

Upper and Lower Bounds and Limits of Accuracy – www.m4ths.com – Steve Blades

(1) Complete the inequality below for each:

- (a) The height (H) of a man is 160cm to the nearest 10cm : $\text{_____} \leq H < \text{_____}$
- (b) The capacity (C) of a jug is 300ml correct to the nearest 50ml : $\text{_____} \leq C < \text{_____}$
- (c) The mass (M) of a rock is 1kg to the nearest 100g : $\text{_____} \leq M < \text{_____}$
- (d) The number of people (N) at a concert is 100 to the nearest 10 : $\text{_____} \leq N \leq \text{_____}$
- (e) The number x is 500 correct to one significant figure: $\text{_____} \leq x < \text{_____}$
- (f) The number y is 34.8 correct to one decimal place: $\text{_____} \leq y < \text{_____}$
- (g) The number a is 28 correct to 2 significant figures: $\text{_____} \leq a < \text{_____}$
- (h) The number t is 53.26 correct to 2 decimal places: $\text{_____} \leq t < \text{_____}$

(2) Trevor has some carpet. The carpet is rectangular in shape measures 6 metres by 10 metres. Both measurements are correct to the nearest metre.

- (a) Show that the minimum possible area of the carpet is 52.25 square metres.
- (b) Find the maximum possible area of the carpet.

(3) Karen has 6 different pieces of string. Each piece is 40cm long correct to the nearest 5cm .

- (a) Find the maximum possible total length of her 6 pieces of string.
- (b) Find the minimum possible total length of her 6 pieces of string.

(4) Robert has $\text{£}1$ correct to the nearest 10p . Paula has $\text{£}5$ correct to the nearest 50p .

- (a) Find the lower bound for the combined total of money they have.
- (b)* Find the upper bound for the total of money they have. BE CAREFUL AS THIS IS MONEY!

(5) $x = 80$ correct to the nearest 10 and $y = 12$ correct to the nearest integer.

- (a) Find the upper bound of $x + y$
- (b) Find the lower bound of xy
- (c) Find the upper bound of $\frac{x}{y}$
- (d) Find the least possible value of $x - y$

(6) The length of a swimming pool is 50m correct to the nearest 1m . The width of the pool is 10m correct to the nearest 1m and the depth is 2.4m correct to one decimal place.

- (a) Show that the minimum possible volume of the pool is 1105.0875m^3 .
- (b) Find the upper bound for the volume of the swimming pool.

(7) The distance from Spalding to London is 100 miles to the nearest 5 miles. Abdul can cycle at 20 miles per hour to the nearest 1 mile per hour. He leaves Spalding at 11am . Prove that he can get to London before 4pm . You must show full workings.

(8) $T = 40$ correct to one significant figure and $U = 500$ correct to one significant figure. Find the least possible value of $\frac{U}{T}$. Write your full calculator display.

(9) Fred is 20 years old to the nearest 5 years. What is the oldest he can possibly be in 40 years' time? *Be careful with this question!*

(10) $x = 30$ correct to 2 significant figures and $y = 410$ correct to 2 significant figures.

- (a) Find the upper bound of xy
- (b) Find the lower bound of $x - y$