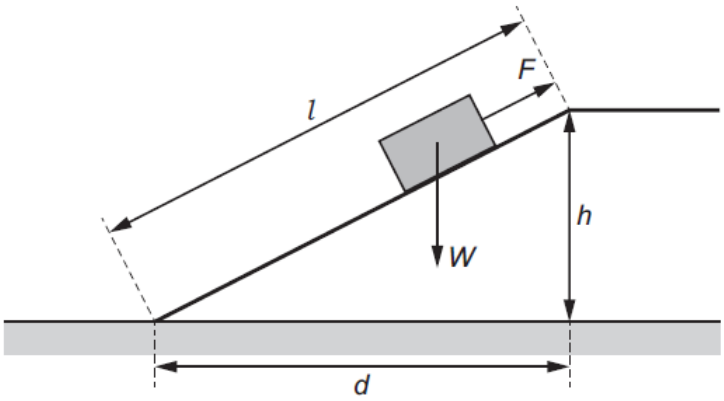
Energy, work and power – 2022 Nov O Level 5054

1. Nov/2022/Paper_11,12/No.15,16

A constant force *F* pulls a block of weight *W* up the slope shown.



How much work is done by *F* in pulling the block up the slope?

A $F \times h$ **B** $F \times l$ **C** $W \times d$ **D** $W \times l$

2. Nov/2022/Paper_11/No.16

X and Y are both 40 W, 240 V lamps. Lamp X is more efficient than lamp Y.

Which statement correctly compares X with Y?

A X is more expensive to run.

B X has a lower electrical resistance.

C X produces less light energy.

D X produces less thermal energy.

3. Nov/2022/Paper_12/No.17

The input power to a motor is 12 W.

The motor wastes 590 J of energy in 1.0 min.

What is the efficiency of the motor?

A 18% **B** 22% **C** 55% **D** 82%

4. Nov/2022/Paper_12/No.18

Electric motors have an efficiency of about 90% when used in an electric train.

Which forms of wasted energy are produced?

A sound only

B thermal only

C thermal and chemical

D thermal and sound

5. Nov/2022/Paper_21/No.2

A child's toy consists of a flexible track and a model car.

Fig. 2.1 shows a diagram of the toy.

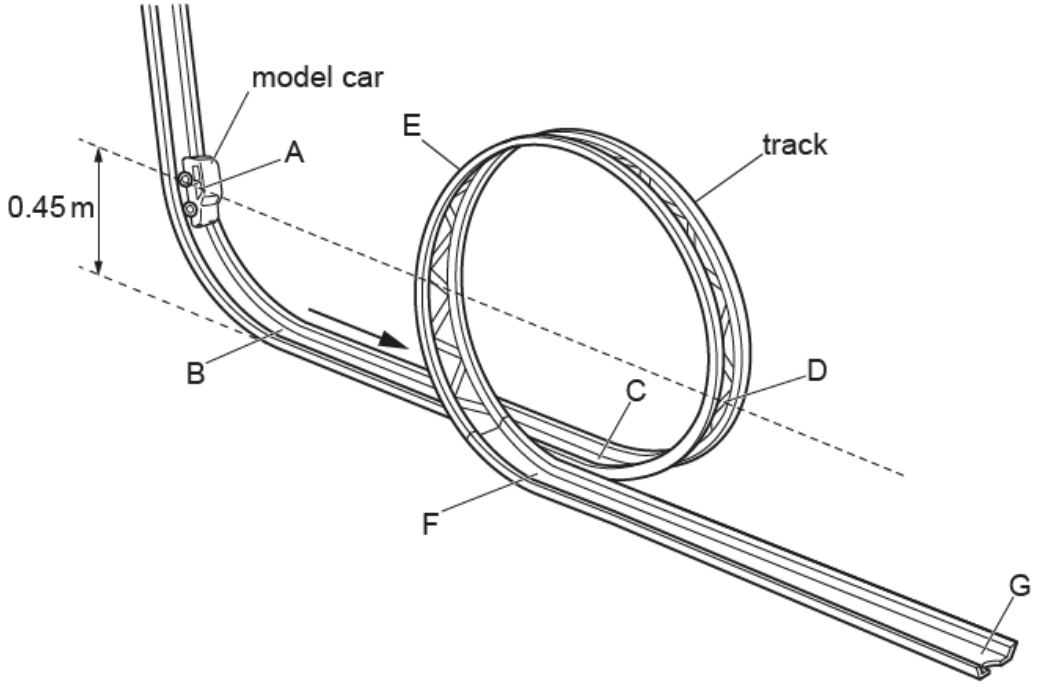


Fig. 2.1

The child first holds the car stationary at point A which is 0.45 m above the horizontal sections of track BC and FG. The mass of the car is 0.12 kg.

The child then releases the car which travels towards point B. Both air resistance and friction between the car and the track are negligible.

The gravitational field strength g is 10 N / kg.

(a) Calculate the change in gravitational potential energy (g.p.e.) of the car as it travels from A to B.

change in g.p.e. = ... [2]

(b) Calculate the speed of the car when it reaches B.

speed = ... [3]

(c) After releasing it, the child expects the car to follow the track along the route ABCDEFG. In fact, the model car does not reach F.

(i) Explain, in terms of energy, why the car does not go past D, which is also 0.45 m above the horizontal track.

.....

..... [1]

(ii) Immediately after being released at A, the car travels to B, to C and then to D.

Describe the motion of the car after it reaches D.

.....

..... [1]

[Total: 7]

6. Nov/2022/Paper_22/No.2(b)

(b) The pile-driver lifts the block from the top of a concrete cylinder, through a height of 0.80 m.

The gravitational field strength g is 10 N / kg.

(i) Calculate the gravitational potential energy gained by the block.

gravitational potential energy = ... [2]

(ii) The block is then dropped from rest onto the top of the concrete cylinder.

Calculate the speed of the block just before it hits the concrete cylinder.

speed = ... [3]