## UNIT 1 (HIGHER TIER)

| Methods Unit 1 Higher Tier June 2014 |  |  |  |  |  | Mark | Comment |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\text { 1. } \begin{aligned} & a=52^{\circ} \\ & b=128^{\circ} \\ & c=128^{\circ} \\ & d=40^{\circ} \\ & e=88^{\circ} \end{aligned}$ |  |  |  |  |  | $\begin{gathered} \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ \hline 5 \end{gathered}$ | FT their $b=c$ <br> FT 92 - their a, or their $\mathrm{b}-88$, or their $\mathrm{c}-88$, or $128-$ their e |
| 2. Considering all possible outcomes, e.g. use of twoway table, or showing all possible totals, or (Game card A) 6 possible (ways or outcomes) AND (Game card B) 16 possible (ways or outcomes) |  |  |  |  |  | B3 | Accept $6 / 25$ and $16 / 25$. No extra outcomes should be included, e.g. including numbers not on the spinners <br> If card A list complete, accept stopping listing card <br> $B$ possibilities as soon as >6 possible ways |
| Example: |  |  |  |  |  |  | indicated correctly. |
| 1 | 2 | 3 | 4 | 5 | 6 |  | B2 for at least 1 possible outcome indicated for |
| 2 | 3 | 4 | 5 | 6 | 7 |  | each of the 4 numbers on card A AND at least 2 |
| 3 | 4 | 5 | 6 | 7 | 8 |  | possible outcomes indicated for each of the 4 |
| 4 | 5 | 6 | 7 | 8 | 9 |  | numbers on card B, OR for all possible outcomes |
| 5 | 6 | 7 | 8 | 9 | 10 |  | for card B |
|  |  |  |  |  |  |  | B1 for 1 way of scoring a number on card A AND 2 ways for a number on card B, OR all outcomes for card A |
| Conclusion, game card B has the better chance |  |  |  |  |  | E1 | The conclusion must be based on working, i.e. provided at least B2 previously awarded |
| Look for: <br> - clear organisation, ordered lists or tables <br> - labels linking working and game cards <br> - clear explanation in a conclusion <br> - if used, correct notation for probability |  |  |  |  |  | $\begin{gathered} \text { QWC } \\ 2 \end{gathered}$ | QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. |

QWC2: Candidates will be expected to

- present work clearly, with words explaining process or steps
AND
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer

QWC1: Candidates will be expected to

- present work clearly, with words explaining process or steps
OR
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer
3.(a) 18 or equivalent
(b) 12 or equivalent
(c) 9
(d) Numerator $0.06(0)$ or 1 correct step in calculation Multiplying numerator and denominator by suitable multiple of 10 - for eliminating decimals, or correct (FT) evaluation as a decimal

$$
1 / 1000
$$

QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar
OR
evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.

QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

B1 Accept a product of factors
B1 Accept a product of factors
B2 B1 for sight of 3 , or $1 / 4+23 / 4$, or $0.25+2.75$
B1
B1
FT depending on their numerator.

These $1^{\text {st }} 2$ B marks are interchangeable A final answer of 0.001 is awarded B1, B1, B0
B1 CAO
(Example: 0.60/60 $=0.01$ or $1 / 100$ or $6 / 600$ is awarded B0, B1, BO
$60 / 600$ as a $1^{\text {st }}$ stage is awarded BO, BO, BO

\begin{tabular}{|c|c|c|}
\hline \begin{tabular}{l}
4. (a) Square or rectangle or isosceles trapezium \\
(b) Parallelogram or rhombus or rectangle \\
(c)(i) \((-5,4)\) \\
(ii) \((5,-4)\)
\end{tabular} \& B1
B1
B1
B1
4 \& \\
\hline \begin{tabular}{l}
\begin{tabular}{rlrl} 
5.(a) \(\mathrm{h}+4\) \& \(=5 \mathrm{e}\) \& or \& \(-5 \mathrm{e}=-4-\mathrm{h}\) \\
\(\mathrm{e}=\frac{\mathrm{h}+4}{5}\) \& or \& \(\mathrm{e}=\frac{-4-\mathrm{h}}{-5}\)
\end{tabular} \\
(b) (i) 9 \\
(ii) 6 \\
(iii) 3
\end{tabular} \& B1
B1

