Mark scheme

Question			Answer/Indicative content	Marks	Guidance	
1			Answer 1500 with 3, 4 and 9000 seen	4	**B1** for at least two of the values 3, 4 and 9000 M2 for $\dfrac{their\,9000}{0.5 \times their\,4 \times their\,3}$ oe or M1 for $\frac{1}{2} \times their\,4 \times their\,3$	For **B1** condone trailing zeros For **M2** and **M1** *their* values can be 8947, 4.04, 2.96 or other rounded relatable values
			Total	**4**		
2			44 with correct working	4	**B1** for 102.5 selected or 102.49[9…] **B1** for 2.35 selected **M1** for (101.5 to 102.5) ÷ (2.35 to 2.45) If **0** scored, instead award **SC1** for an answer of 44 with no working or insufficient working or **SC1** for either 101.5 and 102.49[9…]/102.5 or 2.35 and 2.449[9…]/2.45	"Correct working" requires evidence of at least **B1B1** <u>Alt method</u> **B1** for 2.35 selected **B1** for 102.5 selected **M1** for 2.35 × 43 = 101.[05] **M1** for 2.35 × 44 = 103.4 Max. **3** marks unless the answer is 44
			Total	**4**		
3	a		19.5[7]… with correct working	4		

				B2 for 191.5 and 9.785 or 9.7849[9..] selected or **B1** for one of these or **M1** for 191.5 to 192.5/192.49[9..] and 9.775 to 9.785/9.7849[9..] **M1** for (191.5 to 192.5) ÷ (9.775 to 9.785) If **0** or **1** scored, instead award **SC2** for answer 19.5[7]… with no working or insufficient working	"Correct working" requires evidence of the selection of 191.5 and 9.785 or 9.7849[9..]
	b	Any viable reason e.g. lift has to speed up and slow down	1		For additional information refer to 'Qn16b, 2024 June, Alternative J560/04, Mark Scheme Appendix' within downloadable resource materials.
		Total	**5**		
4		1500 final answer and 500 and 3 shown	3	**M2** for 500 × 3 or **M1** for *their* 500 × *their* 3 or **B1** for 500 and 3 seen	For **M1** e.g. uses 497 and 2.7 or uses incorrectly rounded values
		Total	**3**		
5		$\frac{30}{360} \times \pi \times 10^2$ **oe** 26.179 to 26.183	M2 A1	**M1** for $\pi \times 10^2$ implied by 100π or 314.1 to 314.2	**M2 oe** e.g. $\frac{360}{30} = 10$ and $\frac{\pi \times 10^2}{10}$ Condone 3.14

				A0 for just 26.2	or $\frac{22}{7}$ for π in **M** marks **M0** for 10π without working
		Total	**3**		
6		Answer 800 with 2, 5 and 4000 seen	4	**B1** for at least two of the values 5, 2 and 4000 **M2** for $\dfrac{their\ 4000}{0.5 \times their\ 5 \times their\ 2}$ oe or **M1** for $\frac{1}{2} \times their\ 5 \times their\ 2$	For B1 condone trailing zeros For M2 and M1 *their* values can be 3951, 5.03, 1.96 or other rounded relatable values
				Examiner's Comments A number of candidates answered this correctly using values rounded to one significant figure. In questions that ask for an estimation in the demand, candidates should round the given values to one significant figure before attempting any calculation. A number of candidates worked with the given values in the question making the calculation much more difficult and not answering the demand. Other made errors in calculating the triangular area and did base × height rather than base × height ÷ 2. A few converted units from km to metres which was unnecessary and led to errors.	
		Total	**4**		
7		17 with correct working	4	**B1** for 37.5 selected or 37.49[9…] **B1** for 2.25 selected	"Correct working" requires evidence of at least **B1B1**

