

1(a). Mia cycled 23 km, correct to the nearest km.

What is the least distance Mia could have cycled?

----- km [1]

(b). A number x , rounded to one decimal place, is 4.7.

So the error interval for x is given by $4.65 \leq x < 4.75$.

(i) A number y , rounded to **two** decimal places, is 4.13.

Write down the error interval for y .

(i) ----- [2]

(ii) A number z , rounded to two significant figures, is 4700.

Write down the error interval for z .

(ii) ----- [2]



2. Tickets for an event cost £7.95 each.
There are 87 tickets sold for the event.

Estimate the total amount of money received from ticket sales.
Show clearly the approximations you use.

£ _____

[2]

3. A suitcase weighs 23 kilograms, correct to the nearest kilogram.
Write down the smallest possible weight and the largest possible weight of the suitcase.

smallest _____ kg

largest _____ kg

[2]

4. On the busiest Christmas shopping day in 2014, an online store sold an average of 64 items each second.

Calculate how many items the store sold during that 24 hours.

Show how you decide and give your answer correct to the nearest million.

[4]

5. Calculate.

$$\sqrt{\frac{63.4^3}{0.083}}$$

Give your answer correct to the nearest 1000.

[2]

6. In 2011, the population of Guildford was 100 383.

(i) Write 100 383 correct to the nearest hundred.

(i) ----- [1]

(ii) Write 100 383 correct to one significant figure.

(ii) ----- [1]



7(a). Kennon discovers a water leak from the pipe supplying his house.

He thinks the water has been leaking for just over 3 months.

Explain why “just over 3 months” is about 100 days.

----- [1]



(b). Kennon checks his water meter and finds the pipe is losing 0.2894 cubic metres of water each day.

(i) Round 0.2894 correct to 1 decimal place.

(i)----- [1]

(ii) Use your answer to part (b)(i) to show that about 30 cubic metres of water has leaked in 100 days.

[1]



(c). This is how the water company charges for water.

STEP 1: Charge £1.04 for each cubic metre of water.

STEP 2: Find 91% of the number of cubic metres of water.

STEP 3: Charge £2.08 for each cubic metre of water worked out in STEP 2.

STEP 4: Add the answers from STEP 1 and STEP 3 together.

Kennon wants to estimate how much the 30 cubic metres of water has cost him.

Round each value you use correct to one significant figure and find approximately how much Kennon has paid for the water that leaked.

£ [5]

8(a). Calculate each of the following.

$$2.6^3 - 0.42$$

Give your answer correct to one decimal place.

----- [2]

(b).
$$\frac{70}{\sqrt{18.5}}$$

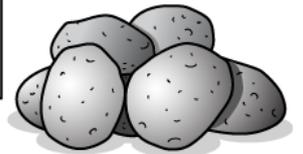
Give your answer correct to the nearest whole number.

----- [2]



9. Estimate how much Maria will pay for 2.9 kg of these potatoes.
Show the values you use.

Potatoes
61p a
kilogram



----- [3]



10(a) The area of St Petersburg is 605.8 km².

Write 605.8 correct to the nearest ten.

----- [1]



(b). In 2010 the population of St Petersburg was 4 840 000.

Write 4 840 000 correct to one significant figure.

----- [1]

11(a) Round 56 856 to the nearest hundred.

----- [1]

(b). Round 56 856 to the nearest ten.

----- [1]

12. Calculate.

$$\frac{6.3^2 - 3.7}{5.8}$$

Write your answer correct to 2 decimal places.

----- [2]

13. Calculate.

$$\frac{4.95 + 1.64}{2.61 \times 1.57}$$

Give your answer correct to two decimal places.

----- [2]

14(a) Write 34.7 correct to the nearest whole number.

----- [1]

(b). Write 3.96 correct to 1 decimal place.

----- [1]

(c). Write 124.923 correct to 2 significant figures.

----- [1]



15. There were 78614 people at a match.

Write this number correct to

(i) the nearest ten,

(i) ----- [1]

(ii) two significant figures.

(ii) ----- [1]

16.

Round 184 329 to the nearest hundred.

----- [1]

17. Work out 17% of 54.
Give your answer correct to 1 decimal place.

----- [3]

-  18(a)
Round 7.306 5 to 2 decimal places.

----- [1]

-  (b). Round each number to 3 significant figures.

(i) 408 231

----- [1]

(ii) 0.006 137 02

----- [1]



19.

Ruth buys 19 identical tickets for £280.25.

Estimate the cost of one ticket.

Show your working.

£ [2]



20.