B1
B1
B1
5 \& FT until $2^{\text {nd }}$ error
(e.g. $4 h=5 e$ leading to $4 h / 5=e$ is awarded BO, B1) <br>

\hline | 6.(a) False with valid general reason, OR a correct general statement without selection of false |
| :--- |
| (b) True with valid general reason, OR a correct general statement without selection of true | \& E2 \& | For example 'false, there is always 1 and the number itself', or 'false, as they have exactly two factors' |
| :--- |
| E1 for sight of at least 2 prime numbers, with no errors in choice of primes, and a list of the factors of at least 2 prime numbers |
| Penalise incorrect reference to factors -1 |
| Choice TRUE but correct general statement allow SC1 |
| For example 'the square root is a factor times by itself, (other factors are in pairs)' |
| E1 for evidence of working with at least 2 square numbers, with no errors in choice of square numbers leading to |
| - correct factors |
| OR |
| - statement of the correct number of factors |
| OR |
| - 1 of each ( 1 example of factors and 1 example of number of factors) |
| Choice FALSE but correct general statement allow SC1 | <br>


\hline | 7. $360 \div 9$ $\ldots \text { X } \ldots \text { has } \mathbf{4 0} \text { sides }$ |
| :--- |
| $360 \div(180-120)$ OR equivalent full method working with interior angles $\text { ... Y ... has } 6 \text { sides }$ | \& M1

A1
M1

A1

4 \& | An unsupported answer is awarded M1, A1 |
| :--- |
| An unsupported answer is awarded M1, A1 | <br>

\hline 8. Interpretation that 36 cm is 8 parts

$$
\begin{aligned}
& 3 \times 36 \div 8+36 \quad \text { OR }(3+8) \times 36 \div 8 \\
& 49.5(\mathrm{~cm}) \text { or } 491 / 2(\mathrm{~cm})
\end{aligned}
$$ \& S1

M1

A1

3 \& | Or sight of $36 \div 8$ or $36 / 8$ or 4.5 |
| :--- |
| Full method to calculate AC. FT their miscalculated $36 \div 8$, not for $36 \div 11$ CAO. Do not accept $50(\mathrm{~cm})$, unless 49.5 seen | <br>

\hline | $\text { 9.(a) } 6$ |
| :--- |
| (b) $0.1212 \ldots$ or 0.12 |
| (c) $1 / 40$ | \& B2

B2
B2

6 \& | B1 for sight of $4 \times 6$ or $4 \times 2 \times 3$ or $2^{3} \times 3$ |
| :--- |
| OR for sight of 144 . Not for $2 \times 12$, this is B0 |
| B1 for 0.12 or $0.12 \ldots$ or 0.12 as an answer or seen in working |
| B1 for sight of $25 / 1000$ or equivalent unsimplified fraction | <br>

