|  | nest | Answer | Marks | Guidance | Question |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | (i) |  | $\begin{gathered} 1 \\ {[1]} \end{gathered}$ |  |  |
| 1 | (ii) | $\begin{aligned} & 3 \\ & 5 \end{aligned} \text { or } 0.6$ | 3 <br> [3] | allow $\mathbf{B 3}$ for $\pm 0.6$ oe; <br> M1 for $\binom{25}{9}^{-\frac{1}{2}}=\binom{9}{25}^{\frac{1}{2}}$ soi or $\frac{1}{\binom{25}{9}^{\frac{1}{2}}}$ <br> and M1 for at least one of 3 and 5 found | M1 for inversion even if they have done something else first, eg may be earned after $2^{\text {nd }} \mathrm{M} 1$ for inversion of their $\frac{5}{3}$ |


| Question |  | Answer | Marks | Guidance |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | (i) | $\begin{aligned} & 1 \\ & 9 \end{aligned}$ | 2 <br> [2] | isw conversion to decimal <br> M1 for 9 or for $3^{-2}$ or for $\frac{1}{3}$ <br> Except M0 for 9 from $27 / 3$ or $\sqrt[3]{27}$ | ie M1 for evidence of $(\sqrt[3]{27})^{2}$ or $1 /(\sqrt[3]{27})$ found correctly |
| 2 | (ii) | $2 a^{2} c^{-4}$ or $\begin{gathered}2 a^{2} \\ c^{4}\end{gathered}$ as final answer | 3 <br> [3] | B1 for each element; must be multiplied <br> if B 0 , allow SC 1 for $64 a^{6} c^{3}$ obtained from numerator or for all elements correct but added |  |


| Question |  | Answer | $\begin{array}{\|c\|} \hline \text { Marks } \\ \hline \text { B2 } \\ \text { [2] } \end{array}$ | Guidance |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | (i) | $3 n^{2}+6 n+5$ isw |  | M1 for a correct expansion of at least one of $(n+1)^{2}$ and $(n+2)^{2}$ |  |
| 3 | (ii) | odd numbers with valid explanation | B2 | marks dep on 9(i) correct or starting again <br> for B2 must see at least odd $\times$ odd $=$ odd [for $3 n^{2}$ ] (or when $n$ is odd, [3] $n^{2}$ is odd) and odd $[+$ even $]+$ odd $=$ even soi, <br> condone lack of odd $\times$ even $=$ even for $6 n$; condone no consideration of $n$ being even <br> or B2 for deductive argument such as: $6 n$ is always even [and 5 is odd] so $3 n^{2}$ must be odd so $n$ is odd <br> B1 for odd numbers with a correct partial explanation or a partially correct explanation <br> or B1 for an otherwise fully correct argument for odd numbers but with conclusion positive odd numbers or conclusion negative odd numbers <br> B0 for just a few trials and conclusion | accept a full valid argument using odd and even from starting again <br> Ignore numerical trials or examples in this part - only a generalised argument can gain credit |


| 4 | (i) | 25 | $2$ <br> [2] | M1 for $\left(\frac{10}{2}\right)^{2}$ or $\left(\frac{1}{0.2}\right)^{2}$ oe soi or for $\frac{1}{0.04}$ oe | ie M1 for one of the two powers used correctly <br> M0 for just $\frac{1}{0.4}$ with no other working |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 4 | (ii) | $8 a^{9}$ | $3$ [3] | B2 for 8 or M1 for $16^{\frac{1}{4}}=2$ soi and B1 for $a^{9}$ | ignore $\pm$ <br> eg M1 for $2^{3}$; M0 for just 2 |


| Question |  | Answer | Marks | Guidance |  |
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| 5 | (i) | $\frac{9}{25}$ or 0.36 isw | 2 <br> [2] | M1 for numerator or denominator correct or for squaring correctly or for inverting correctly | M1 for eg $\frac{1}{\binom{25}{9}}$ or $\binom{25}{9}^{-1}$ or $\frac{25}{9}$ or <br> for $\binom{3}{5}^{2}$ or $\frac{3}{5}$ <br> M0 for just $\frac{1}{\binom{5}{3}^{2}}$ |
| 5 | (ii) | 27 | $2$ <br> [2] | M1 for $81^{4}=3$ soi | eg M1 for $3^{3}$ M0 for $81^{3}=531441$ (true but not helpful) |