				M1 for (36.5 to 37.5) ÷ (2.25 to 2.35) If **0** scored, instead award **SC1** for an answer of 17 with no working or insufficient working or **SC1** for either 36.5 and 37.49[9…]/37.5 or 2.25 and 2.349[9…]/2.35 **Examiner's Comments** In this question the answer is not as important as the method used. Unfortunately, it is too easy just to do 37 ÷ 2.3 without using the appropriate bounds to ensure that the answer is accurate. Many did write down the bounds, but they would often choose the incorrect ones.	alt. method **B1** for 2.25 selected **B1** for 37.5 selected **M1** for 2.25 × 16 = 36 **M1** for 2.25 × 17 = 38.25 Max. 3 marks unless the answer is 17 Note : 37 ÷ 2.3 = 16.08… with answer 17 scores **M1**
		Total	**4**		
8		28 **nfww**	4	**B1** for 105 **B1** for 7.5 **M1** for $\dfrac{their\,(105\ to\ 115)}{\frac{1}{2} \times their\,(6.5\ to\ 7.5)}$	In part marks condone 7.499 or better for 7.5 $\dfrac{110}{\frac{1}{2} \times 7}$ scores **M0**
		Total	**4**		
9		6.37 and [0].63 with correct algebraic working	4	**M2** for correct substitution into the formula e.g. $\dfrac{^-(^-7) \pm \sqrt{(^-7)^2 - 4[\times 1] \times 4}}{2[\times 1]}$ **oe** allowing one error	"Correct working" requires evidence of at least **M2** For **oe** allow better up to $\dfrac{7 \pm \sqrt{49 - 16}}{2}$

10				2	or for solving by completing the square e.g. $\left(x-\frac{7}{2}\right)^2-\left(\frac{7}{2}\right)^2+4 = 0$ **oe** **and** $x=\pm\sqrt{(-4)+\left(\frac{7}{2}\right)^2}+\frac{7}{2}$ **oe** or better or **M1** for correct substitution into the formula, allowing two errors, or for completing the square e.g. $\left(x-\frac{7}{2}\right)^2-\left(\frac{7}{2}\right)^2+4=0$ **oe** or better and **A1** for 6.37 or [0].63 **nfww** or for both solutions correct **nfww** but to more than 2 dp, to just 1 dp or in exact form If **0** scored, instead award **SC1** for both answers correct or to more than 2 dp, to just 1 dp or in exact form with no working or insufficient working	but do not allow $\frac{7\pm\sqrt{33}}{2}$ Condone 7^2 for $(^-7)^2$ e.g. 6.37228… and 0.62771…. 6.4 and 0.6, $\frac{7\pm\sqrt{33}}{2}$
			Total	**4**		
10			70 with correct 700 and $\sqrt{100}$ or 10 shown **nfww**	2		

					M1 for one of 700 or $\sqrt{100}$ or 10
		Total	**2**		
11		$\frac{30}{360} \times \pi \times 12^2$ oe 37.69 to 37.704	M2 A1	**M1** for $\pi \times 12^2$ implied by 144π or 452.3 to 452.45 **A0** for just 37.7	**M2** oe e.g. $\frac{360}{30}$ = 12 and $\frac{\pi \times 12^2}{12}$ Condone 3.14 or $\frac{22}{7}$ for π in **M** marks **M0** for 12π without working

Examiner's Comments

This was answered well, with most candidates substituting directly into the formula for the area of a sector. This was a 'Show that…' question, so sufficient working needed to be seen for the full 3 marks. For example, $\frac{30}{360}$ (or the interim step $\frac{360}{30}$ = 12 rather than just 12) needed to be seen. Jumping straight from 12π to the given 37.7 also did not satisfy the demand, as a more accurate response such as 37.69… should be shown.

Those candidates that didn't score often tried methods such as splitting the sector into a triangle and another area then applying trigonometry or Pythagoras' theorem, or trying to include the parallelogram within their calculations.

