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Exam Preparation and Free Resources

Name of the Student:_____

Max. **Marks : 22 Marks**   **Time : 22 Minutes**

Q1.

Students investigate conservation of momentum using two identical trolleys.

A card is then added to trolley A.

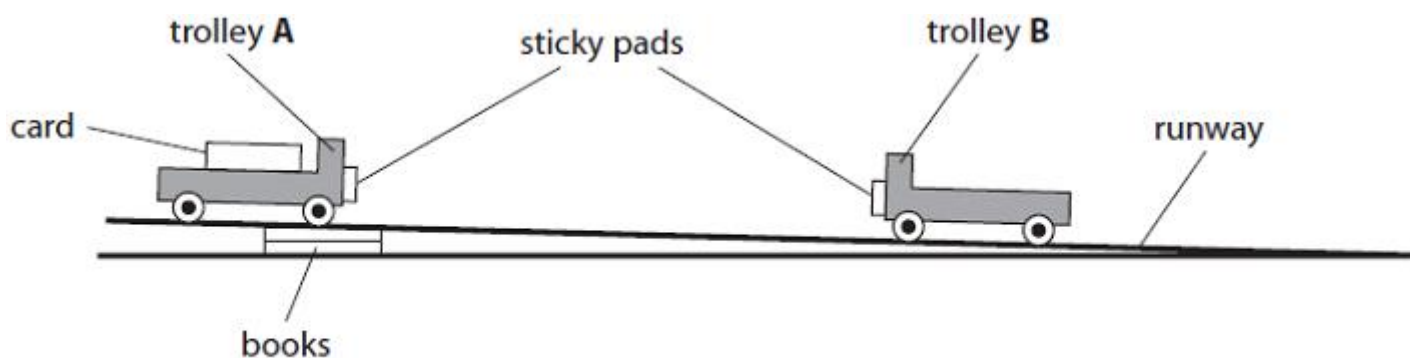Some of the apparatus is set up as shown in Figure 4.

Figure 4

(i) Describe an investigation the students could carry out to show that momentum is conserved when these two trolleys collide.

   You may add to the diagram to help with your answer.

(4)

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(ii) Give a reason for the runway being at a slope.

(1)

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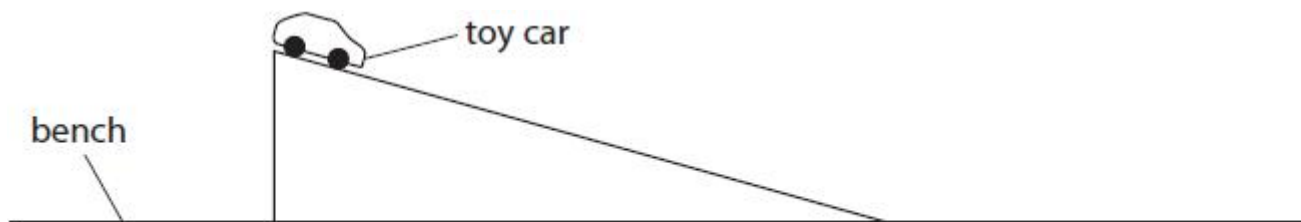
(Total for question = 5 marks)

Q2.

A student lifts a toy car from a bench and places the toy car at the top of a slope as shown in Figure 1.

Figure 1

The student lets the toy car roll down the slope.

Describe how the student could find, by experiment, the speed of the toy car at the bottom of the slope.

(4)

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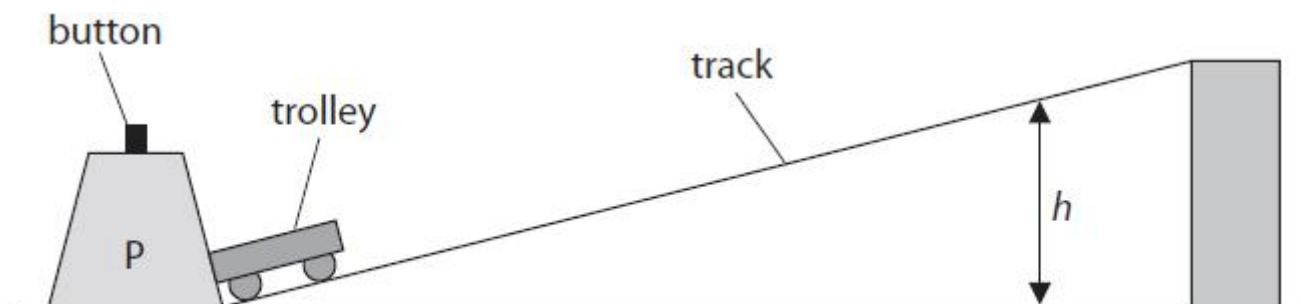
(Total for question = 4 marks)

Q3.

Figure 2 shows a way of projecting a small trolley up a sloping track.

Figure 2

When the button is pressed, a spring is released in P that projects the trolley up the track.

The trolley travels up the track, stops and then rolls back down.

The spring in P always exerts the same force when projecting the trolley.

A student investigates how the mass of the trolley affects the maximum vertical height, *h*, reached by the trolley.

Describe how the student could extend the investigation to determine the average speed of the trolley as it rolls back down the track.

(3)

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(Total for question = 3 marks)

Q4.

A pilot begins to land an aircraft.
(a) The height of the aircraft decreases from 200 m above the ground to 100 m.

(i) What happens to the gravitational potential energy of the aircraft?

Put a cross (■) in the box next to your answer.

(1)

⊠　**A**　it becomes zero

⊠　**B**　it decreases

⊠　**C**　it does not change

⊠　**D**　it increases

(ii) The velocity of the aircraft remains constant.

What happens to the kinetic energy of the aircraft?

Put a cross (■) in the box next to your answer.

(1)

⊠　**A**　it becomes zero

⊠　**B**　it decreases

⊠　**C**　it does not change

⊠　**D**　it increases

(b) The aircraft lands with its wheels on the runway as shown.

runway

The aircraft is moving forwards.

(i) Draw an arrow on the diagram to show the direction of the momentum of the aircraft.

(1)

(ii) The velocity of the aircraft when it lands is 75 m/s.

The mass of the aircraft is 130 000 kg.

Calculate the momentum of the aircraft.

(2)

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(iii) The aircraft comes to a stop.

State the momentum change of the aircraft from when it lands to when it stops.

(1)

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(c) When the aircraft lands, the momentum of each passenger also changes.

(i) Explain why it is more comfortable for a passenger if the aircraft takes a longer time to slow down.

(2)

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(ii) Suggest why some aircraft need a very long runway to land safely.

(2)

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(Total for Question is 10 marks)