Energy, Work and Power

Question 1 **M/J 04 P1 Q11**

When a nucleus of Uranium-235 absorbs a neutron, nuclear fission occurs. In a typical reaction the total mass decreases by 3×10^{-28} kg.

Given that the speed of light c is 3×10^{8} m/s, approximately how much energy is released?

A 9×10^{-20} J

B 2×10^{-13} J

C 3×10^{-11} J

D 3×10^{-5} J

Question 2 **O/N 04 P1 Q11**

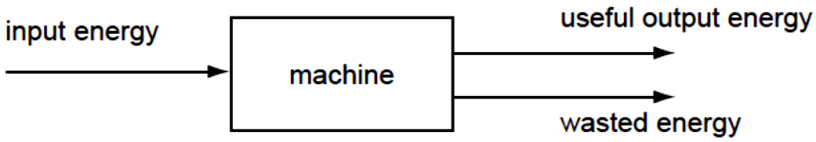
Hydroelectric, tidal and fossil fuels are three sources of energy.

Which of these are renewable energy sources?

	hydroelectric	tidal	fossil fuels
A	no	yes	yes
B	no	no	yes
C	yes	no	no
D	yes	yes	no

Question 3 **O/N 04 P1 Q12**

The diagram shows the energy transfer through a machine.



The machine is 50% efficient.

Which is correct?

A input energy = useful output energy

B useful output energy = input energy + wasted energy

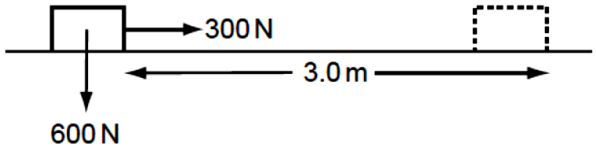
C wasted energy = input energy + useful output energy

D wasted energy = useful output energy

Energy, Work and Power

Question 4 **O/N 04 P1 Q13**

When a 300 N force is applied to a box weighing 600 N, the box moves 3.0 m horizontally in 20 s.



What is the average power?

A 45 W **B** 90 W **C** 900 W **D** 1800 W

Question 5 **M/J 04 P1 Q13**

Which represents the main energy changes that take place in a coal-fired power station?

A chemical → heat → kinetic → electrical

B chemical → heat → light → electrical

C chemical → kinetic → electrical → potential

D kinetic → heat → light → electrical

Energy, Work and Power

Question 6 O/N 04 P2 Q3

A pole-vaulter runs along a track, reaching a maximum speed of 8.4 m/s. At the end of the track, he places a pole into the ground as shown in Fig. 3.1, and uses the pole to push himself vertically upwards.

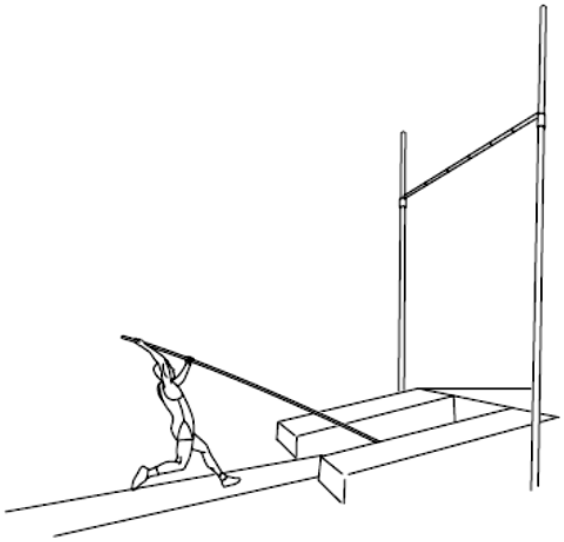


Fig. 3.1

(a) When the pole-vaulter runs along the track, there is a constant forward force on him of 320 N and a backwards resistive force that varies with his speed as shown in Fig. 3.2.

