Upper and Lower Bounds

Examples ) If Length = 4n to nearest metre then 3.5 ≤ L < 4.5 2) If Length = 4n to nearest 10 cm 3.95m ≤ L < 4.05m 3) Time = 26s to nearest second 25.5 ≤ T < 26.5 Calculations 1) A carpet is 4m x 3m each measurement to the nearest metre

measurement to the nearest metric Find the nominal area and upper and lower bounds for the area. Nominal Area =  $4 \times 3 = 12 \text{ m}^2$   $3.5 \text{ m} \leq \text{Length} \leq 4.5 \text{ m}$  $2.5 \text{ m} \leq \text{Width} \leq 3.5 \text{ m}$ 

Area = Length x Width

Upper Bound =  $4.5 \times 3.5 = 15.75 \text{ m}^2$ Lower Bound =  $3.5 \times 2.5 = 8.75 \text{ m}^2$  $8.75 \text{ m}^2 \in \text{Area} < 15.75 \text{ m}^2$ Find bounds for Perimeter

$$P = 2L + zW$$

Upper Bound =  $2 \times 4.5 + 2 \times 3.5 = 16m$ Lower Bound =  $2 \times 3.5 + 2 \times 2.5 = 12m$  $12m \leq Perimeter < 16m$ 

Speed, Time, Distence  
John runs the 100m (measured to nearest m)  
John teles 12s (measured to nearest second)  
Find Lower and Upper Bounds for John's speed  
99.5m 
$$\leq$$
 Distance  $<$  100.5m  
11.5s  $\leq$  Time  $<$  12.5s  
Speed  $=$  Distance  
Time  
Upper Bound  $=$   $\frac{100.5}{11.5} = 8.74$  ms'  
m/s

Lower Bound =  $\frac{99.5}{12.5}$  = 7.96 ms<sup>-1</sup> 7.96 m/s = Speed < 8.74 m/s A piece of string is 20m to nearest 10cm A piece is cut off measuring 4m to nearest 10 cm Find bounds for the piece that is left. Piece Left = Original - Cut Off 19.95 = Original < 20.05 3.95 E Cut-Off 2 4.05 Upper Bound for Piece Left = 20.05 - 3.95 = 16,1m Lower Bound = 19.95 - 4.05 = 15.9m 15.9m E Piece Left & 16.1m

Exercise