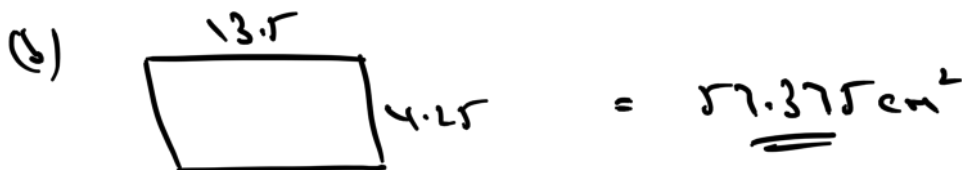
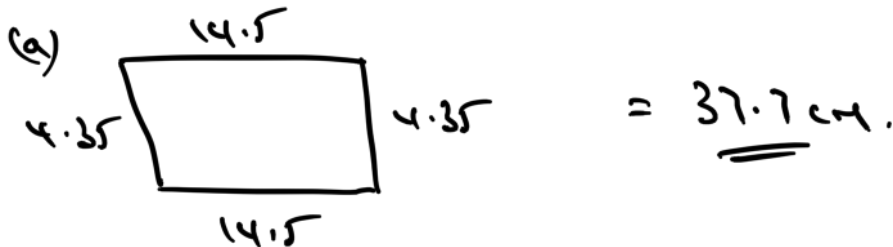
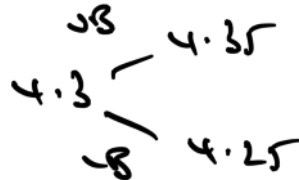
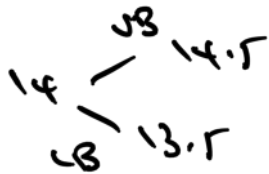


QT Bounds



1. A rectangle has a length of 14cm, correct to the nearest cm, and a width of 4.3cm, correct to the nearest mm.

- a) Calculate the upper bound for the perimeter of the rectangle. (2 marks)
b) Calculate the lower bound for the area of the rectangle. (2 marks)



QT Bounds



2. A circle has a radius of 14cm, correct to the nearest cm.

a) Calculate the upper bound for the circumference of the circle. Give your answer in terms of π .

b) Calculate the upper bound for the area of the circle. Give your answer in terms of π .

$$\begin{array}{r} \text{UB} \\ 14 \text{ --- } 14.5 \\ \text{LB} \text{ --- } 13.5 \end{array}$$

$$\begin{aligned} \text{(a) Circumference} &= \pi D \\ \text{Upper Bound} &= \pi (14.5 + 14.5) \\ &= \underline{\underline{29\pi \text{ cm}}} \end{aligned}$$

$$\begin{aligned} \text{(b) Area} &= \pi r^2 \\ \text{Upper Bound} &= \pi (14.5)^2 \\ &= \underline{\underline{\frac{841}{4} \pi \text{ cm}^2}} \end{aligned}$$

3. In the formula $D = ST$

$S = 15.93$ correct to 2 decimal places

$T = 1.556$ correct to 3 decimal places

Calculate the upper bound for D . Give your answer to 3 decimal places.

$$\begin{array}{r} \text{UB} \\ S \text{ --- } 15.935 \\ \text{LB} \text{ --- } 15.925 \end{array}$$

$$\begin{array}{r} \text{UB} \\ T \text{ --- } 1.5565 \\ \text{LB} \text{ --- } 1.5555 \end{array}$$

$$\begin{aligned} D &= ST \\ \text{(UB)} &= 15.935 \times 1.5565 \\ &= 24.8018275 \\ &= \underline{\underline{24.803}} \text{ (3dp)} \end{aligned}$$

QT Bounds



4. In the formula $S = \frac{D}{T}$

$d = 6.73$ correct to 2 decimal places

$t = 3.456$ correct to 3 decimal places

Calculate the upper bound for s . Give your answer to 3 decimal places.

$$D = 6.73 \begin{array}{r} \text{UB} \\ \hline 6.735 \\ \hline \text{LB} \\ \hline 6.725 \end{array}$$

$$t = 3.456 \begin{array}{r} \text{UB} \\ \hline 3.4565 \\ \hline \text{LB} \\ \hline 3.4555 \end{array}$$

$$S = \frac{D}{T} \begin{array}{l} \leftarrow \text{Bigger} \\ \leftarrow \text{smaller} \end{array}$$

$$= \frac{6.735}{3.4555} = 1.9490667$$

$$= \underline{\underline{1.949}} \text{ (3dp)}$$

5. In the formula $v^2 = u^2 + 2as$

$v = 48.35$ correct to 2 decimal places

$a = 9.81$ correct to 2 decimal places

$s = 45.2$ correct to 1 decimal place

Calculate the upper bound for u . Give your answer to 3 decimal places.

$$v = 48.35 \begin{array}{r} \text{UB} \\ \hline 48.355 \\ \hline \text{LB} \\ \hline 48.345 \end{array}$$

$$a = 9.81 \begin{array}{r} \text{UB} \\ \hline 9.810 \\ \hline \text{LB} \\ \hline 9.805 \end{array}$$

$$s = 45.2 \begin{array}{r} \text{UB} \\ \hline 45.25 \\ \hline \text{LB} \\ \hline 45.15 \end{array}$$

$$v^2 = u^2 + 2as$$

$$v^2 - 2as = u^2$$

$$\therefore u = \sqrt{v^2 - 2as}$$

Big small

$$= \sqrt{(48.355)^2 - 2(9.805)(45.15)}$$

$$= 38.11580414$$

$$u = \underline{\underline{38.116}} \text{ (3dp)}$$

QT Bounds



6. A coffee machine dispenses 130ml of black coffee into cups with a capacity of 175ml. These values are correct to 3 significant figures.

Milk is supplied in small cartons which contain 21ml, accurate to the nearest ml. Beryl likes milky coffee and always uses 2 cartons of milk.

Will Beryl's cup ever overflow?

You must show your working.

$$\begin{array}{r} \text{UB} \\ 130 \\ \underline{-8} \\ 129.5 \end{array}$$

$$\begin{array}{r} \text{UB} \\ 175 \\ \underline{-8} \\ 174.5 \end{array}$$

$$\begin{array}{r} \text{UB} \\ 21 \\ \underline{-1} \\ 20.5 \end{array}$$

$$\begin{aligned} 2 \text{ cartons of milk} &= 21.5 \times 2 \\ &= 43 \end{aligned}$$

$$\begin{aligned} \text{Coffee} &= \underline{130.5} \end{aligned}$$

$$\text{Beryl's coffee} = \underline{\underline{173.5 \text{ ml}}}$$

no, it won't overflow as the lower bound of the cup is 174.5 ml.