| Methods in Mathematics June 2014 Unit 2 Higher Tier | Mark | Comment |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { 4.(Area of faces are) } 2 e \times 3 e, 2 e \times 4 e, 3 e \times 4 e,\left(\mathrm{~cm}^{2}\right) \\ & (2 e \times 3 e, 2 e \times 4 e, 3 e \times 4 e)\left(\mathrm{cm}^{2}\right) \end{aligned}$ | M2 | M1 for any one of the 3 unique expressions These marks may be implied by correct simplified expressions |
| (Simplified equation for the total surface area is) $52 e^{2}=468$ | A2 | FT for M2 or M1 as appropriate, provided their simplified sum includes at least two of the expressions $6 e^{2}, 8 e^{2}, 12 e^{2}$ and all three terms in the form $\mathrm{a} e^{2}$. <br> A1 for (2x) $\left[6 e^{2}+8 e^{2}+12 e^{2}\right]$ OR $52 e^{2}\left(\mathrm{~cm}^{2}\right)$ <br> A1 for $e^{2}=468$ |
| $\begin{aligned} e^{2} & =468 / 52 \quad(=9) \\ e & =3 \end{aligned}$ | $\begin{aligned} & \text { B1 } \\ & \text { B1 } \end{aligned}$ | FT 'their equation' if in the form $\mathrm{a}^{2}=468$ <br> FT 'their equation' if in the form $\mathrm{a} e^{2}=468$ |
| $($ Volume $=6 \times 9 \times 12=) 648\left(\mathrm{~cm}^{3}\right)$ | B1 | FT 'their $e$ ' within $24 \times e^{3}$ correctly evaluated |
| Look for: <br> - if units given, are they correct? <br> - notation | QWC | If no marks, then allow SC2 for $3 e \times 4 e \times 2 e=468$ leading to an answer of $e=2.69 \ldots$ or 2.7 , or SC1 for sight of $3 e \times 4 e \times 2 e=468$ or equivalent |
| - labels and joining text | 2 | QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical |
| QWC2: Candidates will be expected to <br> - present work clearly, with words explaining process or steps |  | form, and with few if any errors in spelling, punctuation and grammar. |
| AND <br> - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer |  | QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR |
| QWC1: Candidates will be expected to <br> - present work clearly, with words explaining process or steps |  | evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. |
| - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer | 9 | QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. |
| 5. $26.5-26.5 \times 0.12 \quad$ OR $26.5 \times 0.88$ (=23.3(2) | M1 | OR M2 for $26.5 \times 0.88 \times 0.92$ |
| $\begin{array}{r} 23.3(2)-23.3(2) \times 0.08 \text { OR } 23.3(2) \times 0.92 \\ (=21.4544 \text { or } 21.436) \end{array}$ | M1 | FT 'their 23.32 ', but not 26.5 |
| $25.3-21.4544(=3.8456)$ OR $25.3-21.436(=3.864)$ | m1 | Depends on both previous M marks FT for their 23(.32) and their 21(...) |
| $3.8\left(\ldots .{ }^{\circ} \mathrm{C}\right)$ to $3.9\left({ }^{\circ} \mathrm{C}\right)$ from correct working | $\begin{gathered} \mathrm{A} 1 \\ 4 \end{gathered}$ | Accept $4\left({ }^{\circ} \mathrm{C}\right)$ from correct working |
| 6. Sight of any quotient using values from the table for $\mathrm{a} / \mathrm{b}$ or $\mathrm{b} / \mathrm{a}$ | M1 | Or sight of 1 correct response, or answers reversed |
| $\mathrm{a}=2.5 \times \mathrm{b}$ | A1 | Or equivalent |
| $\mathrm{b}=0.4 \times \mathrm{a}$ | $\begin{gathered} \text { A1 } \\ 3 \end{gathered}$ | Or equivalent FT from $\mathrm{a}=0.4 \times \mathrm{b}$ to give $\mathrm{b}=2.5 \times \mathrm{a}$ |
