Science - The method of exploring the world and sometimes diagnosing issues
1) Make a hypothesis
2) Test hypothesis
3) If hypothesis fails, return to step 1
4) If hypothesis succeeds, return to step 2

Physics - The branch of physics that studies the motion of matter and energy. Relies heavily on symmetry and similarity. For this reason we will do linear and rotational motion in parallel.

Ex: linear and rotational
\[ x = x_0 + v_0 t + \frac{1}{2} a t^2 \quad \theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2 \]

Exactly the same form, slightly different meaning.

SI units:
- m - distance
- kg - mass
- s - time
- K - temperature
- mol - amount of substance
- A - current
- cd - luminous intensity

Accuracy vs. Precision

\[ \frac{W}{\epsilon} \]

Weigh the item \( N \) times

SI prefixes:
- T = 10\(^{12}\)
- G = 10\(^{9}\)
- M = 10\(^{6}\)
- k = 10\(^{3}\)
- \( \mu = 10^{-6}\)
- \( \alpha = 10^{-9}\)
- p = 10\(^{-12}\)

If \( W = 137.648 \ldots \ g \)

Then \( W = 267.78 \ g \) is precise and inaccurate
\( W = 100.0 \ g \cdot 10^3 \ g \) is accurate and inaccurate
\( W = 137.70 \ g \) is precise and accurate
\[
\begin{align*}
A_x &= 5 \cos 52^\circ = 3.08 \\
A_y &= 5 \sin 52^\circ = 3.94 \\
B_x &= 3 \cos 273^\circ = 0.157 \\
B_y &= 3 \sin 273^\circ = -2.996
\end{align*}
\]

You have to track sine and cosine + signs.

\[
\begin{align*}
C_x &= A_x + B_x = 3.237 \\
C_y &= A_y + B_y = 1.944 \\
\vec{C} &= (3.237, 1.944)
\end{align*}
\]

\[
|\vec{C}| = \sqrt{(3.237)^2 + (1.944)^2} = 3.77
\]

\[
\theta = \arctan \left( \frac{1.944}{3.237} \right) = 31.3^\circ
\]

\[
\vec{C} = 3.77 \hat{i} + 16.3^\circ \text{ or } 3.77 \hat{i} + 16.3^\circ \text{ N of E}
\]

\[
W = F \cdot \vec{d} = Fd \cos \theta = Fd_{\parallel}
\]

\[
Q = \vec{F} \cdot \vec{F} = F \sin \theta = Fd_{\perp}
\]

\[
\text{hidden dot product} \quad \text{parallel}
\]

\[
\text{hidden cross product} \quad \text{perpendicular}
\]