		Total	**3**		
12		1800 final answer and 200 and 9 shown	3	**M2** for 200 × 9 or **M1** for *their* 200 × *their* 9 or **B1** for 200 and 9 seen	For M1 e.g. uses 198 and 8.9 or uses incorrectly rounded values

Examiner's Comments

					This question was very well answered. Some incorrectly rounded 8.9 to 10, leading to a final answer of 2000. Others divided rather than multiplied. Partial credit was given for rounding correctly to 200 and 9, as well as for multiplying their rounded or unrounded values.
		Total		**3**	
13	a	17.6[4…] with correct working		4	**B2** for 173.5 and 9.835 or 9.8349[9..] selected or **B1** for one of these or **M1** for 173.5 to 174.5/174.49[9..] and 9.825 to 9.835/9.8349[9..] **M1** for (173.5 to 174.5) ÷ (9.825 to 9.835) If **0** or **1** scored, instead award **SC2** for answer 17.6[4…] with no working or insufficient working | "Correct working" requires evidence of the selection of 173.5 and 9.835 or 9.8349[9..] **Examiner's Comments** The vast majority of responses divided the distance by the speed. Some divided the other way round and some multiplied. Some knew to write down the bounds, but many of these chose one or two incorrect bounds to use in their calculation.
	b	Any viable reason e.g. lift has to speed up and slow down		1	**Mark** lift has to speed up and slow down **1** it will take time to reach this speed **1** It will not travel at the maximum speed all the way **1** the distance could be greater than

				173.5 (e.g. 174.3) and the speed may be less than 9.835 (e.g. 9.826) therefore the time will be greater than the shortest time oe **1** We are using the bounds so it may not be accurate/achievable **1** The figure for the height has been rounded down which may not be the height of the building **1** The figure for the speed has been rounded up which may not be the actual speed **1** It makes other stops on the way **1** Extra weight may slow it down **1** Technical fault may occur **1** May not be a constant speed **1** Lift gets stuck **1** Lift may not be able to reach that speed **1** Weight on the lift is a factor [so may slow it down] **1(BOD)** It does not make any other stops **0** **Examiner's Comments** We accepted any reasonable explanation. Usually it included any incident that would slow the lift down or anything about the lift that would slow it down such as loading or malfunction.	
		Total	**5**		
14		12 [hours] 52 [mins] with correct working	5	**B4** for answers 12 [hours] 53 [mins] or 12 [hours] 52.4[…] to 52.7 [mins], with correct working OR **B1** for 10 750 **B1** for 835 **M1** for (10 750 to 10 850) ÷ (825 to 835) **M1** for *their* 0.87… × 60 oe If **0, 1** or **2**	"Correct working" requires evidence of at least **B1B1M1** Allow 834.9[9…] for 835 With no contradictory choic With no contradictory choice Do not imply this first **M1** mark. *their* 0.87

				scored, instead award **SC3** for answer 12 [hours] 52 [mins] with no working or insufficient working If **0** or **1** scored, instead award **SC2** for answer 12 [hours] 53 [mins] or 12 [hours] 52.4[…] to 52.7 [mins] with no working or insufficient working If **0** scored, instead award **SC1** for 12.87[…] with no working or insufficient working	following from distance ÷ speed implied by 12.87 to 13.16
		Total	**5**		
15	a	295 [≤ *n* ≤] 304	2	**B1** for 295 or 304 in correct position or for both 295 and 304 but in wrong position	Do not accept < 305 where ≤ has been crossed out and replaced
	b	$\frac{331.5}{8.5 \times 6.5} = 6$	3	Max 2 marks if answer is incorrect **B1** for 331.5 **B1** for 8.5 and 6.5 **M1** for $\frac{their\ 331.5}{their\ 8.5 \times their\ 6.5}$ where 331.5 ≤ *their* 331.5 ≤ 332.5,	May be done in stages. 6 must not come from a rounded answer or other wrong working. If choice, mark the bounds used in the calculation. If no calculation, then 0 each time upper and lower bounds are both given

