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# **GCSE MARKING SCHEME**

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**SUMMER 2023**

**GCSE  
MATHEMATICS – NUMERACY  
UNIT 1 – HIGHER TIER  
3310U50-1**

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2023 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

# WJEC GCSE MATHEMATICS - NUMERACY

## SUMMER 2023 MARK SCHEME

| Unit 1: Higher Tier                                                                                                                                                                                                                                                       | Mark             | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| 1. (Mari's share of the prize) $4 \times 2700 \div (4 + 5)$<br>OR (Huw's share of the prize) $5 \times 2700 \div (4 + 5)$<br><br>(Mari's share is £) 1200                                                                                                                 | M1<br><br>A1     | ( $4 \times 300$ )<br>( $5 \times 300$ )<br><br>Allow for sight of (£)1200 irrespective of the name assigned<br>May be implied in later calculation<br>(Huw's share is £1500)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (Mari donates) $0.24 \times 1200$<br><br>(£) 288                                                                                                                                                                                                                          | M1<br>A1         | FT $0.24 \times$ 'their smaller share'<br>(Note: 'their smaller share' < 1350)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (Fraction of his prize Huw donates) $\frac{0.24 \times 1200}{5 \times 2700 \div (4 + 5)}$<br>or $\frac{0.24 \times 1200}{2700 - 1200}$ or $\frac{288}{1500}$<br>or $1 - \frac{(1500 - 0.24 \times 1200)}{2700 - 1200}$ or $1 - \frac{1212}{1500}$<br><br>$\frac{24}{125}$ | M1<br><br><br>A1 | FT 'their $0.24 \times$ 'their smaller share'' and $2700 -$ 'their smaller share'<br><br><br>Must be a simplified fraction, ISW (e.g. 19.2%)<br>An unsimplified fraction ( $144/750$ or $96/500$ or $72/375$ or $48/250$ ) is awarded M1 A0<br><br>Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, and not both numerator and denominator being a multiple of 10, i.e. equivalent level of difficulty<br><br>If consistently working with Mari's getting the larger share, initially possible M1, A1 or M1, A0, but then M0, A0, M0, A0. However, also award SC2 for a final answer of $\frac{3}{10}$ or SC1 for (donation) (£)360.<br>Mari with larger share leads to:<br>$\frac{0.24 \times 1500}{2700 - 1500} = \frac{360}{1200} = \frac{3}{10}$ |

