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Mark Scheme (Results)

June 2011

Methods in Mathematics (GCSE)
Unit 1: Methods 5MM1H_01

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 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.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

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

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

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.

8 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.

9 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: e.g. incorrect canceling 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 e.g. algebra.

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

10 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.

11 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.

12 Parts of questions

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

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

<table>
<tr><th colspan="6">5MM1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>1</td><td>(i)</td><td>20 – (5 + 4) = 11</td><td>$\frac{11}{20}$, 0.55, 55%</td><td>2</td><td>M1 for 20 – (5 + 4) or 11 seen or for $\frac{n}{20}$ where $n < 12$
A1 for $\frac{11}{20}$ oe (eg. 55%, 0.55, $\frac{55}{100}$)</td></tr>
<tr><td></td><td>(ii)</td><td>20 – 4 = 16
OR
$\frac{5}{20} + \frac{11}{20}$</td><td>$\frac{4}{5}$, 0.8, 80%</td><td>2</td><td>M1 for $\frac{20-4}{20}$ or $1-\frac{4}{20}$ or $\frac{5}{20} + \frac{'11'}{20}$
A1 for $\frac{16}{20}$ oe
[SC: B1 for 16 to 20 or 16:20 or 16 out of 20 oe if M0 scored]</td></tr>
<tr><td>2</td><td></td><td>374
53 ×
1122
18700
19822

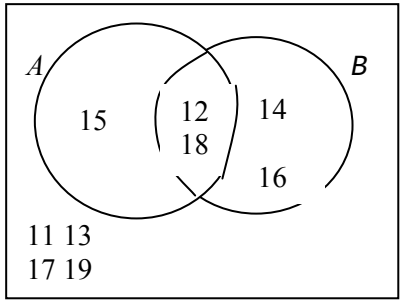
<table><tr><td>×</td><td>300</td><td>70</td><td>4</td></tr><tr><td>50</td><td>15000</td><td>3500</td><td>200</td></tr><tr><td>3</td><td>900</td><td>210</td><td>12</td></tr></table>
15 000 + 3500 + 200 + 900 + 210 + 12 = 19 822

<table><tr><td></td><td>3</td><td>7</td><td>4</td><td></td></tr><tr><td>1</td><td>1 / 5</td><td>3 / 5</td><td>2 / 0</td><td>5</td></tr><tr><td>9</td><td>/ 9</td><td>2 / 1</td><td>1 / 2</td><td>3</td></tr><tr><td></td><td>8</td><td>2</td><td>2</td><td></td></tr></table></td><td>19 822</td><td>3</td><td>M1 for complete method for multiplying 374 by 3 and 50 condone one error in multiplication
M1 (dep) for addition, condone one addition error
A1 cao

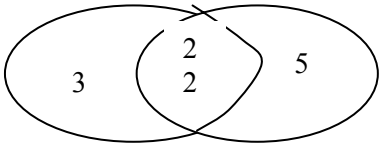
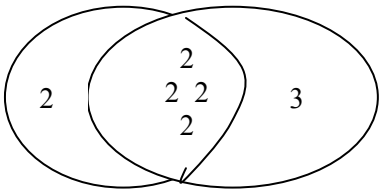
Alternative
M1 for complete method for multiplying 300, 70 and 4 by 3 and 50 condone one error in multiplication
M1 (dep) for addition, condone one addition error
A1 cao

Alternative
M1 for complete method for multiplying 3, 7 and 4 by 3 and 5 condone one error in multiplication
M1 (dep) for addition, condone one addition error
A1 cao</td></tr>
</table>

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		Triangle with vertices: (3, 1), (3, -2) and (1, -2)	2	M1 for any translation A1 for correct translation
	(b)		Triangle with vertices: (1, 3), (3, 3) and (1, 0)	2	B2 cao for a correct rotation [B1 for a rotation of of 180º about any point OR for a correct rotation of 90º clockwise or anticlockwise about the point (0, 2)]
4		$4 + \frac{2}{10} + \frac{7}{10}$ $4\frac{9}{10}$ OR $\frac{6}{5} + \frac{37}{10} = \frac{12}{10} + \frac{37}{10}$	$4\frac{9}{10}$	3	M1 for attempting to use a common denominator or obtaining $\frac{2}{10}$ oe M1 for adding $4 + \frac{2}{10} + \frac{7}{10}$ A1 for $4\frac{9}{10}$ or 4.9 or $\frac{49}{10}$ oe OR M1 for $\frac{6}{5}$ or $\frac{37}{10}$ oe M1 for $\frac{12}{10} + \frac{37}{10}$ oe A1 for $4\frac{9}{10}$ or 4.9 or $\frac{49}{10}$ oe

