Name of the Student:_____

Max. **Marks : 24 Marks**   **Time : 24 Minutes**

Q1.

A remote village in the UK uses a hydroelectric generator to provide electricity.

(a) In one day, 2 500 000 kg of water passes through the hydroelectric generator.

The change in gravitational potential energy of the water is 367.5 MJ.

gravitational field strength = 9.8 N/kg

Calculate the mean change in vertical height of the water as it moves through the hydroelectric generator.

Use the Physics Equations Sheet.

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Mean change in vertical height = _____ m

(4)

(b) The generator transfers 3.0 kW of electrical power.

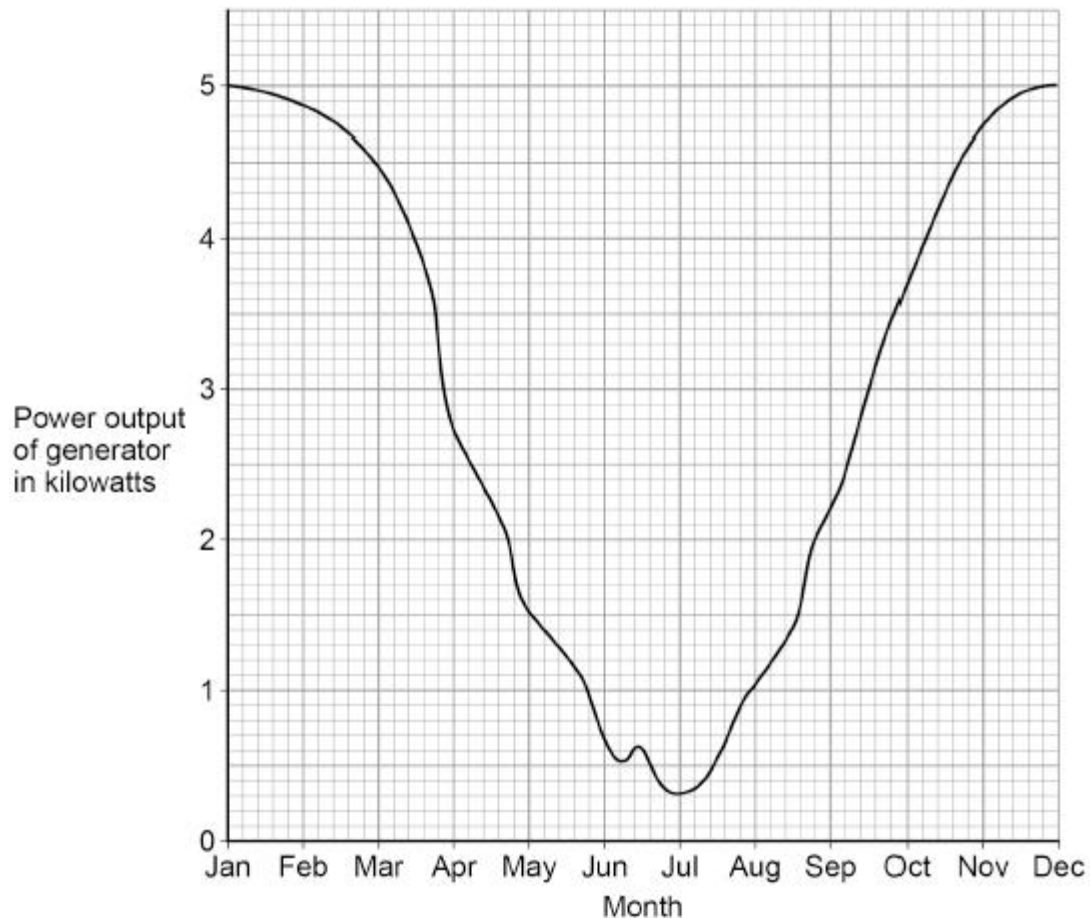Calculate the time taken for the generator to transfer 2.16×10^7 J of energy.

Use the Physics Equations Sheet.

Give your answer in standard form.

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Time taken (in standard form) = _____ s

(5)

(c)   The figure below shows how the power output of the generator varied during one year.

A solar power system is installed in the remote village in addition to the hydroelectric generator.

