

IGCSE

Mathematics (Specification B)

Sample Assessment
Materials (SAMs)

Edexcel IGCSE in Mathematics (Specification B)
(4MB0)

First examination 2011



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Acknowledgements

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Introduction

These sample assessment materials have been prepared to support the specification. The aim of these materials is to provide students and centres with a general impression and flavour of the actual question papers and mark schemes in advance of the first operational examinations.

Sample assessment papers

Paper 1	7
Paper 2	23

Centre No.						Paper Reference						Surname		Initials	
Candidate No.						4	M	B	0	/	0	1	Signature		

Paper Reference(s)

4MB0/01

Edexcel IGCSE

Mathematics B

Paper 1

Sample Assessment Material

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Materials required for examination

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

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper. Answer ALL the questions in the spaces provided in this question paper. If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2). Full marks may be obtained for answers to all questions. There are 30 questions in this question paper. The total mark for this paper is 100. There are 16 pages in this question paper. Any blank pages are indicated. You may use a calculator.

Advice to Candidates

Show all stages in any calculations. Work steadily through the paper. Do not spend too long on one question. If you cannot answer a question, leave it and attempt the next one. Return at the end to those you have left out.

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Turn over

1. Richard Divers played Bobby Spinsky in a chess tournament. They played a total of 48 games. The results for these 48 games were:

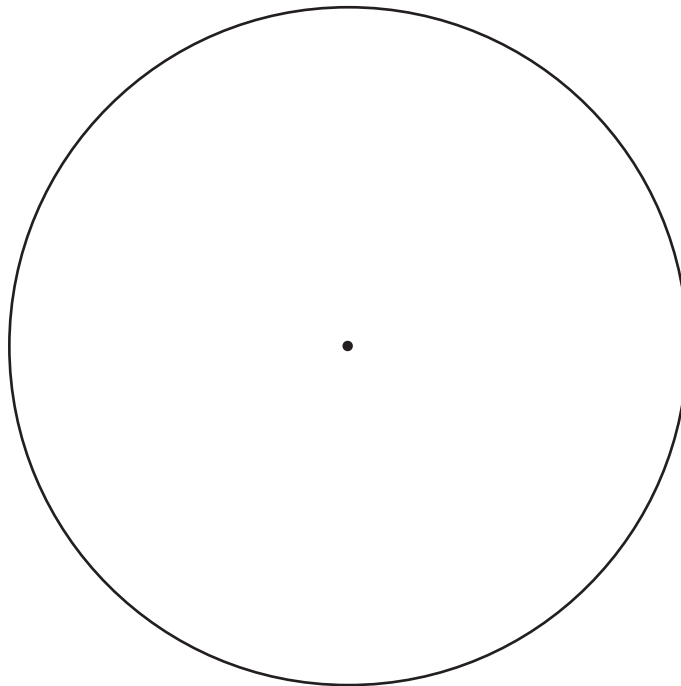
Richard Divers won 26 games
Bobby Spinsky won 14 games
Drawn 8 games

A pie chart is to be drawn to show this information.

- (a) Calculate the size, in degrees, of the angle of the sector representing the number of games won by Richard Divers.

.....
(2)

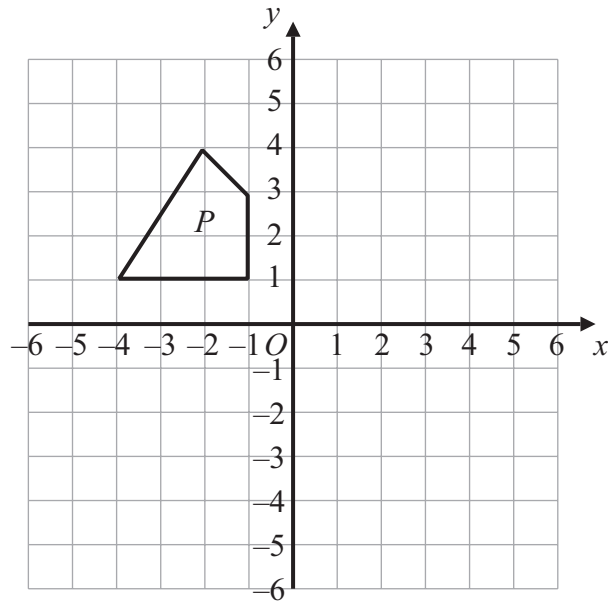
- (b) Using the circle, draw an accurate pie chart illustrating the information.
State clearly the size of the angle of each sector.



(2) Q1

(Total 4 marks)

2.



The shape P is transformed to the shape Q by a clockwise rotation of 90° about the point $(2, 0)$.

(a) Draw and label the shape Q on the grid.

(2)

The shape Q is transformed to the shape R by a reflection in the line $y = 1$

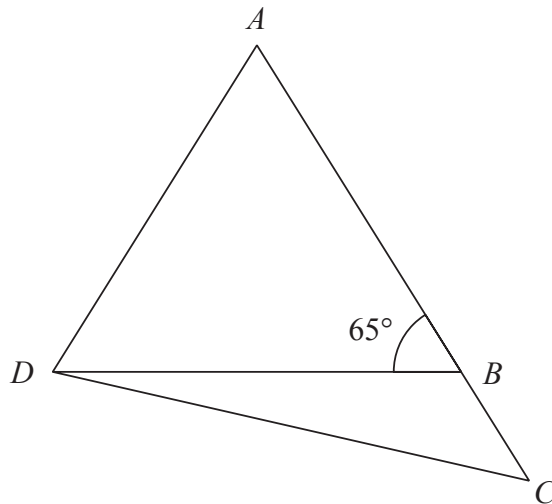
(b) Draw and label the shape R on the grid.

(2)

(Total 4 marks)

Q2

3.



ABD is an isosceles triangle with $AB = AD$, and $\angle ABD = 65^\circ$.
The side AB is extended to the point C so that $AD = DC$.
Find the size, in degrees, of $\angle BDC$.

o

Q3

(Total 3 marks)

4. Find the Highest Common Factor (HCF) of 135, 180 and 225

.....
(Total 2 marks)

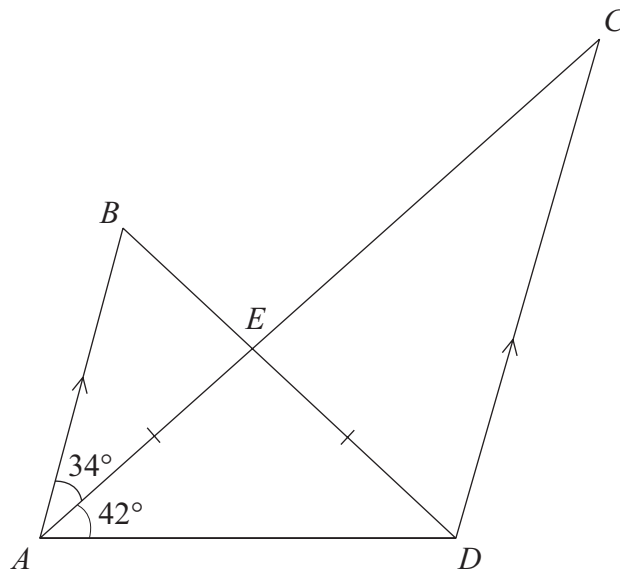
Q4

5. Given that $x : y = 6 : 5$ and $y : z = 4 : 5$, find the ratios $x : y : z$, in integer form.

$x : y : z =$
(Total 2 marks)

Q5

6.



