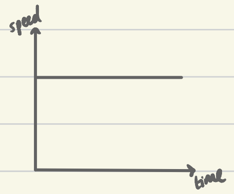
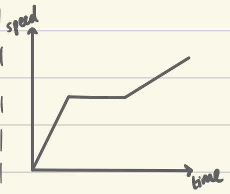
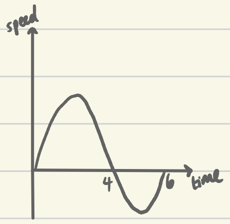
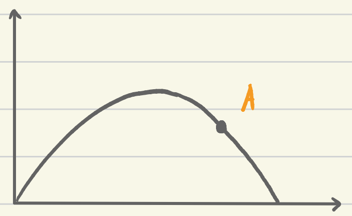
Kinematics - motion

	Constant Speed, $a=0$	Constant Acceleration	Variable Acceleration
Kinematic Equations	dist = kmph $\longrightarrow$ ms^{-1} ms^{-1} $\longrightarrow$ kmph	F $v=$ F $s=$ F $s=$ F $v^2=$ F $s=$	s/x v a
Speed-Time Graphs			
Vector Motion	$\underline{r} =$	$\underline{v} =$ $\underline{r} =$ $\underline{r} =$	$\underline{r}$ $\underline{v}$ $\underline{a}$

distance travelled =
acceleration =

Projectiles



Horizontal Motion
$a=$

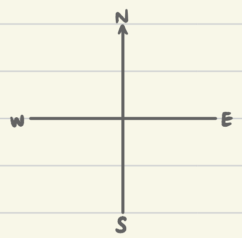
Vertical Motion
$a=$

Find the speed and direction of motion at A

Vector Motion

"moving in the direction $\binom{2}{3}$"

"is north-east of the origin"



Modelling Assumptions

smooth pulley:
light string:
inextensible string:
particle:
rod:
+ obvious ones like smooth, rough, etc.

Forces

Equilibrium

static/at rest
on the point of slipping/limiting equilibrium
constant speed

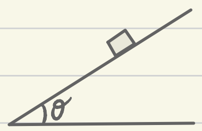
Vector forces

Dynamics, $F=ma$

If none of the above, it is accelerating/decelerating
Resolve using $F=ma$, in the direction of
Vectors, use $\underline{F}=m\underline{a}$ where $\underline{F}$ is the resultant, $\underline{R}$
$\underline{R}=$

Friction

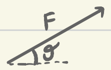
Always opposes
If static, F_r
If limiting equilibrium/dynamic F_r
$0 \le \mu$
On slopes



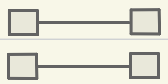
$> F_{r\,max}$
$\le F_{r\,max}$

Forces Diagrams - Basic

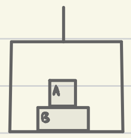
Resolving



Tension
Thrust



Boxes on boxes/Lifts

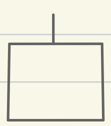


A: m kg
B: M kg Lift: L kg

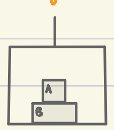
A:

B:

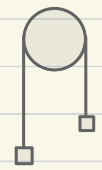
Lift:

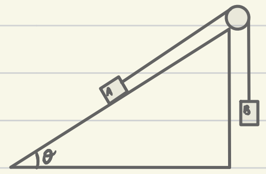


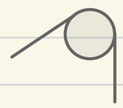
Whole system:



Connected Particles



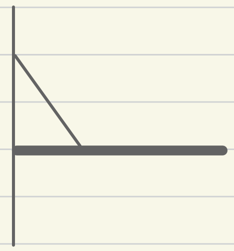


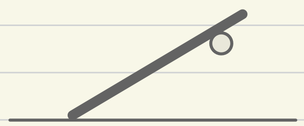


Method
1)
2)
3)
4)
5)
6)

Rigid Bodies

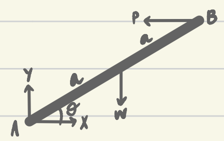
uniform:
non-uniform:
on the point of
tilting about A:





Moments

moment =
anticlockwise =



Method:
1)
2)
3)