| 7.(a) $5.6 \times 10^{-5}$ <br> (b) $2.3 \times 10^{9}$ | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ 2 \end{gathered}$ |  |

\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics June 2014 Unit 2 Higher Tier \& Mark \& Comment \\
\hline \begin{tabular}{l}
8. Idea to show or use the perpendicular height in a right angled triangle \\
Height \(=\sin 58^{\circ} \times 6\)
\[
=5(.088 \ldots \mathrm{~cm})
\]
\[
\text { Area }=5(.088 \ldots) \times 10
\]
\[
=50.9\left(\mathrm{~cm}^{2}\right) \text { or } 51\left(\mathrm{~cm}^{2}\right)
\]
\end{tabular} \& S1
M2
A1
M1

A1 \& | Award for statement such as ' $6(\mathrm{~cm}$ ) is not the vertical height' |
| :--- |
| M1 for $\sin 58^{\circ}=$ Height $/ 6$ |
| FT their $5(.088 \ldots \mathrm{~cm})$ provided prior M1 awarded or an attempt has been made to use a trig ratio Must be rounded. Do not accept 50.8 or 50 (from premature approximation). FT from M1 If S1 only, then use of spurious perpendicular height <6, then also award SC1 for their perpendicular height $\times 10$ correctly evaluated |
| Alternative: |
| Use of $1 / 2 a b \sin C$ |
| $2 \times 1 / 2 \times 6 \times 10 \times \sin 58^{\circ}$ |
| or M2 for $1 / 2 \times 6 \times 10 \times \sin 58^{\circ}$ |
| $50.9\left(\mathrm{~cm}^{2}\right)$ or $51\left(\mathrm{~cm}^{2}\right)$ |
| or Al for calculating $1 / 2$ required area | \\

\hline | 9(a) Correct translation |
| :--- |
| (b) Correct rotation |
| (c) Correct reflection in $y=x$ |
| (d) Enlargement scale factor $1 / 2$ |
| Correct position | \& B1

B2

B2
B2

B1

8 \& | B1 near miss of grid lines, or for clockwise $90^{\circ}$ about ( $-2,-1$ ), or for anticlockwise $90^{\circ}$ about (-1, -2) |
| :--- |
| B1 for a reflection in $y=-x$, OR for sight of the line $y=x$ |
| B1 for any 1 line correct, or consistent incorrect fractional scale | \\

\hline ```
10. $26.7=\Pi \times \mathrm{d}$ or $26.7=2 \times \Pi \times \mathrm{r}$ or $\mathrm{r}=26.7 / \Pi$
Diagonal $=8.495 \ldots$ to $8.5(0 \ldots)(\mathrm{cm})$
diagonal $^{2}=$ side $^{2}+$ side $^{2}$
side $^{2}=$ diagonal $^{2} / 2$
side length $=6(.0096 \ldots \mathrm{~cm})$
Perimeter $=24 .(\ldots . \mathrm{cm})$

``` & \[
\begin{gathered}
\hline \text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
\\
\text { B1 } \\
6 \\
\hline
\end{gathered}
\] & \begin{tabular}{l}
Accept rounded or truncated FT their diagonal \\
Do not FT from inappropriate truncation or incorrect rounding (e.g. from \(\mathrm{d}=8.4\) ) Answer here for A1 should round to 6.01 FT provided both M marks awarded for \(4 \times\) 'their side length'
\end{tabular} \\
\hline \begin{tabular}{l}
11.(a)(i) \(\mathrm{y}=\mathrm{x}\) and \(\mathrm{y}=-\mathrm{x}\) indicated (2 quadrants for both) \\
(ii) \(\mathrm{y}=\mathrm{x}\) and \(\mathrm{y}=-\mathrm{x}\) or equivalent \\
(b) \(\mathrm{x}^{2}+\mathrm{y}^{2}=3^{2}\) or \(\mathrm{x}^{2}+\mathrm{y}^{2}=9\)
\end{tabular} & \begin{tabular}{l}
B2 \\
B2 \\
B1 \\
5
\end{tabular} & \begin{tabular}{l}
B1 for either indicated in 2 quadrants, or both indicated in 1 quadrant each \\
B1 for indication of appropriate points at least 3 in each of the 4 quadrants \\
Ignore any circles drawn \\
CAO. B1 for either equation \\
CAO
\end{tabular} \\
\hline \[
\begin{aligned}
