2001 HIGHER SCHOOL CERTIFICATE EXAMINATION

Physics

Centre Number

Section I – Part B (continued)

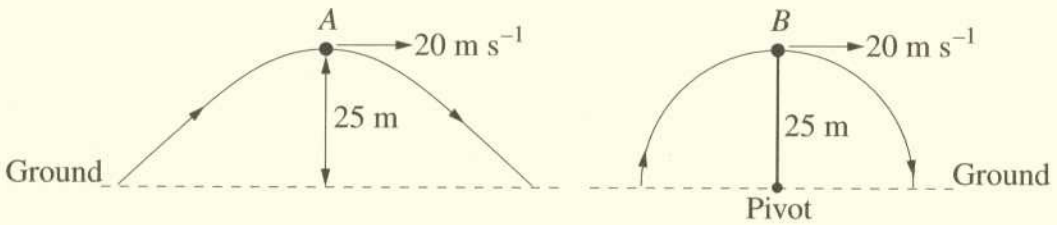
Student Number

Marks

Question 18 (6 marks)

A 30 kg object, *A*, was fired from a cannon in projectile motion. When the projectile was at its maximum height of 25 m, its speed was 20 m s^{-1}.

An identical object, *B*, was attached to a mechanical arm and moved at a constant speed of 20 m s^{-1} in a vertical half-circle. The length of the arm was 25 m.



Ignore air resistance.

(a) Calculate the force acting on object *A* at its maximum height. **1**

F=ma F= 30×9.8

= 294N

(b) Calculate the time it would take object *A* to reach the ground from its position of maximum height. **2**

(c) Describe and compare the vertical forces acting on objects *A* and *B* at their maximum heights. **3**

Object A has a vertical force of 9.8ms⁻² at maximum height

Object B has a vertical force of 9.8ms⁻² at maximum height however because the arm is vertically straight it opposes this force.

Marks

Question 19 (4 marks)

How does Einstein's Theory of Special Relativity explain the result of the Michelson–Morley experiment? 4

Einstein shaped that their was no ether. He gave the mathematical equation to prove the Michelson - Mosley experement by mathematicely showing that the ether did not exist, he justified how the experement was a failure, but a success in showing that the ether didn't exist.

Question 20 (4 marks)

The electrical supply network uses a.c. and a variety of transformers between the generating stations and the final consumer. 4

Explain why transformers are used at various points in the network.

transformers are used to increase or decrease current through resistors. The control the amount of current going through by having more wire turns in the secondary coil than the primary coil. So if there was an increased current entering from the generating station it is about 560kV, by going through several transformers the result for consumers end up to be 240 V. This is due to transformers at power stations, telegraph poles etc.