



3.1D Error Intervals: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 40 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Write down the lower bound and upper bound for a number which is 12, correct to the nearest integer, using inequality notation.

(Total for Question 1 is 1 mark)

- 2** A measurement is 3.7, correct to 1 decimal place. Give the lower and upper bounds using inequalities.

(Total for Question 2 is 1 mark)

- 3** A length is 250 cm, correct to the nearest 10 cm. State its bounds using inequality notation.

(Total for Question 3 is 1 mark)

- 4** A mass is recorded as 0.03, correct to 2 decimal places. Give the lower and upper bounds in inequality form.

(Total for Question 4 is 1 mark)

- 5** A number is 4.6, correct to 2 significant figures. Write down the lower and upper bounds using inequalities.

(Total for Question 5 is 2 marks)

- 6** A rectangle has length 12 cm, correct to the nearest centimetre, and width 3.5 cm, correct to 1 decimal place. Work out the greatest possible area of the rectangle. Give your answer as an inequality.

(Total for Question 6 is 3 marks)

- 7** A metal sheet has length 8.02 m correct to 3 significant figures and width 0.450 m correct to 3 significant figures. Find the lower bound for the area of the sheet. Give your answer as an inequality.

(Total for Question 7 is 3 marks)

- 8** Write down the bounds for 4.00, correct to 3 significant figures, using inequality notation.

(Total for Question 8 is 1 mark)

- 9** x is 2.3, correct to 1 decimal place. Work out the greatest possible value of $3x$. Give your answer as an inequality.

(Total for Question 9 is 3 marks)

- 10** A cylindrical rod has radius 2.5 cm (to 2 significant figures) and height 40 cm (to the nearest centimetre). Find an inequality giving the range of possible volumes. Give numeric bounds.

(Total for Question 10 is 4 marks)

- 11** x is 12, correct to the nearest integer. Let $y = x/3$. Find the range of possible values of y , giving your answer in exact fractional form with inequalities.

(Total for Question 11 is 3 marks)

- 12** Give the lower and upper bounds for 0.7, correct to 1 significant figure, using inequalities.

(Total for Question 12 is 1 mark)

- 13** A cuboid has dimensions 2.0 cm, 3.0 cm and 4.0 cm, each given to 2 significant figures. Work out the greatest possible volume. Give your answer as an inequality.

(Total for Question 13 is 3 marks)

- 14** A baker uses 250 g of flour (to the nearest 10 g) and 120 g of sugar (to the nearest 10 g). Find the possible range for the total mass of flour and sugar. Give your answer using inequalities.

(Total for Question 14 is 2 marks)

- 15** A rectangle has length 7.8 cm, correct to 2 significant figures, and width 2.45 cm, correct to 3 significant figures. Work out the least possible perimeter of the rectangle. Give your answer to 2 decimal places.

(Total for Question 15 is 4 marks)

16 Write down the bounds for a number given as 5, correct to 1 significant figure, using inequality notation.

(Total for Question 16 is 1 mark)

Mark scheme · 3.1D Error Intervals: Fluency and Exam Drill

Question 1

- **B1** $11.5 \leq x < 12.5$ cao
- **Answer:** $11.5 \leq x < 12.5$

Question 2

- **B1** $3.65 \leq x < 3.75$ cao
- **Answer:** $3.65 \leq x < 3.75$

Question 3

- **B1** $245 \leq x < 255$ cao
- **Answer:** $245 \leq x < 255$

Question 4

- **B1** $0.025 \leq x < 0.035$ cao
- **Answer:** $0.025 \leq x < 0.035$

Question 5

- **M1** identify bounds $4.55 \leq x < 4.65$ or equivalent oe
- **A1** $4.55 \leq x < 4.65$ cao
- **Answer:** $4.55 \leq x < 4.65$

Question 6

- **M1** use upper bounds: length < 12.5 and width < 3.55
- **M1** multiply upper bounds oe
- **A1** area $< 44.375 \text{ cm}^2$ cao
- **Answer:** area $< 44.375 \text{ cm}^2$, since $12.5 * 3.55 = 44.375$. **WorkingCheck:** upper bounds 12.5 and 3.55, $12.5 * 3.55 = 44.375$ so area is less than 44.375.