In the diagram, AB is parallel to DC , $AE = ED$, $\angle EAB = 34^\circ$ and $\angle EAD = 42^\circ$. Calculate the size, in degrees, of $\angle CDE$.

.....
(Total 3 marks)

Q6

10. Given that $\sin x^\circ = 0.5$ and that $90 \leq x \leq 180$, find the value of $\cos x^\circ$.
Give your answer to 3 significant figures.

$\cos x^\circ = \dots\dots\dots$
(Total 2 marks)

Q10

11. An unbiased standard die is to be rolled twice. Find the probability that the total of the two rolls is 3, giving your answer as a fraction.

$\dots\dots\dots$
(Total 3 marks)

Q11

12. Solve the inequality

(a) $5x - 8 > 16$,

.....
(1)

(b) $7x - 22 \leq 5x - 8$.

.....
(2)

x is an integer which satisfies both the inequalities in part (a) and part (b).

(c) Write down all the possible values of x .

.....
(2)

(Total 5 marks)

Q12

13. A sector of area 50 cm^2 and angle 60° is cut from a circle.

(a) Calculate the radius, in cm, of the circle.
Give your answer correct to 3 significant figures.

..... cm
(3)

(b) Calculate the perimeter, in cm, of the sector.
Give your answer correct to 3 significant figures.

..... cm
(3)

(Total 6 marks)

Q13

14. (a) Express $\frac{7}{329}$ as a decimal to 3 significant figures.

.....
(1)

(b) Express your answer to part (a) in standard form.

.....
(1)

(Total 2 marks)

Q14

15. $T = 2\pi \sqrt{\left(\frac{l}{g}\right)}$

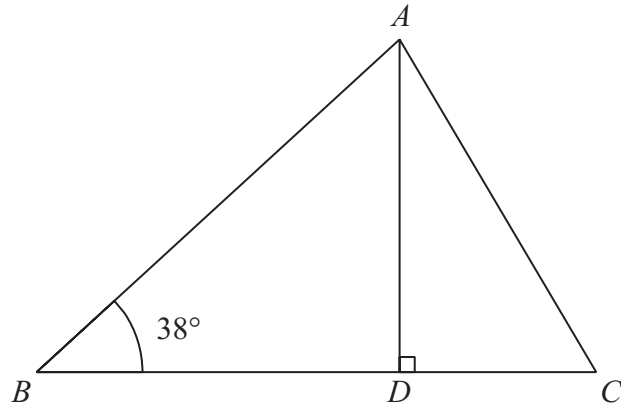
Make l the subject of the formula.

$l =$

(Total 3 marks)

Q15

16.



In the acute angled triangle ABC , $\angle ABC = 38^\circ$ and $BC = 15$ cm. The area of triangle ABC is 60 cm^2 and D is the point on BC such that $\angle ADC = 90^\circ$.

Calculate

(a) the length, in cm, of AD ,

..... cm
(2)

(b) the length, in cm to 3 significant figures, of BD ,

..... cm
(2)

(c) the length, in cm to 3 significant figures, of AC .

..... cm
(2)

(Total 6 marks)

Q16

17. Factorise $3x^2 - 2x - 5$

Q17

.....
(Total 2 marks)

18. $\mathcal{E} = \{2, 3, 4, 5, 6, 7, 8, 9\}$,

$A = \{\text{prime numbers}\}$,

$B = \{\text{odd numbers}\}$.

List the elements of

(i) $A \cap B'$,

.....

(ii) $A' \cap B$,

.....

(iii) $(A \cap B') \cup (A' \cap B)$.

.....

(Total 3 marks)

Q18

19. Given that $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and $\mathbf{c} = 2\mathbf{a} - 3\mathbf{b}$,
find \mathbf{c} .

..... Q19

(Total 2 marks)

20. Solve the equation $\frac{x}{4} - \frac{x+2}{5} = \frac{5}{8}$.

$x =$ Q20

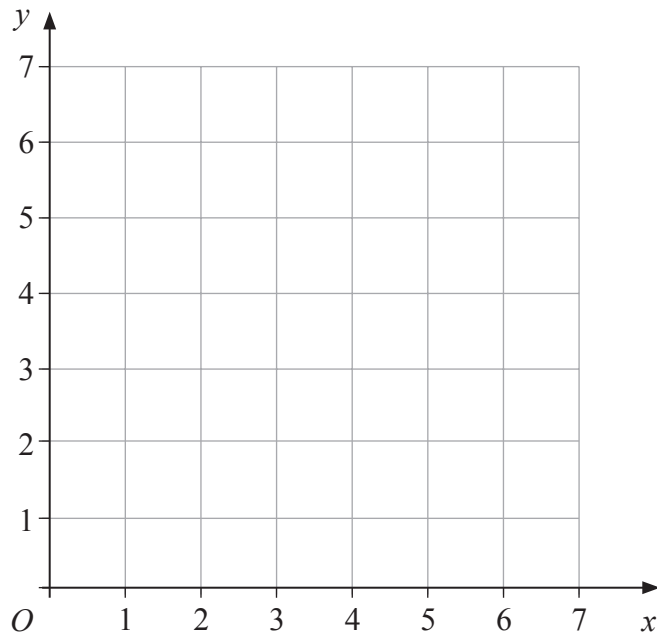
(Total 3 marks)

21. Express $\sqrt{75} + \sqrt{12}$ in the form $a\sqrt{b}$, where a and b are integers.
Show your working.

..... Q21

(Total 4 marks)

22.



The point A is such that $\vec{OA} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$.

(a) Mark and label A in the diagram.

(1)

(b) Calculate the magnitude of the vector \vec{OA} .
Give your answer correct to 3 significant figures.