The mass, m tonnes, of a girder is 12.7, correct to 1 decimal place.

Complete the error interval for the mass, m .

..... $m <$ [2]



21.

Round 7874 to

(i) the nearest hundred,

(i) ----- [1]

(ii) 1 significant figure.

(ii) ----- [1]



22.

Estimate the value of

$$\frac{23.1 \times 3.9}{8.12}$$

----- [3]

23.

The length of a line is 10.4 cm, correct to 1 decimal place.

Write down the shortest possible length of the line.

-----cm [1]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Part marks and guidance	
1	a		22.5	1		
	b	i	$4.125 \leq y < 4.135$	2	B1 for either limit with correct inequality sign	Condone using x instead of y
		ii	$4650 \leq z < 4750$	2	B1 for either limit with correct inequality sign	Condone using x instead of z
			Total	5		
2			8 × 90 soi leading to 720 or 85 × 8 soi leading to 680	2	B1 for 8 and 90 used as an estimate Or $10 \times 90 = 900$ or $10 \times 87 = 870$ or $8 \times 100 = 800$ or $7.95 \times 100 = 795$ or $8 \times 87 = 696$	Accept rounding of 720 seen to 700 or 680 seen to 700 for 2 marks Condone 8 and 90 seen or 8 and 9 seen with answer 720 for 2 marks, and similarly for part marks 0 marks for calculation of 7.95×87 Examiner's Comments About half the candidates either made no attempt to estimate, performing a complicated multiplication to work out the exact answer, or found it difficult to choose the most suitable approximations for estimating. Some candidates who used £8 and 90 made errors in multiplication leading to answers such as £630, or in simplifying the calculation to 8×9 left their answer as £72.
			Total	2		
3			22.5	1		

Question			Answer/Indicative content	Marks	Part marks and guidance
			23.5	1	<p>Allow 23.499 or better</p> <p>Examiner's Comments</p> <p>This question caused problems for the majority of candidates and was not answered well. Few gained both marks and most scored one mark at best by calculating the lower bound. The large majority were unable to correctly calculate the upper bound and would commonly answer 23.4 or 23.49. Very few gave 23.499 or used recurring decimal notation and even fewer gave 23.5.</p>
			Total	2	

Question		Answer/Indicative content	Marks	Part marks and guidance	
4		6 million or 6 000 000 with correct working seen	4	<p>B3 for 5 529 600 or M2 for $64 \times 24 \times 60 \times 60$ soi or M1 for three of these multiplied</p> <p>and B1 ft for their unrounded value seen and correctly rounded to nearest million if > 1 million</p> <p>Examiner's Comments</p> <p>Candidates' work was generally well presented in this question, with the majority gaining 4 or 3 marks for correct calculations. It was rare to see M2 awarded as these candidates generally went on to score more. The most common part mark awarded was M1 for three values multiplied.</p>	eg M1 for 230400 [sold in one hour] or for 86 400 [secs in 1 day]
		Total	4		

Question			Answer/Indicative content	Marks	Part marks and guidance	
5			2000 nfw	2	<p>B1 for 1752. ... rot to 3 or more sf or for 2000.0 or more decimal zeros nfw</p> <p>Examiner's Comments</p> <p>This question was reasonably well answered. Common errors included leaving the answer as 1752..., 6082... from</p> $\sqrt{(63.4^3)}$ <p>then dividing by 0.083, and 6000 from not square rooting the denominator.</p>	Common 0 for just 1800
			Total	2		
6		i	100400	1		
		ii	100000	1	<p>Examiner's Comments</p> <p>Parts (i) and (ii) proved to be straight forward for most candidates.</p>	
			Total	2		

Question			Answer/Indicative content	Marks	Part marks and guidance	
7	a		Estimate number of days in 3 months	1	[3 months about] (28 to 33) x 3 [days] or 7 x (12 or 13) [days] or 84 to 99 [days] seen	
	b	i	[0].3[000]	1		
		ii	[0].3 x 100 oe	1		<p>Accept $0.2894 \times 100 = 28.94$ which is approximately 30 oe e.g. $0.2894 \times 100 = 30$ 1sf</p> <p><u>Examiner's Comments</u></p> <p>This was well done although some said, "Because there are 30 days in a month" and did complete with $30 \times 3 = 90$. This was generally correct although 0.28, 0.2894, 2.8 and 2894 were all seen in part (i) and 0.3×30 was seen in part (ii). Some worked out that $30 \div 100 = 0.3$ to score the mark.</p>