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| <p>1. <i>Alternative method:</i><br/> (Fraction of his prize Huw donates) <math>\frac{4}{5} \times \frac{24}{100}</math></p> <p style="text-align: right;"><math>\frac{24}{125}</math></p>    | <p>M3</p> <p>A3</p>           | <p>M2 for sight of <math>\frac{1}{5}</math> of 24%<br/> M1 for sight of <math>\frac{1}{5}</math> of 24</p> <p>Must be a simplified fraction<br/> A2 for correct unsimplified fraction, e.g. <math>\frac{96}{500}</math></p> <p>Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, i.e. equivalent level of difficulty ISW (e.g. 19.2%)</p>                                                                                                                                                                                                                                                                                                                                     |
| <p>Organisation and communication</p> <p>Writing</p>                                                                                                                                          | <p>OC1</p> <p>W1</p>          | <p>For OC1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanations and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul> <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc.</li> </ul> |
| <p>2(a) <math>1 : 100\ 000</math></p>                                                                                                                                                         | B1                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>2(b)(i) <math>1\ 500\ 000 \div (2 \times 60)</math></p> <p style="text-align: right;">12500 (litres/min)</p>                                                                               | <p>M2</p> <p>A1</p>           | <p>With no other further working<br/> May be shown in stages</p> <p>M1 for any one of the following, that may be embedded in further incorrect working:</p> <ul style="list-style-type: none"> <li>• <math>1\ 500\ 000 \div 2</math> (or 750 000)</li> <li>• <math>1\ 500\ 000 \div 60</math> (or 25 000)</li> </ul> <p>CAO</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>2(b)(ii) Sight of 30 000 (cm) AND 1 500 000 000 (cm<sup>3</sup>)</p> <p>1 500 000 000 <math>\div</math> 30 000 or equivalent</p> <p style="text-align: right;">50 000 (cm<sup>2</sup>)</p> | <p>B1</p> <p>M1</p> <p>A1</p> | <p>Or two values of the correct comparative order, not for 1 500 000 and 300</p> <p>For the intention of this division, allow with place value error (including <math>1\ 500\ 000 \div 300</math>) for M1 only</p> <p>CAO. ISW if sight of answer 50 000 <b>cm<sup>2</sup></b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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| <p>3(a) (Sugar <math>0.58 \times 300 =</math> 174 (g)<br/>(Cocoa <math>300 \div 8 =</math> 37.5 (g)<br/><br/>(Milk powder) <math>4 \times 37.5 \div 5</math><br/>(=) 30 (g)<br/><br/>(Palm oil <math>300 - 174 - 37.5 - 30 =</math> 58.5 (g)<br/>OR<br/>(Ingredients other than palm oil <math>174 + 37.5 + 30 =</math> 241.5 (g)<br/><br/>(% of Palm oil) <math>(100 \times) \frac{58.5}{300}</math> or <math>58.5 \div 3</math> or 0.195<br/>or <math>(100 \times) 1 - \frac{241.5}{300}</math> or <math>1 - 0.805</math> or equivalent<br/>19.5 (%)</p> | <p>B1<br/>B1<br/><br/>M1<br/>A1<br/><br/>B1<br/><br/>M1<br/><br/>A1</p> | <p>FT 'their derived mass of cocoa'<br/><br/>May be implied in further working<br/>FT correctly evaluated sum of 'their sugar, cocoa and milk' provided at least 2 marks previously awarded and this sum is &lt; 300<br/><br/>FT 'their 58.5' or 'their 241.5' as appropriate<br/><br/>CAO, must be given as a percentage</p>                                                                                                                                           |
| <p>3(a) <u>Alternative method 1:</u><br/>(Cocoa) <math>\frac{1}{8} \times 100</math> or <math>1 \div 8</math><br/>12.5 % or 0.125<br/>(Milk powder) <math>\frac{4}{5} \times \frac{1}{8} (\times 100)</math><br/>10 % or 0.1<br/>(Other than palm oil) <math>(58 + 12.5 + 10 =) 80.5 \%</math><br/>or <math>(0.58 + 0.125 + 0.1 =) 0.805</math><br/><br/>(Palm oil) <math>100 - (58 + 12.5 + 10)</math><br/>or <math>1 - (0.58 + 0.125 + 0.1)</math> or 0.195<br/>19.5 (%)</p>                                                                             | <p>M1<br/>A1<br/>M1<br/>A1<br/><br/>B1<br/><br/>M1<br/><br/>A1</p>      | <p>FT 'their 12.5% or 0.125' or 'their % or decimal mass of cocoa'<br/><br/>May be implied in further working<br/>FT <math>58 +</math> 'their 12.5 + 10' or <math>0.58 +</math> 'their 0.125 + 0.1' correctly evaluated provided at least 2 marks previously awarded and this sum is &lt; 100 or &lt; 1 respectively<br/><br/>FT <math>58 +</math> 'their sum of %s cocoa and milk' or equivalent working with decimals<br/><br/>CAO, must be given as a percentage</p> |
| <p>3(a) <u>Alternative method 2:</u><br/>(Proportion other than palm oil)<br/><math>\frac{58}{100} + \frac{1}{8} + \frac{4}{5} \times \frac{1}{8}</math> or <math>\frac{58}{100} + \frac{1}{8} + \frac{1}{10}</math><br/><math>\frac{805}{1000}</math> or <math>\frac{161}{200}</math><br/>(Palm oil) <math>1 - \frac{161}{200}</math> or <math>\frac{39}{200}</math> or <math>\frac{19.5}{100}</math><br/>19.5 (%)</p>                                                                                                                                    | <p>M3<br/>A1<br/><br/>M2<br/>A1</p>                                     | <p>May be implied in further working<br/><br/>FT from M3<br/><br/>CAO, must be given as a percentage</p>                                                                                                                                                                                                                                                                                                                                                                |
| <p>3(b) Realising that 840g is 120%<br/><br/>For appropriate use of 120% being 840g, e.g.<br/><math>840 \div 1.2</math> or <math>8400 \div 12</math> or <math>100 \times 840/120</math><br/>700 (g)</p>                                                                                                                                                                                                                                                                                                                                                    | <p>B1<br/><br/>M1<br/>A1</p>                                            | <p>Also implies previous B1<br/><br/>Award all 3 marks for an answer of 700(g) provided not from incorrect working</p>                                                                                                                                                                                                                                                                                                                                                  |

