leq 40$	100	10	$\frac{100}{10} = 10$
$40 < x \leq 70$	120	30	$\frac{120}{30} = 4$

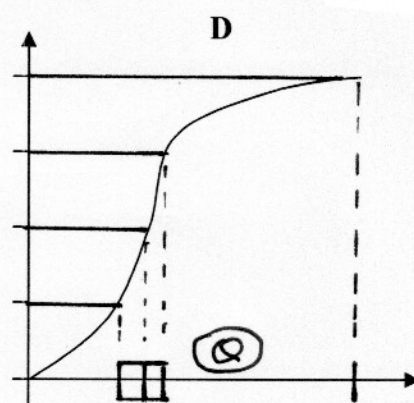
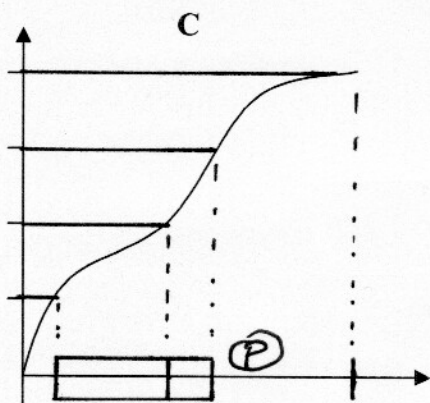
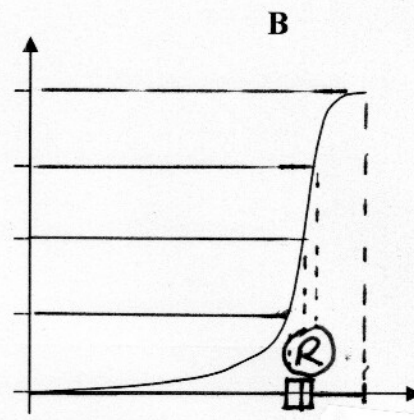
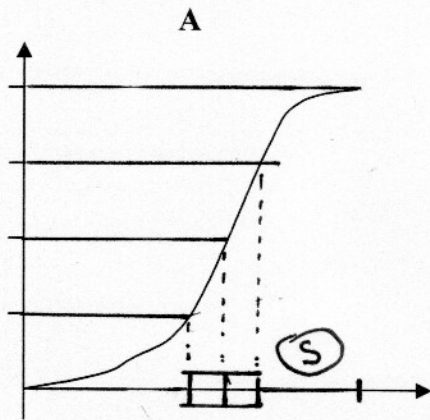
(2)

- (b) Complete the histogram.

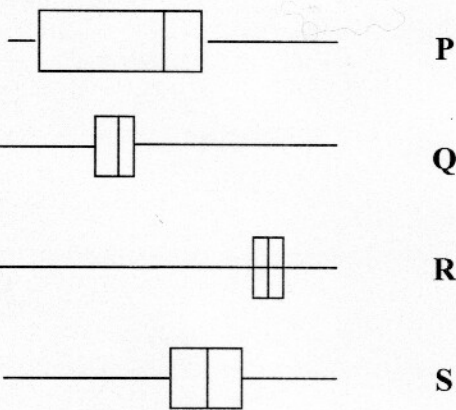
(2)

(Total for Question 11 is 4 marks)

12. Here are four cumulative frequency diagrams.



Here are four box plots.



For each box plot write down the letter of the appropriate cumulative frequency diagram.

P and ...C....

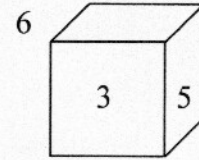
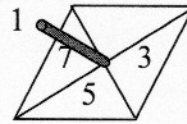
Q and ...D....

R and ...B....

S and ...A....

(Total for Question 12 is 2 marks)

13. Sally has a fair 4-sided spinner numbered 1, 3, 5 and 7 and a fair 6-sided die.



He spins the spinner once and rolls the die once.
To get the score he **adds** the numbers together.