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)			2	M1 for writing the contents of set A or set B correctly in the correct places in a Venn diagram A1 for a fully correct Venn Diagram
	(b)		12 and 18	1	B1 for the correct answer or ft on their Venn Diagram
	(c)		12, 14, 15, 16, 18	1	B1 for the correct answer or ft on their Venn Diagram
	(d)		11, 13, 14, 16, 17, 19	1	B1 for the correct answer or ft on their Venn Diagram

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(i)	$\begin{array}{c\|cccccc} \times & 1 & 2 & 3 & 4 & 5 & 6 \\ \hline 2 & 2 & 4 & 6 & 8 & 10 & 12 \\ 4 & 4 & 8 & 12 & 16 & 20 & 24 \\ 6 & 6 & 12 & 18 & 24 & 30 & 36 \\ 8 & 8 & 16 & 24 & 32 & 40 & 48 \end{array}$ OR $\frac{1}{4} \times \frac{1}{6}$	$\frac{1}{24}$	5	M1 for identifying 2 and 1 or 2×1 (= 2) M1 for 24 seen OR an attempt to get the 24 outcomes or an attempt at a sample space or a list of possibilities or a list of ordered pairs [at least 12 correct; outcomes , possibilities, ordered pairs must be shown (ignore incorrect extras)] A1 for 1/24 oe OR M2 for $\frac{1}{4} \times \frac{1}{6}$ (M1 for $\frac{1}{4}$ or $\frac{1}{6}$ seen) A1 for 1/24 oe
	(ii)		$\frac{4}{24} = \frac{1}{6}$		M1 ft from their ordered list from part (i) for identifying at least one possible score from; 8×4 (=32), 6×6 (=36), 8×5 (=40) or 8×6 (=48), condone the inclusion of pairs reversed; eg. 4×8, 6×8 and 5×8 [accept the inclusion of 6×5 (=30) as a misread] [accept an answer of $\frac{5}{24}$, for M1, ONLY if the 5 outcomes are selected in either part (i) or part (ii)] A1 for 4/24 oe

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)	12 = 2×2×3 20 = 2×2×5 OR 12: 1, 2, 3, 4, 6, 12 20: 1, 2, 4, 5, 10, 20 OR  	4	2	M1 for dealing with both 12 **and** 20 by, Writing each number as a product of prime factors (condone one error only); or by, Listing the factors of each number (condone one error only), or by, Drawing a Venn Diagram (or two factor trees) showing all prime factors of each number (condone one error only) A1 for HCF = 4 (accept 2×2 or 2^2)
	(b)	32 = 2×2×2×2×2 48 = 2×2×2×2×3 OR 32. 64, 96, 128, … 48, 96, 144, …. OR  	96	2	M1 for dealing with both 32 **and** 48 by, Writing each number as a product of prime factors (condone one error only); or by, Listing the multiples of each number , up to at least 96 in each list (condone one error only), or by, Drawing a Venn Diagram (or two factor trees) showing all prime factors of each number (condone one error only) A1 for LCM = 96 (accept $2^5 \times 3$ or 2×2×2×2×2×3) [SC: B1 for any multiple of both 32 and 48 (eg 192) if M0 scored]
8	(a)	$2x + 6y + 4x - 4y$	$6x + 2y$	2	M1 for $2x + 6y$ or $4x - 4y$ or $6x$ or $2y$ A1 for $6x + 2y$ [accept $2(3x + y)$]
	(b)	$2 \times 4 \times p - 3 \times 4 \times p \times q$	$4p(2 - 3q)$	2	B2 cao [B1 for $2p(4 - 6q)$ or $p(8 - 12q)$ or $4(2p - 3pq)$ or $2(4p - 6pq)$ or $4p(a + bq)$ where $a \neq 0$ and $b \neq 0$]

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		180 – (70 + 70) 180 – 140	40º	4	M1 for identifying two correct equal 70º angles in either triangle M1 for 180 – (70 + 70) A1 for angle $C = 40º$ or $F(x) = 40^o$ C1 for x = "40º" 'because the ***triangles*** are ***similar***' or 'one triangle is an ***enlargement*** of the other' **and** either 'base ***angles*** of an ***isosceles*** triangle are ***equal***' or 'sum of the ***angles*** in a ***triangle*** is ***180º***' oe
10			(0, 4, 5)	2	B2 cao B1 for (x, 4, 5) or (0, 4, z) or (0, y, 5)

<table>
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<tr>
<td>11</td>
<td></td>
<td>$y = 2x - 3$

