Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Figure 21 shows a pulley system that enables a person to lift a heavy barrel.

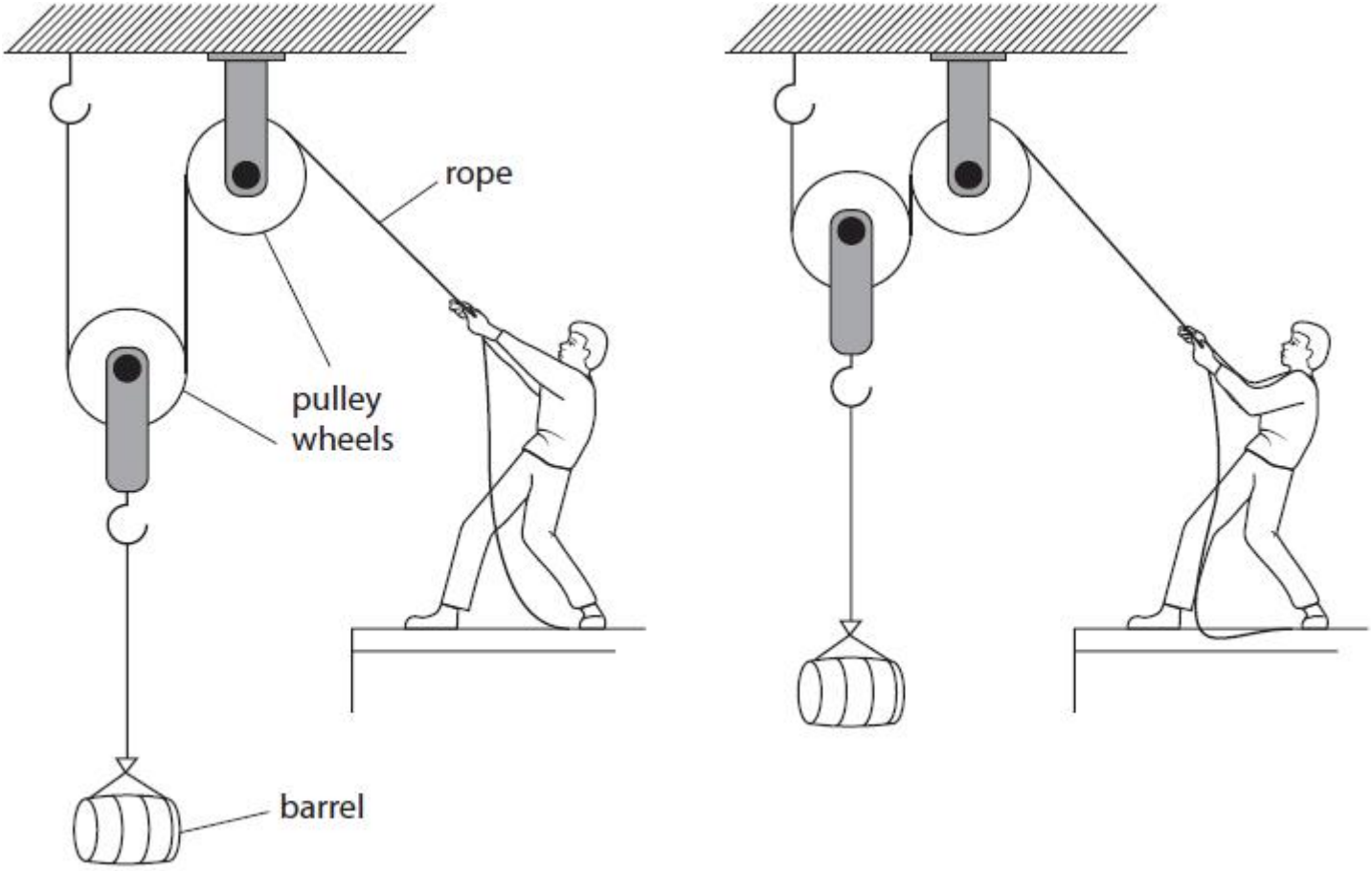

Figure 21

The person pulls down on the rope to make the barrel rise through 1.2 m.

The work done against gravity on the barrel is 1800 J.

(i) Calculate the weight of the barrel.

Use the equation

work done = force × distance moved in the direction of the force

(2)

weight of the barrel = ... N

(ii) The efficiency of the system is 64%.