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| 4(a) 40 (seconds)                                                                                                                                                                                                                                                                                                                                                                      | B1                     |                                                                                                                                                                                                                                                                |
| 4(b)<br>$0.9 \times 60$ or $60 - 0.1 \times 60$<br>= 54 (employees)<br><br>In 60 seconds, 57 employees logged on<br>or<br>54 employees logged on within 58 seconds                                                                                                                                                                                                                     | M1<br>A1<br><br>B1     | <u>Penalise incorrect units -1 only.</u><br><br>Ignore additional spurious statements<br>Check the diagram for indication, provided values are written<br>FT 'their 54 employees' provided M1 previously awarded and number of seconds < 60                    |
| 4(b) <u>Alternative method 1:</u><br>By 1 minute, 57 employees logged on<br><br>$(100 \times) 57/60$<br>0.95 or 95(%)<br>or<br>570/600 compared with (90% =) 540/600                                                                                                                                                                                                                   | B1<br><br>M1<br>A1     | <u>Penalise incorrect units -1 only.</u><br><br>If M0, A0 award SC1 for 'only 5% (or 0.05) not logged on'<br><br>If no marks, award SC1 for an answer of 93(.3..)% or 96(.6..)% or rounded to 97% or equivalents as decimals from use of 56 or 58 respectively |
| 4(b) <u>Alternative method 2:</u><br>For <b>clearly</b> considering employees not logged on, must be evidence of this before awarding marks<br><br>$(0.1 \times 60 =) 6$ (employees not logged on)<br><br>(After 9:01 a.m.) $60 - 57$<br><br>3 (employees not logged on)                                                                                                               | B1<br><br>M1<br><br>A1 | <u>Penalise incorrect units -1 only.</u><br><br>If M0A0, award SC1 for an answer of 4 or 2 employees from sight of calculation $60 - 56$ or $60 - 58$                                                                                                          |
| 4(b) <u>Alternative method 3:</u><br>For <b>clearly</b> considering employees not logged on, must be evidence of this before awarding marks<br><br>$(0.1 \times 60 =) 6$ (employees not logged on)<br><br>(For 6 employees not logged on graph gives)<br>58 seconds<br><br>Conclusion that after 58 seconds there are fewer than 6 employees not logged (i.e. more than 90% logged on) | B1<br><br>M1<br><br>A1 | <u>Penalise incorrect units -1 only.</u><br><br>FT 'their 6 employees' provided $0.1 \times 60$ attempted and 'their 58 seconds' < 60                                                                                                                          |