& \text { 12. } \sin \mathrm{XYZ} / 23.8=\sin 123\left(^{\circ}\right) / 38.9 \\
& \sin \mathrm{XYZ}=23.8 \times \sin 123\left({ }^{\circ}\right) / 38.9 \\
& \mathrm{XYZ}=30.871 . .\left(^{\circ}\right) \text { rounded or truncated correctly }
\end{aligned}
\] & \[
\begin{gathered}
\hline \text { M1 } \\
\text { M1 } \\
\text { A1 } \\
3 \\
\hline
\end{gathered}
\] & OR 23.8/sin XYZ = 38.9/sin \(123\left({ }^{\circ}\right)\) OR \(\sin ^{-1} 0.513\)... This M1 implies previous M1 \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics June 2014 Unit 2 Higher Tier & Mark & Comment \\
\hline \[
\begin{array}{lc}
\text { 13. } y=4-x & \text { OR } \begin{array}{c}
x=4-y \\
2 x^{2}+x(4-x)-5=0 \\
x^{2}+4 x-5=0
\end{array} \\
\begin{array}{cc}
2(4-y)^{2}+(4-y) y-5=0 \\
(x-1)(x+5)=0 & y^{2}-12 y+27=0 \\
& \\
& \\
& \\
& \\
& \\
x=1,-3)(y-9)=0 \\
y=3, y=9 & \text { OR }
\end{array} & \begin{array}{l}
y=3, y=9 \\
x=1, x=-5
\end{array}
\end{array}
\] & \begin{tabular}{l}
M1 \\
M1 \\
A1 \\
M1 \\
A1 \\
A1
\end{tabular} & \begin{tabular}{l}
OR For sight of \(x^{2}+x y=4 x\) \\
OR Subtraction from \(1^{\text {st }}\) equation \\
OR \(\quad x^{2}+4 x=5\) \\
FT provided quadratic from an appropriate substitution method or subtraction method OR alternative method to solve , e.g. formula with correct substitution and \(b^{2}-4 a c\) correctly simplified \\
If A0, A0 then SC1 for \(x=1, y=3\) OR \(x=-5, y=9\) provided algebraic method shown with appropriate M1, M1, M1 marks \\
No marks for trial \& improvement methods
\end{tabular} \\
\hline \begin{tabular}{l}
14(a) 6:2 and 7:QR or equivalent, or scale factor 7/6 \(\mathrm{QR}=2 \times 7 \div 6\) or equivalent \(\mathrm{QR}=2.3(33 \ldots \mathrm{~cm})\) \\
(b)
\[
\begin{aligned}
& \mathrm{AE}=4 \mathrm{x} \\
& \mathrm{AF}=5.5 \mathrm{y} \\
& \text { (Perimeter }=) 6 \mathrm{x}+8.5 \mathrm{y} \quad \text { or } 6 \mathrm{x}+17 \mathrm{y} / 2
\end{aligned}
\]
\end{tabular} & \[
\begin{gathered}
\mathrm{B} 1 \\
\text { M1 } \\
\text { A1 } \\
\text { B1 } \\
\text { B1 } \\
\text { B1 }
\end{gathered}
\] & \begin{tabular}{l}
OR 6:8 and 7:PR or equivalent \\
OR PR=7×8 \(\div 6(=9.33 \ldots)\) or equivalent \\
CAO. Must be simplified \\
Accept \(1 / 2(12 x+17 y)\) \\
Answers of \(4 x+5.5 y+2 x+3 y\) imply B1, B1, B0
\end{tabular} \\
\hline \[
\text { 15. } \begin{aligned}
& \mathrm{b}=45\left({ }^{\circ}\right) \\
& \mathrm{c}=180\left({ }^{\circ}\right)
\end{aligned}
\] & \[
\begin{gathered}
\hline \text { B1 } \\
\text { B1 } \\
2
\end{gathered}
\] & \\
\hline \begin{tabular}{l}
\[
\begin{gathered}
\text { 16(a) } \mathbf{H K}=\mathbf{H L}+\mathbf{L K}(=5 \mathbf{x}+6 \mathbf{y}+3 \mathbf{x}-6 \mathbf{y}) \\
\quad=8 \mathbf{x}(+0 \mathbf{y}) \\
\text { (b)(i) } \quad \begin{array}{c}
\mathbf{L N}=3 \mathbf{x}-6 \mathbf{y}+18 \mathbf{x}-36 \mathbf{y} \quad(=21 \mathbf{x}-42 \mathbf{y}) \\
\mathrm{k}
\end{array}=7
\end{gathered}
\] \\
(ii) Collinear (or lie along the same straight line)
\end{tabular} & \[
\begin{gathered}
\hline \text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { B1 } \\
5
\end{gathered}
\] & \begin{tabular}{l}
May be embedded. Award M1, A1 for sight of \(\mathrm{k}=7\) \\
Do not accept parallel as a full description
\end{tabular} \\
\hline \[
\begin{aligned}