Calculate the total work done by the person.
Use the equation

$$\text{efficiency} = \frac{\text{(work done against gravity on the barrel)}}{\text{(total work done by the person)}} \times 100\%$$

(2)

work done = ... J

(iii) Some energy is wasted due to friction.

Suggest **another** reason why some energy is wasted in using this pulley system.

(1)

.....

.....

(Total for question = 5 marks)

Q2.

Figure 11 shows a pulley system that enables a person to lift a heavy barrel.

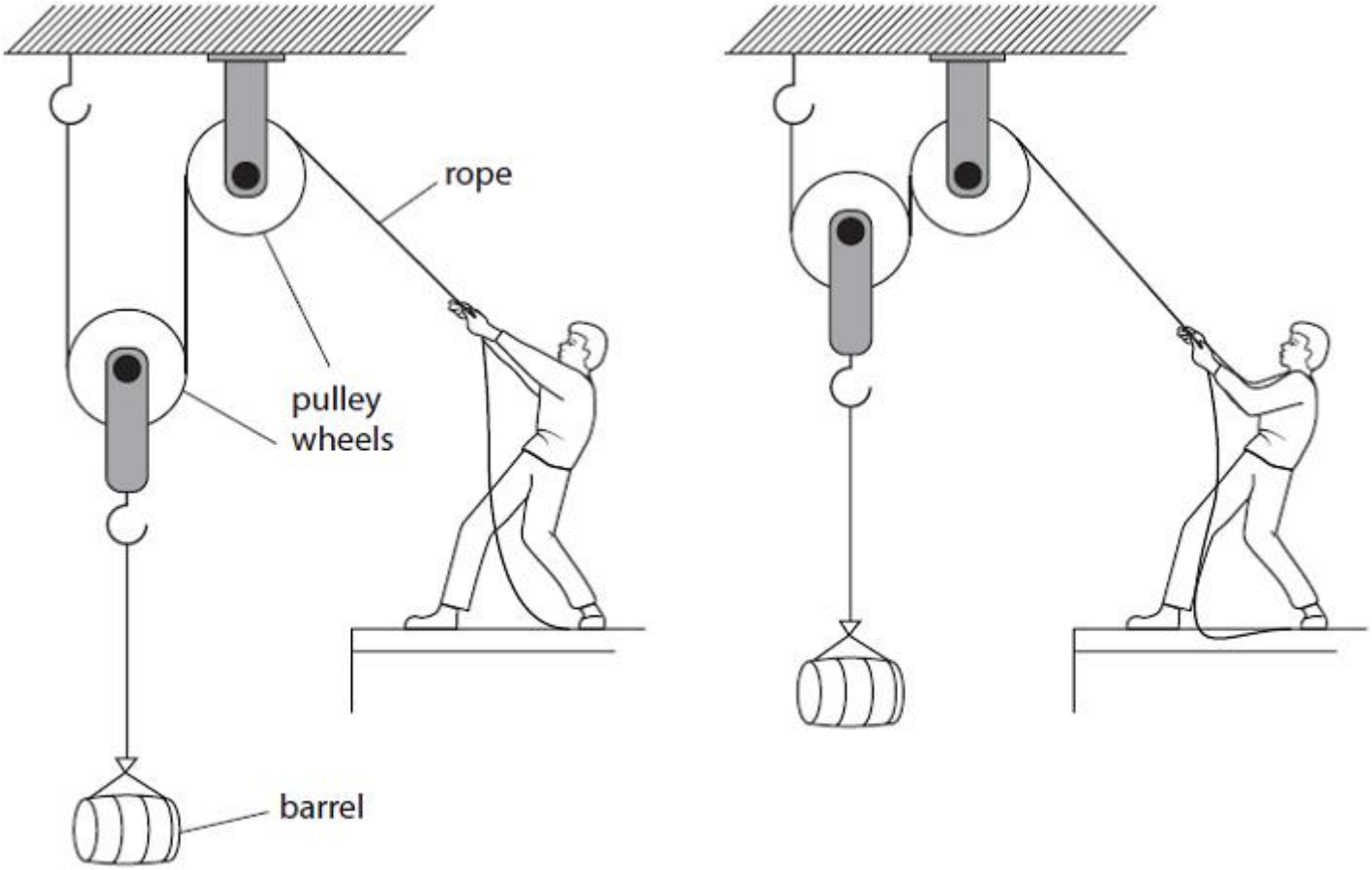

Figure 11

The person pulls down on the rope to make the barrel rise through 1.2 m.

