Significant Digits (Sig Digs)

Key concepts:

- significant digits
- error
- manipulating equations

Exact Numbers

- all counted quantities are exact and have infinite sig digs
- example: 32 red cars on a lot; pi

Significant

- numbers 1 to 9 are **always** significant

5 sig digs

- example: 259.49
- any zeros between two non-zeros

3 sig digs

- example: 104
- any zero to the right of **both** a decimal and a non-zero

2 sig digs

- example: 0.0030
- ALL digits in scientific notation

Significant Digits (Sig Digs)

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NOT Significant

- leading zeros
- example: 0.00071 — 2 sig digs

- trailing zeros
- example: 2800 — 2 sig digs

***if zeros are meant to be sig digs, the number must be written as

2.800×10^4 — 4 sig digs

Rounding and Sig Digs

Key concepts:

- significant digits
- error
- manipulating equations

Adding and Subtracting

- check which number is the **least precise** (least numbers after decimal)
- use that many decimals in your final answer
- **example**:

4.0 + 12.32 + 2.03456 = 18.35456

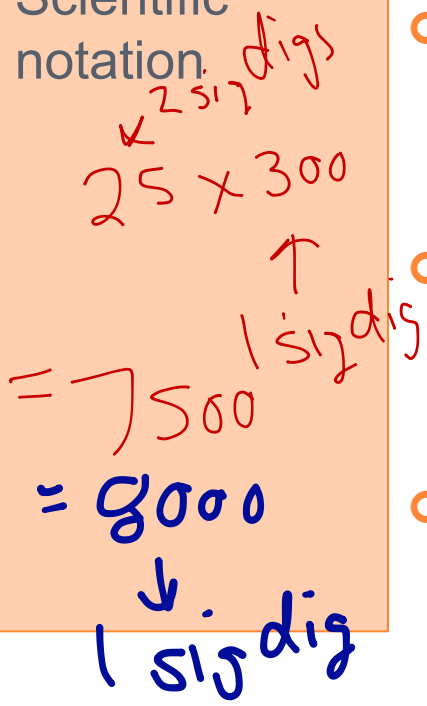
Final answer = **18.4**

1 decimal place

Rounding and Sig Digs

Key concepts:

- significant digits
- manipulating equations
- Scientific notation



Multiplying and Dividing

- check which number has the fewest sig digs
- round answer so it has this many sig digs

NOTE:

- if digits dropped are less than 5, remaining digit is unchanged

4.123
4.12
4.1

- if digits dropped are greater than 5, remaining digit is increased

9.786
9.79
9.8

- if digit dropped is exactly 5, remaining digit is rounded to the **nearest even number**

8.750	**6.450**
8.8	**6.4**

Manipulating Equations

Key concepts:

- significant digits
- manipulating equations
- Scientific notation

- rearrange equation so the unknown value is on one side of the equation

- TWO RULES:

1. To move something to the other side, just do the opposite math operation to it.

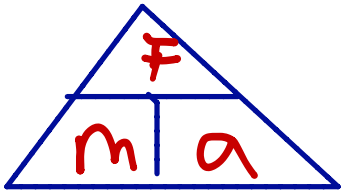
2. If you do it to one side, do it to the other.

Manipulating Equations

Key concepts:

- significant digits
- manipulating equations
- Scientific notation

- example: Solve for *m*



$m = \frac{F}{a}$

$F = ma$

$\frac{F}{a} = \frac{ma}{a}$

$\frac{F}{a} = m$

- example: Solve for v_1

$v_2^2 = v_1^2 + 2ad$

$v_2^2 - 2ad = v_1^2 + 2ad - 2ad$

$v_2^2 - 2ad = v_1^2$

$\sqrt{v_2^2 - 2ad} = \sqrt{v_1^2}$

$\sqrt{v_2^2 - 2ad} = v_1$

Scientific notation

Key concepts:

- significant digits
- manipulating equations
- Scientific notation

- Extremely large and extremely small numbers are awkward to write in common decimal notation
- Common decimal notation does not always convey the number of significant digits of a measured quantity

Scientific notation

Key concepts:

- significant digits
- manipulating equations
- Scientific notation

Expression	Common decimal notation	Scientific notation
"124.5 million kilometres"	124 500 000 km	1.245×10^{8} km
"154 thousand picometres"	154 000 pm	1.54×10^{5} pm
"602 sextillion molecules"	602 000 000 000 000 000 000 000 molecules	6.02×10^{23} molecules

0.0000053 = 5.3×10^{-6}

6

Pg. 350

#3

7 A extension cord

∴ limit current to 7A

so 15 A not adequate

Pg 348 #3.

0.83 A / light

15 A fuse

15 ÷ 0.83

= 18.07

Read 351-357