# Significant Figures

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**Significant digits or figures** are those digits in a measured number (or result of a calculation with measured numbers) that include all certain digits plus a final one having some uncertainty.

**Rules:**

1) Non-zero integers (1-9) always count as significant figures.
2) Zeros:
   a) Enclosed zeros with integers to both the left and right always count as significant figures.
   b) Leadings zeros (on the left) NEVER count as significant figures.
   c) Trailing zeros (on the right) only count as significant figures when there is a decimal point present; otherwise, they DO NOT count as significant figures.
3) Numbers that are exact have an infinite number of significant figures.
4) When numbers are **added or subtracted**, write the result with the same uncertainty (find using **decimal places**) as the number having the largest uncertainty.
5) When numbers are **multiplied or divided**, write the result with the same number of **significant figures** as the number having the fewest number of significant figures.
6) When taking common logarithms, if L is the logarithm of A (L = logA), the number of places after the decimal in L is the same number of significant figures in A. Conversely, if A is the antilogarithm of L, (A = antilogL or $A = 10^L$), the number of significant figures in A is equal to the number of places after the decimal in L.

Here are a few problems with the answers below. How many significant figures (sig figs) are there in each number or calculated value?

| | | | | | |
|---|---|---|---|---|---|
| **1)** | 12 ft | | **2)** | 45,526 sec | |
| **3)** | 528 torr | | **4)** | 1203 miles | |
| **5)** | 890 J | | **6)** | 4.056 candela | |
| **7)** | 890. J | | **8)** | 503 ergs | |
| **9)** | 0.056578 km | | **10)** | 0.017000 µL | |
| **11)** | 0.0590570 ton | | **12)** | 2.032081 °C | |
| **13)** | 3 ft = 1 yd | | **14)** | 144 apples = 1 gross apples | |
| **15)** | 0.0233 ft + 3,000 ft | | **16)** | 5 days + 6 days | |
| **17)** | 865 lb - 1,700 lb | | **18)** | 0.236 tsp + 0.841 tsp | |
| **19)** | 5.47 nm ÷ 89.7 s | | **20)** | 4.5 oz x 56 ft | |
| **21)** | 56,968 hr ÷ 0.00000258 hr | | **22)** | 0.002 dL x 52189112 Gm | |
| **23)** | $2.56 \times 10^{-23} \div 3.600 \times 10^{-34}$ | | **24)** | (132 + 2.53) / (345 - 371) | |
| **25)** | log(0.05478) | | **26)** | antilog(0.56) | |
| **27)** | antilog(-23.562) | | **28)** | log(25.302 + 5.0 ÷ 2.78) | |
| **29)** | $\frac{(2.06 + \log(250))}{\text{antilog}(0.0213)}$ | | **30)** | 2.50 + 0.0 | |

**Achtung!!! The Answers are below!!! Warning!!!**

| | | |
|---|---|---|
| **1)** | 12 ft | 2 |
| **3)** | 528 torr | 3 |
| **5)** | 890 J | 2 |
| **7)** | 890. J | 3 |
| **9)** | 0.056578 km | 5 |
| **11)** | 0.0590570 ton | 6 |
| **13)** | 3 ft = 1 yd | inf. |
| **15)** | 0.0233 ft + 3,000 ft | 1 |
| **17)** | 865 lb - 1,700 lb | 1 |
| **19)** | 5.47 nm ÷ 89.7 s | 3 |
| **21)** | 56,968 hr ÷ 0.00000258 hr | 3 |
| **23)** | $2.56 \times 10^{-23} \div 3.600 \times 10^{-34}$ | 3 |
| **25)** | log(0.05478) | 5 |
| **27)** | antilog(-23.562) | 3 |
| **29)** | $\frac{(2.06 + \log(250))}{\text{antilog}(0.0213)}$ | 3 |

| | | |
|---|---|---|
| **2)** | 45,526 sec | 5 |
| **4)** | 1203 miles | 4 |
| **6)** | 4.056 candela | 4 |
| **8)** | 503 ergs | 3 |
| **10)** | 0.017000 µL | 5 |
| **12)** | 2.032081 °C | 7 |
| **14)** | 144 apples = 1 gross apples | inf. |
| **16)** | 5 days + 6 days | 2 |
| **18)** | 0.236 tsp + 0.841 tsp | 4 |
| **20)** | 4.5 oz x 56 ft | 2 |
| **22)** | 0.002 dL x 52189112 Gm | 1 |
| **24)** | (132 + 2.53) / (345 - 371) | 2 |
| **26)** | antilog(0.56) | 2 |
| **28)** | log(25.302 + 5.0 ÷ 2.78) | 4 |
| **30)** | 2.50 + 0.0 | ? |

inf = infinite