\hline
\end{tabular}

| 10.(a)(i) $4 n+3$ <br> (ii) $-2 n+74$ <br> (iii) $n^{2}-8$ <br> (b) $3 \times 20^{2}+4$ $=1204$ | $\begin{gathered} \text { B2 } \\ \text { B2 } \\ \text { B2 } \\ \text { M1 } \\ \text { A1 } \\ 8 \end{gathered}$ | B1 for 4n <br> B1 for $-2 n$. Allow SC1 for $2 \mathrm{n}+74$ <br> B1 for $\mathrm{n}^{2}$, not $\mathrm{an}^{2}$ where $a \neq 1$, OR <br> B1 for sight of second differences 2 <br> Must clearly be $20^{2}$ not $(3 \times 20)^{2}$ CAO |
| :---: | :---: | :---: |
| $\text { 11.(a) } 2 \times 10^{10}$ <br> (b) $7.3 \times 10^{9}$ | B2 B2 | B1 for $20 \times 10^{9}$ or $0.2 \times 10^{11}$ or similar attempt at standard form <br> B0 for 20000000000 <br> B1 for $10^{8}(5+6.8 \times 10)$ or $73 \times 10^{8}$ or $0.73 \times 10^{10}$ or similar attempt at standard form B0 for 7300000000 <br> If no marks in (a) \& (b) then SC1 for both answers correct but not in standard form |
| 12.(a) (i) $6 x(2 x+3 y)$ <br> (ii) $(x+10)(x-10)$ <br> (b) $\begin{aligned} (\mathrm{x}+2)(\mathrm{x}-7) & (=0) \\ & \mathrm{x}=-2 \text { and } \mathrm{x}=7 \end{aligned}$ | $\begin{gathered} \text { B2 } \\ \\ \text { B1 } \\ \text { B2 } \\ \text { B1 } \\ 6 \end{gathered}$ | B1 for a correct partially factorised expression, OR for sight of $6 \mathrm{x}(2 \mathrm{x} \ldots)$ or $6 \mathrm{x}(\ldots+3 \mathrm{y})$ <br> B1 for ( $\mathrm{x} . . .2$ )(x ... 7) <br> Must be from factorised expression or equation <br> FT from their pair of brackets |
| 13.(a) Explains parallel with intersection $y$-axis at 3 , e.g. 'same gradient with intersection at $(\mathrm{y}=)_{3}$ ' <br> (b) Reflection (in $x$-axis) or perpendicular (through the origin) or change the sign of the $y$-coordinate | E1 | Must imply parallel and mention (vertical) translation <br> Allow 'put the line up another 3 squares' <br> Do not accept ' $\mathrm{m}=1, \mathrm{c}=3$ ' unless related to $\mathrm{y}=\mathrm{x}$, <br> Accept use of knowledge ' $\mathrm{m} \times-1 / \mathrm{m}=-1$ ', or ${ }^{\prime} \mathrm{m}_{1} \times \mathrm{m}_{2}=-1$ ' <br> Do not accept 'diagonally downwards', 'opposite (direction)', or 'reversed (direction)', or 'swap the coordinates' <br> Allow 'same but decreasing instead of increasing (as it is minus)', 'rotate $90^{\circ}$ (about the origin)', 'change the sign of one of the coordinates' |
| 14.(a) $0.35 \quad 0.8 \quad 0.2 \quad 0.8$ on the correct branches <br> (b) $0.65 \times 0.2$ $=0.13$ | $\begin{gathered} \hline \text { B2 } \\ \text { M1 } \\ \text { A1 } \\ 4 \\ \hline \end{gathered}$ | B1 for any two correct entries. Accept fractions |
| 15.(a) Correct region shaded <br> (b) Correct region shaded <br> (c) Correct region shaded | $\begin{gathered} \hline \text { B1 } \\ \text { B1 } \\ \text { B1 } \\ 3 \end{gathered}$ | Union of A and B <br> All shaded except the intersection of A with B All except the non overlap region of A |
| 16. <br> (a) $37\left({ }^{\circ}\right)$ <br> Alternate segment theorem and isosceles triangle <br> (b) $55\left({ }^{\circ}\right)$ <br> (Isosceles triangle,) angle at centre twice angle at circumference | $\begin{gathered} \text { B1 } \\ \text { E1 } \\ \text { B1 } \\ \text { E1 } \\ 4 \\ \hline \end{gathered}$ | The E1 mark depends on the B1 or sight of a correct method. <br> For E marks: Do not accept calculation <br> Or equivalent. <br> Or equivalent. |
| $\begin{gathered} 17.30 \times 70=35 \times \mathrm{AC} \text { OR } 30 \times(30+40)=35 \times \mathrm{AC} \\ \mathrm{AC}=60(\mathrm{~cm}) \\ \mathrm{AB}=60-35 \\ =25(\mathrm{~cm}) \end{gathered}$ | $\begin{gathered} \hline \text { M1 } \\ \text { A1 } \\ \text { m1 } \\ \text { A1 } \\ 4 \\ \hline \end{gathered}$ | May be within a calculation towards AB directly <br> May be implied in further working <br> FT for their AC provided M1 awarded |

