Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

A student plots a graph showing the height at the start and the maximum height reached after each bounce. Figure 16 shows the student's graph.

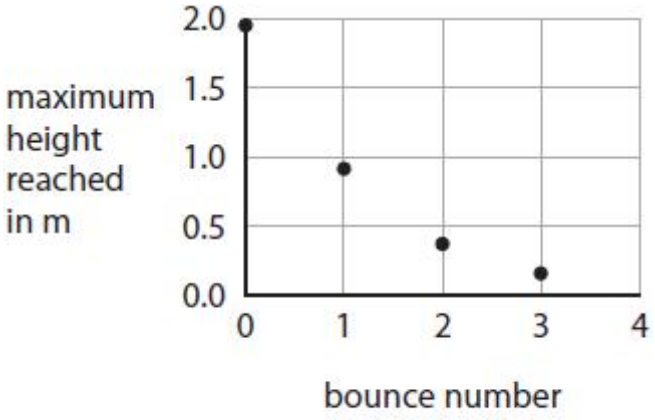


Figure 16

Describe how the maximum height reached changes with the bounce number in Figure 16.

(2)

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

(Total for question = 2 marks)

Downloaded from www.merit-minds.com

Q2.

*Figure 23 shows a drone.



© Liubov Kotliar/123RF

Figure 23

The blades on the drone are turned by electric motors.

The electric motors are powered by a battery.

Figure 25 represents the energy transfers involved when the drone rises from the ground.

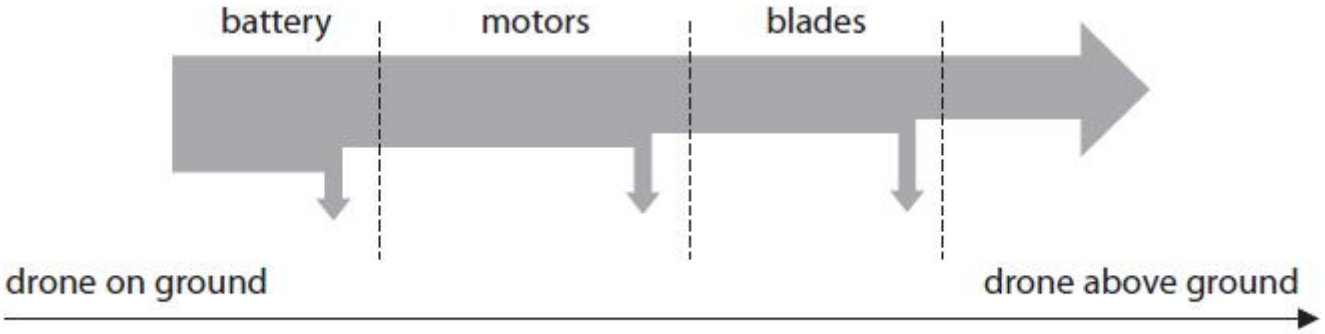


Figure 25

Describe the changes in the way energy is stored when the drone rises from the ground.

Your answer should refer to energy transfers.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 6 marks)

Downloaded from www.merit-minds.com

Q3.

An electric motor is used to lift a box.

Figure 14 shows how the efficiency of the electric motor changes as the mass of the box increases.

