Oxford Revise | AQA GCSE Maths Higher | Answers

Chapter 2 Rounding, truncating, error intervals, and estimating

Question	Answer	Extra information	Marks
2.1	Error interval for P is $1 \le P < 2$ Error interval for Q is $0.6 \le Q < 0.7$ Error interval for $P + Q$ is $1.6 \le P + Q < 2.7$		1 1 1
2.2	$\sqrt{0.06} = \sqrt{0.01} \times \sqrt{6}$ $\quad = 0.1\sqrt{6}$ $\quad = 0.245 \,(3 \text{ sf})$	$\sqrt{0.01} \times \sqrt{6} \ or \ 0.1\sqrt{6}$ $0.24494...$ Correct answer, to 3 sf.	1 1 1
2.3 (a)	Lower bound = $\dfrac{6.15}{20.35^2} = 0.014850678...$ $\quad = 0.014851 \,(5 \text{ sf})$	6.15 20.35 Correct answer	1 1 1
2.3 (b)	Lower bound $= 0.014851$ Upper bound $= 0.015242$ Bounds agree when rounded to 2 sf, so the value of A is 0.015	Explanation Correct answer	1 1

Question	Answer	Extra information	Marks
2.4	Length: LB = 29.95 cm, UB = 30.05 cm Width: LB = 25.35 cm, UB = 25.45 cm Height: LB = 9.15 cm, UB = 9.25 cm Mass: LB = 56.375 kg, UB = 56.625 kg Volume LB = 29.95 × 25.35 × 9.15 Volume UB = 30.05 × 25.45 × 9.25 Density LB = Mass LB ÷ Volume UB $\qquad$ = 0.007969… kg/cm^3 Density UB = Mass UB ÷ Volume LB $\qquad$ = 0.008151… kg/cm^3 The bounds are equal when rounded to 1 sf.	Any correct LB or UB for any dimension Correct method to find LB and UB for volume Correct method to find LB and UB for density Correct bounds for density Correct answer, with explanation	1 1 1 1 1
2.5 (a)	20190		1
2.5 (b)	20200		1
2.5 (c)	20000		1
2.5 (d)	20000		1
2.6 (a)	0.018881333		1
2.6 (b) (i)	0.01		1
2.6 (b) (ii)	0.019		1

Question	Answer	Extra information	Marks
2.7	Akira has either misunderstood the question and rounded to 2 decimal places, or thought that the first zero after the decimal point is significant.	Either correct explanation	1
2.8	$\dfrac{2.67 \times 1.36}{0.11 + 0.42} \approx \dfrac{3 \times 1}{0.1 + 0.4} = \dfrac{3}{0.5} = 6$	Rounding to 1 sf for each number Correct answer	1 1
2.9	Round 17 to 20 5 months = approx. 150 days 20 fish per day for 150 days = 3000 Add this to 1000 for an estimate of 4000 fish	Rounding the rate to 20 Correct estimation of 5 months' worth of fish Correct answer	1 1 1
2.10	Profit estimation per portion = 9 − 3 = £6 96 rounds to 100 Estimation for week's profit is 100 × 6 = £600	Rounding portions, sale price and cost to 1 sf A profit calculation Correct answer	1 1 1
2.11 (a)	$\sqrt{47}$ is a little lower than $\sqrt{49}$ which is 7, so $\sqrt{47} \approx 6.9$	Accept 6.8 or 6.9	1
2.11 (b)	$\sqrt{196} < \sqrt{200} < \sqrt{225}$ so $14 < \sqrt{200} < 15$ 200 is much closer to 196 than it is to 225, so the square root will be much closer to 14 than 15. Estimate 14.1	Accept 14.1 or 14.2	1

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2.1	Error interval for P is $1 \leq P < 2$ Error interval for Q is $0.6 \leq Q < 0.7$ Error interval for $P + Q$ is $1.6 \leq P + Q < 2.7$		1 1 1
2.2	$\sqrt{0.06} = \sqrt{0.01} \times \sqrt{6}$ $= 0.1\sqrt{6}$ $= 0.245\,(3\text{ sf})$	$\sqrt{0.01} \times \sqrt{6}$ *or* $0.1\sqrt{6}$ $0.24494\ldots$ Correct answer, to 3 sf.	1 1 1
2.3 (a)	Lower bound = $\dfrac{6.15}{20.35^2} = 0.014850678\ldots$ $= 0.014851\,(5\text{ sf})$	6.15 20.35 Correct answer	1 1 1
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2.4	Length: LB = 29.95 cm, UB = 30.05 cm
	Width: LB = 25.35 cm, UB = 25.45 cm
	Height: LB = 9.15 cm, UB = 9.25 cm
	Mass: LB = 56.375 kg, UB = 56.625 kg
	Volume LB = 29.95 × 25.35 × 9.15
	Volume UB = 30.05 × 25.45 × 9.25
	
	Density LB = Mass LB ÷ Volume UB
	          = 0.007969… kg/cm^3
	
	Density UB = Mass UB ÷ Volume LB
	          = 0.008151… kg/cm^3
	The bounds are equal when rounded to 1 sf.
		Any correct LB or UB for any dimension
		Correct method to find LB and UB for volume
		Correct method to find LB and UB for density
		Correct bounds for density
		Correct answer, with explanation
			1
			1
			1
			1
			1

2.5 (a)	20190		1
2.5 (b)	20200		1
2.5 (c)	20000		1
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2.6 (a)	0.018881333		1
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2.9	Round 17 to 20 5 months = approx. 150 days 20 fish per day for 150 days = 3000 Add this to 1000 for an estimate of 4000 fish	Rounding the rate to 20 Correct estimation of 5 months' worth of fish Correct answer	1 1 1
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2.11 (a)	$\sqrt{47}$ is a little lower than $\sqrt{49}$ which is 7, so $\sqrt{47} \approx 6.9$	Accept 6.8 or 6.9	1
2.11 (b)	$\sqrt{196} < \sqrt{200} < \sqrt{225}$ so $14 < \sqrt{200} < 15$ 200 is much closer to 196 than it is to 225, so the square root will be much closer to 14 than 15. Estimate 14.1	Accept 14.1 or 14.2	1

Question	Answer	Extra information	Marks
2.12	$\dfrac{\sqrt{5^3}}{5} + 2\sqrt{125} = \dfrac{5^{\frac{3}{2}}}{5} + 2 \times \sqrt{25 \times 5}$ $= 5^{\frac{3}{2}-1} + 2 \times 5 \times \sqrt{5}$ $= 5^{\frac{1}{2}} + 10 \times 5^{\frac{1}{2}}$ $= 11 \times 5^{\frac{1}{2}}$	Writes $\sqrt{5^3}$ as $5^{\frac{3}{2}}$ Factors out a 5 from $\sqrt{125}$ Uses rules of exponents to get $5^{\frac{3}{2}} \div 5 = 5^{\frac{1}{2}}$ Fully correct	1 1 1 1
2.13	$20 \div (12 - 7) + 8 \times (4 + 1) + 3 = 47$	One set of brackets inserted to group $12 - 7$ or $4 + 1$ Fully correct	1 1