					7.5 ≤ *their* 8.5 ≤ 8.5 and 5.5 ≤ *their* 6.5 ≤ 6.5	8.5 × 6.5 × 6 = 331.5 scores just the second mark. If they then explicitly state that 247.5 is the lower bound of 248 they also get the first mark but not for "331.5 rounds to 332"
		Total		**5**		
16		81.48[…] with correct working	4		**M3** for $\pi \times \left(\frac{32}{2\pi}\right)^2$

OR

M1 for 32 ÷ 2π or 32 = 2π*r* or 32 =π*d*
A1 for 5.09[…]

M1 for π × (*their* 5.09)²

If 0 or 1 scored, instead award **SC2** for 81.48[…] with no or insufficient working | Correct working requires evidence of at least **M1**

Do not accept starting with 81.5 and working backwards

Candidates should use the π button or 3.142. Accept 3.14 and 22/7 for max of **M3**

M1 may be in two steps or seen as diameter here and diameter/2 in the area calculation

their 5.09 must come from a calculation involving π |

					If 0 scored, instead award **SC1** for 5.09[…], 81.39[…], 81.42[…], 81.52[…] or 325[…] or 326 with no or insufficient working	
		Total		**4**		
17			*s* = 350 with 6, 5 and 10 or 100 seen	4	**B2** for 6, 5 and 10 or 100 or **B1** for two correct AND **M1** for (5 × 10) + ½(6 × 10^2) or correct substitution of unrounded or incorrectly rounded values If **0** scored then **SC1** for sight of 350	For all marks condone e.g. 5.00, 6.0, 10.0 used These values may be written in the stem of the question For M1 e.g. allow a mixture (4.92 × 10.3) + ½(6.1 × 10^2)
		Total		**4**		
18			32.5 or 32.49[…] ÷ 1.75 19	M3 A1	**B1** for 1.75 **B1** for 32.5 or 32.49[9…] If **0** scored award **B3** for 18.57[1…] or if **0** or **1** scored award **SC1** as	**B1** seen anywhere and mark figures crossed out if you think they have been "rejected" for use

				well for *their* 18.57 seen and correctly rounded up	
		Total	**4**		
19	a	79.5 80.5	2	**B1** for either one correct or both correct but reversed	
	b	i	Accept any correctly matched wall and 6 × cupboard where values quoted satisfy: wall < 6 × cupboard where 482.5 ≤ wall < 483 and 482.5 < 6 × cupboard ≤ 483 OR wall ÷ 6 < cupboard where 482.5 ≤ wall < 483 and 80.416to 80.42 < cupboard ≤ 80.5 OR wall ÷ cupboard < 6 where 482.5 ≤ wall < 483 and 80.416to 80.42 < cupboard ≤ 80.5	3	**B1** for 482.5 ≤ wall value < 483 **B1** for 482.5 < 6 × cupboard value ≤ 483 or 80.416 to 80.42 < cupboard value ≤ 80.5 e.g. [lower bound of] wall is 482.5 [upper bound of] cupboard is 80.5 482.5 ÷ 80.5 = 5.9[9…] < 6	
		ii	6.5 cm	3	**M2** for 483.5 – 6 × *their* lower bound of cupboard or 483.5 – 477 Or **M1** for [upper bound of wall =] 483.5 or for 6 × *their* lower bound of cupboard	

					or [6 cupboards =] 477	
		Total	8			
20	i	15 200 or 15 160 or 15 159	2	**M1** for 8500 × 1.054^{11} **oe**	Allow 15 158 or 15 158.8[2…]	
	ii	Any correct reason e.g. the rate may not continue	1	**Response Mark** The rate may not continue **1** There may not be enough housing on the island **1** They may run out of space **1** There may be a famine **1** There may be disease **1** The answer is a decimal **0** People will die **0**		
		Total	3			
21		5.82	3	**B2** for 5.81[5…] OR **B1** for 81.17 or 9.0 or 9.00[9…] **B1** for *their* answer written to more than 3 figures correctly rounded to 3 sf		
		Total	3			
22		28 nfww	4	**B1** for 105 **B1** for 7.5 **M1** for $\frac{their\,(95\,to\,105)}{\frac{1}{2}\times their\,(7.5\,to\,8.5)}$ but not $\frac{100}{\frac{1}{2}\times 8}$ **Examiner's Comments** Many candidates did not treat this as a bounds question and a very common wrong answer was 25 from	In part marks condone 104.99 or better for 105	

