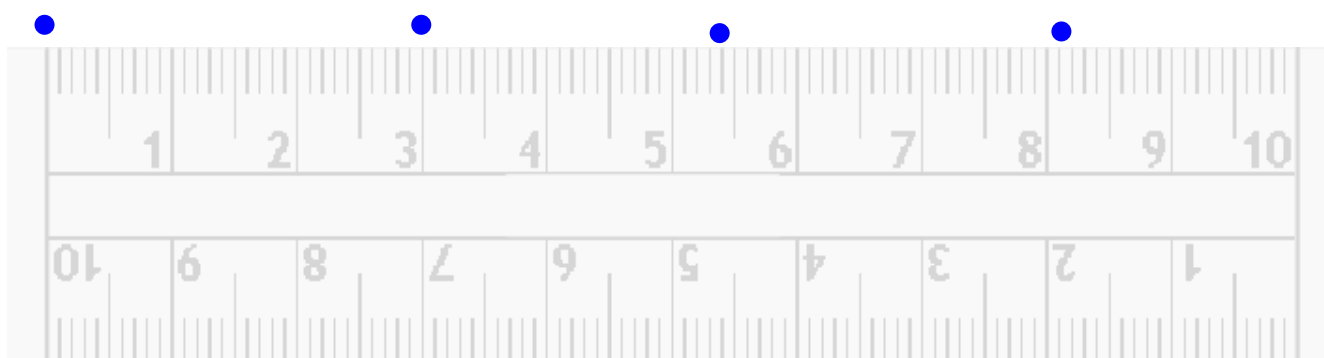# Significant Digits

All of the certain digits, plus one, of a measurement are considered to be significant digits.

You need to communicate how confident you are in your measurements in science. There is an international agreement about the correct way to record measurements and this is using significant digits.

There are certain rules that must be followed when calculating significant digits.

Significant Figures

Rules for Counting Sig. Fig.

1. **All** non-zero digits are significant

2. Zeroes
a) zeroes between non-zero digits are significant
Ex. 507 (3)　　　　507 (4)

b) leading zeroes are not significant
Ex. 0.00004 (1)

c) Trailing zeroes to the right of a number are significant **if the number has a decimal point**. If the number ends in zero and has no decimal point, we assume that the trailing
zeroes are not significant.
Ex. 480.0 (4 sig figs)
Ex. 4800 (2 sig figs)

How many significant figures in the following?

a) 38.4703 mL　　　- 6 sig. figs
b) 0.0052 g　　　　- 2 sig. figs
c) 0.05700 s　　　　- 4 sig. figs
d) 6.19 x 10⁸ years - 3 sig. figs

480　　　　　480.0

475-484

54 (2)

Lets Try a Few

423.230

0.000081

34.000000

687

80 0076

200 000

Significant Figures and Calculations

1. <u>Multiplication and Division</u>
    The result of the operation is reported as having as many significant figures as the measurement with the fewest significant figures.

Ex. Find the area of a rectangle with dimensions of 6.221cm and 5.2cm.

(4)   (2)

$A = l \times w$

$A = (6.221 \text{ cm}) \times (5.2 \text{ cm})$

$A = $ 32.3492 cm^2

$= \boxed{32 \text{ cm}^2}$

6.221×5.15
$= 32.03815$

6.221×5.24
$= 32.59804$

(4)   (2)

$17.04 \text{ cm} \times 4.0 \text{ cm}$

$= 68.16 \text{ cm}^2$

$= 68 \text{ cm}^2$

2. <u>Addition and Subtraction</u>
   The result of the operation is reported to the same number of **decimal places** as that of the term with the least number of **decimal places**.

Ex. Find the total distance:
   $D_1 = 106.7$km $D_2 = 14$km $D_3 = 0.59$km

   D_{total} $= D_1 + D_2 + D_3$
   D_{total} $= 106.7$km $+ 14$km $+ 0.59$km
   D_{total} $=$ 121 km

Ex.   20.4
        1.322
   +   83
   _____
      105   104.722

Lets Try A Few

Significant Figures Game

Determine the correct number of significant figures in each:

a) 3427

b) 0.00456

c) 123 453

d) 172

e) 0.000984

f) 0.502

g) 3100.0×10^2

Solve. Use the correct number of significant figures for each answer:

a) 17.34

　4.900

+ 23.1

b) 9.80

- 4.762

c) 3.9 x 6.05 x 420

d) 14.1 / 5 =

Worksheet - Significant Figures