Significant Digits

borrow that ball → 29.235789 cm not reasonable way too much guessing!

Any time we record a measurement, there is guessing involved, but not as above!

1cm divisions ⇒ 29.2 cm (3 sd)
certain ↑ guessed digit (uncertain)

With any measurement, you can only guess 1 digit.

1mm divisions → 29.23 cm (4 sd)
certain ↑ uncertain digit

When counting significant digits, you count all the certain digits and the ONE uncertain digit.

BASIC SKILL

17. 2.9910 m → 5sd (count zeroes to the right of the decimal after a non-zero digit)
certain ↑ uncertain

19. 0.00670 kg → 3sd (leading zeroes never count)
leading zeroes; certain ↑ uncertain digit
6.70×10^{-3} kg

20. 809 g → 3 sd (zeroes between non-zero digits count)
certain ↑ uncertain

18. 5600 km → 2sd* (it could be 3, or 4 depending on the preciseness of the measuring instrument)
which is uncertain?

writing in scientific notation is a better way to show sd.

5.6×10^3 km → 2sd
5.60×10^3 km → 3sd
5.600×10^3 km → 4sd

5600. → 4sd

$560\bar{0}$ → 4sd

Calculations involving Significant Digits

Adding / Subtracting:

$$\begin{array}{rrl} & 12.012 & g \\ & 153.1 & g \\ + & 2.52 & g \\ \hline & 167.632 & g \end{array}$$

↑ can only have 1 uncertain digit

167.6 g

Round final answer to the least precise place value.

Multiplying / Dividing:

$$\begin{array}{rrll} & 32.8 & m & (3sd) \\ \times & 1.2 & m & (2sd) \\ \hline & 656 & & \\ & 328 & & \\ \hline & 39.36 & m^2 & \end{array}$$

39 m^2 (2sd)

Round final answer to the least number of significant digits used.

Basic Skill

21. $\frac{2.674\,m}{2.0\,m} = 1.337$ (4sd; 2sd; 2sd)

$\doteq 1.3$

22. $5.25\,L \times 1.3\,L = 6.825\,L^2$ (3sd; 2sd)

$\doteq 6.8\,L^2$

What if we wanted to round:

$6.825\,L^2 \doteq 6.82\,L^2$ (this place?) (round to even #)

$6.835\,L^2 \doteq 6.84\,L^2$

23. $9.0\,cm - 7.66\,cm + 5.44\,cm = 22.10\,cm$

$= 22.1\,cm$

24. $10.07\,g - 3.1\,g = 6.97\,g$

$\doteq 7.0\,g$

$A = \frac{1}{2}bh$