Question		Answer/Indicative content	Marks	Part marks and guidance	
	c	[£]84 cao	1	<p>B1 for [£]1, [0].9 and [£]2 seen And M1 for $30 \times \textit{their}$ (1 or 1.05 or 1.04) And M1 for $30 \times \textit{their}$ ([0].9 or [0].91) oe And M1 for $\textit{their} 27 \times \textit{their}$ (2 or 2.1 or 2.08)</p> <p>If B0 M1 for correctly adding <i>their</i> water supply and sewer costs</p> <p>Examiner's Comments</p> <p>Very few candidates understood that the multipliers to be used were to be approximated to 1sf and that the question was about finding approximate values. In consequence, many ended up with difficult multiplications that they were unable to evaluate correctly. However, many candidates did score 2 or more marks.</p> <p>A common error was to try to find 90 (or 91)% of the answer to STEP 1 rather than of 30.</p> <p>Some found a final answer in the thousands of pounds but this did not alert them to the need to check their work.</p>	<p>Allow 90% for 0.9</p> <p>soi 30 or 31.5 or 31.2</p> <p>soi 27 or 27.3 or 28.39[2]</p> <p>soi 54 or 56.7 or 56.16 or 56.78[4] For '<i>their</i> 27' allow a value seen from STEP 2 rounded (may be 30)</p> <p>STEP 1 + STEP 3</p>
		Total	8		

Question		Answer/Indicative content	Marks	Part marks and guidance	
8	a	17.2	2	B1 for 17.15 to 17.16 or $\frac{4289}{250}$	
				Examiner's Comments The calculation was generally well done.	
	b	16	2	B1 for 16.2 to 16.3 or $\frac{70\sqrt{74}}{37}$	
				Examiner's Comments The calculation was generally well done.	
		Total	4		
9		Valid and explicit approximation method At least 1 value rounded to 1sf 170 to 190	M1 M1 A1	If 0 scored, allow SC1 for 170 to 190 Examiner's Comments A disappointing number of candidates did not attempt to estimate an answer but tried to work out $2.9 \times 61p$. Of those who did, $3 \times 60 = 180p$ earned marks quite easily.	Expect 3 or 60 Condone poor money notation Exact answer $176.9p \approx 177p$ Expect £1.80 or £1.83
		Total	3		

Question		Answer/Indicative content	Marks	Part marks and guidance	
10	a	610 cao	1	Examiner's Comments Generally well attempted, however a number of responses were 610.0. Otherwise candidates rounded to the nearest whole number giving answers of 606 and 606.0.	
	b	5 000 000	1	Examiner's Comments This part was not well answered, a common error of 4 800 000 gave the impression that candidates were not proficient in understanding significant figures. Some others who understood 1sf incorrectly rounded to 4 000 000. Other errors seen were to repeat the given number.	Accept words
		Total	2		
11	a	56 900	1	Examiner's Comments This question was well answered in general. Some candidates lost marks as they did not show the full answer of 56900, but simply wrote the section they had rounded i.e. 900.	
	b	56 860	1	Examiner's Comments This question was well answered in general. Some candidates lost marks as they did not show the full answer of 56860, but simply wrote the section they had rounded i.e. 60.	
		Total	2		

Question			Answer/Indicative content	Marks	Part marks and guidance	
12			6.21	2	<p>B1 for 6.20[5...] or 35.99 seen</p> <p>Examiner's Comments</p> <p>Many candidates had an answer of 6.20, but relatively few rounded correctly. Some did not do the order of calculations correctly, resulting in an answer of 39.05.</p>	
			Total	2		
13			1.61 final answer	2	<p>M1 for 1.60[8...] seen Or for <i>their</i> answer seen to more than 2dp corrected to 2dp OR SC1 for answer 3.96 or 5.35 or 5.94</p> <p>Examiner's Comments</p> <p>There was evidence that many candidates had the calculator skills necessary to carry out this calculation, but some had problems rounding the answer to two decimal places. 5.93 and 5.94 were seen occasionally as incorrect answers suggesting that these candidates had problems using their calculators effectively.</p>	Both rounded and unrounded value must be seen
			Total	2		

Question			Answer/Indicative content	Marks	Part marks and guidance	
14	a		35	1	Examiner's Comments	
					Answered very well and most were able to give 35 as the answer.	
	b		4.0	1	Examiner's Comments	
					Answered poorly with the errors of 3.9 or 4 being most common.	
	c		120	1	Examiner's Comments	
					Many candidates did not appear to know what was meant by significant figures and many rounded their answers to two decimal places instead. Common errors included 125, 124.000, 120.000, 124.92 .	
			Total	3		
15		i	78 610	1		
		ii	79 000	1	Examiner's Comments	
					Part (i) was generally well answered, (ii) was less well done as many candidates did not appear to understand significant figures. Common incorrect answers were 78 000, 78 or 79.	
			Total	2		
16			184 300	1		
			Total	1		

