Math Review

Fill in the following table for the following quantities and their symbols:

Quantity	**Unit**	**Symbol**
length	meters	m
mass	Kilograms	Kg
time	seconds	s
force	Newtons	N
energy	Joules	J
power	Watts	W
speed	meters per second	m/s
frequency	Hertz	Hz

Complete the following conversions

1. 4 km = 4000 m
2. 54 mm = 0.054 m
3. 0.394 Mg = 394 000 g
4. 4000 ms = 4 s
5. 4 dl = 0.4 l
6. 70 dam (deka meters) = 700 m
7. 4 Gg = 4×10^{11} cg
8. 9 000 000 µm = 0.009 km
9. 4000 s = 1.11 h
10. 67 m^2 = 670 000 cm^2

Example 1:

3000 cm = __________ km

$$3000 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} = \boxed{0.03 \text{ km}}$$

Example 2:

3 m^3 = __________ cm^3

$$3 \text{ m}^3 \times \frac{(100 \text{ cm})^3}{(1 \text{ m})^3} = 3 \text{ m}^3 \times \frac{1\,000\,000 \text{ cm}^3}{1 \text{ m}^3} = \boxed{3\,000\,000 \text{ cm}^3}$$

Rounding:

5 and up → round up	4.55 → 4.6
4 and down → round down	4.54 → 4.5

Significant Figures:

All non-zero numbers count.
Zeros to the left never count.
Zeros in the middle always count.
Zeros to the right count only if there is a decimal in the number.

Example: 0.00050600 This number has 5 sig figs because the four zeros to the left of the 5 don't count. The 5 and 6 count. The 0 in the middle counts. The two zeros to the right of the 6 count because there is a decimal in the number.

Example: 567, 000 This number has 3 sig figs because the 5,6,and 7 count, but the zeros to the right do not count since there is no decimal in the number.

Round the following numbers to 2 sig figs:

1. 35.67 →	36	6. 0.0102 →	0.010
2. 0.0004567 →	0.00046	7. 99536 →	1.0×10^5
3. 2.34×10^4 →	2.3×10^4	8. 1.0326 →	1.0
4. 4.777×10^{-6} →	4.8×10^{-6}	9. 156.21 →	160
5. 23.333 →	23	10. 9.75 →	10.

Multiplication / Division: This is the most common rule for sig figs we will be using. Use this for all multiplication or multifunction equations. Use the **lowest number of total sig figs** in your equation for your answer.

Example: 6.5 m x 687.3 m = 4467.645 m, but because of sig figs, your answer will be $\boxed{4.5\text{x}10^3\text{ m}}$
(2) (4) (7) (2)

Addition / Subtraction: If you have a situation where you are only using addition and / or subtraction you should use this rule for sig figs. Look at the number of **decimal places** and use the smallest number of decimal places in your answer.

Example: 3.456 s + 22.55 s = 26.006 s, but because of sig figs, your answer will be $\boxed{26.01\text{ s.}}$
(3) (2) (3) (2)

Solve the following equations and leave the answers with the correct number of sig figs:

1. 23 + 4.8 = 28
2. 234.67 x 34 = 8.0×10^3
3. 4567 / 2.45 = 1860
4. 2.56 + 0.89 = 3.45
5. 2345.8 x 23.2 = 54400

<u>Percent Uncertainty:</u>

If something is measured to be 12.3 cm +/- 0.5 cm. What is its percent uncertainty?

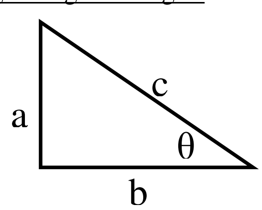
$\frac{0.5\text{ cm}}{12.3\text{ cm}}$ x 100% = 4% uncertainty

It is important to know how big the uncertainty is compared to the actual measurement. 0.5 cm error would be a lot if your measurement was only 2.1 cm! That would amount to an error of 24% instead of only 4%
(0.5 / 2.1) x 100% = 24%

To emphasize this point, consider this; 1 cm error when you are measuring 100 000 cm isn't much, therefore almost negligible. Your calculated % error would be low. 1 cm error when you are measuring only 10 cm is a concern. Your % error would be much higher.

<u>Trigonometry:</u>

a) <u>Right Angle Triangles</u>

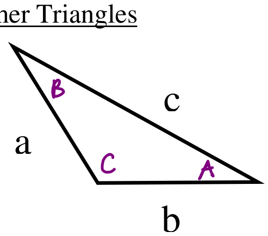


$\sin\theta = a/c$
$\cos\theta = b/c$
$\tan\theta = a/b$

Pythagorean Theorem:

$c^2 = a^2 + b^2$

b) <u>Other Triangles</u>



Sine Law: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Cosine Law:

$c^2 = a^2 + b^2 - 2ab\cos C$