Revision Workshop 2014

PHYSICS

PROGRAMME

0930 Registration
0945 Introduction
0955 Session 1 – Mechanics
1130 Short break
1140 Session 2 – Electricity and Magnetism
1300 LUNCH
1340 Session 3 – Waves, Matter and Materials
1455 Final comments
1500 END

QUICK HINTS & TIPS

- READ THE QUESTION CAREFULLY
- ENGAGE with the paper – underline, highlight, draw (anything important, put on yr script)
- CLEAR working and answers
  - Calc – Neat, logical layout
  - Expl - Use point form – clear, concise
  - NB – generous marks for substitution line (±20%)
- Be guided by mark allocation
- Know your terms and definitions (±10%)
- Units!!!!!
- Don't get stuck
- COMMUNICATE!!!

MECHANICS

DBE 42% | IEB 55%

- Newton's laws and application of Newton's laws
- Different kinds of forces: weight, normal force, frictional force, applied force (push, pull), tension (strings or cables)
  - Force diagrams, free-body diagrams
- Projectile motion, 1D
  - Equations
  - Graphs
- Momentum and Impulse
- Work, Energy, Power
- Newton's Law of Universal Gravitation

Approaching the Question

- Knowing where to begin!?
- TOP TIPS…

- REFWA
  - Read
  - Extract

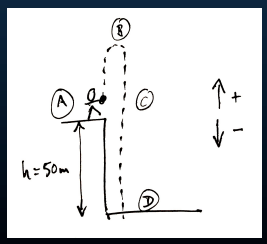
- 3D approach
  - Diagram
  - Direction
  - Data

Which Diagram?

Make it visual

PROJECTILES

- Draw the path
- Basic context
- Mark "milestones"

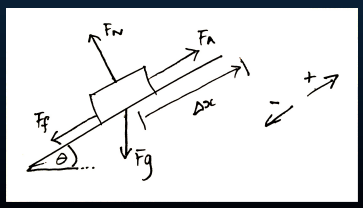


Which Diagram?

Make it visual

WORK

- Force / Free-body diag
- Label clearly



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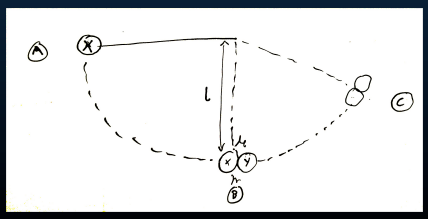
Which Diagram?

Make it visual

MULTI-STEP – WORK, ENERGY, MOMENTUM

- Show the story (chapters)
- Mark "milestones"



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Which Diagram?

Make it visual

MOMENTUM

- Before and After
- Label clearly

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Approaching the Question

- Knowing where to begin!?
- TOP TIPS…

- REFWA
  - Read
  - Extract
  - Formula
  - Working
  - Answer

- 3D approach
  - Diagram
  - Direction
  - Data

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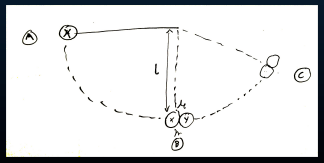
Using "Chapters"

- Many questions have a "story"…
  - Before… After
  - Start… Crash! … End
- E.G. – Tarzan & Monkeys



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Using "Chapters"

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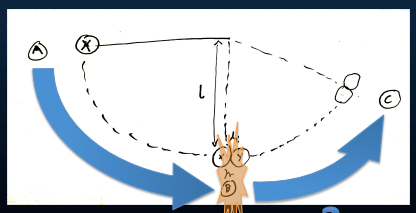
Using "Chapters"

- E.G. – Tarzan & Monkeys



1 Cons of Energy

$v_{f1} => v_{i2}$ $v_{f2} => v_{i3}$

2 Cons of Mom

3 Cons of Energy

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Using "Chapters"

- Many questions have a "story"…
  - Before… After
  - Start… Crash! … End
- E.G. – Tarzan & Monkeys

- Ensure the DATA you are working with is appropriate for the "Chapter" you are in
- And that the PRINCIPLES / FORMULAE you are using is correct for that part of the story

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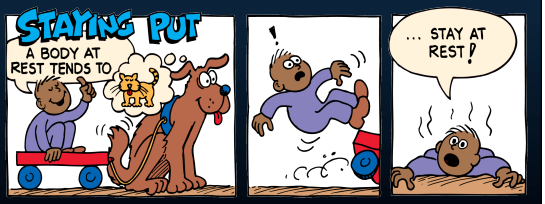
Newton's 1st Law

"A body will remain in its state of rest or motion at constant velocity unless a non-zero resultant/net force acts on it."



Things keep doing what they're doing!