& \text { 17. Area of the square base }=119.8-4 \times 23.6 \\
& =25.4\left(\mathrm{~cm}^{2}\right) \\
& (\text { Volume pyramid) } 76.4=1 / 3 \times 25.4 \times \text { height }
\end{aligned} \quad \begin{aligned}
& \text { height }=9.02 \ldots \mathrm{~cm} \\
& \text { (Volume cone) } 44.4=1 / 3 \times \pi \times \mathrm{r}^{2} \times \text { height } \\
& \mathrm{r}^{2}=44.4 /(1 / 3 \times \pi \times \text { height }) \\
& \mathrm{r}^{2}=(44.4 \times 1 / 3 \times 25.4) /(76.4 \times 1 / 3 \times \pi) \\
& \mathrm{r}^{2}=4.69 \ldots \text { to } 4.701 \ldots \\
& (\text { (radius }) \quad 2.17 \text { or } 2.2(\mathrm{~cm})
\end{aligned}
\] & \begin{tabular}{l}
M1 \\
A1 \\
m1 \\
A1* \\
M1* \\
M1 \\
A1 \\
A1
\end{tabular} & \begin{tabular}{l}
FT their area of square base \\
Note \(\sqrt{ } 25.4=5.0398 \ldots \times 5.0398 \ldots\) \\
Depends on all previous method marks, FT their height \\
FT equivalent difficulty, isolating \(\mathrm{r}^{2}\) \\
CAO. \\
OR \(\mathrm{r}^{2}=4.7\), or an appropriate unrounded \(\mathrm{r}, \mathrm{r}=\) \\
2.1681875... to 2.17 \\
CAO. \\
Appropriate degree of accuracy required \\
Alternative for \(A 1\) *, M1* \\
Equating heights,
\[
76.4 /(1 / 3 \times 25.4)=44.4 /\left(1 / 3 \times \pi \times \mathrm{r}^{2}\right)
\] \\
For information: \\
Common height \(=9.02(\mathrm{~cm})\) \\
Height of a triangular face \(=9.37(\mathrm{~cm})\)
\end{tabular} \\
\hline
\end{tabular}

\section*{UNIT 2 (HIGHER TIER)}
\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics Unit 2 Higher Tier June 2014 & Mark & Comment \\
\hline 1. Shape completed accurately with correct rotation seen & B3 & With no other \(90^{\circ}\) rotations shown B2 for at least two lines correct in attempting to complete the shape with correct rotation of their shape with no other \(90^{\circ}\) rotations shown, OR B1 for the shape completed correctly, or a correct rotation of the part of the shape given, ignore other \(90^{\circ}\) rotations shown \\
\hline \begin{tabular}{l}
2. \\
(a) \((x=) 10 \times 8 / 5\)
\[
x=16
\] \\
(b) \((x=) 4\) \\
(c) \(18 x-102=42\)
\[
18 x=144
\]
\[
\begin{array}{r}
\text { OR } \begin{array}{c}
3 x-17=42 / 6 \\
3 x=24 \text { or } x=24 / 3 \\
x=8
\end{array} \quad .
\end{array}
\] \\
(d) \(9 x<77-5\)
\[
x<8
\] \\
(e) \(x<85 / 5\) or \(x<17\)
\end{tabular} & \begin{tabular}{l}
M1 \\
A1 \\
B1 \\
B1 \\
B1 \\
B1 \\
M1 \\
A1 \\
M1 \\
A1
\[
10
\]
\end{tabular} & \begin{tabular}{l}
Accept embedded answers in parts (a), (b) \& (c) \\
Mark final answer. Do not accept 28/7 \\
FT until \(2^{\text {nd }}\) error \\
No marks for use of "=", unless finally replaced to give \(\mathrm{x}<8\) then award M1 A1. \\
SC1 for \(\mathrm{x}<82 / 9\) ISW \\
Or sight of \(5 \times 16=80\) with \(5 \times 17=85\) \\
Accept unsupported 16, or a unique answer of 16 from a trial and improvement method. Do not accept \(\mathrm{x}<16\). \\
SC1 for sight of \(5 x=85, x=17\) followed by selecting \(x=16\)
\end{tabular} \\
\hline \[
\begin{aligned}
& \text { 3(a) } 100 \times 34 / 6800 \text { or } 100 \times 34 \div 6800 \\
& 0.5(\%) \text { or } 1 / 2(\%) \\
& \text { (b) } 1.0225 \times 34000 \text { or } 34000+34000 \times 2.25 / 100 \\
& \text { or } 102.25 \times 34000 / 100
\end{aligned}
\] & \[
\begin{aligned}
& \text { M1 } \\