Question		Answer/Indicative content	Marks	Part marks and guidance		
17		9.2	3	<p>M1 for 0.17×54 oe A1 for 9.18 If 0 scored SC1 for <i>their</i> answer rounded to 1dp, if two dp or more seen.</p> <p>Examiner's Comments Many candidates scored full marks, though several did not round their answer to 1 decimal place. Several non-calculator attempts were seen, but often failed to reach the correct result. Common incorrect methods were $54 \div 17$ and $54 \div 0.17$. A small number gained the final mark for an incorrect answer correctly rounded to 1dp.</p>	<p>Allow fully correct non-calculator method for 1 mark allow 1 error in addition</p>	
		Total	3			

Question			Answer/Indicative content	Marks	Part marks and guidance	
18	a		7.31 cao	1		<p>Examiner's Comment This part was much better attempted than (b), probably due to a combination of decimal places being better understood than significant figures and an easier number to deal with. Candidates should understand that trailing decimal places after the last rounded digit is not correct; this error cost many candidates the marks in both parts of the question. Those who did not score in part (a) usually gave these trailing zeros, or 7.30, or sometimes moved the decimal point so that the number then had 2 decimal places (i.e. 730.65).</p>
	b	i	408 000 cao	1		<p>Examiner's Comment In this part, by far the most common error in part (i) was to give 408 and not maintain place value. The other common error was rounding to 2 significant figures.</p>

Question			Answer/Indicative content	Marks	Part marks and guidance	
		ii	[0].006 14 cao	1		<p>Examiner's Comment There were fewer correct responses in this part, with trailing zeros and rounding to 2 or 3 decimal places being the most common mistakes.</p>
			Total	3		
19			$\frac{300}{20}$ or $\frac{280}{20}$ 15 or 14	M1 A1	15 dep $\frac{300}{20}$ and 14 dep on $\frac{280}{20}$ If 0 scored SC1 for one of 300 or 280 or 20	Answers from 280.25 ÷ 19, and rounded, score 0 Accept 15 (14) and 15.00 (14.00) but not 15.0 (14.0) or 15.00p (14.00p)
			Total	2		

Question		Answer/Indicative content	Marks	Part marks and guidance	
20		12.65 12.75	2	B1 for one correct or both correct and reversed	For B1, correct value must be in correct place
				Examiner's Comment Only a very small minority understood the idea of error intervals. Few correct answers were seen to this part. When one mark was awarded it was often for 12.65 correctly placed.	
		Total	2		
21	i	7900	1		
	ii	8000	1		
				Examiner's Comments Of the two accuracy issues in part (a) rounding to the nearest 100 was the most successful. In (a)(ii) 8 was a common incorrect response.	
		Total	2		

Question		Answer/Indicative content	Marks	Part marks and guidance	
22		10	3	<p>M2 for two values from 20, 4 and 8 used correctly in calculation or M1 for 20 or 4 or 8</p> <p>e $\frac{23 \times 4}{8}$ or g (24 $\div 8) \times 4$</p> <p>Examiner's Comments</p> <p>In part (a) many correct answers were seen but a significant number of candidates ignored the priority of operations and worked through the calculations left to right. This resulted in common errors of 2.5 in part (i) and 28 in part (ii). In part (b) many demonstrated understanding of powers and square roots but did not always present a scoring final answer. For example, in part (i) some left their answer as $2 \times 2 \times 2 \times 2 \times 2$. Those with less understanding gave errors of 64 or 10. In part (ii) answers of 20×20 or 20^2 were sometimes seen. Other common errors were 40 or 200. Candidates are often missing that they need to estimate so in part (c) grid multiplication, followed by a difficult division was commonly seen. Some candidates then rounded their attempted answer. Those that estimated the values first, mostly scored 2 marks for rounding to 23, 8 and 4. Very few reached the correct answer of 10.</p>	

Question			Answer/Indicative content	Marks	Part marks and guidance	
			Total	3		
23			10.35 cao	1	<p><u>Examiner's Comments</u></p> <p>In part (a)(i) a number of correct answers were seen, 12 and 60 were common incorrect answers.</p> <p>Part (a)(ii) was often correctly answered. However, 16×16 and 4 were common incorrect answers. The correct answer to part (b) was rarely seen. 10, 10.1 and 10.41 were common wrong answers.</p>	
			Total	1		