Explain why this improves the reliability of the electricity supply to the village.
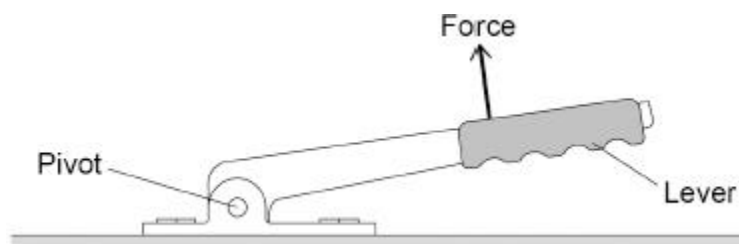
Use information from the figure above.

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(2)

(Total 11 marks)

Q2.

Some cars have a lever that is used to apply the handbrake.

Figure 1 shows the handbrake lever in a car.

Figure 1

(a)   The driver applies the force shown in **Figure 1**. The force produces a moment about the pivot.
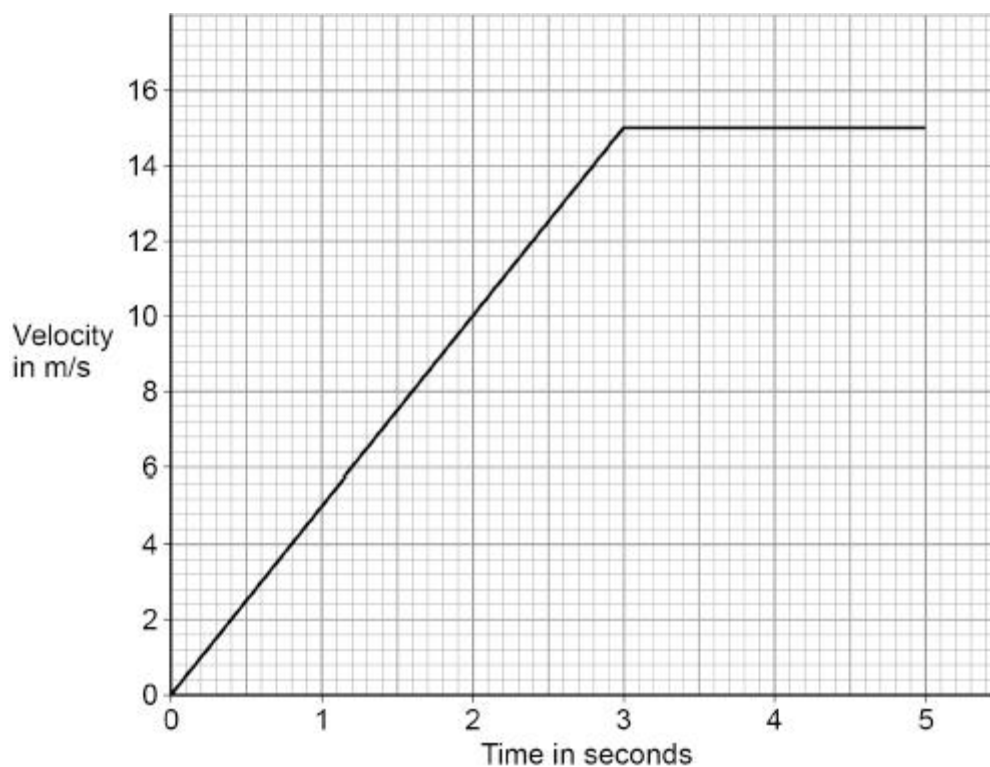
How could the driver increase the moment about the pivot without increasing the size of the force?

_____

_____

(1)

The driver releases the handbrake.

Figure 2 shows how the velocity of the car changes during the first 5 seconds of a journey.

Figure 2

(b)   After 3 seconds, the momentum of the car is 24 000 kg m/s.

Calculate the mass of the car.

Use the Physics Equations Sheet.

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Mass = _____ kg

(4)

(c)   Determine the distance travelled by the car during the first 5 seconds of the journey.

Use **Figure 2**.

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Distance travelled by the car = _____ m

(3)

(d)   In an emergency the driver needs to apply the brakes suddenly to stop the car quickly.

The driver of the car is distracted.

Explain why the distraction will increase the stopping distance.

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(3)

(e)   Explain why the temperature of the brakes increases as they are used.

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(2)
(Total 13 marks)