& \text { A1 } \\
& \text { M1 } \\
& \text { A1 }
\end{aligned}
\] & Accept 0.25 written as 1/4 \\
\hline (c) \(0.26 \times 1345\) or \(3 / 8 \times 600\) or \(0.045 \times 3600\) or equivalent 349.7 (m)
\[
\begin{array}{ll}
225(\mathrm{~m}) & \\
& 162(\mathrm{~m}) \\
160 & 230
\end{array}{ }^{250} \text { (m) }
\] & \begin{tabular}{l}
M1 \\
A1 \\
A1 \\
A1 \\
B1
\end{tabular} & \begin{tabular}{l}
Any one correct calculation shown \\
Accept 349 or 350 \\
Accept 230 \\
Accept 160 \\
Must all be 2 significant figures \\
FT provided at least 2 of the A marks awarded
\end{tabular} \\
\hline \[
\text { (d) } \begin{aligned}
& 450 \times 4 \div 9 \\
&=200
\end{aligned}
\] & M1
A1 & Complete method CAO \\
\hline \begin{tabular}{l}
\[
450 \times 4 \div 5
\]
\[
=360
\] \\
Difference 160
\end{tabular} & \[
\begin{gathered}
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
14
\end{gathered}
\] & \begin{tabular}{l}
Complete method \\
CAO \\
Depend on both M marks
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics Unit 2 Higher Tier June 2014 & Mark & Comment \\
\hline \[
\begin{aligned}
& \text { 4.(Area of faces are) } 2 e \times 3 e, 2 e \times 4 e, 3 e \times 4 e,\left(\mathrm{~cm}^{2}\right) \\
& (2 e \times 3 e, 2 e \times 4 e, 3 e \times 4 e)\left(\mathrm{cm}^{2}\right)
\end{aligned}
\] & M2 & M1 for any one of the 3 unique expressions These marks may be implied by correct simplified expressions \\
\hline (Simplified equation for the total surface area is)
\[
52 e^{2}=468
\] & A2 & \begin{tabular}{l}
FT for M2 or M1 as appropriate, provided their simplified sum includes at least two of the expressions \(6 e^{2}, 8 e^{2}, 12 e^{2}\) and all three terms in the form \(\mathrm{a} e^{2}\). \\
A1 for \((2 \times)\left[6 e^{2}+8 e^{2}+12 e^{2}\right]\) OR \(52 e^{2}\left(\mathrm{~cm}^{2}\right)\) \\
A1 for \(\mathrm{a} e^{2}=468\)
\end{tabular} \\
\hline \[
\begin{aligned}
e^{2} & =468 / 52 \quad(=9) \\
e & =3
\end{aligned}
\] & \[
\begin{aligned}
& \text { B1 } \\
& \text { B1 }
\end{aligned}
\] & \begin{tabular}{l}
FT 'their equation' if in the form \(\mathrm{a}^{2}=468\) \\
FT 'their equation' if in the form \(\mathrm{a} e^{2}=468\)
\end{tabular} \\
\hline \((\) Volume \(=6 \times 9 \times 12=) 648\left(\mathrm{~cm}^{3}\right)\) & B1 & FT 'their \(e\) ' within \(24 \times e^{3}\) correctly evaluated \\
\hline \begin{tabular}{l}
Look for: \\
- if units given, are they correct? \\
- notation
\end{tabular} & QWC & If no marks, then allow SC2 for \(3 e \times 4 e \times 2 e=468\) leading to an answer of \(e=2.69 \ldots\) or 2.7 , or SC1 for sight of \(3 e \times 4 e \times 2 e=468\) or equivalent \\
\hline - labels and joining text & 2 & QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical \\
\hline \begin{tabular}{l}
QWC2: Candidates will be expected to \\
- present work clearly, with words explaining process or steps
\end{tabular} & & form, and with few if any errors in spelling, punctuation and grammar. \\
\hline \begin{tabular}{l}
AND \\
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
\end{tabular} & & QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR \\
\hline \begin{tabular}{l}
QWC1: Candidates will be expected to \\
- present work clearly, with words explaining process or steps
