OAKRIDGE INTERNATIONAL SCHOOL
BENGALURU
A NORD ANGLIA EDUCATION SCHOOL

Revision Worksheet
MYP 4

Mechanics [Force and motion, Energy, Work done]

1. The speed limit of most sections of the highway is 65 miles/hour. If a car travels 450 miles in in six hours, was the car exceeding the speed limit? How far above or below the speed limit was the car?

2. In 1990, Glenn Spear set a world speed record by swimming the 50 meter freestyle in 21.81 seconds. What was Glenn's speed?

3. A college scout is looking for a swimmer to break Glenn Spear's speed record. He watches a swimmer doing a 100 meter freestyle event. When the swimmer reaches the halfway point in distance, he is timed at 23.71 seconds. Did he beat Glenn Spear's speed record? Why or why not?

4. If the swimmer's final time at the end of the 100m free-style was 41.32 s, would the scout recruit the swimmer for his swim team to swim the 50 meter race? What about the 100 meter race? Why or why not?

5. A snowmobile travels south at 45 km/hr for 30 minutes, turns west, and continues traveling at 35 km/hr for an hour. What distance did the snow mobile cover? What was the displacement of the snowmobile? What was its speed? What was its velocity?

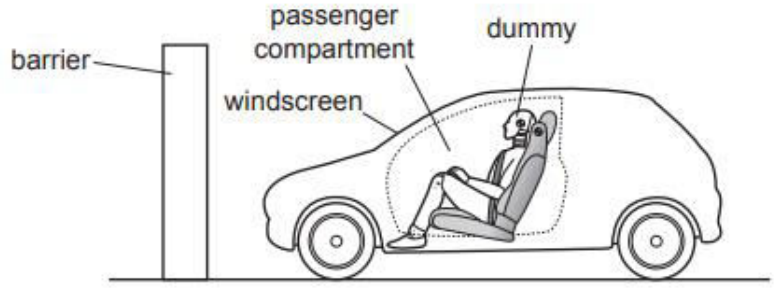
6. A student wishes to work out how much power she uses to lift her body when climbing a
flight of stairs. Her body mass is 60 kg and the vertical height of the stairs is 3.0 m. She takes 12 s to walk up the stairs.

(a) Calculate the work done in raising her body mass as she climbs the stairs
(b). Calculate the output power she develops when raising her body mass. At the top of the stairs she has gravitational potential energy.
(c)Describe the energy transformations taking place as she walks back down the stairs and stops at the bottom.

7. You are traveling in a car that is moving at a velocity of 20 m/s. Suddenly, a car 10 meters in front of you slams on its brakes. At that moment, you also slam on your brakes and slow to 5 m/s. Calculate the acceleration if it took 2 seconds to slow your car down.

8. Falling objects drop with an average acceleration of 9.8 m/s^2. If an object falls from a tall building, how long will it take before it reaches a speed of 49 m/s

9. The below figure shows a dummy of mass 70kg used in a crash test to investigate the safety of a new car.



The car approaches a solid barrier at 20 m / s. It crashes into the barrier and stops suddenly.

(a). Calculate the momentum of the dummy immediately before the crash.
(b) Impulse is the change in momentum. Determine the impulse that must be applied to the dummy to bring it to rest.
(c) The seat belt and air bag bring the dummy to rest so that it does not hit the windscreen. The dummy has an average deceleration of 80 m/s^2.
Calculate the average resultant force applied to the dummy, of mass 70 kg.

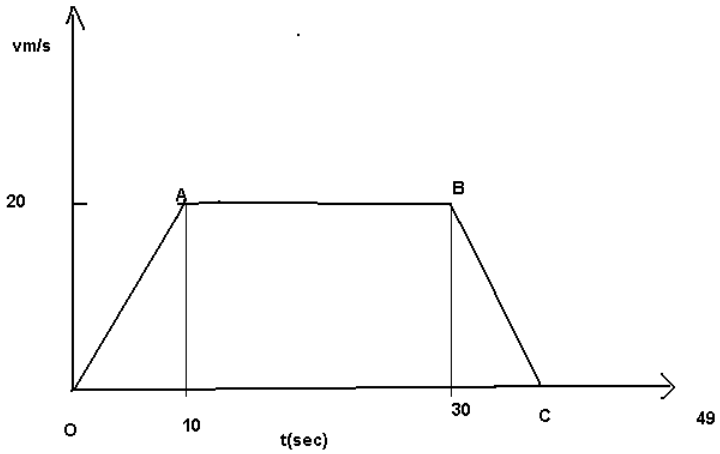
NUMERICALS

1. **A bullet of mass 10g is fired with a rifle. The bullet takes 0.003sec.to move through its barrel and leaves it with a velocity of 300m/s. What is the force exerted on the bullet by the rifle?**
2. **What will be the acceleration of a body of mass 5kg if a force of 200N is applied on it?**
3. **A cricket ball of mass 70g moving with a velocity of 0.5m/s is stopped by a player in 0.5 sec. What is the force applied by the player to stop the ball?**
4. **A 1000kg mass having a speed of 10m/s is brought to rest over a distance of 100m.Find (i) the retardation (ii) the retarding force.**
5. **Suppose that a sledge is accelerating at a rate of 2 m/s^2. If the net force is tripled and the mass is halved, then what is the new acceleration of the sledge?**

6. **Fill in the blank spaces below, using the given data.**

7. **The velocity- time graph of a bike of mass 120 kg is given below. Calculate the force acting on the bike in the first 10 seconds of the journey.**

	Net Force (N)	Mass (kg)	Acceleration (m/s/s)
1.	10	2	
2.	20	2	
3.	20	4	
4.		2	5
5.	10		10



Formulae to be used :

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

$$s = \frac{1}{2}(u + v)t$$

F= m.a
Impulse = final momentum= initial momentum
Impulse = Force x Time
p= m.v
P.E = mhg
KE = ½ mv^2

Work done = change in energy [Work energy theorem]

Power = Energy / time or Power = Work done/time.