					100 ÷ 4, which gained no marks. Those who did use bounds usually selected the appropriate values of 105 and 7.5. However, it was also very common across the whole ability range to omit the $\frac{1}{2}$ from the area of a triangle calculation, leading to only a few candidates achieving full marks.	
		Total		**4**		
23		4.30 and [0].70 with correct algebraic working		4	**M2** for correct substitution into the formula, eg. $\dfrac{-(-5)\pm\sqrt{(-5)^2-4\,[\times 1]\times 3}}{2[\times 1]}$ oe allowing one error or for solving by completing the square eg. $\left(x-\frac{5}{2}\right)^2 - \left(\frac{5}{2}\right)^2 + 3 = 0$ oe **and** $x = \pm\sqrt{(-3)+\left(\frac{5}{2}\right)^2} + \frac{5}{2}$ **oe** or better or **M1** for correct substitution into the formula, allowing two errors, or for completing the square eg. $\left(x-\frac{5}{2}\right)^2 - \left(\frac{5}{2}\right)^2 + 3[= 0]$ oe or better	"Correct working" requires evidence of at least **M2** For oe allow better up to $\dfrac{5\pm\sqrt{25-12}}{2}$ but do not allow $\dfrac{5\pm\sqrt{13}}{2}$ Condone 5^2 for $(^-5)^2$

and

A1 for 4.30 or [0].70 nfww or for both solutions correct nfww but to more than 2 dp, to just 1 dp or in exact form

eg. 4.30277…
and
0.69722….
4.3 and 0.7,
$\frac{5\pm\sqrt{13}}{2}$

If **0** scored, instead award **SC1** for both answers correct or to more than 2 dp, to just 1 dp or in exact form with no working or insufficient working

Examiner's Comments

The quadratic formula was given on the formula sheet and candidates of all abilities made an attempt to substitute into it. Most identified *a*, *b* and *c* correctly, but errors occurred in writing and evaluating the parts involving the b term as it was negative. About a third of candidates both substituted and evaluated correctly, but some of these did not give the final answer to the requested accuracy.

A few candidates used the method of completing the square, then solving the equation. These tended to be the higher performing candidates and most attempts were successful.

◯   **Assessment for learning**

When substituting negative values into formulae (the quadratic formula, in particular), it is a good idea to write them in brackets, e.g. (⁻5), before doing any simplifying. Calculators are

					also more likely to give a correct answer if brackets are used, e.g. $(^-5)^2$ will be given as 25, whereas $^-5^2$ may be given as $^-25$.
		Total	**4**		
24		50 with correct 500 and $\sqrt{100}$ or 10 shown nfww	2		**M1** for one of 500 or $\sqrt{100}$ or 10

Examiner's Comments

Most candidates rounded the values given in the question to 1 significant figure and went on to give the correct answer. Few candidates rounded just one of the figures (usually rounding 101.2 to 100), for which they were given partial marks. Some gave the answer 48.6 from $486 \div \sqrt{100}$ and then rounded to 50, which was given only partial marks as the working did not follow the instructions given in the question.

⟳ **Assessment for learning**

For estimation questions, always round the figures in the calculation before attempting the actual calculation. Here, the demand specifies the degree of accuracy to round the values to complete the estimation.