| $\mathbf{6}$ | (i) | 25 | 2 | M1 for $\frac{1}{\frac{1}{25}}$ or $\left(\frac{1}{25}\right)^{-1}$ or $5^{2}$ or $\frac{25}{1}$ |  |
| :--- | :--- | :--- | :--- | :---: | :--- | :--- |
| $\mathbf{6}$ | (2i) | $\frac{4}{9}$ | 2 | M1 for 4 or 9 or $\frac{1}{9}$ or $\frac{2}{3}$ or $\left(\frac{2}{3}\right)^{2}$ or $\sqrt[3]{\frac{64}{729}}$ | 0 for just $\left(\frac{64}{729}\right)^{\frac{1}{3}}$ |
| [2] |  | seen |  |  |  |


| Question |  | er |  | Marks | Guidance |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 7 | (i) | 30 |  | 3 <br> [3] | M1 for $(\sqrt{6})^{3}=6 \sqrt{6}$ soi and M1 for $\sqrt{24}=2 \sqrt{6}$ soi or allow SC2 for final answer of $5(\sqrt{6})^{2}$ or $5 \sqrt{36}$ or $10 \sqrt{9}$ etc | M0 for $6000 \sqrt{6}$ ie cubing 10 as well for those using indices: M1 for both $10 \times 6^{3 / 2}$ and $2 \times 6^{1 / 2}$ oe then M 1 for $5 \times 6$ oe <br> award SC2 for similar correct answer with no denominator |
| 7 | (ii) | $\frac{8}{11}$ |  | 2 <br> [2] | M1 for common denominator $(4+\sqrt{5})(4-\sqrt{5})$ soi - may be in separate fractions or for a final answer with denominator 11, even if worked with only one fraction | condone lack of brackets |



| 9 |  | $6 n^{2}+12 n+8$ or $2\left(3 n^{2}+6 n+4\right)$ oe <br> as final answer |
| :--- | :--- | :--- | :--- |


| 3 | B2 for 2 terms correct in final answer or for <br> $(n+2)^{3}=n^{3}+6 n^{2}+12 n+8$ | B1 for |
| :--- | :--- | :--- |
| or B1 for 1, 3, 3, 1 soi |  |  |
| [3] | or SC2 for final answer of $3 n^{2}+6 n+4$ | 3 <br> condoning one error |


| 10 | (i) /3 isw | 2 | condone $\pm 4 / 3$; <br> M1 for numerator or denominator correct or for $\frac{3}{4}$ or $\frac{1}{\left(\frac{3}{4}\right)}$ oe or for $\left(\frac{16}{9}\right)^{\frac{1}{2}} \text { soi }$ | M1 for just -4/3; allow M1 for $\sqrt{16}=4$ and $\sqrt{9}=3$ soi; condone missing brackets |
| :---: | :---: | :---: | :---: | :---: |
| 10 | (ii) $\frac{2 a}{c^{5}}$ or $2 a c^{-5}$ | 3 | B1 for each 'term' correct; mark final answer; <br> if B0, then SC1 for $\left(2 a c^{2}\right)^{3}=8 a^{3} c^{6}$ or $72 a^{5} c^{7}$ seen | condone $a^{1}$; condone multiplication signs but $\mathbf{0}$ for addition signs |


| 11 | (i)(A) $1 / 16$ | $\mathbf{1}$ | isw attempted conversion of $1 / 16$ to <br> decimals | accept 0.0625 <br> 11 |
| :--- | :--- | :---: | :--- | :--- |
| (i)(B) 1 | $\mathbf{1}$ |  | set image 'fit to height' so that in marking this question <br> you also check that there is no working on the back <br> page attached to the image |  |
| 11 | (ii) $256 / 625$ | $\mathbf{2}$ | M1 for num or denom correct or for $4 / 5$ <br> or 0.8 | accept 0.4096 |