.....
(2)

Q22

(Total 3 marks)

23. Simplify fully $\frac{x^2 - 5x}{x^2 - 25}$

.....
(Total 3 marks)

Q23

24. The six numbers 1, 7, 11, 19, 30 and x have a mean of $3x$.
Work out the value of x .

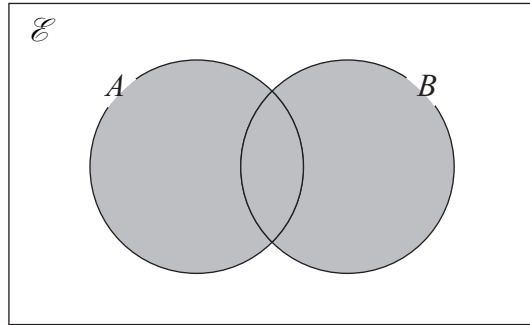
$x =$

Q24

(Total 3 marks)

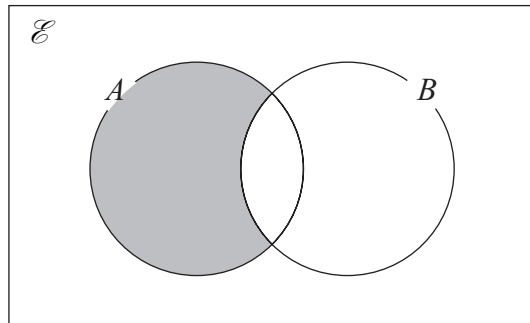
25. Describe, in set notation, the region shaded in each Venn diagram.

(a)



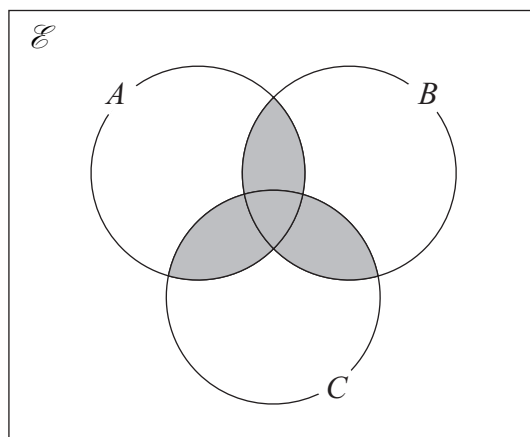
.....
(1)

(b)



.....
(1)

(c)



.....
(1)

(Total 3 marks)

Q25

26. $y = x^4 - 2x^{-4}$

Find $\frac{dy}{dx}$.

$\frac{dy}{dx} = \dots\dots\dots$

Q26

(Total 3 marks)

27. The volume of a sphere varies directly as the cube of its radius. The volume of a sphere of radius r is V .
Find the radius R , in terms of r , of a sphere with volume $64V$.

$R = \dots\dots\dots$

Q27

(Total 4 marks)

28. A and B are two similar solids with volumes 48 cm^3 and 2058 cm^3 respectively.
The length of one side of B is 21 cm .
Calculate the length, in cm , of the corresponding side of A .

..... cm

(Total 4 marks)

Q28

29.

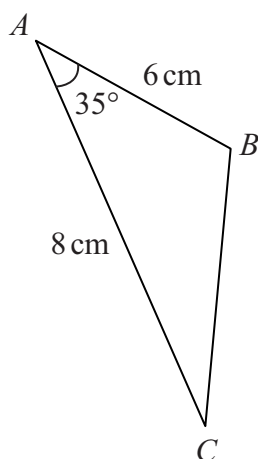


Diagram NOT accurately drawn

In triangle ABC , $AB = 6 \text{ cm}$, $AC = 8 \text{ cm}$ and $\angle BAC = 35^\circ$.

Calculate, to 3 significant figures,

(a) the length of BC ,

..... cm
(3)

(b) the size of $\angle ACB$.

.....
(3)

(Total 6 marks)

Q29

30. A particle is moving in a straight line through O .
The displacement s of the particle from O at time t seconds ($t \geq 0$) is given by
 $s = t^3 - 27t + 2$.
Find the value of t when the velocity of the particle is zero.

$t = \dots\dots\dots$

Q30

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END

Centre No.						Paper Reference						Surname		
Candidate No.						4	M	B	0	/	0	2	Signature	

Paper Reference(s)

4MB0/02

Edexcel IGCSE

Mathematics B

Paper 2

Sample Assessment Material

Time: 2 hours 30 minutes

Examiner's use only

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Team Leader's use only

--	--	--

Materials required for examination

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

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper. Answer ALL the questions in the spaces provided in this question paper. If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2). Full marks may be obtained for answers to all questions. There are 11 questions in this question paper. The total mark for this paper is 100. There are 24 pages in this question paper. Any blank pages are indicated. You may use a calculator.

Advice to Candidates

Show all stages in any calculations. Work steadily through the paper. Do not spend too long on one question. If you cannot answer a question, leave it and attempt the next one. Return at the end to those you have left out.

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3.