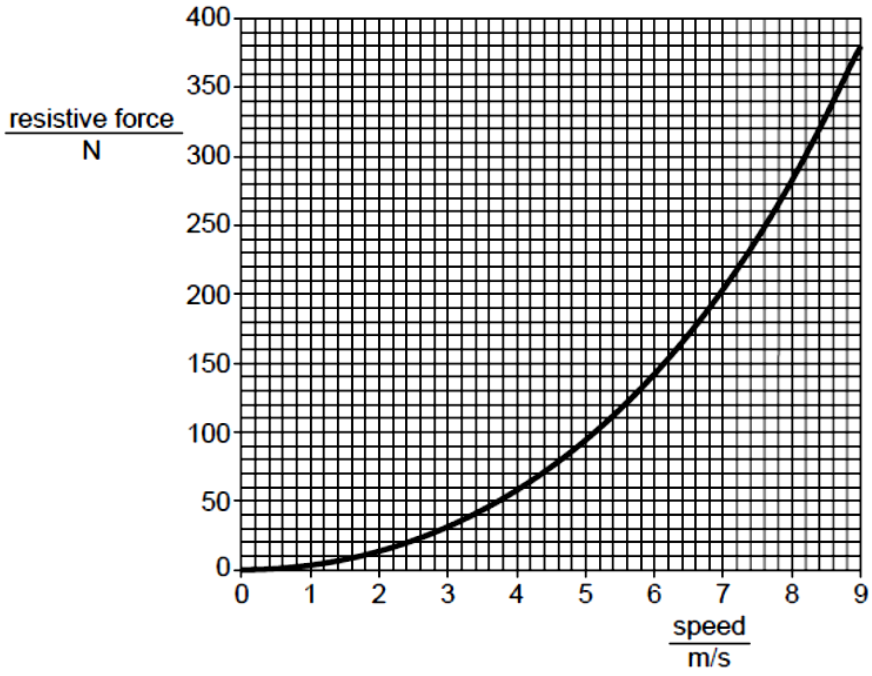


Fig. 3.2

Explain why the maximum speed that he can reach is 8.4 m/s.

.....

.....[1]

Energy, Work and Power

Question 7 M/J 04 P2 Q11

Fig. 11.1 shows a children's ride. A carriage containing children is pulled up the slope by a motor. The carriage stops at A and then runs down through B, C and D without further input of energy. Between D and E the carriage turns through a bend at constant speed, as shown in Fig. 11.2. At E, brakes are applied and the carriage slows to a stop at F. The height of the ride is 30 m at A and 10 m at C.

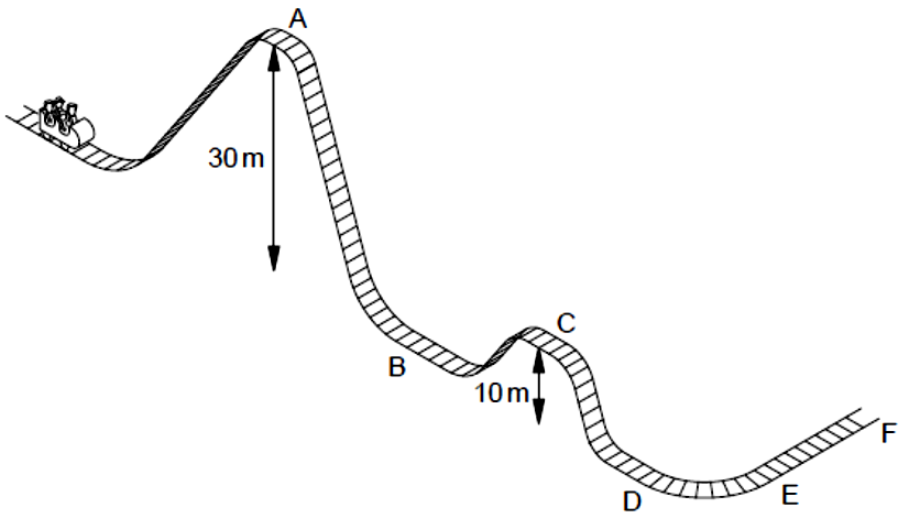


Fig. 11.1

The mass of the carriage and children is 500 kg.
Take the gravitational field strength as 10 N/kg.

(a) (i) Discuss the energy changes that occur in the ride from A to D.

(ii) Calculate the maximum potential energy of the carriage and children.

(iii) Assuming that there is no friction between A and C, determine the kinetic energy of the carriage and children at C. Show your working.

[9]

(b)

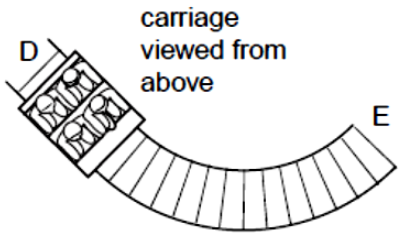


Fig. 11.2

Between D and E, the carriage goes round part of a horizontal circle at constant speed. During this time the velocity of the carriage changes.

(i) Explain how the carriage can have a constant speed but a changing velocity.

(ii) State the direction of the force that acts on the carriage to make it move round the curve.

[3]

(c) Between E and F, a frictional force of 3000 N acts to slow the carriage. Calculate the deceleration of the carriage. [3]