\begin{tabular}{|c|c|c|}
\hline \begin{tabular}{l}
18.(a)(i) Sketch of \(\mathrm{y}=\mathrm{x}^{2}\) symmetrical passing through the origin \\
(ii) Sketch of \(\mathrm{y}=1 / \mathrm{x}\) in appropriate 2 quadrants with axes as asymptotes \\
(b) Sketch of \(y=2^{x}\) through \((0,1)\), with 1 indicated on the \(y\)-axis or coordinate \((0,1)\) given
\end{tabular} \& B1
B2

B2

5 \& | Mark intention to be symmetrical passing through the origin |
| :--- |
| B1 for sketch in 1 quadrant with axes as asymptotes, or for 2 curves appropriately in both quadrants but not clearly with intention of axes as asymptotes |
| B1 for general shape, towards zero gradient for greater negative values of x , and rising for greater positive values of $x$, clearly through a point on positive $y$-axis | <br>

\hline | 19.Substitution of (2, 26), |
| :--- |
| e.g. sight of $26=\mathrm{k} \times 2^{2}+3 \times 2$ $\mathrm{k}=5$ |
| Equating $y=0$, e.g. sight of $0=k x^{2}+3 x$ $\begin{gathered} x(5 x+3)=0 \\ (0,0) \quad \text { or } \quad x=0 \end{gathered}$ $(-3 / 5,0) \text { or } x=-3 / 5 \text { or equivalents }$ | \& M1

A1
M1
m1
A1
A1

6 \& | FT their k with $\mathrm{k} \neq 0$, including ' k ' |
| :--- |
| Extracting common factor, accept $\mathrm{x}(\mathrm{kx}+3)=0$ |
| Must be from correct working |
| Accept $x=-3 / k$. Not dependent on $m 1$ | <br>

\hline | 20.(a) $(x+7)^{2}+4$ |
| :--- |
| (b) Attempt to use common denominator $\begin{aligned} & \frac{4(3 x+2)-5(5 x-2)+14}{(20)} \text { or equivalent } \\ & \frac{12 x+8-25 x+10+14}{20} \text { or equivalent } \\ & =\frac{32-13 x}{20} \end{aligned}$ | \& B2

B1
M2
A1

A1

7 \& | B1 for $\mathrm{a}=(+) 7$, B 1 for $\mathrm{b}=4$, only award B2 for $(x+7)^{2}+4$ |
| :--- |
| e.g. allow sight of all 3 fractions denominator 20 without change to numerators |
| M1 for 2 of the three terms correct. |
| May be expressed as separate fractions, or working without consideration of the denominator |
| Convincing step. FT from 1 error, i.e. M1. |
| Must be clearly implying +10 term rather than -10 from notation |
| Denominator must be seen |
| Must follow from correct working | <br>

\hline $$
\begin{aligned}
& \text { 21.Sight of } \mathrm{P}\left(\mathrm{~A}^{\prime}\right)=0.6 \\
& 0.6 \times x=0.48 \text { OR } x=0.48 / 0.6 \\
& x=0.8
\end{aligned}
$$ \& B1

M1

A1
3 \& FT their 1-0.4 incorrectly evaluated for M1 only, do not FT 0.4 for $\mathrm{P}\left(\mathrm{A}^{\prime}\right)$
CAO <br>
\hline
\end{tabular}