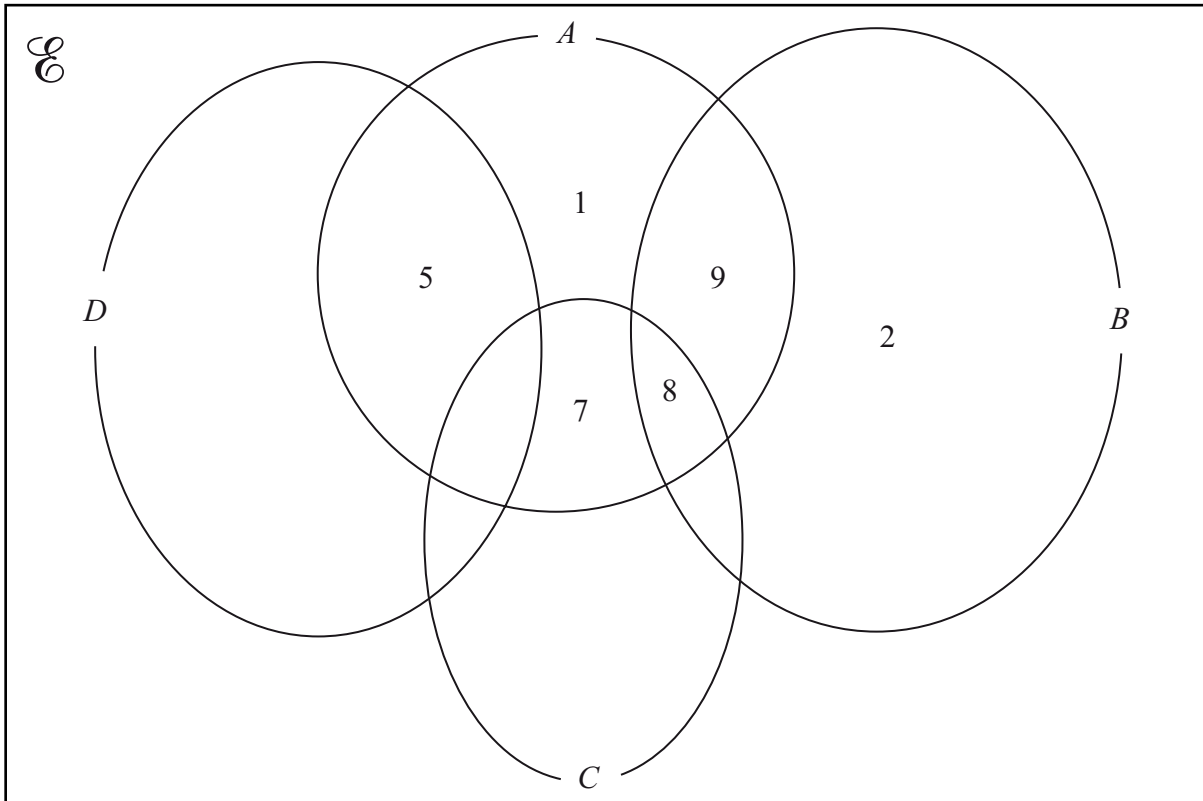


Figure 2

$$\begin{aligned} \mathcal{E} &= \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}, \\ A &= \{1, 5, 6, 7, 8, 9\}, \\ B &= \{2, 8, 9, 10\}, \\ C &= \{3, 6, 7, 8, 10, 11\}, \\ D &= \{4, 5, 6, 11\}. \end{aligned}$$

Six of the elements of \mathcal{E} are shown in the Venn diagram.

- (a) Complete the Venn diagram with the remaining elements. (2)

List the elements of

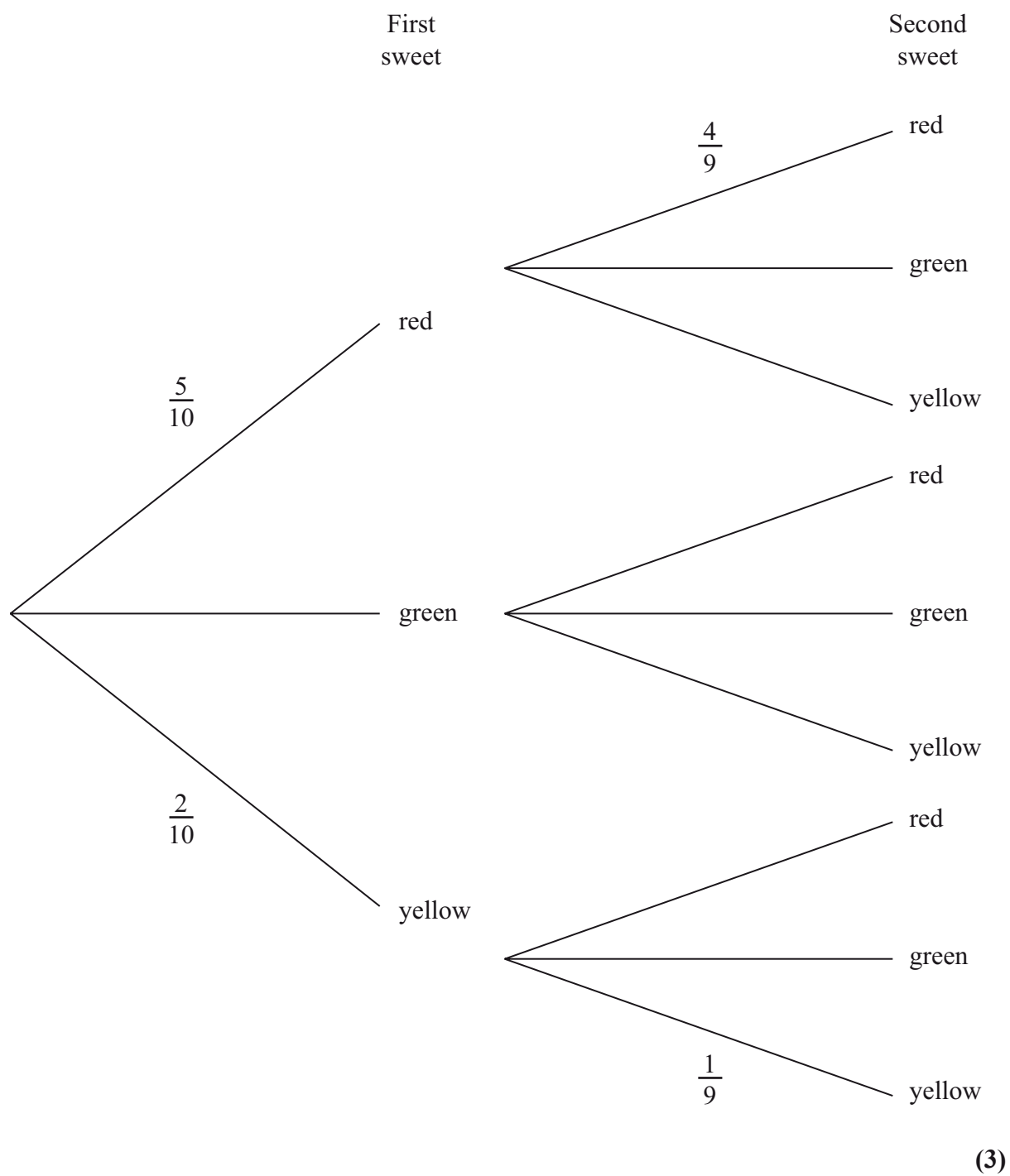
- (b) $A \cap B \cap C$, (1)

- (c) $(B \cup C) \cap A$, (1)

- (d) $(C \cup D)' \cap A$. (1)

5. A bag contains 5 red sweets, 3 green sweets and 2 yellow sweets. A sweet is to be taken at random from the bag and eaten. A second sweet is then to be taken at random from the bag.

(a) Complete the tree diagram.



(b) Calculate the probability that

- (i) both sweets will be green,
- (ii) the two sweets will be of different colours,
- (iii) at most one of the two sweets will be yellow.