<table>
<tr><td>x</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>y</td><td>-5</td><td>-3</td><td>-1</td><td>1</td><td>3</td><td>5</td><td>7</td></tr>
</table>
</td>
<td>Correct line
from (–1, −5) to (4, 5)</td>
<td>3</td>
<td>(Table of values)
M1 for at least 2 correct attempts to find points by substituting values of x
M1 for plotting at least 2 of their points
(if more than two points are plotted, condone one plotting error)
A1 for the correct line from (–1, −5) to (4, 5)

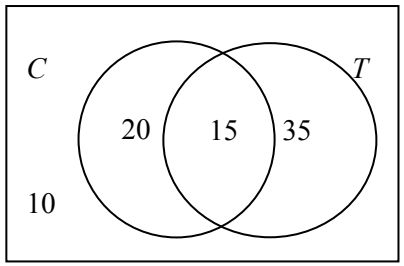
OR
(No table of values)
M2 for at least 2 correct points (and no incorrect points) correctly plotted
or
M2 for a line segment of the graph of $y = 2x - 3$ drawn (ignore any additional incorrect line segments)

[M1 for at least 3 correct points plotted with no more than 2 incorrect points]
A1 for the correct line from (–1, −5) to (4, 5)

OR
(Use of $y = mx + c$)
M2 for a single straight line of gradient 2, passing through the point (0, −3)
(M1 for a single straight line of gradient 2 or for a single straight line passing through the point (0, −3))
A1 for the correct line from (–1, −5) to (4, 5)</td>
</tr>
</table>

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		1	1	B1 cao
	(b)		$\frac{1}{7}$	1	B1 for $\frac{1}{7}$ (condone $\pm\frac{1}{7}$)
	(c)	$\frac{2^2\times 2^3}{2^{4^3}}=\frac{2^5}{2^{12}}$ OR $\frac{2\times 16}{16\times 16\times 16}=\frac{2}{16\times 16}=\frac{2}{2^4\times 2^4}=\frac{2}{2^8}$	2^{-7}	3	M1 for writing one of the numbers correctly as a power of 2 M1 for $2^{'2'}\times 2^{'3'}=2^{'2'+'3'}$ $(=2^5)$ or $(2^{'4'})^3=2^{'4'\times 3}$ $(=2^{12})$ or $\frac{2^{'5'}}{2^{'12'}}=2^{'5'-'12'}$ A1 for 2^{-7} or $\frac{1}{2^7}$ OR B1 for $\frac{2}{16^2}$ or an equivalent fraction with a numerator of 2 M1 for $2^{'4'}\times 2^{'4'}=2^{'4'+'4'}$ $(=2^8)$ or $\frac{2^{'1'}}{2^{'8'}}=2^{'1'-'8'}$ A1 for 2^{-7} or $\frac{1}{2^7}$ [SC: B1 for an answer of $\frac{1}{128}$ if M0 scored]
13	(a)		9.6×10^7	1	B1 cao [Do not accept 9.6^7]
	(b)		0.0012	1	B1 for 0.0012 or .0012
	(c)	16×10^4	1.6×10^5	2	M1 for '3.2×5' $\times 10^4$ $(=16\times 10^4)$ or 1.6×10^n, where n is an integer, or 160000 seen A1 cao

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$(2x – 3 + 2x + 3) \div 2 \times 4 = 18$ $8x = 18$ $x = 2.25$ $P = 2x – 3 + 2x + 3 + 5 + 5$ $P = 4x + 10$ $P = 9 + 10$ OR $2 \times 2.25 – 3 = 1.5$ $2 \times 2.25 + 3 = 7.5$ $5 + 5 + 1.5 + 7.5$	19 cm	6	M1 for $(2x – 3 + 2x + 3) \div 2 \times 4$ oe M1 for equating "$(2x – 3 + 2x + 3) \div 2 \times 4$" = 18 A1 cao $x = 2.25$ oe (eg. $\frac{18}{8}$) M1 (indep) $2x – 3 + 2x + 3 + 5 + 5$ (= 4x + 10) oe M1 (dep) for substituting "x" into an expression for the perimeter A1 cao OR M1 for $2 \times$ '2.25' – 3 (= 1.5) or $2 \times$ '2.2'5 + 3 (= 7.5) M1 for 5 + 5 + '1.5' + '7.5' [Note: the '2.25' must be the solution of an algebraic equation for their attempt at the area of the trapezium] A1 cao

