Practice Question Set For GCSE
Subject : Physics
Paper-2 Topic: Forces (High Demand Questions)

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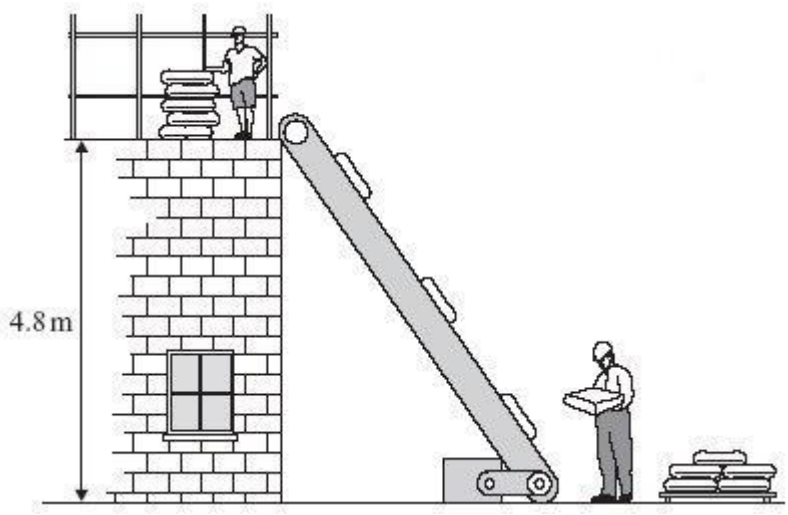
Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

A machine is used to lift materials on a building site.



(a) (i) Write down the equation that links change in gravitational potential energy, change in vertical height and weight.

_____

(1)

(ii) A 25 kg bag of cement is lifted from the ground to the top of the building. Calculate the gain in the gravitational potential energy of the bag of cement.

(On Earth a 1 kg mass has a weight of 10 N.)

_____

_____

Change in gravitational potential energy = _____ joules

(2)

(b) The conveyor belt delivers six bags of cement each minute to the top of the building.

(i) Calculate the useful energy transferred by the machine each second.

_____

_____

_____

Useful energy transfer each second = _____ J

(1)

(ii) The machine is 40% efficient.
Use the following equation to calculate the total energy supplied to the machine each second. Show how you work out your answer.

$$\text{Efficiency} = \frac{\text{useful energy transferred by device}}{\text{total energy supplied to device}}$$

_____

_____

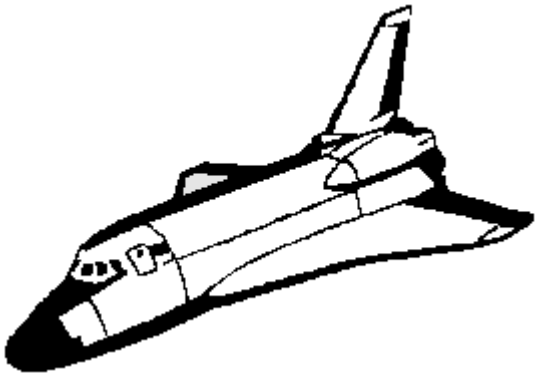
Total energy supplied each second = _____ J

(2)

(Total 6 marks)

Q2.

The diagram shows an orbiter, the reusable part of a space shuttle. The data refers to a typical flight.



Orbiter data	
Mass	78 000 kg
Orbital speed	7.5 km/s
Orbital altitude	200 km
Landing speed	100 m/s
Flight time	7 days

(a) (i) What name is given to the force which keeps the orbiter in orbit around the Earth?

_____

(1)

(ii) Use the following equation to calculate the kinetic energy, in joules, of the orbiter while it is in orbit.

$$\text{kinetic energy} = \tfrac{1}{2}\, mv^2$$

_____

_____

Kinetic energy = _____ joules

(2)

(iii) What happens to most of this kinetic energy as the orbiter re-enters the Earth's atmosphere?

_____

_____

(1)

(b) After touchdown the orbiter decelerates uniformly coming to a halt in 50 s.

(i) Give the equation that links acceleration, time and velocity.

_____

(1)

(ii) Calculate the deceleration of the orbiter. Show clearly how you work out your answer and give the unit.

_____

_____

Deceleration = _____

(2)

(c) (i) Give the equation that links acceleration, force and mass.

_____

(1)

(ii) Calculate, in newtons, the force needed to bring the orbiter to a halt. Show clearly how you work out your answer.

_____

_____

Force = _____ newtons

(1)

(Total 9 marks)

Q3.

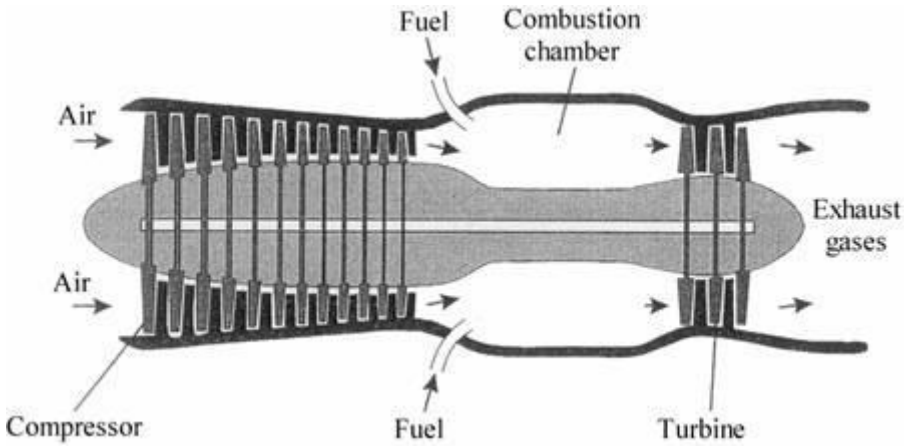
(a) What is the principle of conservation of momentum?

_____

_____

(2)

(b) The diagram shows a simplified aircraft jet engine.



Adapted from GCSE Physics by Tom Duncan. John Murray (Publishers) Ltd.

(i) What is the function of the turbine?

_____

_____

(1)

(ii) Explain how the engine produces a forward thrust.

_____

_____

_____

_____

_____

_____

_____

(4)

(c) During flight, air enters the engine at 175 m/s and leaves at 475 m/s. A forward thrust of 105 kN is produced.

Use the following equation to calculate the mass of air passing through the engine every second. (Ignore the mass of the burned fuel.)

$$\text{force} = \frac{\text{change in momentum}}{\text{time}}$$

_____

_____

_____

Mass of air = _____ kg

(2)

(Total 9 marks)