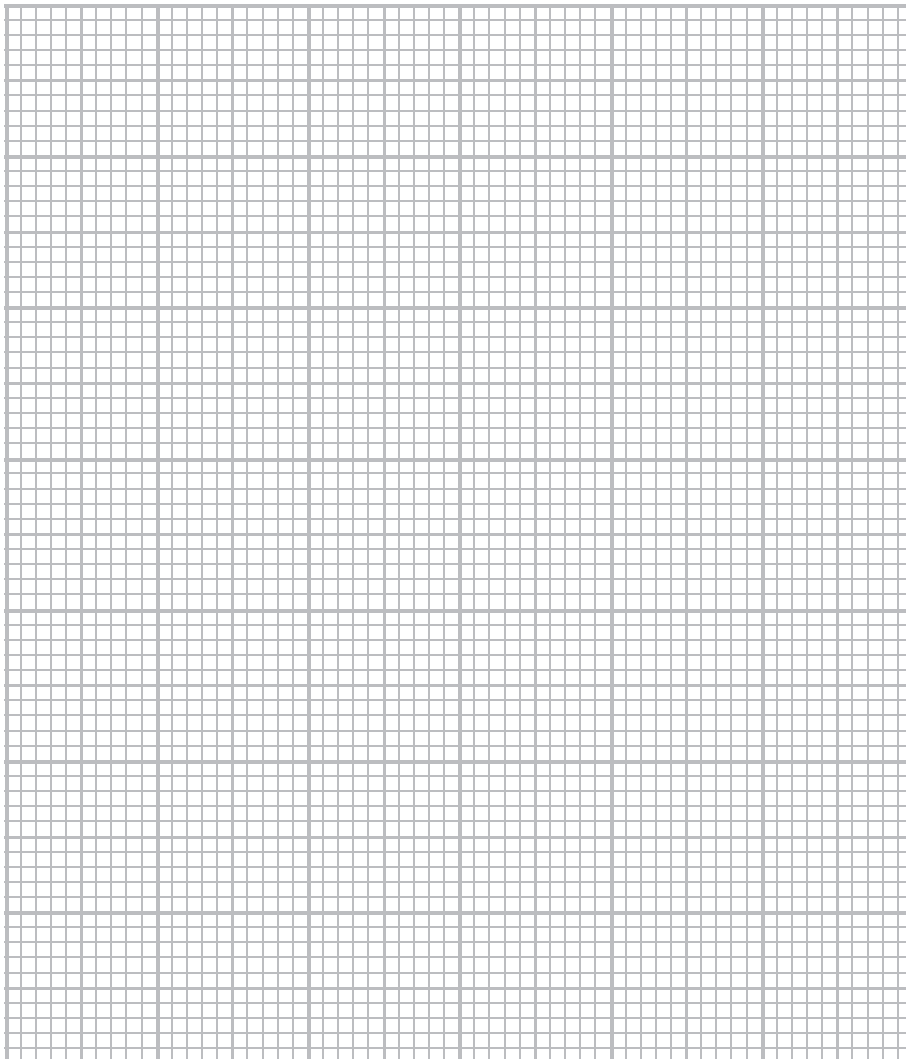
(7)

6. The table gives information about the ages of the population of a country.

Age (a years)	Number (millions)
$0 \leq a < 10$	9
$10 \leq a < 20$	8
$20 \leq a < 35$	10
$35 \leq a < 50$	19
$50 \leq a < 55$	4
$55 \leq a < 65$	7
$65 \leq a < 80$	4
$80 \leq a < 100$	1

(a) On the graph paper below, using a scale of 1 cm to represent 10 years on the Age axis, draw a histogram to represent this information.

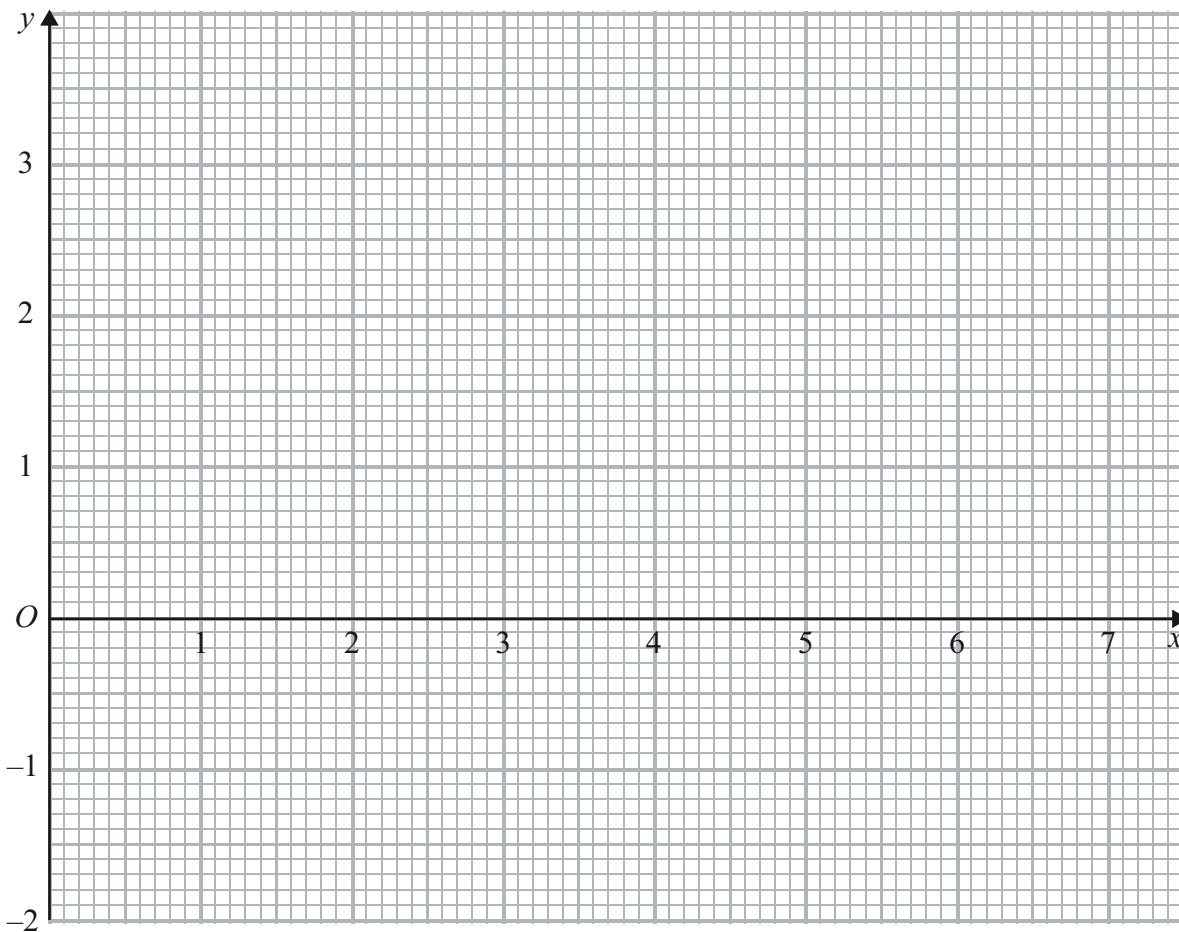
(4)



9. The coordinates of the vertices of $\triangle ABC$ are $A(1, 1)$, $B(2, 0)$ and $C(2, 2)$.

(a) On the graph below, draw and label $\triangle ABC$.