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| 5(a) At a randomly chosen name                                                                                                                                                 | B1       |                                                                                                                                                                                                                                                 |     |     |     |     |   |    |     |     |     |     |    |     |
| 5(b) (360 ÷ 6 =) 60<br>or 360 ÷ 60 = 6 or 6 × 60 = 360                                                                                                                         | B1       | May be implied by any of the following: <ul style="list-style-type: none"><li>consistent position patterns + 60 indicated for at least 3 consecutive positions<br/>e.g. (4,) 60, 120, 180, 240, 300</li><li>sight of 64 for student 2</li></ul> |     |     |     |     |   |    |     |     |     |     |    |     |
| <table><tr><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td><td>6th</td></tr><tr><td>4</td><td>64</td><td>124</td><td>184</td><td>244</td><td>304</td></tr></table> | 1st      | 2nd                                                                                                                                                                                                                                             | 3rd | 4th | 5th | 6th | 4 | 64 | 124 | 184 | 244 | 304 | B1 | CAO |
| 1st                                                                                                                                                                            | 2nd      | 3rd                                                                                                                                                                                                                                             | 4th | 5th | 6th |     |   |    |     |     |     |     |    |     |
| 4                                                                                                                                                                              | 64       | 124                                                                                                                                                                                                                                             | 184 | 244 | 304 |     |   |    |     |     |     |     |    |     |
| 6(a) Correct format of a box-and-whisker                                                                                                                                       | B1       | Do not ignore additional lines drawn<br>End stopper lines omitted can be ignored                                                                                                                                                                |     |     |     |     |   |    |     |     |     |     |    |     |
| Showing lower end whisker at 10 seconds                                                                                                                                        | B1       | For unambiguous indications of the following:<br><br>On the graph paper.<br>Allow for the least point indicated                                                                                                                                 |     |     |     |     |   |    |     |     |     |     |    |     |
| Showing LQ 40 seconds                                                                                                                                                          | B1       | On the graph paper.<br>Must be the lower line of a rectangle                                                                                                                                                                                    |     |     |     |     |   |    |     |     |     |     |    |     |
| Showing median at 84 seconds<br>AND UQ at 108 seconds<br>AND greatest time 130 seconds                                                                                         | B1       | On the graph paper<br>Median and UQ must be unambiguous vertical lines,<br>allow 130 indicated as a point or a vertical line                                                                                                                    |     |     |     |     |   |    |     |     |     |     |    |     |
| 6(b) 6 seconds                                                                                                                                                                 | B1       |                                                                                                                                                                                                                                                 |     |     |     |     |   |    |     |     |     |     |    |     |
| 6(c) 0.75 × 200 or equivalent<br>150 (phone calls)                                                                                                                             | M1<br>A1 | Allow sight of '75% of 200' or '3/4 of 200'<br>Answer space takes precedence<br>If no marks, award SC1 for an answer of 50 (phone calls)                                                                                                        |     |     |     |     |   |    |     |     |     |     |    |     |
| 7(a)(i) (Least possible volume of a carton =)<br>40 × 12.5<br>= 500 (cm³)                                                                                                      | M1<br>A1 | Allow use of 12 ≤ h < 13 for M1 only<br>CAO<br><br>If no marks awarded, SC1 for use of 12.5                                                                                                                                                     |     |     |     |     |   |    |     |     |     |     |    |     |
| 7(a)(ii) Use of 8500                                                                                                                                                           | B1       | Allow 8499.999(...) for 8500                                                                                                                                                                                                                    |     |     |     |     |   |    |     |     |     |     |    |     |
| $\frac{8500}{500} (\times 60)$                                                                                                                                                 | M1       | FT 'their 500' from (a)(i)<br>If B0, FT provided unambiguously chosen:<br>8000 < 'their 8500' ≤ 9000                                                                                                                                            |     |     |     |     |   |    |     |     |     |     |    |     |
| = 1020                                                                                                                                                                         | A1       | CAO for 'their 500' from (a)(i)                                                                                                                                                                                                                 |     |     |     |     |   |    |     |     |     |     |    |     |