Newton's 2nd Law

"When a net force is applied to an object (mass) it accelerates in the direction of the net force.

The acceleration is directly proportional to the net force and inversely proportional to the mass."

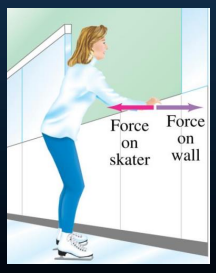
$F_{net} = ma$

When you push something, it speeds up (or slows down)!

The net force acting on an object is equal to the rate of change of momentum.

$$F_{net} = \frac{\Delta p}{\Delta t}$$

Newton's 3rd Law



"When object A exerts a force on object B, object B simultaneously exerts a force of equal magnitude on object A in the opposite direction."

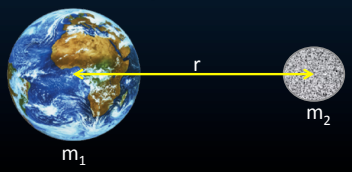
A key to the correct application of the third law is that the forces are exerted on 2 different objects.

When you push something, it pushes back!

Newton's Law of Universal Gravitation

"Every particle in the universe attracts every other particle with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres."

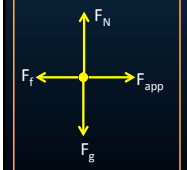
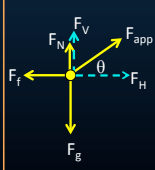
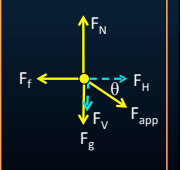
$$F = G\frac{m_1 m_2}{r^2} \qquad g = G\frac{M_{(planet)}}{r^2}$$



Free-Body diagrams

Make it visual

- The Normal Force does not always equal F_g
- Take this into account when using $F_f = mF_N$

Horizontal	Pulling Force	Pushing Force
		
$F_N = F_g$	$F_N = F_g - F_V$	$F_N = F_g + F_V$

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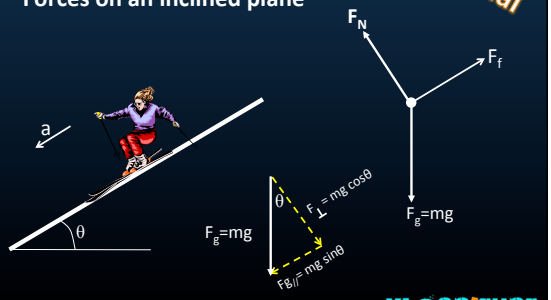
Which Diagram?

Make it visual

Forces on an inclined plane



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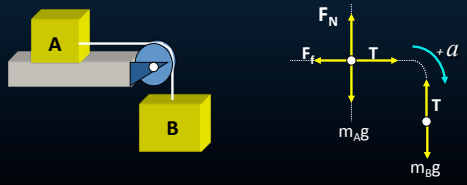
Which Diagram?

Make it visual

Two Objects that are joined

- Draw a free-body diagram for each object
- Remember a is the same for both
- Choose direction of motion as positive



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1-D Projectiles

- Don't forget DIAG + DIRECTION
- For equations of motion:
  - Write formula
  - Clear substitutions
- For graphs of motion:
  - Know what to expect (shape)
    e.g. object speeding up uniformally then slowing down uniformally
- NB!!!:
  - Reference point
  - Positive Direction

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Work, Energy, Power

- Identify CLOSED SYSTEM or not?
  - i.e. is there friction or applied force (not closed)
- If it is a closed system:
  - Use "Energy Principles" / Conservation of E_{mech}
  - $E_{mech\ i} = E_{mech\ f}$
- If it's not a closed sytem
  - Look at whether energy is being added to, and/or taken away from the system
  - $W_{net} = \Delta K$ OR
  - $W_{nc} = \Delta E_K + \Delta E_P$

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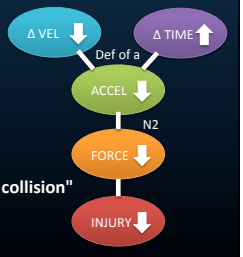
Momentum & Impulse

- Careful between "change in momentum" and "rate of change of momentum"
- Calculations
  - NB – direction v important
  - Careful with substitutions
- Safety features
  - Explain systematically
  - Usually – "extends time of collision"



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General Mechanics Tips

- Motion graphs – remember the basics
  - E.g. (v/t) – Grad = accel; Area = displ
- Watch out for phrases that lock you into a particular method of answering the question, e.g.:
  - USING THE GRAPH…
  - USING ENERGY PRINCIPLES…
  - USING THE WORK-ENERGY THEOREM…
- **NB NB NB:**
  - **Direction**

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BEST TIP EVER…

Practice!

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