(1)



The matrix $\mathbf{P} = \begin{pmatrix} 2 & 1 \\ 0 & 1 \end{pmatrix}$.

(b) Calculate the matrix product $\mathbf{P} \begin{pmatrix} 1 & 2 & 2 \\ 1 & 0 & 2 \end{pmatrix}$.

(2)

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Sample mark schemes

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
 - M marks: method marks
 - A marks: accuracy marks
 - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
 - cao - correct answer only
 - ft - follow through
 - isw - ignore subsequent working
 - SC - special case
 - oe - or equivalent (and appropriate)
 - dep - dependent
 - indep - independent
 - eeo - each error or omission
- **No working**

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.
- **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

If there is no answer on the answer line then check the working for an obvious answer.

- **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

- **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

- **Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

- **Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another

Paper 1

Question Number	Working	Answer	Mark	Notes
1(a)	$\frac{26}{48} \times 360$	195°	2	M1 A1

Question Number	Working	Answer	Mark	Notes
1(b)	One sector correct with the angle marked $\pm 2^\circ$ Completely correct	$195^\circ, 105^\circ, 60^\circ$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
2(a)	Triangle drawn	Q drawn	2	B2 (-1eeoo)

Question Number	Working	Answer	Mark	Notes
2(b)	Triangle drawn	R	2	B2 (-1eeoo) ft on their quadrilateral

Question Number	Working	Answer	Mark	Notes
3	$\angle DAC = 50^\circ$ Correct method leading to $\angle ADC = 80^\circ$ OR $\angle CBD = 115^\circ$ (could be implied)	$\angle BDC = 15^\circ$	3	B1 M1 A1

Question Number	Working	Answer	Mark	Notes
4	any common factor (ie 9, 5, 15) but not 3	45	2	B1 B1

Question Number	Working	Answer	Mark	Notes
5	$x:y = 24:20$ $y:z = 20:25$	24:20:25	2	M1 for either ratio A1

Question Number	Working	Answer	Mark	Notes
6	$\angle EDA = 42^\circ$ or $\angle AED = 96^\circ$ $\angle ACD = 34^\circ$ or $\angle ADC = 104^\circ$ or $\angle ABE = 62^\circ$ or $180 - (34 + 2 \times 42)$ or clearly identified in c's diagram	$\angle CDE = 62^\circ$	3	B1 B1 B1

Question Number	Working	Answer	Mark	Notes
7		$\begin{pmatrix} -9 & 10 & 7 \\ 19 & 2 & 19 \end{pmatrix}$	3	B3 (-1 eeo)

Question Number	Working	Answer	Mark	Notes
8	$\frac{97.29}{1.175}$ oe NB: Treat 17% as a misread	£82.80	2	M1 A1 Accept 82.8 oe

Question Number	Working	Answer	Mark	Notes
9(a)	line drawn from A into the Δ line drawn correctly	line	2	B1 B1

Question Number	Working	Answer	Mark	Notes
9(b)	correct shading	region	1	B1

Question Number	Working	Answer	Mark	Notes
10	$x = 150^\circ$	-0.866	2	B1 B1

Question Number	Working	Answer	Mark	Notes
11	$\left(\frac{1}{6}\right)^2$ or 36 outcomes $\left(\frac{1}{6}\right)^2 + \left(\frac{1}{6}\right)^2$ or 2 possibilities	$\frac{1}{18}$	3	B1 M1 A1 cao

Question Number	Working	Answer	Mark	Notes
12(a)	o.e	$x > \frac{24}{5}$	1	B1

Question Number	Working	Answer	Mark	Notes
12(b)	$7x - 5x \leq 22 - 8$	$x \leq 7$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
12(c)	all integers satisfying c's inequalities	5, 6, 7	2	M1 A1

Question Number	Working	Answer	Mark	Notes
13(a)	$\frac{60}{360} \times \pi \times r^2 = 50$ $r = \sqrt{50 \times \frac{1}{\pi} \times \frac{360}{60}}$ isolating r	9.77	3	M1 M1 A1

Question Number	Working	Answer	Mark	Notes
13(b)	$\frac{60}{360} \times 2 \times \pi \times 9.77$ Ans + 2 × 9.77"	29.8	3	M1 M1 DEP A1

Question Number	Working	Answer	Mark	Notes
14 (a)		0.0213	1	B1

Question Number	Working	Answer	Mark	Notes
14 (b)		2.13×10^{-2}	1	B1 Ft from (a)

Question Number	Working	Answer	Mark	Notes
15	$\frac{T}{2\pi} = \sqrt{\left(\frac{l}{g}\right)} \text{ oe}$ $\frac{T^2}{4\pi^2} = \frac{l}{g} \text{ (ie removal of square root)}$	$l = \frac{gT^2}{4\pi^2} \text{ oe}$	3	M1 (allow 1 error only) M1 (DEP) A1 N.B: The order of the 2 Ms can be reversed. T – 2π scores M0 M0 A0. Using $\frac{22}{7}$ instead of π correctly scores M1 M1 A0.

Question Number	Working	Answer	Mark	Notes
16 (a)	$\frac{1}{2} \times 15 \times h = 60$	$h = 8 \text{ cm}$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
16 (b)	$"8" \div BD = \tan 38$	10.2 cm	2	M1 A1

Question Number	Working	Answer	Mark	Notes
16 (c)	$AC = \sqrt{8^2 + (15 - 10.2)^2}$ 9.33 cm using 10.2 (9.31 using "10.24")	9.31	2	M1 A1

Question Number	Working	Answer	Mark	Notes
17	Attempt to factorise quadratic	$(3x - 5)(x + 1)$	2	M1 A1 Alternative: $3(x - \frac{5}{3})(x + 1)$

Question Number	Working	Answer	Mark	Notes
18 (i)		2	1	B1

Question Number	Working	Answer	Mark	Notes
18 (ii)		9	1	B1

Question Number	Working	Answer	Mark	Notes
18 (iii)		2, 9	1	B1 (ft)

Question Number	Working	Answer	Mark	Notes
19	$2 \begin{pmatrix} 2 \\ 1 \end{pmatrix} - 3 \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ $\begin{pmatrix} 2 \times 2 + 3 \times 3 \\ 2 \times 1 - 3 \times 4 \end{pmatrix}$	$\begin{pmatrix} 13 \\ -10 \end{pmatrix}$	2	M1 (1 sign error) A1