		Total	**2**		
25	a	195 [≤ *n* ≤] 204	2	**B1** for 195 or 204 in correct position or for both 195 and 204 but in wrong position	Do not accept < 205 where ≤ has been crossed out and replaced

Examiner's Comments

					Most candidates treated this question as being the same as that set in previous series and did not appreciate the integer context. An example of this type of question is included in 4.01c of the specification. Many candidates gave the correct lower bound of 195. Far fewer gave the correct upper bound of 204.	
b		$\frac{247.5}{7.5 \times 5.5} = 6$		3	**Max 2 marks if answer is incorrect** **B1** for 247.5 **B1** for 7.5 and 5.5 **M1** for $\frac{their247.5}{their7.5 \times their5.5}$ where 247.5 ≤ *their*247.5 ≤ 248.5, 6.5 ≤ *their*7.5 ≤ 7.5 and 4.5 ≤ *their*5.5 ≤ 5.5 **Examiner's Comments** Candidates were expected to show the calculation $\frac{247.5}{7.5 \times 5.5}$, perhaps	May be done in stages. 6 must not come from a rounded answer or other wrong working. If choice, mark the bounds used in the calculation. If no calculation, then 0 each time upper and lower bounds are both given 7.5 × 5.5 × 6 = 247.5 scores just the second mark. If they then explicitly state that 247.5 is the lower bound of 248 they also get the first mark but not for "247.5 rounds to 248"

					performed in two steps, and evaluated it to exactly 6. Candidates using one incorrect bound scored B1, as well as usually M1 for the division, depending on the values used. Many candidates used the '6' that they were asked to show and worked out 7 × 5 × 6, perhaps with an attempt at bounds for some or all of these dimensions. This scored 0 marks, unless their working was 7.5 × 5.5 × 6 which scored B1 for the two correct bounds. If this was evaluated as 247.5, candidates needed to clearly relate the answer as being the lower bound of the volume, but instead almost all candidates merely said it was an answer that rounded to 248. ◯ **Assessment for learning** Candidates generally would benefit from more experience of showing results. Here, by assuming '6', they are really at best performing a verification; this should be a strategy of last resort and may receive reduced or no credit depending on the specific question.	
		Total	**5**			
26		11 [hours] 35 [mins] with correct working	5	**B4** for answers 11 [hours] 34 [mins] or 11 [hours] 34.5[…] to 34.8 [mins], with correct working OR **B1** for 9550	"Correct working" requires evidence of at least **B1B1M1** Allow 824.9[9…] for 825	

					B1 for 825	With no contradictory choice
					M1 for (9550 to 9650) ÷ (815 to 825)	With no contradictory choice
					M1 for *their* 0.57… × 60 oe	Do not imply this first **M1** mark. *their* 0.57 following from distance ÷ speed implied by 11.57 to 11.85
					If **0, 1** or **2** scored, instead award	
					SC3 for answer 11 [hours] 35 [mins] with no working or insufficient working	
					If **0** or **1** scored, instead award	
					SC2 for answer 11 [hours] 34 [mins] or 11 [hours] 34.5[…] to 34.8 [mins] with no working or insufficient working	
					If **0** scored, instead award	
					SC1 for 11.57[…] or 11.58 with no working or insufficient working	
					Examiner's Comments	

						Candidates scored the full range of marks. Almost all candidates provided sufficient working for at least the first 3 marks to be considered. The working for the fourth mark for converting decimal hours into hours and minutes was often omitted. Candidates should have been using the bounds of 9550 and 825 leading to a time of 11.5757… hours. Many used the given 9600 and 820 leading to a time of 11.707… hours instead. Candidates should then have shown, for example, 0.5757… × 60 or 0.707… × 60. The correct answer of 11 hours 35 minutes was often achieved, except when the decimal time was rounded which led to an answer of 11 hours 34 minutes.
			Total	**5**		
27			42.5 or 42.49[9..] ÷ 1.75 25	M3 A1	**B1** for 1.75 **B1** for 42.5 or 42.49[9…] If **0** scored award **B3** for 24.29 or 24.28[5…] or if **0** or **1** scored award **SC1** as well for *their* 24.29 seen and correctly rounded up **Examiner's Comments** Many candidates did not write down the upper and lower bounds for each of the two numbers first. Instead they tried a number of calculations before selecting one of them for their answer. In many cases very little working was	**B1** seen anywhere and mark figures crossed out if you think they have been "rejected" for use

