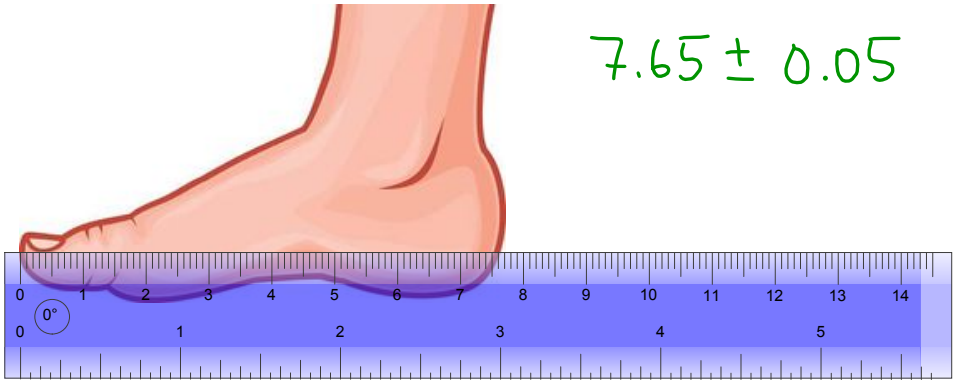
SIGNIFICANT FIGURES

How long is this image of a foot?



7.65 ± 0.05

In physical sciences, all our models and theories that attempt to describe how the world works are based on experimental evidence.

This evidence, is gathered in the form of numerical data. Therefore, it is essential that we are conscientious whenever we record data values.

There are two conventions we must follow when recording data:

1. Significant figures (significant digits)

2. Uncertainty (absolute and relative)

Significant figures (digits)

When any number is recorded it has a specific number of signicant digits. The number of significant digits provides information about how precisely the number is known.

Ex:

1.9 inches 2 s.f.

1.90 inches 3 s.f.

1.900 inches 4 s.f.

Rules for signifcant figures:

Rule #1: All non-zero digits are significant

Ex:

314 3

3.14 3

11 492 5

Rule #2: Zeros located between non-zeros are significant

Ex:

2013 4

3.005 4

1 000 001 7

Rule #3: Leading zeros are not significant

Ex:

0.6 1

0.08 1

0.00014 2

Rule #4: Trailing zeros are only signifcant when the number contains a decimal.

Ex:

2.50 3

2.500 4

250.0 4

0.00250 3

Addendum to rule #4: Trailing zeros without a decimal **may or may not be** significant. We will consider them **not** significant.

Ex:

14 000. 2, 3, 4 or 5

1.4×10^4

1.40×10^4

1.400×10^4

1.4000×10^4

How should we treat numbers that aren't measurements, such as the quantity of finite objects or constants?

Ex:

2 cars

6.02214×10^{23} (Avagadro's number)

$a_g = 9.81\ m/s^2$

exempt from significant figure consideration (∞ s.f.)