\end{tabular} & & evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. \\
\hline \begin{tabular}{l}
OR \\
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
\end{tabular} & 9 & QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. \\
\hline 5. \(26.5-26.5 \times 0.12 \quad\) OR \(26.5 \times 0.88 \quad(=23.3(2)\) & M1 & OR M2 for
\[
26.5 \times 0.88 \times 0.92
\] \\
\hline \[
\begin{array}{r}
23.3(2)-23.3(2) \times 0.08 \text { OR } 23.3(2) \times 0.92 \\
(=21.4544 \text { or } 21.436)
\end{array}
\] & M1 & FT 'their 23.32 ', but not 26.5 \\
\hline \(25.3-21.4544(=3.8456)\) OR \(25.3-21.436(=3.864)\) & m1 & Depends on both previous M marks FT for their 23(.32) and their 21(...) \\
\hline \(3.8\left(\ldots .{ }^{\circ} \mathrm{C}\right)\) to \(3.9\left({ }^{\circ} \mathrm{C}\right)\) from correct working & \[
\begin{gathered}
\mathrm{A} 1 \\
4
\end{gathered}
\] & Accept \(4\left({ }^{\circ} \mathrm{C}\right)\) from correct working \\
\hline 6. Sight of any quotient using values from the table for \(\mathrm{a} / \mathrm{b}\) or \(\mathrm{b} / \mathrm{a}\) & M1 & Or sight of 1 correct response, or answers reversed \\
\hline \(\mathrm{a}=2.5 \times \mathrm{b}\) & A1 & Or equivalent \\
\hline \(\mathrm{b}=0.4 \times \mathrm{a}\) & \[
\begin{gathered}
\text { A1 } \\
3
\end{gathered}
\] & \begin{tabular}{l}
Or equivalent \\
FT from \(\mathrm{a}=0.4 \times \mathrm{b}\) to give \(\mathrm{b}=2.5 \times \mathrm{a}\)
\end{tabular} \\
\hline 7.(a) \(5.6 \times 10^{-5}\) & B1 & \\
\hline (b) \(2.3 \times 10^{9}\) & B1
2 & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics Unit 2 Higher Tier June 2014 & Mark & Comment \\
\hline \begin{tabular}{l}
8. Idea to show or use the perpendicular height in a right angled triangle \\
Height \(=\sin 58^{\circ} \times 6\)
\[
=5(.088 \ldots \mathrm{~cm})
\] \\
Area \(=5(.088 \ldots) \times 10\)
\[
=50.9\left(\mathrm{~cm}^{2}\right) \text { or } 51\left(\mathrm{~cm}^{2}\right)
\]
\end{tabular} & \[
\begin{gathered}
\text { S1 } \\
\text { M2 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 }
\end{gathered}
\] & \begin{tabular}{l}
Award for statement such as ' \(6(\mathrm{~cm}\) ) is not the vertical height' \\
M1 for \(\sin 58^{\circ}=\) Height \(/ 6\) \\
FT their \(5(.088 \ldots \mathrm{~cm})\) provided prior M1 awarded or an attempt has been made to use a trig ratio Must be rounded. Do not accept 50.8 or 50 (from premature approximation). FT from M1 If S1 only, then use of spurious perpendicular height <6, then also award SC1 for their perpendicular height \(\times 10\) correctly evaluated \\
Alternative: \\
Use of \(1 / 2 a b \sin C\) \\
\(2 \times 1 / 2 \times 6 \times 10 \times \sin 58^{\circ}\) \\
or \(M 2\) for \(1 / 2 \times 6 \times 10 \times \sin 58^{\circ}\) \\
\(50.9\left(\mathrm{~cm}^{2}\right)\) or \(51\left(\mathrm{~cm}^{2}\right)\) \\
or A1 for calculating \(1 / 2\) required area
\end{tabular} \\
\hline \begin{tabular}{l}
9(a) Correct translation \\
(b) Correct rotation \\
(c) Correct reflection in \(y=x\) \\
(d) Enlargement scale factor \(1 / 2\) \\
Correct position
\end{tabular} & \begin{tabular}{l}
B1 \\
B2 \\
B2 \\
B2 \\
B1 \\
8
\end{tabular} & \begin{tabular}{l}
B1 near miss of grid lines, or for clockwise \(90^{\circ}\) about ( \(-2,-1\) ), or for anticlockwise \(90^{\circ}\) about (-1, -2) \\
