

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

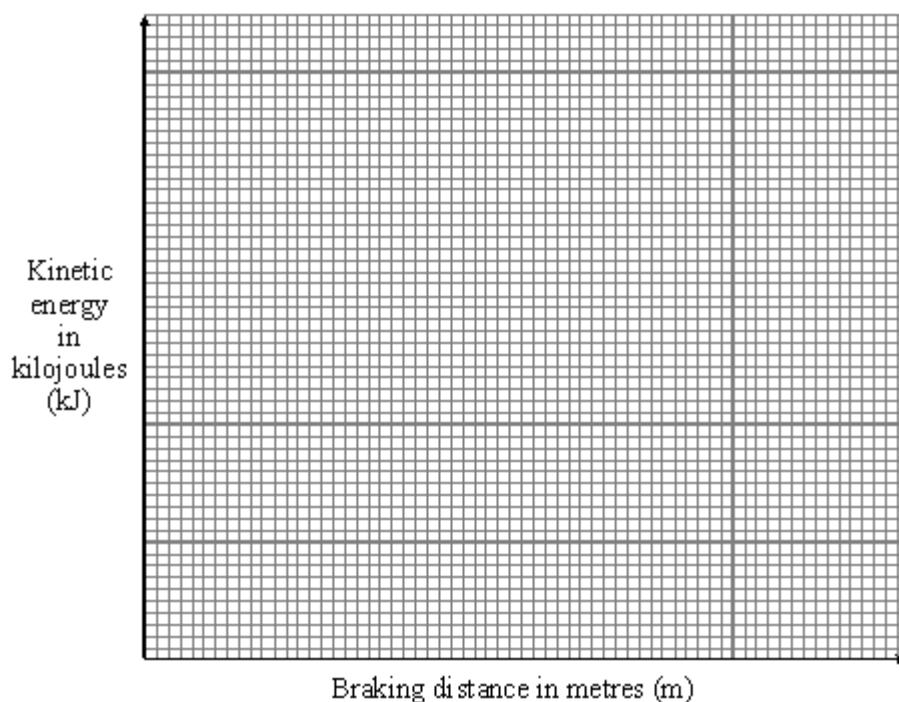
Q1.

The table shows the braking distances for a car at different speeds and kinetic energy. The braking distance is how far the car travels once the brakes have been applied.

Braking distance in m	Speed of car in m/s	Kinetic energy of car in kJ
5	10	40
12	15	90
20	20	160
33	25	250
45	30	360

(a) A student suggests, “*the braking distance is directly proportional to the kinetic energy.*”

(i) Draw a line graph to test this suggestion.

**(3)**

(ii) Does the graph show that the student's suggestion was correct or incorrect? Give a

reason for your answer.

(1)

- (iii) Use your graph and the equation for kinetic energy to predict a braking distance for a speed of 35 metres per second (m/s). The mass of the car is 800 kilograms (kg). Show clearly how you obtain your answer.

Braking distance = _____ m

(2)

- (iv) State **one** factor, apart from speed, which would increase the car's braking distance.

(1)

- (b) The diagram shows a car before and during a crash test. The car hits the wall at 14 metres per second (m/s) and takes 0.25 seconds (s) to stop.



- (i) Write down the equation which links acceleration, change in velocity and time taken.

(1)

- (ii) Calculate the deceleration of the car.

Deceleration = _____ m/s²

(1)

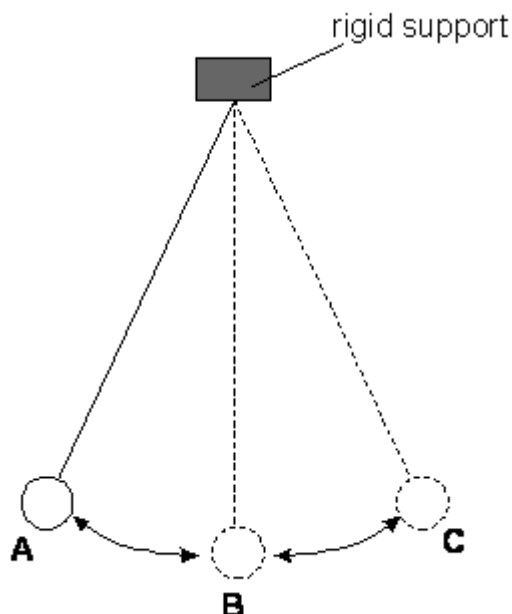
- (iii) In an accident the crumple zone at the front of a car collapses progressively. This increases the time it takes the car to stop. In a front end collision the injury to the car passengers should be reduced. Explain why. The answer has been started for you.

By increasing the time it takes for the car to stop, the _____

(2)

Q2.

The diagram below shows an experiment where a pendulum swings backwards and forwards. A pendulum is a small heavy weight suspended by a light string.



- (a) (i) In which position, A, B or C, does the pendulum have least potential energy?
Explain your answer.

(1)

- (ii) In which position, A, B or C, does the pendulum have greatest kinetic energy?
Explain your answer.

(1)

- (iii) After a few minutes the size of the swings becomes smaller.
Explain why this happens.

(1)

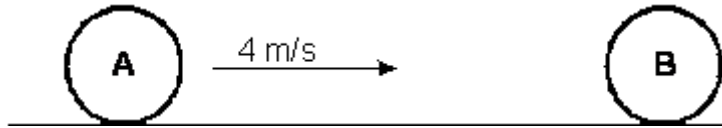
- (b) If the experiment were repeated on the Moon the pendulum would swing more slowly.
Suggest a reason for this.

(2)

(Total 5 marks)

Q3.

The diagram below shows two balls on the bowling green. Ball A is moving with a velocity of 4 m/s, and is about to collide with ball B which is stationary. Both balls have a mass of 1.5 kg.



After the collision both balls move to the right but the velocity of A is now 1 m/s.

- (a) (i) Calculate the momentum of ball A just before the collision.

Answer _____ kg m/s

(1)

- (ii) What is the total momentum of balls A and B after the collision?

Answer _____ kg m/s

(1)

- (iii) Calculate the momentum of ball A just after the collision.

Answer _____ kg m/s

(1)

- (iv) Calculate the momentum of ball B just after the collision.

Answer _____ kg m/s

(1)

- (v) Calculate the velocity of ball B just after the collision.

Answer _____ m/s

(1)

- (b) Calculate the loss of kinetic energy in the collision.

Answer _____ J

(3)
(Total 8 marks)