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)			4	B1 for 15 shown in the intersection of two sets M1 for an attempt to show 35 – 15 or 50 – 15 in the correct place on the Venn Diagram. M1 for 80 – [“20” + 15 + “35”] (= 10), this may be implied from their numbers in the diagram A1 for a fully correct and labelled diagram [condone omission of the surrounding box]
	(b)		$\frac{1}{8}$	2	M1 for identifying “10” outside of C and T A1 ft for $\frac{'10'}{80}$ o.e.
16	(a)	$6x^2 - 8x + 9x - 12$	$6x^2 + x - 12$	2	M1 for any three correct terms out of the four from $6x^2 - 8x + 9x - 12$ or sight of these 4 terms correct $6x^2$, $8x$, $9x$, 12, ignoring signs, (with no extra terms). A1 cao
	(b)		$(3p+5q)(3p-5q)$	2	M1 for either bracket correct or $(3p \pm 5q)(3p \pm 5q)$ A1 for both brackets correct

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
17		$(2p \pm 1)^2 + (2n \pm 1)^2$ $4p^2 \pm 4p + 1 + 4n^2 \pm 4n + 1$ $4(p^2 \pm p + n^2 \pm n) + 2$ Formal proof of odd × odd = odd $(2p \pm 1)(2n \pm 1)$ $= 4pn \pm 2p \pm 2n + 1$ $= 2(2pn \pm p \pm n) + 1$ Formal proof of odd + odd = even $(2p \pm 1) + (2n \pm 1)$ $= 2p + 2n \pm 2$ (or 0) $= 2(p + n \pm 2(0))$		4	M1 for one number written in the form $2p \pm 1$, $2p \pm 3$, $2p \pm 5$, etc. M1 (dep) for squaring both numbers to obtain two expressions of the form $4p^2 \pm 4p + 1$ oe A1 for a correct, simplified, expression in the form $4(p^2 \pm p + n^2 \pm n) + 2$ or $2(2p^2 \pm 2p + 2n^2 \pm 2n + 1)$, where n and p are positive integers C1 (dep on at least M1 scored) for explaining that their expression $4(p^2 \pm p + n^2 \pm n) + 2$ has to be even because it has a common factor of 2 oe **OR** M1 for odd² = odd × odd = odd M1 for odd + odd = even A1 for a formal proof that : odd × odd = odd **and** odd + odd = even C1 for odd ^{2}+ odd ^{2} = odd + odd = even SC: B1 For an example showing that the sum of the squares of two different odd numbers equates to an even number
18	(a)	6 × 2.5	15	2	M1 for $\frac{10}{25}$ or $\frac{25}{10}$ oe or 0.4 seen or 2.5 seen A1 cao
	(b)	20 ÷ 2.5	8	2	M1 for 20 ÷ "$\frac{25}{10}$" or 20 × "0.4" oe A1 cao

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		$\frac{x+5}{3} = 2x - 6$ $x + 5 = 3(2x - 6)$ $x + 5 = 6x - 18$ $23 = 5x$	4.6	3	M1 for attempting to multiplying both sides of the equation by 3 (this could be shown by equations of the form: $x + 5 = 6x - ?$ or $x + 5 = ?x - 18$ ie the LHS must be correct) M1 (dep) for a correct method for isolating terms in x and number terms A1 for 4.6 or $\frac{23}{5}$ oe
20		180 – (90 + 32) = 58 58 ÷ 2 OR 180 – (90 + 32) = 58 180 – 58 = 122 (180 – 122) ÷ 2	Angle *TPO* = 90º (angle between a tangent and a radius = 90º) Angle *TOP* = 58º (angle sum of a triangle is 180º) Angle *OAP* = 29º (angle subtended by an arc at the centre is twice the angle subtended by the same arc at the circumference	5	B1 for Angle *TPO* = 90º (could be seen on diagram) Reason **A**: angle between a ***tangent*** and a ***radius*** = 90º M1 for Angle *TOP* = 180 – (90 + 32) or 58º or complete method shown Reason **B**: ***angle*** sum of a ***triangle*** is ***180º*** A1 for 29º Reason **C**: ***angle*** subtended by an arc at the ***centre*** is ***twice*** the ***angle*** subtended by the same arc at the ***circumference*** or ***exterior angle*** of a triangle is equal to the ***sum*** of the ***interior*** opposite ***angles*** and base ***angles*** of an ***isosceles*** triangle are ***equal*** or ***angles*** on a ***straight line*** add up to ***180º*** and base ***angles*** of an ***isosceles*** triangle are ***equal*** C2 for reasons **A**, **B** and **C** seen (C1 for any 2 reason seen from **A**, **B** and **C**)