B1 for a reflection in \(y=-x\), \\
OR for sight of the line \(y=x\) \\
B1 for any 1 line correct, or consistent incorrect fractional scale
\end{tabular} \\
\hline ```
10. \(26.7=\Pi \times \mathrm{d}\) or \(26.7=2 \times \Pi \times \mathrm{r}\) or \(\mathrm{r}=26.7 / \Pi\)
Diagonal \(=8.495 \ldots\) to \(8.5(0 \ldots)(\mathrm{cm})\)
diagonal \({ }^{2}=\) side \(^{2}+\) side \(^{2}\)
side \(^{2}=\) diagonal \(^{2} / 2\)
side length \(=6(.0096 \ldots \mathrm{~cm})\)
Perimeter \(=24 .(\ldots . \mathrm{cm})\)
``` & \[
\begin{gathered}
\hline \text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\text { A1 } \\
\\
\text { B1 } \\
6 \\
\hline
\end{gathered}
\] & \begin{tabular}{l}
Accept rounded or truncated FT their diagonal \\
Do not FT from inappropriate truncation or incorrect rounding (e.g. from \(\mathrm{d}=8.4\) ) Answer here for A1 should round to 6.01 FT provided both M marks awarded for \(4 \times\) 'their side length'
\end{tabular} \\
\hline \begin{tabular}{l}
11.(a)(i) \(\mathrm{y}=\mathrm{x}\) and \(\mathrm{y}=-\mathrm{x}\) indicated (2 quadrants for both) \\
(ii) \(\mathrm{y}=\mathrm{x}\) and \(\mathrm{y}=-\mathrm{x}\) or equivalent \\
(b) \(\mathrm{x}^{2}+\mathrm{y}^{2}=3^{2}\) or \(\mathrm{x}^{2}+\mathrm{y}^{2}=9\)
\end{tabular} & B2
B2
\[
\begin{gathered}
\text { B1 } \\
5 \\
\hline
\end{gathered}
\] & \begin{tabular}{l}
B1 for either indicated in 2 quadrants, or both indicated in 1 quadrant each \\
B1 for indication of appropriate points at least 3 in each of the 4 quadrants Ignore any circles drawn CAO. B1 for either equation \\
CAO
\end{tabular} \\
\hline \[
\begin{gathered}
\text { 12. } \sin \mathrm{XYZ} / 23.8=\sin 123\left(^{\circ}\right) / 38.9 \\
\sin \mathrm{XYZ}=23.8 \times \sin 123\left(^{\circ}\right) / 38.9 \\
\left.\mathrm{XYZ}=30.871 . .{ }^{\circ}\right) \text { rounded or truncated correctly }
\end{gathered}
\] & \[
\begin{gathered}
\text { M1 } \\
\text { M1 } \\
\text { A1 } \\
3 \\
\hline
\end{gathered}
\] & OR 23.8/sin XYZ \(=38.9 / \sin 123\left({ }^{\circ}\right)\) OR \(\sin ^{-1} 0.513 \ldots\) This M1 implies previous M1 \\
\hline \[
\begin{array}{lc}
\text { 13. } \mathrm{y}=4-\mathrm{x} & \text { OR } \begin{array}{c}
\mathrm{x}=4-\mathrm{y} \\
2 \mathrm{x}^{2}+\mathrm{x}(4-\mathrm{x})-5=0
\end{array} \\
\mathrm{x}^{2}+4 \mathrm{x}-5=0 & \left.\mathrm{y}^{2}-\mathrm{y}\right)^{2}+(4-\mathrm{y}) \mathrm{y}-5=0 \\
\end{array}
\] & \[
\begin{aligned}
& \hline \text { M1 } \\
& \text { M1 } \\
& \text { A1 }
\end{aligned}
\] & \begin{tabular}{l}
OR For sight of \(x^{2}+x y=4 x\) \\
OR Subtraction from \(1^{\text {st }}\) equation \\
OR \(\quad x^{2}+4 x=5\)
\end{tabular} \\
\hline \[
(x-1)(x+5)=0
\]
\[
(y-3)(y-9)=0
\] & M1 & FT provided quadratic from an appropriate substitution method or subtraction method OR alternative method to solve , e.g. formula with correct substitution and \(b^{2}-4 a c\) correctly simplified \\
\hline \[
\begin{array}{lll}
x=1, x=-5 & \text { OR } & y=3, y=9 \\
y=3, y=9 & x=1, x=-5
\end{array}
\] & \[
\begin{aligned}
& \text { A1 } \\
& \text { A1 }
\end{aligned}
\] & \begin{tabular}{l}
If A0, A0 then SC1 for \(x=1, y=3\) OR \(x=-5, y=9\) provided algebraic method shown with appropriate M1, M1, M1 marks \\
No marks for trial \& improvement methods
