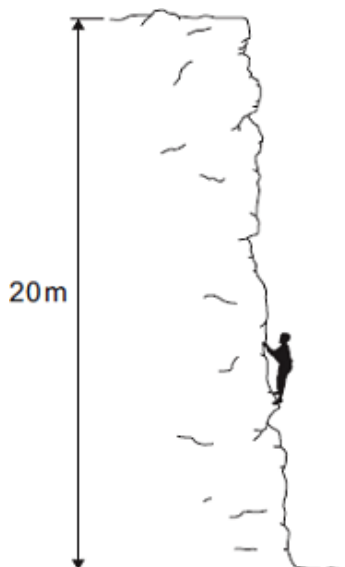


Q1. The diagram shows a climber part way up a cliff.



(a) Complete the sentence.

When the climber moves up the cliff, the climber
gains gravitational energy.

(1)

(b) The climber weighs 660 N.

(i) Calculate the work the climber must do against gravity, to climb to the top of the cliff.
Use the correct equation from the Physics Equations Sheet.

.....
.....

Work done = J

(2)

(ii) It takes the climber 800 seconds to climb to the top of the cliff.
During this time the energy transferred to the climber equals the work done by the climber.

Calculate the power of the climber during the climb.

Use the correct equation from the Physics Equations Sheet.

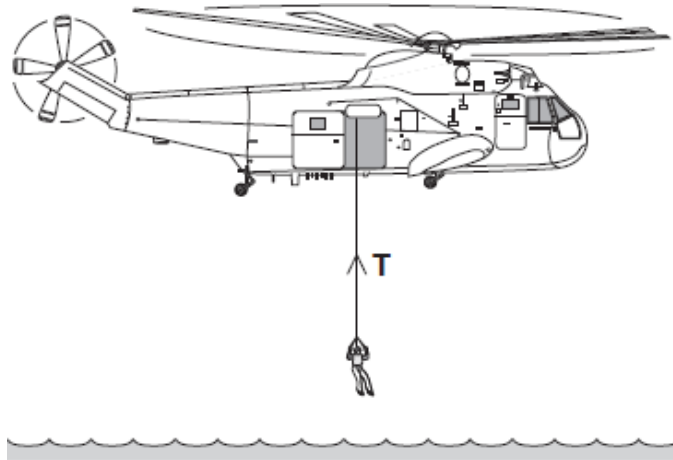
.....
.....

Power = W

(2)

(Total 5 marks)

Q2. The diagram shows a helicopter being used to rescue a person from the sea.



- (a) (i) The mass of the rescued person is 72 kg.

Use the equation in the box to calculate the weight of the rescued person.

$\text{weight} = \text{mass} \times \text{gravitational field strength}$

gravitational field strength = 10 N/kg

Show clearly how you work out your answer.

.....

Weight = N

(2)

- (ii) An electric motor is used to lift the person up to the helicopter.
 The motor lifts the person at a constant speed.

State the size of the force, **T**, in the cable.

Force **T** = N

(1)

- (b) To lift the person up to the helicopter, the electric motor transformed 21 600 joules of energy usefully.

- (i) Use a form of energy from the box to complete the following sentence.

gravitational potential	heat	sound
-------------------------	------	-------

The electric motor transforms electrical energy to kinetic energy. The kinetic energy is then transformed into useful energy.

(1)

- (ii) It takes 50 seconds for the electric motor to lift the person up to the helicopter.

Use the equation in the box to calculate the power of the electric motor.

$$\text{power} = \frac{\text{energy transformed}}{\text{time}}$$

Show clearly how you work out your answer and give the unit.

Choose the unit from the list below.

coulomb (C)

hertz (Hz)

watt (W)

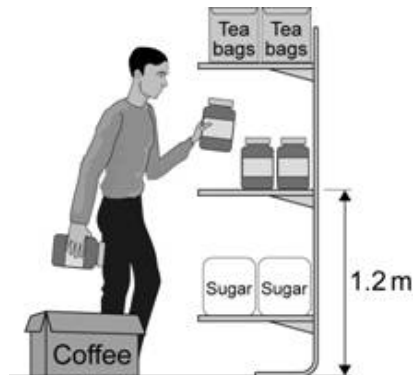
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.....

Power =

(3)
(Total 7 marks)

- Q3.** The diagram shows a supermarket worker stacking jars of coffee onto a shelf.



- (a) The mass of each jar of coffee is 0.4 kg.

Calculate the weight of each jar of coffee.

gravitational field strength = 10 N/kg

Write down the equation you use, and then show clearly how you work out your answer.

.....
.....
.....
.....

Weight = N

(2)

- (b) The distance between the floor and the middle shelf is 1.2 m.

Calculate the work done to lift one jar of coffee from the floor onto the shelf.

Write down the equation you use, and then show clearly how you work out your answer and give the unit.

.....
.....
.....
.....
.....
.....

Work done =

(3)

(Total 5 marks)

Q4. The diagram shows an adult and a child pushing a loaded shopping trolley.



- (a) (i) What is the *total force* on the trolley due to the adult and child?

.....

(1)

- (ii) Which **one** of the terms in the box means the same as *total force*?

Draw a ring around your answer.

answer force mean force resultant force

(1)

- (iii) The trolley is pushed at a constant speed for 80 metres.

Use the equation in the box to calculate the work done to push the trolley 80 metres.

work done = force applied \times distance moved in direction of force

Show clearly how you work out your answer.

.....

.....

Work done =

(2)

- (b) Complete the following sentences by drawing a ring around the correct word in each of the boxes.

- (i) The unit of work done is the

joule
newton
watt

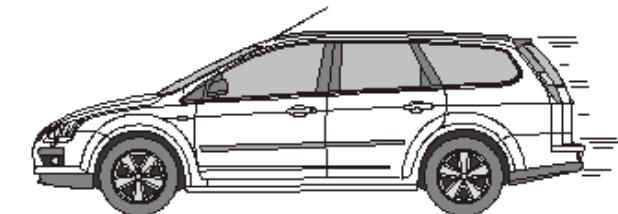
(1)

- (ii) Most of the work done to push the trolley is transformed into

heat
light
sound

(1)
(Total 6 marks)

- Q5.** (a) The diagram shows a car travelling at a speed of 12 m/s along a straight road.



- (i) Use the equation in the box to calculate the momentum of the car.

$$\text{momentum} = \text{mass} \times \text{velocity}$$

Mass of the car = 900 kg

Show clearly how you work out your answer.

.....

.....

.....

.....

Momentum = kg m/s

(2)

- (ii) Momentum has direction.

Draw an arrow on the diagram to show the direction of the car's momentum.

(1)

- (b) The car stops at a set of traffic lights.

How much momentum does the car have when it is stopped at the traffic lights?

.....

Give a reason for your answer.

.....

.....

.....

.....

(2)
(Total 5 marks)