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
21			$y = 6x + 2$	3	M1 for '$m = 6$' seen or for $y = 6x + c$ or for an attempt to find the gradient of the line with sight of a right angled triangle with their height divided by their base. M1 for '$c = 2$' seen or for an equation of the form $y = mx + 2$ A1 for $y = 6x + 2$ oe
22		$(x – 1)(x – 1) – 6 = x – 1$ OR $\frac{(x-1)(x-1)-6}{x-1} = 1$ $x^2 – 2x + 1 – 6 = x – 1$ $x^2 –3x – 4 = 0$ $(x –4)(x + 1) = 0$ $x – 4 = 0$ or $x + 1 = 0$	$x = 4$ or $x = –1$	5	M1 for multiplying LHS by $(x – 1)$ or writing LHS as a fraction(s) with a common denominator M1 for $x^2 – 2x + 1 – 6 = x – 1$ or $\frac{x^2-2x+1-6}{x-1} = 1$ oe A1 for correct quadratic equation $x^2 –3x – 4 = 0$ M1 ft for factorizing to get $(x \pm 4)(x \pm 1) = 0$ or for correct substitution into the quadratic formula A1 cao for $x = 4$ and $x = –1$ (accept $x = 4, –1$) [SC: B1 for one correct solution if M0 scored]

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
23	(a)		6**b** – 6**a**	1	B1 cao
	(b)	$\overrightarrow{CD} = \overrightarrow{CO} + \overrightarrow{OA} + \overrightarrow{AD}$ = –⅓6**b** + 6**a** + ⅓(6**b** – 6**a**) = –2**b** + 6**a** + 2**b** – 2**a** = 4**a** **OR** = $\frac{2}{3} \times 6\mathbf{b} - \frac{2}{3} \times$ ("6**b**-6**a**") = 4**b** – 4**b** + 4**a** = 4**a**		5	M1 for ± ⅓6**b** or ± ⅓(6**b** – 6**a**) or ± $\frac{2}{3} \times 6\mathbf{b}$ or $\pm\frac{2}{3} \times$ (6**b**-6**a**)) [these may be just shown in the diagram, in simplified or un-simplified form] or for $\overrightarrow{CD} = \overrightarrow{CO} + \overrightarrow{OA} + \overrightarrow{AD}$ or $\overrightarrow{CB} + \overrightarrow{BD}$ M1 for –⅓6**b** + 6**a** + ⅓("6**b** – 6**a**") Or $\frac{2}{3} \times 6\mathbf{b} - \frac{2}{3} \times$ ("6**b**-6**a**") A1 for 4**a** (accept $\frac{2}{3}$ of 6**a**) from a correct vector method seen. C1 for a statement that 4**a** is parallel to 6**a** because they have the same vector **a** oe C1 for 4 is ⅔ of 6 so CD is ⅔ the length of OA oe

5MM1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		$(\frac{5}{10}\times\frac{4}{9})+(\frac{3}{10}\times\frac{2}{9})$ $+(\frac{2}{10}\times\frac{1}{9})$ $=\frac{20+6+2}{90}=\frac{28}{90}$	$\frac{14}{45}$	4	B1 for $\frac{4}{9}$ or $\frac{2}{9}$ or $\frac{1}{9}$ seen as 2nd probability (could be in a tree diagram) M1 for $(\frac{5}{10}\times\frac{4}{9})$ or $(\frac{3}{10}\times\frac{2}{9})$ or $(\frac{2}{10}\times\frac{1}{9})$ M1 for $(\frac{5}{10}\times\frac{4}{9})+(\frac{3}{10}\times\frac{2}{9})+(\frac{2}{10}\times\frac{1}{9})$ A1 for $\frac{28}{90}$ o.e. Alternative scheme for replacement B0 for $\frac{5}{10}$ or $\frac{3}{10}$ or $\frac{2}{10}$ seen as 2nd probability M1 for $(\frac{5}{10}\times\frac{5}{10})$ or $(\frac{3}{10}\times\frac{3}{10})$ or $(\frac{2}{10}\times\frac{2}{10})$ M1 for $(\frac{5}{10}\times\frac{5}{10})+(\frac{3}{10}\times\frac{3}{10})+(\frac{2}{10}\times\frac{2}{10})$ A0 for $\frac{38}{100}$ **Special cases:** [SC: B2 for $\frac{38}{100}$ or $\frac{28}{100}$ or $\frac{38}{90}$ o.e. if M0 is scored] OR [SC: B1 for $\frac{4}{10}$ and $\frac{2}{10}$ and $\frac{1}{10}$ o.e. or $\frac{5}{9}$ and $\frac{3}{9}$ and $\frac{2}{9}$ seen as second probability if M0 is scored]

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