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Methods in Mathematics Unit 2 Higher Tier June 2014 & Mark & Comment \\
\hline \begin{tabular}{l}
14(a) 6:2 and 7:QR or equivalent, or scale factor 7/6 \(\mathrm{QR}=2 \times 7 \div 6\) or equivalent
\[
\mathrm{QR}=2.3(33 \ldots \mathrm{~cm})
\] \\
(b)
\[
\begin{aligned}
& \mathrm{AE}=4 \mathrm{x} \\
& \mathrm{AF}=5.5 \mathrm{y} \\
& (\text { Perimeter }=) 6 \mathrm{x}+8.5 \mathrm{y} \text { or } 6 \mathrm{x}+17 \mathrm{y} / 2 \quad \text { ISW }
\end{aligned}
\]
\end{tabular} & \[
\begin{gathered}
\text { B1 } \\
\text { M1 } \\
\text { A1 } \\
\\
\text { B1 } \\
\text { B1 } \\
\text { B1 } \\
\\
\hline
\end{gathered}
\] & \begin{tabular}{l}
OR 6:8 and 7:PR or equivalent \\
OR PR=7×8 \(\div 6(=9.33 \ldots)\) or equivalent \\
CAO. Must be simplified \\
Accept \(1 / 2(12 x+17 y)\) \\
Answers of \(4 x+5.5 y+2 x+3 y\) imply B1, B1, B0
\end{tabular} \\
\hline \[
\text { 15. } \begin{aligned}
& \mathrm{b}=45\left({ }^{\circ}\right) \\
& \\
& \mathrm{c}=180\left({ }^{\circ}\right)
\end{aligned}
\] & \[
\begin{gathered}
\hline \text { B1 } \\
\text { B1 } \\
2 \\
\hline
\end{gathered}
\] & \\
\hline \begin{tabular}{l}
\[
\begin{aligned}
& \text { 16(a) } \mathbf{H K}=\mathbf{H L}+\mathbf{L K}(=5 \mathbf{x}+6 \mathbf{y}+3 \mathbf{x}-6 \mathbf{y}) \\
& \quad=8 \mathbf{x}(+0 \mathbf{y}) \\
& \text { (b)(i) } \begin{aligned}
\mathbf{L N} & =3 \mathbf{x}-6 \mathbf{y}+18 \mathbf{x}-36 \mathbf{y}(=21 \mathbf{x}-42 \mathbf{y}) \\
\mathrm{k} & =7
\end{aligned}
\end{aligned}
\] \\
(ii) Collinear (or lie along the same straight line)
\end{tabular} & \[
\begin{gathered}
\hline \text { M1 } \\
\text { A1 } \\
\text { M1 } \\
\text { A1 } \\
\\
\text { B1 } \\
5 \\
\hline
\end{gathered}
\] & \begin{tabular}{l}
May be embedded. Award M1, A1 for sight of k=7 \\
Do not accept parallel as a full description
\end{tabular} \\
\hline \begin{tabular}{l}
17. Area of the square base \(=119.8-4 \times 23.6\)
\[
=25.4\left(\mathrm{~cm}^{2}\right)
\] \\
(Volume pyramid) \(76.4=1 / 3 \times 25.4 \times\) height
\[
\text { height }=9.02 \ldots \mathrm{~cm}
\] \\
(Volume cone) \(44.4=1 / 3 \times \pi \times r^{2} \times\) height
\[
\begin{aligned}
& \mathrm{r}^{2}=44.4 /(1 / 3 \times \pi \times \text { height } \\
& \mathrm{r}^{2}=(44.4 \times 1 / 3 \times 25.4) /(76.4 \times 1 / 3 \times \pi) \\
& \mathrm{r}^{2}=4.69 \ldots \text { to } 4.701 \ldots \\
& \text { (radius) } 2.17 \text { or } 2.2(\mathrm{~cm})
\end{aligned}
\]
\end{tabular} & \begin{tabular}{l}
M1 \\
A1 \\
m1 \\
A1* \\
M1* \\
M1 \\
A1 \\
A1
\end{tabular} & \begin{tabular}{l}
FT their area of square base \\
Note \(\sqrt{ } 25.4=5.0398 \ldots \times 5.0398 \ldots\) \\
Depends on all previous method marks, FT their height \\
FT equivalent difficulty, isolating \(\mathrm{r}^{2}\) \\
CAO. \\
OR \(r^{2}=4.7\), or an appropriate unrounded \(r, r=\) \(2.1681875 \ldots\) to 2.17 \\
CAO. \\
Appropriate degree of accuracy required \\
Alternative for \(A I^{*}, M 1\) * \\
Equating heights,
\[
76.4 /(1 / 3 \times 25.4)=44.4 /\left(1 / 3 \times \pi \times r^{2}\right)
\] \\
For information: \\
Common height \(=9.02(\mathrm{~cm})\) \\
Height of a triangular face \(=9.37(\mathrm{~cm})\)
\end{tabular} \\
\hline
\end{tabular}```

