PHYS 117 MT2 Formula Sheet
Jason Ngo

1 Kinematics

1.1 Scalar Product

$$\vec{A} \cdot \vec{B} = AB\cos\theta$$
$$\vec{A} \cdot \vec{B} = A_x B_x + A_y B_y + A_z B_z$$

1.2 Cross Product

$$\vec{A} \times \vec{B} = -\vec{B} \times \vec{A} = AB\sin\theta$$
$$\vec{A} \times \vec{B} = (A_y B_z - A_z B_y)\,\hat{i} + (A_z B_x - A_x B_z)\,\hat{j} + (A_x B_y - A_y B_x)\,\hat{k}$$

Use right hand rule (point fingers along the first vector, curl hand in towards next vector).

1.3 1D/2D Kinematics

$$v_i = v_o + at$$
$$\Delta x = v_o t + \tfrac{1}{2}at^2$$
$$v_f^2 = v_o^2 + 2a\Delta x$$
$$\Delta x = \tfrac{1}{2}t\,(v_o + v_i)$$

1.3.1 Projectile Motion

$$t = \frac{2v_o \sin\theta}{-g}$$
$$\Delta x = \frac{v_o^2 \sin(2\theta)}{-g} = \frac{2v_o^2 \sin\theta\cos\theta}{-g}$$

1.4 Relative Motion

$$v_{pw} = v_{pg} + v_{gw}$$

DRAW VECTOR DIAGRAMS

2 Newton's Laws of Motion

3 Work Power Energy

3.1 Energy

3.2 Work

3.3 Power

4 Linear Momentum/Collisions

4.1 Momentum

4.2 Impulse

4.3 Centre of Mass

5 Rotational Motion

5.1 Rotational Kinematics

5.2 Rotational Work Power Energy

5.3 Inertia

6 Angular Momentum

6.1 Centre of Mass

A Terms/Definitions

B Constants

C Conversions

D Orders of Magnitude

E Trigonometry

F Calculus