Question Number	Working	Answer	Mark	Notes
20	$10x - 8(x + 2) = 25$ $10x - 8x - 16 = 25$	$x = 20.5$ oe	3	M1 error only A1 (oe, ie, $2x = 41$) A1

Question Number	Working	Answer	Mark	Notes
21	$\sqrt{25 \times 3} + \sqrt{4 \times 3}$ $\sqrt{5^2 \times 3} + \sqrt{2^2 \times 3}$ $5\sqrt{3} + 2\sqrt{3}$	$7\sqrt{3}$	4	M1 M1 (DEP) M1 (DEP) A1 If no working seen, A1 only

Question Number	Working	Answer	Mark	Notes
22 (a)	A correctly placed and labelled	Point	1	B1

Question Number	Working	Answer	Mark	Notes
22 (b)	$\sqrt{(6^2 + 4^2)}$ (o.e)	7.21	2	M1 A1

Question Number	Working	Answer	Mark	Notes
23	$\frac{x(x-5)}{(x+5)(x-5)}$	$\frac{x}{x+5}$	3	M1 (factorising numerator, Indep) M1 (factorising denominator, Indep) A1

Question Number	Working	Answer	Mark	Notes
24	$\frac{1+7+11+19+30+x}{6} = 3x$ oe $68+x = 18x$ oe	$x = 4$	3	M1 M1 A1

Question Number	Working	Answer	Mark	Notes
25 (a)	oe	$A \cup B$	1	B1

Question Number	Working	Answer	Mark	Notes
25 (b)	oe	$A \cap B'$ or $(A \cup B) \cap B'$	1	B1

Question Number	Working	Answer	Mark	Notes
25 (c)	oe	$(A \cap B) \cup (A \cap C) \cup (C \cap B)$ or $(A \cap B) \cup (A \cap C \cap B') \cup (B \cap C \cap A')$	1	B1

Question Number	Working	Answer	Mark	Notes
26		$4x^3 + 8x^{-5}$	3	B1 for $4x^3$ seen B1 for $+8x^n$ seen B1 for cao

Question Number	Working	Answer	Mark	Notes
27	$V = k r^3$ (or $V: 64V = r^3: R^3$) (o.e) $64V = kR^3$ (or $\frac{1}{64} = \frac{r^3}{R^3}$) (o.e) $R^3 = 64r^3$ (o.e)	$R = 4r$	4	M1 M1 M1 A1

Question Number	Working	Answer	Mark	Notes
28	Ratio of volumes $= 8: 343$ Ratio of lengths = 2:7 $C's (\frac{2}{7}) \times 2$	6 cm	4	B1 B1 M1 A1

Question Number	Working	Answer	Mark	Notes
29 (a)	$BC =$ $\sqrt{6^2 + 8^2 - 2 \times 6 \times 8 \cos 35}$ $= \sqrt{100 - 96 \cos 35}$	4.64..	3	M1 M1 A1

Question Number	Working	Answer	Mark	Notes
29 (b)	$\frac{6}{\sin \angle ABC} = \frac{"4.64"}{\sin 35}$ $\sin \angle ABC = \frac{6 \times \sin 35}{"4.64"}$	47.8	3	M1 M1 A1

Question Number	Working	Answer	Mark	Notes
30	$3t^2 - 27$, one term correct $3t^2 - 27$ seen $"3t^2 - 27" = 0$	$t = 3$	4	M1 M1 A1 A1

Paper 2

Question Number	Working	Answer	Mark	Notes
1 (a)	$3(-4)^3 + 8(-4)^2 + p(-4) - 60 = 0$	$p = -31$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
1 (b)	$3x^2 - 4x \dots$ $3x^2 - 4x - 15$ attempt to factorise c's trinomial quadratic	$(x + 4)(3x + 5)$ $(x - 3)$	4	M1 A1 M1(INDEP) A1

Question Number	Working	Answer	Mark	Notes
2	<p>36° OR 54° OR 72° seen</p> <p>height = $6 \times \tan "108/2"$</p> <p>= 8.26 (8.2583)</p> <p>area of one triangle = $\frac{1}{2} \times "8.2583" \times 12$</p> <p>area of pentagon =</p> <p>$5 \times \frac{1}{2} \times "8.2583" \times 12$</p> <p>OR</p> <p>O centre of pentagon,</p> $DO = \frac{12 \times \sin 54}{\sin 72} (= 10.208) \text{ o.e}$ $\Delta DOC = \frac{1}{2} \times 12 \times "10.208" \times \sin 54 \text{ o.e}$ <p>area of pentagon = $5 \times \Delta DOC$</p> <p>OR</p> <p>area of triangle = $\frac{1}{2} \times 12^2 \times \sin 108$</p> <p>= 68.5 (68.4761)</p> <p>area of trapezium =</p> $\frac{1}{2} \times "11.4127" \times (12 + 2 \times "9.7082")$ <p>(= 179.273)</p> <p>area of pentagon = "68.5" +</p> $\frac{1}{2} \times "11.4127" \times (12 + 2 \times "9.7082")$ <p>No mixing and matching methods</p>	248 cm ²	5	<p>B1</p> <p>M1</p> <p>M1(DEP)</p> <p>M1(DEP)</p> <p>M1</p> <p>M1(DEP)</p> <p>M1(DEP)</p> <p>M1</p> <p>M1(DEP)</p> <p>M1(DEP)</p> <p>A1 cao</p>

Question Number	Working	Answer	Mark	Notes
3 (a)		A: 6, B:10 C: 3, 6, 10, 11 D: 4, 6, 11	2	B2 (-1 eeo)

Question Number	Working	Answer	Mark	Notes
3 (b)		8	1	B1

Question Number	Working	Answer	Mark	Notes
3 (c)		6, 7, 8, 9	1	B1

Question Number	Working	Answer	Mark	Notes
3 (d)		1, 9	1	B1

Question Number	Working	Answer	Mark	Notes
4 (a)	$\angle AOB = 2 \times 75$	$\angle DOE = 150$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
4 (b)	$\angle AEC = 80$ or $\angle BDC = 55$ or $\angle ABC = 65$ $\angle AEB = 100$,	$OBE = 80$	2	B1 B1

Question Number	Working	Answer	Mark	Notes
4 (c)	$BAO = 15$ or $ABC = 65$	$CAB = 40$	2	B1 B1

Question Number	Working	Answer	Mark	Notes
5 (a)	2 correct probabilities 4 correct probabilities 8 correct probabilities	1 st sweet green = $\frac{3}{10}$ Completed second branches: $\left\{\frac{4}{9}, \frac{3}{9}, \frac{2}{9}\right\}$ $\left\{\frac{5}{9}, \frac{2}{9}, \frac{2}{9}\right\}$ $\left\{\frac{5}{9}, \frac{3}{9}, \frac{1}{9}\right\}$, oe	3	B1 B1 B1