- (a) Work out the probability that the score will be 3

Score 3 must be spinner 1 + die 2

$$P(S=1) = \frac{1}{4}, \quad P(D=2) = \frac{1}{6}, \quad \boxed{\frac{1}{4} \times \frac{1}{6} = \frac{1}{24}}$$

or (since each combination is equally likely):

	1	2	3	4	5	6	← DIE
Spinner 1	2	3	4	5	6	7	One of the 24 possible outcomes
Spinner 3	4	5	6	7	8	9	
Spinner 5	6	7	8	9	10	11	
Spinner 7	8	9	10	11	12	13	

$$\frac{1}{24}$$

(2)

- (b) Work out the probability the score will be less than 5

Score < 5 so $\boxed{\begin{matrix} 2 & 3 & 4 \\ 4 \end{matrix}}$ from table above,

4 ways out of 24

$$\frac{4}{24} = \frac{1}{6}$$

$$\frac{1}{6}$$

(3)

(Total for Question 13 is 5 marks)

14. A bag contains 3 black beads, 5 red beads and 2 green beads. Gianna takes a bead at random from the bag, records its colour (and replaces it). She does this two more times.

Work out the probability that, of the three beads Gianna takes, exactly two are the same colour.

You can make a huge tree diagram, but you don't need to.

$P(B) = \frac{3}{10}$	$P(R) = \frac{5}{10}$	$P(G) = \frac{2}{10}$
$P(\bar{B}) = \frac{7}{10}$	$P(\bar{R}) = \frac{5}{10}$	$P(\bar{G}) = \frac{8}{10}$

$P(\text{not black}) = P(R \text{ or } G) = 1 - \frac{3}{10}$ etc.

To get two the same, we need

$BB\bar{B}$, $B\bar{B}B$, $\bar{B}BB$

probability $3 \times \frac{3}{10} \times \frac{3}{10} \times \frac{7}{10}$

or $RR\bar{R}$, $R\bar{R}R$, $\bar{R}RR$

$3 \times \frac{5}{10} \times \frac{5}{10} \times \frac{5}{10}$

or $GG\bar{G}$, $G\bar{G}G$, $\bar{G}GG$

$3 \times \frac{2}{10} \times \frac{2}{10} \times \frac{8}{10}$

total $\frac{3}{1000} (3 \times 3 \times 7 + 5 \times 5 \times 5 + 2 \times 2 \times 8) = \frac{660}{1000}$
 $= \frac{66}{100}$
 $= \frac{33}{50}$

See next page for tree diagram method

$\frac{33}{50}$

(Total for Question 14 is 5 marks)

Alternatively:

TOTAL FOR PAPER = 60 MARKS

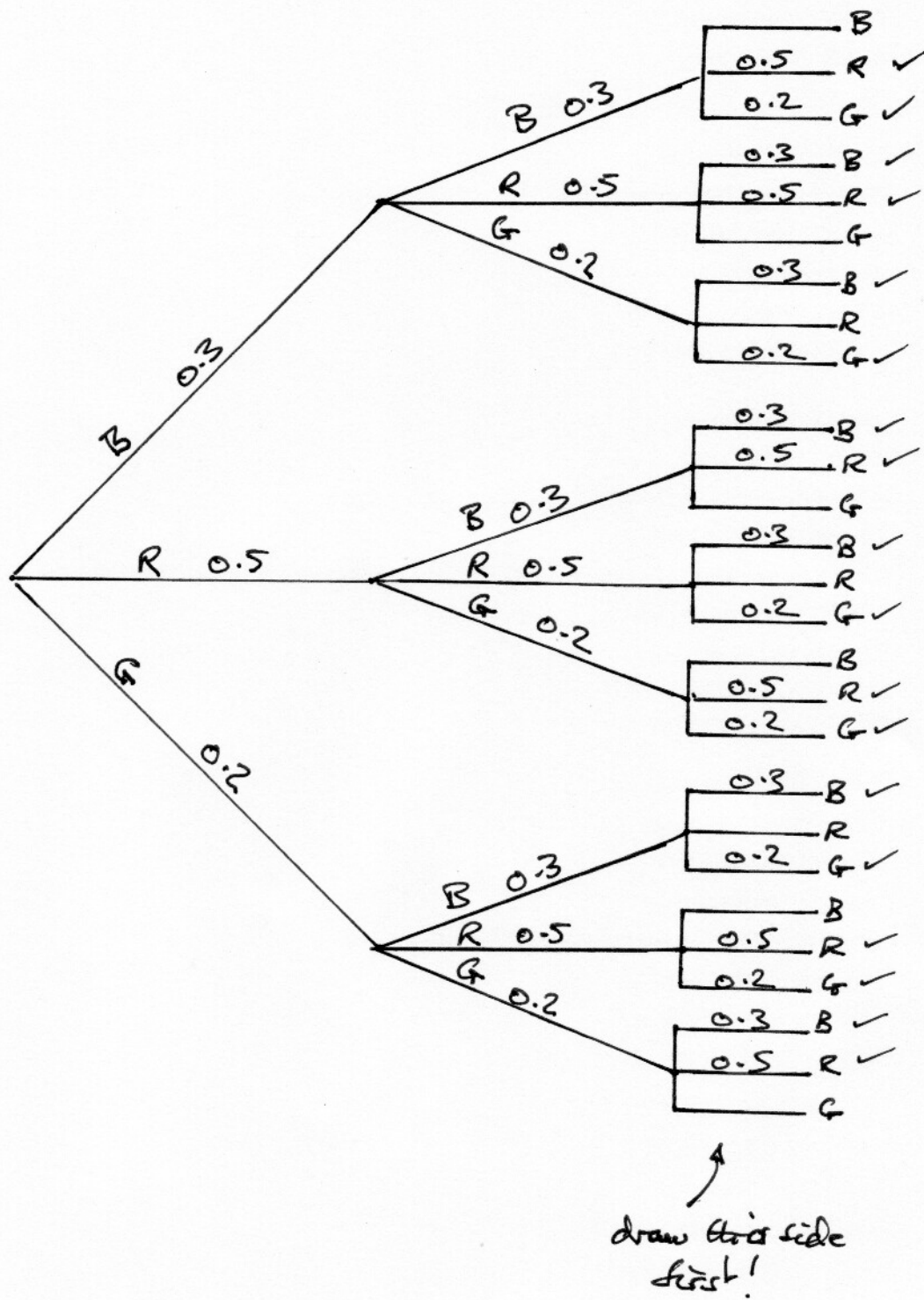
$P(\text{two the same}) = 1 - P(\text{all different}) - P(\text{3 the same})$.

$P(\text{all different}) = 6 \times \frac{3}{10} \times \frac{5}{10} \times \frac{2}{10} = \frac{180}{1000}$
 (BRG, BGR, RBG, RGB, GBR, GRB)

$P(\text{all same}) = P(\text{all B}) + P(\text{all R}) + P(\text{all G}) = \left(\frac{3}{10}\right)^3 + \left(\frac{5}{10}\right)^3 + \left(\frac{2}{10}\right)^3$
 $= \frac{27 + 125 + 8}{1000} = \frac{160}{1000}$

$\therefore P(\text{two same}) = 1 - \left(\frac{180}{1000} + \frac{160}{1000}\right) = 1 - \frac{340}{1000} = \frac{660}{1000}$

14.



Multiply along the branches, then add up. $3 \times 3 \times 3 = 27$ outcomes

$$\begin{aligned}
 P(2 \text{ same}) &= \frac{1}{1000} (3 \times (3 \times 7 + 5 \times 8 + 2 \times 5) + 5 \times (3 \times 8 + 5 \times 5 + 2 \times 7) \\
 &\quad + 2 \times (3 \times 5 + 5 \times 7 + 2 \times 8)) \\
 &= \frac{660}{1000}
 \end{aligned}$$