					shown and it was not always clear how they found their answer.
		Total		**4**	
28		42.09[…] with correct working		4	**M3** for $\pi \times \left(\frac{23}{2\pi}\right)^2$ OR M1 for 23 ÷ 2π *or* 23 = 2π*r* or 23 = π*d* **A1** for 3.66[…] **M1** for π×(*their* 3.66)^2 If 0 or 1 scored, instead award **SC2** for 42.09[…] with no or insufficient working If 0 scored, instead award **SC1** for 3.66[…], 42.08[…], 42.10[…], 42.11[.…] or 168[. …] with no or insufficient working	Correct working requires evidence of at least **M1** Do not accept starting with 42.1 and working backwards Candidates should use the π button or 3.142. Accept 3.14 and 22/7 for max of **M3** **M1** may be in two steps or seen as diameter here and diameter/2 in the area calculation *their* 3.66 must come from a calculation involving π

Examiner's Comments

Candidates were expected to start with the circumference and work towards the area. A correct answer to an accuracy greater than 3 significant figures is required to demonstrate the given answer fully.

The Formulae Sheet included those for the circumference and area of a circle and so very few candidates used incorrect formulae.

Those candidates who found the diameter first often introduced an accuracy error due to premature rounding, whereas those who found the radius in one step from 2π*r* = 23 did not have this problem.

					With full accuracy in the radius and the use of the π-button or 3.142, candidates should have reached an answer of 42.09… . With premature rounding, the candidate usually obtained 42.08… or 42.11… and therefore only scored 3 marks. Presentation of working was often not as clear as it could have been, with jottings and calculations linked by arrows or the values being substituted into the formulae not being explicitly shown.
			Total	**4**	
29			s = 230 with 4, 3 and 10 or 100 seen	4	**B2** for 4, 3 and 10 or 100 or **B1** for two correct AND **M1** for (3 × 10) + ½(4 × 10²) or correct substitution of unrounded or incorrectly rounded values If **0** scored then **SC1** for sight of 230	For all marks condone e.g. 3.00, 4.0, 10.0 used These values may be written in the stem of the question For M1 e.g. allow a mixture (2.93 × 10.1) + ½(4.1 × 10²)

M1 for (3 × 10) + ½(4 × 10²)

Examiner's Comments

Many were successful in rounding the values to one significant figure and then correctly substituting into the given formula before giving the correct answer 230 m. A number of candidates, having correctly rounded, made errors in substitution, sometimes confusing u with a, or giving 3 × 10 + 0.5 × (4 × 10)².

Many candidates chose not to round the values and attempted a complex calculation involving 4.06, 10.1 and 2.93. These candidates earned a method mark for a correct substitution only.

◯ **Assessment for learning**

Candidates need to carefully read the instructions given within questions. Here they are told to round values to 1 significant figure before attempting an estimation. Many candidates spent time doing a complex calculation that was not needed.

Exemplar 1

$S = 3 \times 10 + \frac{1}{2} 4 \times 10^2$

$S = 30 + \frac{1}{2} 4 \times 100$

$S = 30 + \frac{1}{2} 400$

$S = 30 + 200$

$S = 230$

Harper didnt half the values to the right of the equation

Model response with the rounded values correctly substituted into the formula and then correct evaluation to 230.