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| <p>7(b)</p> <p><math>(\text{length}^2 =) 960 \div 20</math><br/> <math>\text{length}^2 = 48</math> OR <math>(\text{length} =) \sqrt{48}</math></p> <p><math>(\text{length} =) 4\sqrt{3}</math></p>                                                                                                                                                                                                                                      | <p>M1<br/>A1<br/><br/>B2</p> | <p>Or equivalent e.g. <math>\sqrt{4} \times \sqrt{12}</math></p> <p>Mark final answer<br/>Accept <math>40\sqrt{3}</math> mm, but not <math>0.04\sqrt{3}</math> m</p> <p>For B2, FT 'their derived 48' provided of equivalent difficulty (it has a square number as one of its factors)</p> <p>For B1, FT 'their derived 48'<br/>B1 for writing 48 as a product of 2 or more factors where one of the factors OR the product of 2 of their factors is a square number<br/>e.g. <math>16 \times 3</math> or <math>4 \times 4 \times 3</math> or <math>4 \times 12</math> or <math>2 \times 2 \times 12</math> OR<br/>B1 for writing <math>\sqrt{48}</math> as a product of 2 or more factors where one of the factors OR the product of 2 of their factors <u>gives</u> a whole number<br/>e.g. <math>\sqrt{16} \times \sqrt{3}</math> or <math>\sqrt{2} \times \sqrt{2} \times \sqrt{12}</math> or <math>2\sqrt{12}</math></p> |
| <p>8(a)</p> <p><math>\frac{1000}{2 \times 10^{-24}}</math> OR <math>\frac{1000}{1.5 \times 10^{-24}}</math> OR <math>\frac{1000}{1.6 \times 10^{-24}}</math></p> <p><math>= 5 \times 10^{26}</math> OR <math>6.6(66...) \times 10^{26}</math> OR <math>6.25 \times 10^{26}</math><br/> or <math>6.7 \times 10^{26}</math> or <math>6.3 \times 10^{26}</math><br/> or <math>7 \times 10^{26}</math> or <math>6 \times 10^{26}</math></p> | <p>M1<br/><br/>A2</p>        | <p>Or equivalents</p> <p>A1 for equivalent values but not in standard form<br/>e.g. <math>500 \times 10^{24}</math> or <math>0.5 \times 10^{27}</math> or their equivalent ordinary numbers</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>8(a) <u>Alternative method:</u></p> <p><math>\frac{1020}{1.7 \times 10^{-24}}</math></p> <p><math>= 6 \times 10^{26}</math></p>                                                                                                                                                                                                                                                                                                      | <p>M1<br/><br/>A2</p>        | <p>Allow M1 for <math>1000/1.7 \times 10^{-24}</math> provided their answer has a leading digit of 6</p> <p>A1 for equivalent value but not in standard form<br/>e.g. <math>600 \times 10^{24}</math> or <math>0.6 \times 10^{27}</math> or the equivalent ordinary number</p> <p>If M0A0, award SC1 for an answer of <math>5.8(...) \times 10^{26}</math> or <math>5.9 \times 10^{26}</math> from <math>1000/1.7 \times 10^{-24}</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>8(b)</p> <p><math>2 \times (1.7 \times 10^{-24}) + (2.7 \times 10^{-23})</math> or equivalent<br/> <math>= 3.04 \times 10^{-23}</math> (g)</p>                                                                                                                                                                                                                                                                                       | <p>M1<br/>A2</p>             | <p>If a candidate adds the mass of 2 atoms of oxygen and 1 atom of hydrogen, treat as a misread (Answer will be <math>5.57 \times 10^{-23}</math>)</p> <p>A1 for the equivalent of <math>3.04 \times 10^{-23}</math> but not in standard form<br/>e.g. <math>30.4 \times 10^{-24}</math> or the equivalent ordinary number, OR<br/>A1 for <math>3 \times 10^{-23}</math></p> <p>If no marks, award SC1 for an answer of <math>2.87 \times 10^{-23}</math> (using one atom of hydrogen)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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| <p>9(a)</p> $\frac{2}{3} \times \pi \times \text{radius}^3 = \frac{128\pi}{3} \quad \text{or equivalent}$ $\text{radius}^3 = \frac{128\pi \times 3}{2 \times \pi \times 3} \quad \text{or equivalent} \quad \text{OR}$ $\text{radius} = \sqrt[3]{\frac{128\pi \times 3}{2 \times \pi \times 3}} \quad \text{or equivalent}$ <p style="text-align: right;">(radius =) 4 (cm)</p><br><br><p style="text-align: center;">(Surface area =) <math>2 \times \pi \times 4^2</math></p> <p style="text-align: center;"><math>= 32\pi \text{ (cm}^2\text{)}</math></p> | <p>M1</p> <p>M1</p> <p>A2</p> <p>M1</p> <p>A1</p> | <p>For isolating radius<sup>3</sup><br/>FT if the volume of a sphere used for a possible M1A1 only</p> <p>CAO<br/>A1 for radius<sup>3</sup> = 64 or (radius =) <math>\sqrt[3]{64}</math> OR<br/>A1 for radius<sup>3</sup> = 32 or (radius =) <math>\sqrt[3]{32}</math> if the volume of a sphere used</p> <p>FT 'their 4' provided an attempt made to use the formula for the volume of a sphere to calculate the radius</p> <p>Accept <math>3200\pi \text{ mm}^2</math> or <math>0.0032\pi \text{ m}^2</math><br/>If 'their radius = <math>\sqrt[3]{32}</math>' then their SA will be <math>2^{13/3} \pi</math></p> <p>If final M0A0, award SC1 for <math>4 \times \pi \times</math> 'their <math>r^2</math>' evaluated correctly provided an attempt made to use the formula for the volume of a sphere to calculate the radius</p> |
| <p>9(b)</p> $\sqrt[3]{8} : \sqrt[3]{27} \quad \text{or} \quad \sqrt[3]{8 \div 27} \quad \text{or} \quad \sqrt[3]{27 \div 8}$ <p style="text-align: center;">( = 2 : 3 )                      ( = 2/3 )                      ( = 3/2 )</p><br><p style="text-align: center;">(Height =) <math>18 \times \frac{2}{3}</math> or <math>18 \div \frac{3}{2}</math> or equivalent</p> <p style="text-align: center;"><math>= 12 \text{ (cm)}</math></p>                                                                                                             | <p>B1</p> <p>M1</p> <p>A1</p>                     | <p>May be implied in further working</p> <p>Implies previous B1 provided not from incorrect working<br/>FT 'their 2/3' or 'their 3/2' provided first B1 awarded</p> <p>CAO</p> <p>Note: <math>27 \div 18 = 1.5</math> followed by either <math>18 \div 1.5 = 12</math> or <math>8 \times 1.5 = 12</math> is awarded B0M0A0</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



