Iteration and Bounds

GCSE Mathematics • **Higher Tier** • Grades 8–9 • Non-calculator

Name: _____ Class: _____ Total: _____ / 69

Show all your working. Marks are given for correct method as well as the final answer.

1. A length is 7 cm to the nearest cm. Write down its lower and upper bounds. **[2 marks]**

Answer: _____

2. A mass is 24 kg to the nearest kg. Write down the error interval. **[2 marks]**

Answer: _____

3. A length is 8.4 cm to 1 d.p. Write down the error interval. **[2 marks]**

Answer: _____

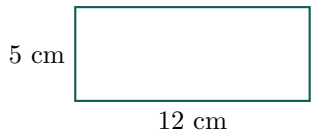
4. A value is 250 to 2 significant figures. Write down the error interval. **[3 marks]**

Answer: _____

5. A number is 6.2 when truncated to 1 d.p. Write down the error interval. **[3 marks]**

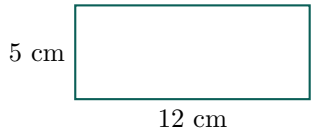
Answer: _____

6. A rectangle is 12 cm by 5 cm, each to the nearest cm. Work out the upper bound of its area. **[3 marks]**



Answer: _____ **cm^2**

7. Using the same rectangle, work out the lower bound of its area. **[3 marks]**



Answer: _____ **cm^2**

8. $a = 20$ and $b = 5$, each to the nearest whole number. Work out the upper bound of $a - b$. **[3 marks]**

Answer: _____

9. With the same a and b, work out the lower bound of $a - b$. **[3 marks]**

Answer: _____

10. $a = 30$ and $b = 6$, each to the nearest whole number. Work out the upper bound of $\frac{a}{b}$. **[3 marks]**

Answer: _____

11. With the same a and b, work out the lower bound of $\frac{a}{b}$. **[3 marks]**

Answer: _____

12. A car travels 150 m (to the nearest 10 m) in 12 s (to the nearest second). Work out the upper bound of its speed, to 2 d.p. **[4 marks]**

Answer: _____ **m/s**

13. Show that $x^3 + x - 3 = 0$ has a root between 1 and 2. **[3 marks]**

Answer: _____

14. Show that $x^3 - 2x - 5 = 0$ has a root between 2 and 3. **[3 marks]**

Answer: _____

15. Explain why a sign change shows a root lies between two values. **[2 marks]**

Answer: _____

16. Use $x_{n+1} = \sqrt{3 - x_n}$ with $x_0 = 1$ to work out x_1, to 3 d.p. **[2 marks]**

Answer: _____

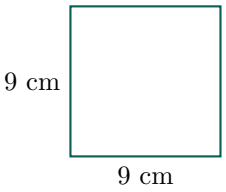
17. Continue that iteration to work out x_2, to 3 d.p. **[3 marks]**

Answer: _____

18. Continue to work out x_3, to 3 d.p. **[3 marks]**

Answer: _____

19. A square has side 9 cm to the nearest cm.



(a) Write down the error interval for the side. **[2 marks]**

(b) Work out the upper and lower bounds of the area. **[3 marks]**

Answer: _____

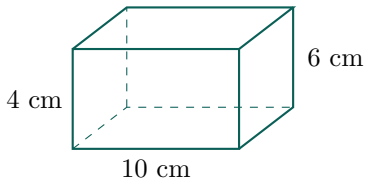
20. $x^3 - 6x + 2 = 0$ has a root near $x = 0.3$.

(a) Show the root lies between 0 and 1. **[3 marks]**

(b) Use $x_{n+1} = \dfrac{x_n^3 + 2}{6}$ with $x_0 = 0$ to find x_1 and x_2, to 4 d.p. **[4 marks]**

Answer: _____

21. A cuboid measures 10 cm by 6 cm by 4 cm, each to the nearest cm.



(a) Write down the upper bound of the length. **[1 mark]**

(b) Work out the upper bound of the volume. **[3 marks]**

Answer: _____

22. $d = 42.6$ cm and $t = 5.2$ s, both correct to 1 d.p. Work out the upper bound of $d \div t$, to 3 s.f. **[3 marks]**

Answer: _____

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