			Total	4		
30			1.5×10^4 nfww isw	4	**B3** for 15000 oe or $1.49[0..] \times 10^4$ or **B2** for 14900 oe or **M1** for figs 181 – figs 32 If **0** scored **SC1** for *their* value correctly rounded to 2 significant figures	eg 15000 may be 15×10^3 Subtraction may be implied by figs 15 or figs 149 *Their* unrounded value must be seen

					Examiner's Comments
					(AfL) **AfL**
					Similarly in this part, where candidates needed to find the difference between two of the values, giving the final answer in standard form correct to 2 significant figures. While the ability to use the standard form facility on a calculator is expected, the numbers were chosen so that the calculator would usually show 14 900 as the answer. Those using this standard form facility reached 14 900 quickly and accurately, whereas those who converted the two numbers first took longer and made mistakes. Candidates of all abilities often did not give the answer in the required form, with 15 000 and 1.49×10^4 being very common.
		Total		**4**	
31	a	59.5 60.5		2	**B1** for either one correct or both correct but reversed
	b	i	Accept any correctly matched wall and 6 × cupboard where values quoted satisfy: wall < 6 × cupboard where $362.5 \leq$ wall < 363 and $362.5 < 6 \times$ cupboard ≤ 363 OR wall ÷ 6 < cupboard where $362.5 \leq$ wall < 363 and 60.416 to 60.42 < cupboard ≤ 60.5	3	**B1** for $362.5 \leq$ wall value < 363 **B1** for $362.5 < 6 \times$ cupboard value ≤ 363 or 60.416 to 60.42 < cupboard value ≤ 60.5 eg [lower bound of] wall is 362.5 [upper bound of] cupboard is 60.5 $362.5 \div 60.5 = 5.9[9\ldots] < 6$

			OR wall ÷ cupboard < 6 where 362.5 ≤ wall < 363 and 60.416 to 60.42 < cupboard ≤ 60.5		**Examiner's Comments** ⟳ **AfL** At least three different methods were seen in part (i). Many of the responses were difficult to follow, with numbers and multiple attempts being scattered around the answer space. The difficulty in marking bounds problems like this one is that some numbers can represent two different objects. Candidates sometimes appeared to confuse themselves and compared two values for the wall. The best scripts included words like "wall" and "cupboard" to explain what the numbers represented. For example, "Wall could be 362.5 cm. Six cupboards could be 6 × 60.5 = 363 cm. Six cupboards > wall, so the cupboards will not fit." Note here, for example, that 363 cm on its own could be interpreted as the length of six cupboards or as the length of the wall, so the use of words is very helpful.
		ii	6.5 cm	3	**M2** for 363.5 – 6 × *their* lower bound of cupboard or 363.5 – 357 or **M1** for [upper bound of wall =] 363.5 or for 6 × *their* lower bound of cupboard or [6 cupboards =] 357 **Examiner's Comments** ? **AfL**

					In part (ii), to find the upper bound of the space remaining, candidates should have been using both the upper bound of the wall and the lower bound of the cupboard. Most candidates only used one or none of the bounds in their calculation.	
		Total	**8**			
32		10 nfww	4	**M1** for 5 × 4 **M1** for 200 or 199 used **M1dep** for *their* 200 ÷ *their* area, **dep** on first M1	nfww for 4 marks no errors in calculating values and at least one of 5, 4, 200 or 199 used Allow for 20 or for 4.9 × 4.1 [20.09] or with one unrounded value [19.6 or 20.5] Allow for 198.5 ÷ (4.9 × 4.1)	

Examiner's Comments

Some candidates tried to complete long decimal calculations instead of making an estimate by rounding the values to 200, 4 and 5 which would have made for a very straightforward calculation. Looking for key words in the demand of the question like 'estimate' should guide candidates to round values in the calculation appropriately.

		Total	**4**		
33	i	11500 or 11530 or 11532	2	**M1** for 6800 × 1.045^{12} oe	allow 11531 and 11531.9[9…]
	ii	Any correct reason e.g. the rate may not continue	1		see appendix
		Total	**3**		
34		2.86	3		

					B2 for 2.85[7…] OR **B1** for 66.95 or 8.2 or 8.16[4…] and **B1** for *their* answer written to more than 3 figures correctly rounded to 3 sf	
		Total		**3**		