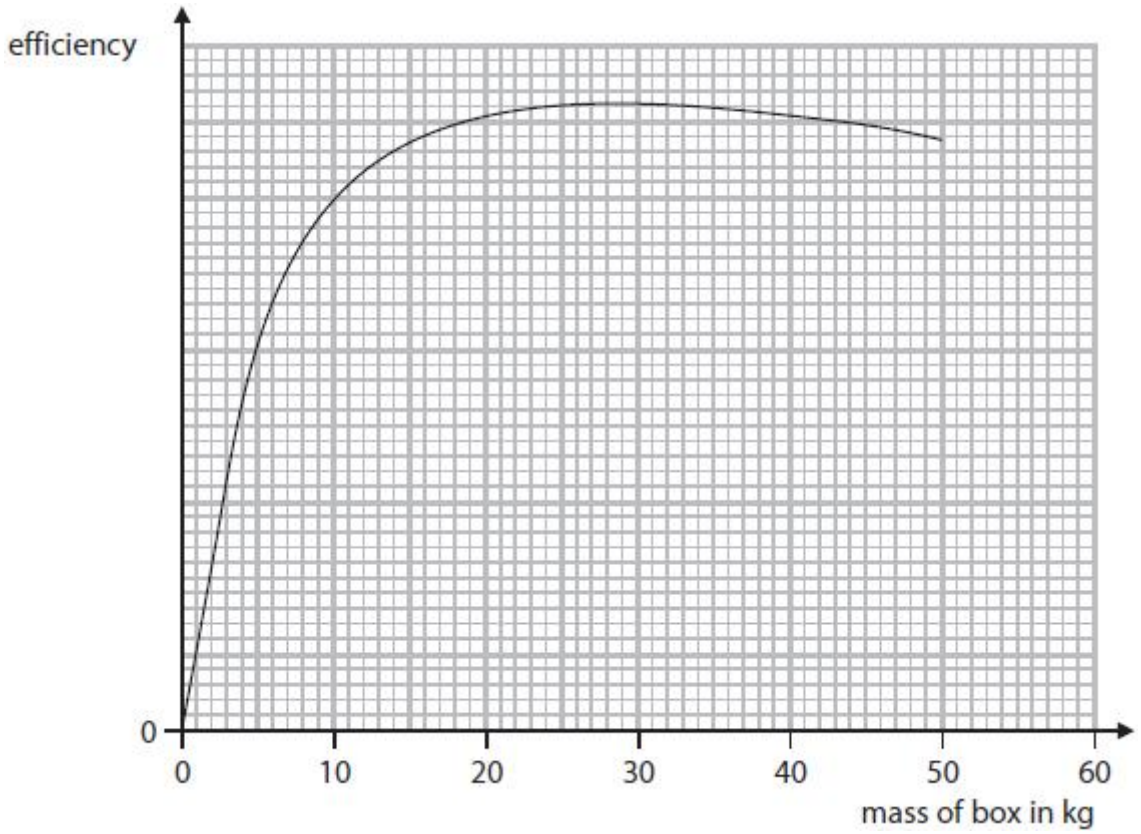


Figure 14

Describe how the efficiency of the electric motor depends on the mass of the box lifted.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

Downloaded from www.merit-minds.com

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)

Downloaded from www.merit-minds.com

Q5.

Fuel weighing 230 000 N is pumped into an aircraft.
This fuel moves upwards through a vertical height of 4.7 m.
The power developed by the pump is 1600 W.
Calculate the time needed to refuel the aircraft.

(3)

time = ... s

(Total for question = 3 marks)

Downloaded from www.merit-minds.com

Q6.

Figure 10 shows a toy used to launch a ball.

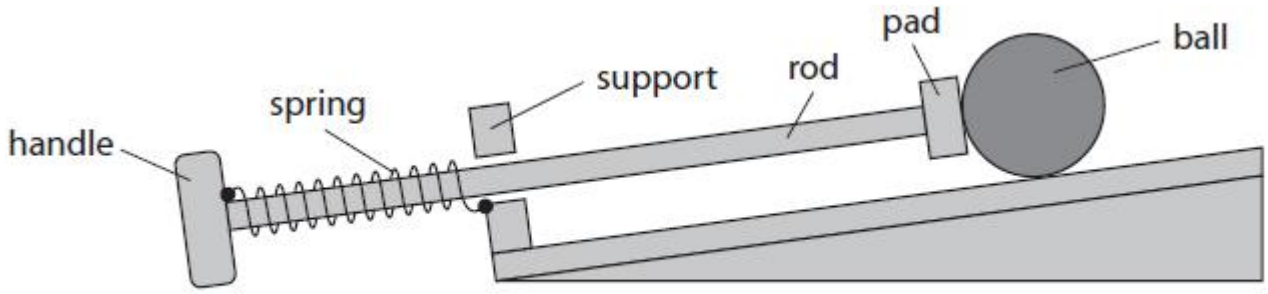


Figure 10

One end of the spring is fixed to the handle.

The other end of the spring is fixed to the support.

The child pulls the handle until the pad is against the support as shown in Figure 12.

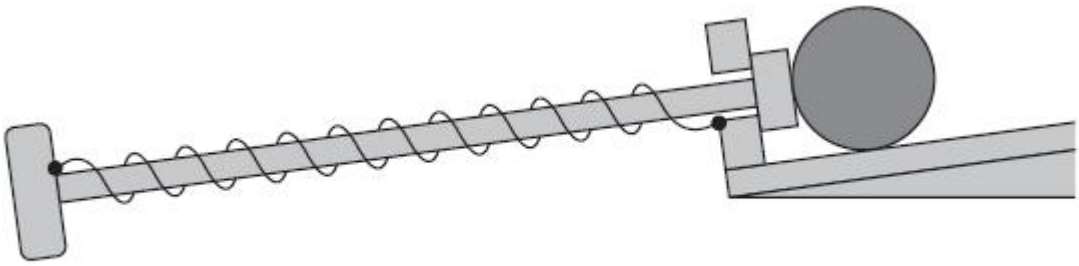


Figure 12

(i) The extension of the spring is 0.09 m.

The spring constant (k) is 20 N/m.
Calculate the work done in extending the spring by 0.09 m.
Use the equation

$$\text{work done} = \tfrac{1}{2} \times k \times (\text{extension})^2$$

(2)

work done = ... J

(ii) The child lets go of the handle.

The ball starts to move.
The spring returns to its original length.
Describe the energy transfer that takes place when the ball starts to move.

(2)

.....

.....

.....

.....

Downloaded from www.merit-minds.com

(iii) The child can only stretch the spring until the pad is pressing against the support.

Explain how the design of the toy prevents the spring from becoming damaged.

(2)

.....

.....

.....

(Total for question = 6 marks)

Downloaded from www.merit-minds.com