Significant Digits

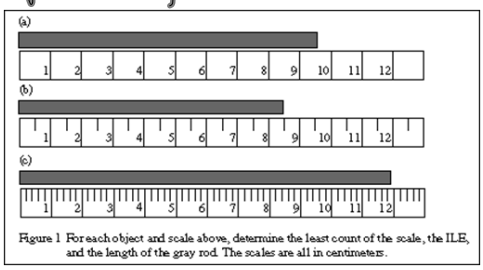

Figure 1 For each object and scale above, determine the least count of the scale, the ILE, and the length of the gray rod. The scales are all in centimeters.

Least Count
1 cm
0.5 cm
0.2 cm

When you take a measurement, you guess at the last digit that you record (it is part way through the smallest division (least count))

32 cm (2 sd)
3 — certain digit
2 — guessed → uncertain digit

32.3 cm (3 sd)
32 — certain
3 — uncertain

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

17. 2.9910 m → 5 sd
2.991 — certain
0 — uncertain

19. 0.00670 kg → 3 sd
0.00 — place holders
67 — certain
0 — uncertain

20. 809 g → 3 sd

18. 5600 km → 2 sd
ambiguous case . . . . you need to know more about the precision of the measuring instrument.

5.6×10^3 km → 2 sd

5.60×10^3 km → 3 sd

Rules For Significant Digits

You can remember these rules or think of it simply in terms of counting your certain digits and the one guessed or uncertain digit.

1. Digits from 1-9 are always significant.
2. Zeros between two other significant digits are always significant
3. One or more additional zeros to the right of both the decimal place and another significant digit are significant.
4. Zeros used solely for spacing the decimal point (placeholders) are not significant.

EXAMPLES	# OF SIG. DIG.	COMMENT
453 kg	3	All non-zero digits are always significant.
5057 L	4	Zeros between 2 sig. dig. are significant.
5.00 m	3	Additional zeros to the right of decimal and a sig. dig. are significant.
0.007 cm	1	Placeholders are not sig.
2500 g	2	How do you know what the uncertain digit is? It is best to write in scientific notation to clearly show the intended precision of the measurement.
2.500×10^3 g	4	The precision is clearly shown.