Question Number	Working	Answer	Mark	Notes
5 (b) (i)	c's $\frac{3}{10} \times$ c's $\frac{2}{9}$	$\frac{1}{15}$ oe	2	M1 A1 Ft from (a)

Question Number	Working	Answer	Mark	Notes
5 (b) (ii)	Attempt to gather at least two consistent pairs of probabilities together Complete method, Eg, $\frac{15}{90} + \frac{15}{90} + \frac{10}{90} + \frac{10}{90} + \frac{6}{90} + \frac{6}{90}$ Or $1 - \frac{28}{90}$	$\frac{31}{45}$ oe	3	M1 M1 (dep) A1

Question Number	Working	Answer	Mark	Notes
5 (b) (iii)	$1 - \frac{2}{10} \times \frac{1}{9}$	$\frac{44}{45}$ oe	2	M1 A1

Question Number	Working	Answer	Mark	Notes
6 (a)	8 rectangles drawn, all correct widths histogram drawn and labelled with heights proportional to: 9, 8, 6.7, 12.7, 8, 7, 2.7, 0.5 (1/10 values for frequency density)	Histogram	4	B1 B3 (-1eeoo)

Question Number	Working	Answer	Mark	Notes
6 (b)		4 th interval	1	B1

Question Number	Working	Answer	Mark	Notes
6 (c)	Discrete values: 5 of 4.5, 14.5, 27, 42, 52, 59.5, 72, 89.5 $9 \times "4.5" + 8 \times "14.5" + 10 \times "27" + 19 \times "42" + 4 \times "52" + 7 \times "59.5" + 4 \times "72" + 1 \times "89.5"$ Sum divided by 62 Or Continuous values	35 y 11 m 36 y 5 mon	4	B1 M1 (slip) A1 A1

Question Number	Working	Answer	Mark	Notes
7 (a)	$BD^2 = 8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 120$ $BD = \sqrt{8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 120}$	14.7	3	M1 M1 (dep) A1

Question Number	Working	Answer	Mark	Notes
7 (b)	$7^2 = 10^2 + "14.7" - 2 \times 10 \times "14.7" \times \cos \angle ABD$ $\cos \angle ABD = \frac{10^2 + 14.7^2 - 7^2}{2 \times 10 \times 14.7}$	41.8	3	M1 M1 dep A1

Question Number	Working	Answer	Mark	Notes
7 (c)	$\frac{7}{\sin \angle ACD} = \frac{9}{\sin 70}$ $\sin \angle ACD = \frac{7 \times \sin 70}{9}$	47.0	3	M1 M1 (Dep) A1

Question Number	Working	Answer	Mark	Notes
8 (a)(i)		$(\lambda - 1) \mathbf{b}$	1	B1

Question Number	Working	Answer	Mark	Notes
8 (a)(ii)	(o.e)	$\mathbf{a + “(\lambda - 1) b”}$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
8 (b)(i)		$(\mu - 1) \mathbf{a}$	1	B1

Question Number	Working	Answer	Mark	Notes
8 (b)(ii)	(o.e)	$\mathbf{b + “(\mu - 1) a”}$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
8 (c)	$(\lambda - 2) \mathbf{b} = (\mu - 2) \mathbf{a}$ $(\lambda - 2) = 0$ and $(\mu - 2) = 0$	$\lambda = 2, \mu = 2$	4	M1 M1 A1, A1

Question Number	Working	Answer	Mark	Notes
8 (d)		Parallelogram	1	B1

Question Number	Working	Answer	Mark	Notes
9 (a)	$\triangle ABC$ drawn and labelled	Triangle	1	B1

Question Number	Working	Answer	Mark	Notes
9 (b)		$\begin{pmatrix} 3 & 4 & 6 \\ 1 & 0 & 2 \end{pmatrix}$	2	B2 (-1eeoo)

Question Number	Working	Answer	Mark	Notes
9 (c)	$\triangle A' B' C'$ drawn and labelled	Triangle	1	B1

Question Number	Working	Answer	Mark	Notes
9 (d)	$\triangle A'' B'' C''$ drawn and labelled	Triangle	3	B3 ft (-1eeoo)

Question Number	Working	Answer	Mark	Notes
9 (e)	rotation, clockwise 90° , about (0, 0) enlargement, scale factor $\frac{1}{2}$, about (0, 0)	Explanation	3	B3 (-1 eeo)

Question Number	Working	Answer	Mark	Notes
10 (a) (i)		-16	1	B1

Question Number	Working	Answer	Mark	Notes
10 (a)(ii)		3	1	B1

Question Number	Working	Answer	Mark	Notes
10 (a)(iii)	$g(2) = 1$ $f(1) = 0$	0	2	M1, A1

Question Number	Working	Answer	Mark	Notes
10 (b)	$yx - y = 1$ or $x - 1 = \frac{1}{y}$	$\frac{1+x}{x}$ or $\frac{1}{x} + 1$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
10 (c)		0	1	B1

Question Number	Working	Answer	Mark	Notes
10 (d)	$\frac{1}{(5 - 4x - x^2 - 1)} = -1$ $1 = -4 + 4x + x^2$ (o.e.) $x^2 + 4x - 5 = 0$ attempt to factorise a trinomial quadratic	$x = -5, 1$	6	M1 M1 dep A1 M1 ind A1, A1

Question Number	Working	Answer	Mark	Notes
11 (a)	100, 60, 40 100, 60, 40 20, 21.6, 12.8	20, 21.6, 12.8	3	B1 B1 B1

Question Number	Answer	Mark	Notes
11 (b)	Curve	3	B3 - 1 mark for incorrect / non uniform scale, straight line segments each point missed each missed segment each point not plotted each point incorrectly plotted tramlines poor curve

Question Number	Working	Answer	Mark	Notes
11 (c)	Identifying c's value of v a turning point	25.6	2	M1 A1

Question Number	Working	Answer	Mark	Notes
11 (d)	Tangent drawn at $t = 10$ Rise and tread values correctly from c's triangle	0.75 - 1.25	3	M1 M1 dep A1

Question Number	Working	Answer	Mark	Notes
11 (e)	$1728 \div 120$	14.4 m/s (oe)	2	M1 A1

Question Number	Working	Answer	Mark	Notes
11 (f)	Line drawn between $v = 14$ and $v = 14.5$ One correct value for t seen ($\pm 1/2$ small square from c's graph)	62 - 66	3	M1 M1 dep A1

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