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| <p>10(b)<br/>e.g. <math>10x = 10.8181\dots</math> and <math>1000x = 1081.8181\dots</math><br/>or equivalent AND an attempt to subtract<br/><math>(x =) \frac{1071}{990}</math> or <math>\frac{108171}{99990}</math> or <math>1\frac{81}{990}</math> or equivalent</p> <p style="text-align: right;"><math>(x =) 1\frac{9}{110}</math></p>                                                                                                                                                                                 | <p>M1 Allow <math>10x = 0.8181\dots</math> and <math>1000x = 81.8181\dots</math></p> <p>A1 Accept e.g. <math>\frac{107.1}{99}</math> or <math>\frac{10817.1}{9999}</math><br/>Allow e.g. <math>\frac{8.1}{99}</math> or <math>\frac{81}{990}</math> or <math>\frac{8181}{99990}</math></p> <p>A1 FT 'their <math>\frac{1071}{990}</math>' provided of equivalent difficulty</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>11.<br/>(Volume of octagonal prism =)<br/><math>50 \times 20 + 2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)</math> or<br/><math>50 \times 20 + 2 \times \frac{1}{2} \times 70 \times 15</math><br/><br/>(= 1000 + 1050)</p> <p style="text-align: right;"><math>\times 5 \times 10</math><br/>= 102 500 (cm<sup>3</sup>)</p> <p>(Volume of a cone =) <math>\frac{1}{3} \times 800 \times 60</math><br/>= 16 000 (cm<sup>3</sup>)</p> <p>(Total volume = 102 500 + 16 000 =) 118 500 (cm<sup>3</sup>)</p> | <p>M2 May be embedded within a volume calculation<br/><math>50 \times 20</math> may be seen as <math>20 \times 20 + 2 \times 20 \times ((50 - 20)/2)</math><br/>or <math>20 \times 20 + 2 \times 20 \times 15</math><br/><math>2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)</math> may be seen as<br/><math>2 \times (20 \times ((50 - 20)/2) + 2 \times \frac{1}{2} \times (50 - 20) \times (50 - 20)/2)</math> or<br/><math>2 \times (20 \times 15 + 2 \times \frac{1}{2} \times 15 \times 15)</math></p> <p>M1 for <math>50 \times 20 + \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)</math> or<br/>M1 for <math>50 \times 20 + \frac{1}{2} \times 70 \times 15</math> OR<br/>M1 for ..... + <math>2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)</math> or<br/>M1 for ..... + <math>2 \times \frac{1}{2} \times 70 \times 15</math></p> <p>m1 FT from M1<br/>A1 CAO<br/>If M0m0A0 awarded, and from an incorrect assumption that the octagon is regular, award SC1 for areas of:</p> <ul style="list-style-type: none"> <li><math>8 \times (20 \times 25)/2 = 2000</math> (possibly leading to a volume of 100 000) or</li> <li><math>50^2 - 20^2 = 2100</math> (possibly leading to a volume of 105 000)</li> </ul> <p>M1 Award M1A0 if this is multiplied by 10</p> <p>A1 CAO</p> <p>B1 FT 'their 102 500' and 'their 16 000' provided at least one M1 mark awarded and is the sum of the volumes of their 10 octagonal bases and 1 (or 10) cone/s</p> |
| <p>11. <i>Alternative method for the first 4 marks:</i><br/>(Volume of octagonal prism =)<br/><math>50^2 - 4 \times \frac{1}{2} \times (50 - 20)/2 \times (50 - 20)/2</math> or<br/><math>50^2 - 4 \times \frac{1}{2} \times 15 \times 15</math><br/><br/>(= 2500 - 450)</p> <p style="text-align: right;"><math>\times 5 \times 10</math><br/>= 102 500 (cm<sup>3</sup>)</p>                                                                                                                                             | <p>M2 May be embedded within a volume calculation<br/>M1 for ... - <math>4 \times \frac{1}{2} \times (50 - 20)/2 \times (50 - 20)/2</math> or<br/>M1 for ... - <math>4 \times \frac{1}{2} \times 15 \times 15</math></p> <p>m1 FT from M1<br/>A1 CAO</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |