

Exam Questions NI

- 1a) A satellite orbits the earth. Name two main types of energy possessed by the satellite in its orbit.
- bi) Show the useful energy change that takes place in a wind turbine
- bii) The wind is a renewable energy source, what does this mean?
- biii) Give two other examples of renewable energy resources.
- c) Show the energy changes taking place in a hydroelectric power station.

2) One environmental effect of using the tides to generate electricity is to reduce the greenhouse effect by decreasing the consumption of fossil fuels. Apart from this environmental issue, state one advantage of generating electricity from the tides.

3) The most common energy resources used in Europe today are oil, natural gas, coal, nuclear, HEP and wind energy.

- i) Choose one non-renewable energy resource from the list above and say what it is non-renewable.
- ii) Choose one renewable energy resource from the list and say why it is renewable.
- iii) Give one advantage that non-renewable energy resources have over renewable energy resources.

b) It has been estimated that $1 \times 10^8 \text{ kg}$ of water flows over Niagara Falls every second. The falls are 50m high. Calculate the GPE lost every second by the water flowing over the falls.

A feasibility study has shown that only 0.8% of the available PE could be converted into electrical energy by a HEPS built on the falls.

ii) Calculate the maximum power output of the HEPS.

iii) Explain why all HEPS are dependent on the energy of the Sun.

c) A 4x4 car stuck in some mud, the winch at the front of the 4x4 has been connected to a tree via a rope. As the winch winds in the rope, the 4x4 moves forward towards the tree. The winch uses 500W of input electrical power. It has an efficiency of 0.6.

i) Calculate the useful output power of the winch.

ii) Write down the useful work done by the winch in 1 second.

iii) The pulling force in the rope is 1200N. Calculate the constant speed at which the vehicle moves forward.

4a) How much work is done by a tractor when it lifts a load of 8000N to a height of 1.8m.

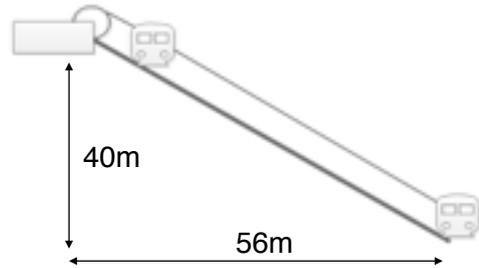
b) The output power of the tractor is 5.2kW. How long does it take to do 26000J of work?

c) The efficiency of the tractor is 0.26. If the output power of the tractor is 5.2kW calculate the input power.

5) Stephen weighs 550N. How much work does he do in climbing up to a diving board which is 3.0m high?

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6) Two identical tramcars with a water tank underneath each one are used to carry people up and down a very steep road. The tramcars are connected by a steel cable which passes around the pulley at the top. The tramcar that is the highest has water added until there is enough to raise the bottom tramcar.



- a) The weight of the lower car and its passengers is 2400N. Ignoring friction calculate the work done in kJ in bringing the tramcar from the bottom to the top.
- b) The time for this journey was 20s. Calculate the power needed to raise the tramcar.
- c) On this journey, the energy provided by the upper car as it descended was 1200kJ. Calculate the efficiency of the tramcar on this journey.
- d) During the journey certain energy changes take place. Copy the table and indicate if the energy increases, decreases or remains the same if the top tramcar descends at a constant speed.

Energy	increase/decrease/ remains constant
Potential energy of the top tramcar	
Kinetic energy of the top tramcar	
Potential energy of the bottom tramcar	
Kinetic energy of the bottom tramcar	

7) A basketball player throws a ball into the air. Copy and complete the table by putting ticks in the appropriate box, to show what happens to each quantity as the ball rises. Ignore friction.

Quantity	Increase	Decrease	Constant
speed of the ball			
Potential energy of the ball			
Total energy of the ball			
Kinetic energy of the ball			