

Maths Y9 - Bounds

1. Significant figures

We say that £6 725 000 rounded to **1 significant figure** is £7 000 000.

£7,000,000 (1 s.f.)

£6,700,000 (2 s.f.)

£6,730,000 (3 s.f.)

Significant figures can be abbreviated to s.f. or sig.fig.

More complex, show all significant zeros

Round 4.7982 to 3 significant figures

4.7982



3rd significant figure

The 8 rounds the 9 up, so

4.80 (3 s.f.)

Significant figures v decimal places

Round 26.345 to 1 decimal place

26.3 (1 d.p)

Round 26.345 to 3 significant figures

26.3 (3 s.f.)

Leading zeros don't count as being significant

Round 0.00024357 to 4 significant figures

2 is the first significant figure

0.0002436 (4 s.f.)

2. Estimation

Estimate the cost per person if I buy 49 cake, each costing £3.09 for 102 people.

Round each number to one significant figure

The approximate calculation is: $\frac{50 \times 3}{100} = \frac{150}{100}$

this gives an approximate answer of: **£1.50**

Estimate the answer to this calculation

$$\begin{aligned} & 623.93 \times (2.2 + 2.1) \\ \approx & 600 \times (2 + 2) \\ = & 600 \times (4) \end{aligned}$$

If numbers are rounded down, it is an underestimation

= 2400

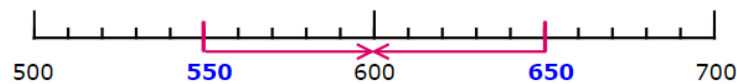
3. Upper and lower bounds

The distance from London to Edinburgh is 600km, rounded to the nearest 100km.

Find the upper and lower bounds.

The smallest it can be is 550km, so the **lower bound** is **550km**.

The largest it can be is 649.999999...km, this number can get infinitely close to 650km, so we say the **upper bound** is **650km**.

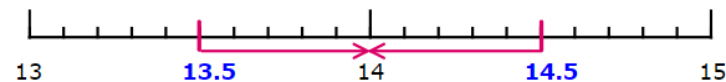


A pencil is 14cm, rounded to the nearest cm.

Find the upper and lower bounds.

The smallest it can be is 13.5cm, so the **lower bound** is **13.5cm**

The largest it can be is 14.499999...cm this number can get infinitely close to 14.5cm, so we say the **upper bound** is **14.5cm**.



4. Error intervals - Truncation

Truncation occurs when all less significant numbers are just ignored, always rounding down e.g. age 13.

We often truncate answers to division questions.

There are 56 eggs. If an egg box holds 6 eggs, how many egg boxes can they fill?

$$56 \div 6 = 9.333\dots$$

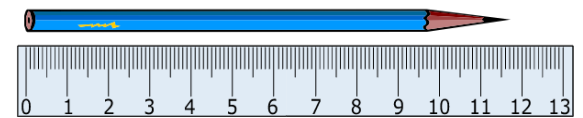
This means that 56 eggs fill 9 boxes and one third of another, so there will be **9 full boxes**.

What is the interval of the number of eggs that will fill 9 boxes?

$$\begin{aligned} 9 \times 6 &= 54 \text{ eggs fill exactly 9 boxes} \\ 10 \times 6 &= 60 \text{ eggs fill exactly 10 boxes.} \end{aligned}$$

$$54 \leq \text{number of eggs} < 60$$

5. Error Intervals - Rounding



The pencil is 12cm long to the nearest cm.

The smallest it can be is 11.5 cm

The largest is 12.499999.....cm tricky?

We can write the **interval** that rounds to 12 as an inequality.

$$11.5 \text{ cm} \leq \text{length} < 12.5 \text{ cm}$$