

CALCULATIONS INVOLVING UPPER AND LOWER BOUNDS

QUANTITIES	CALCULATION	COMMENTS
Max(A + B)	A high + B high	Keep both values high
Min(A + B)	A low + B low	Keep both values low
Max(A x B)	A high x B high	Keep both values high
Min(A x B)	A low x B low	Keep both values low
Max(A – B)	A high – B low	Start high and subtract as little as possible
Min(A – B)	A low – B high	Start low and subtract as much as possible
Max(A ÷ B)	high A ÷ low B	Think of a large fraction like $\frac{100}{1}$
Max $\frac{A}{B}$	$\frac{highA}{lowB}$	Keep the numerator high and denominator low
Min(A ÷ B)	Min A ÷ Max B	Think of a small fraction like $\frac{1}{100}$
Min $\frac{A}{B}$	$\frac{lowA}{highB}$	Keep the numerator small and the denominator large
Max $\frac{A - B}{C - D}$	$\frac{highA - lowB}{lowC - highD}$	Still keeping the numerator high & denominator low

ERRORS

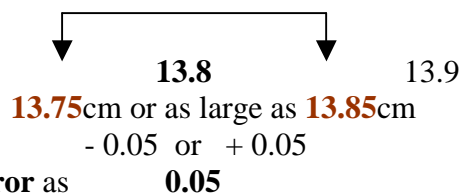
Consider the envelope measured as 13.8 cm to 1 dp.

The range of values for the length of the envelope: 13.7

The length of the envelope may be as small as

In these cases the most we can be out in our calculations is

If we **ignore the signs** in either case, we get the **absolute error** as



The percentage error is then found using $\frac{\text{absolute error}}{\text{measured value}} \times 100 = \frac{0.05}{13.8} \times 100 = \underline{\underline{0.36\%}}$

DEGREES OF ACCURACY

Take the postcard which measured 13.9 cm by 8.8 cm. Both measurements to 1 dp.

The maximum area of the card was $13.95 \times 8.85 = 123.4575$

The minimum area was $13.85 \times 8.75 = 121.1875$

An appropriate degree of accuracy for the area of the square would be 2 sig. fig since the maximum and minimum values agree up to 2 sig. fig.

Significant figures:	1	2	3	4	5	6
123.4575	100	120	123	123.5	123.46	123.458
121.1875	100	120	121	121.2	121.19	121.188

