Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

Figure 14 shows an athlete using a fitness device.

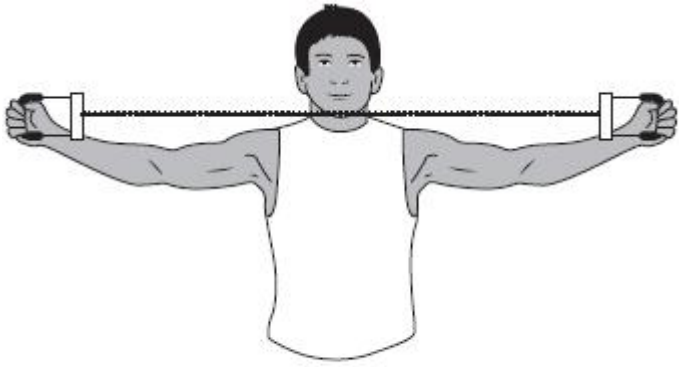

Figure 14

The athlete stretches the spring in the device by pulling the handles apart.

The spring constant of the spring is 140 N/m.

The athlete does 45 J of work to extend the spring.

The athlete takes 0.6 s to expand the spring.

(i) Calculate the useful power output of the athlete when stretching the spring.

(2)

useful power output of the athlete = ... W

(ii) Calculate the extension of the spring.

Use an equation selected from the list of equations at the end of this paper.

(3)

extension of the spring = ... m

(Total for question = 5 marks)

Q2.

Figure 7 shows an athlete using a fitness device.

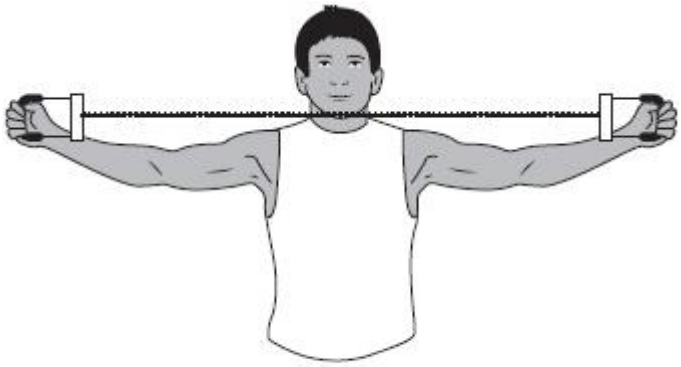

Figure 7

The athlete stretches the spring in the device by pulling the handles apart.

The spring constant of the spring is 140 N/m.

The athlete does 45 J of work to extend the spring.

The athlete takes 0.6 s to expand the spring.

(i) Calculate the useful power output of the athlete when stretching the spring.

(2)

useful power output of the athlete = ... W

(ii) Calculate the extension of the spring.

Use an equation selected from the list of equations from the relevant equation sheet.

(3)

extension of the spring = ... m

(Total for question = 5 marks)

Q3.

The kinetic energy of another cyclist is 2800 J.

The mass of the cyclist is 85 kg.

Calculate the velocity of this cyclist.

Use the equation

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

(3)

velocity = ... m / s

(Total for question = 3 marks)

Q4.

The kinetic energy of another cyclist is 2800 J.

The mass of the cyclist is 85 kg.

Calculate the velocity of this cyclist.

Use the equation

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

(3)

velocity = ... m/s

(Total for question = 3 marks)

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)