The work done against gravity on the barrel is 1800 J.

(i) Calculate the weight of the barrel.

Use the equation

work done = force × distance moved in the direction of the force

(2)

weight of the barrel = ... N

(ii) The efficiency of the system is 64%.

Calculate the total work done by the person.
Use the equation

$$\text{efficiency} = \frac{\text{(work done against gravity on the barrel)}}{\text{(total work done by the person)}} \times 100\%$$

(2)

work done = ... J

(iii) Some energy is wasted due to friction.

Suggest **another** reason why some energy is wasted in using this pulley system.

(1)

.....

.....

(Total for question = 5 marks)

Q3.

Figure 1 shows part of a roller coaster ride seen from the side.

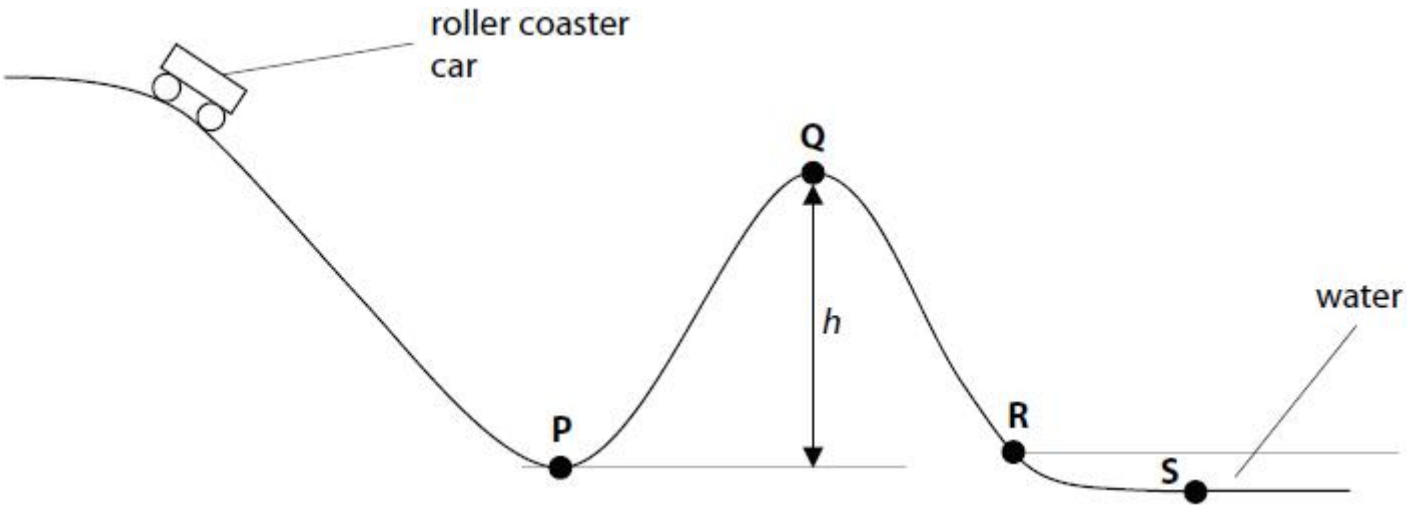

Figure 1

(a) The roller coaster car rolls down towards **P**. The car has mass, *m* kg and velocity *v* m/s.

Which of these is the correct equation for calculating the kinetic energy of the car?

(1)

- ☒ **A** $KE = mv$
- ☒ **B** $KE = mv^2$
- ☒ **C** $KE = ½mv^2$
- ☒ **D** $KE = 2mv^2$

(b) The mass of the car is 580 kg.

The car gains 39 000 J of gravitational potential energy as it climbs from **P** to **Q**.

(i) State the equation relating change in gravitational potential energy, mass, gravitational field strength and change in vertical height.

(1)

(ii) Calculate the height *h*, shown in Figure 1.
(gravitational field strength, *g* = 10 N/kg)

(3)

h = ... m

(Total for question = 5 marks)

Q4.

A cyclist is riding a bicycle at a steady velocity of 12 m/s.

The cyclist and bicycle have a total mass of 68 kg.

Calculate the kinetic energy of the cyclist and bicycle.

Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

(2)

kinetic energy = ... J

(Total for question = 2 marks)