Question 7

- **M1** identify lower bounds: $8.015 \leq L$ and $0.4495 \leq W$
- **M1** multiply lower bounds oe
- **A1** area $\geq 3.6027425 \text{ m}^2$ cao
- **Answer:** area $\geq 3.6027425 \text{ m}^2$. **WorkingCheck:** $L_{\text{low}} = 8.015$, $W_{\text{low}} = 0.4495$, product = $8.015 * 0.4495 = 3.6027425$.

Question 8

- **B1** $3.995 \leq x < 4.005$ cao
- **Answer:** $3.995 \leq x < 4.005$

Question 9

- **M1** use upper bound $x < 2.35$
- **M1** multiply by 3: $3x < 3 * 2.35$
- **A1** $3x < 7.05$ cao
- **Answer:** $3x < 7.05$. **WorkingCheck:** $x < 2.35$ so $3x < 3 * 2.35 = 7.05$.

Question 10

- **M1** state bounds r: $2.45 \leq r < 2.55$ and h: $39.5 \leq h < 40.5$
- **M1** form inequality for volume: $\pi * (2.45)^2 * 39.5 \leq V < \pi * (2.55)^2 * 40.5$
- **A1** evaluate lower bound to 3 significant figures or better
- **A1** evaluate upper bound to 3 significant figures or better
- **Answer:** $\pi * (2.45)^2 * 39.5 \leq V < \pi * (2.55)^2 * 40.5$. **Numerically:** $744.868... \text{ cm}^3 \leq V < 827.342... \text{ cm}^3$. **WorkingCheck:** $(2.45)^2 * 39.5 = 237.09875$, $*\pi = 237.09875 * \pi = \text{approx } 744.868$; $(2.55)^2 * 40.5 = 263.35125$, $*\pi = \text{approx } 827.342$.

Question 11

- **M1** divide bounds $11.5 \leq x < 12.5$ by 3
- **M1** write bounds as fractions $23/6 \leq y < 25/6$
- **A1** $23/6 \leq y < 25/6$ cao
- **Answer:** $23/6 \leq y < 25/6$. **WorkingCheck:** x bounds 11.5 and 12.5; $11.5/3 = 23/6$, $12.5/3 = 25/6$.

Question 12

- **B1** $0.65 \leq x < 0.75$ cao
- **Answer:** $0.65 \leq x < 0.75$

Question 13

- **M1** use upper bounds 2.05, 3.05 and 4.05
- **M1** calculate product $2.05 \times 3.05 \times 4.05$
- **A1** $V < 25.322625 \text{ cm}^3$ cao
- **Answer:** $V < 25.322625 \text{ cm}^3$. **WorkingCheck:** $2.05 \times 3.05 = 6.2525$; $6.2525 \times 4.05 = 25.322625$, so volume is less than 25.322625.

Question 14

- **M1** identify bounds: flour $245 \leq f < 255$, sugar $115 \leq s < 125$
- **A1** $360 \leq \text{total} < 380$ cao
- **Answer:** $360 \leq \text{total} < 380$ g. **WorkingCheck:** min total $245+115=360$, max total $255+125=380$.

Question 15

- **M1** identify lower bounds: length $7.75 \leq l$ and width $2.445 \leq w$
- **M1** add bounds $l_{\text{low}} + w_{\text{low}}$
- **M1** double to get perimeter
- **A1** perimeter = 20.39 cm cao (to 2 dp)
- **Answer:** Least possible perimeter = 20.39 cm. **WorkingCheck:** $l_{\text{low}} = 7.75$, $w_{\text{low}} = 2.445$, sum = 10.195, perimeter = $2 \times 10.195 = 20.39$.

Question 16

- **B1** $4.5 \leq x < 5.5$ cao
- **Answer:** $4.5 \leq x < 5.5$