

2001 HIGHER SCHOOL CERTIFICATE EXAMINATION

Physics

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Centre Number

Section I – Part B (continued)

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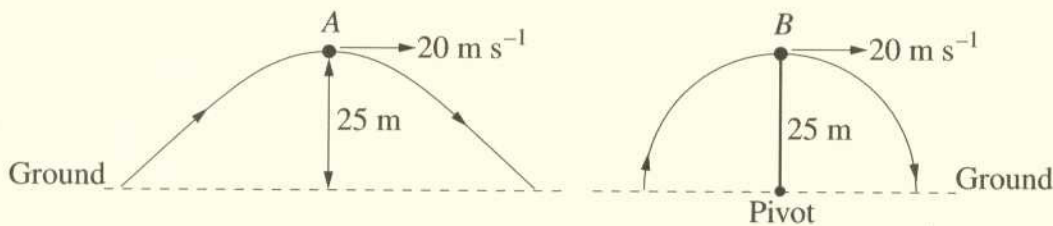
Student Number

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

Force on object 'A' at maximum height is 9.8 m s^{-2}

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

vertical	Horizontal	$v = u + at$
$s = 25 \text{ m}$	$u = 20 \text{ m s}^{-1}$	$\frac{v - u}{a} = t$
$a = 9.8 \text{ m s}^{-2}$	$a = 0 \text{ m s}^{-2}$	$\frac{0 - 20}{0} = 20 \text{ seconds}$
$u = 0 \text{ m s}^{-1}$	$v = 0 \text{ m s}^{-1}$	

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

Object 'A' is free & only has gravity acting upon it.
 Object 'B' is controlled & has gravity as well as the assistance of the mechanical arm.

Question 19 (4 marks)

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

4

Michelson - Morley experiment was set up by a touch of light was reflected from the half angle mirror to the mirrors, and mirror, which were perpendicular. After the experiment was over Michelson and Morley stated the relatively of ether does not exist. This explains ether ~~is~~ has nothing to do in space. The special relativity tells us how this experiment had negative results. Hence the concept of ether was dropped down.

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 along the electrical supply network because they change transformers can change the voltage using different coil ratios. These turn ratios can alter the output voltage in AC circuits. They can step-up or step-down the voltage. Step-up means the voltage is increased in step-down transformers the voltage is reduced. This is used in mobile phone chargers and also used to transform the high voltages of long distance energy transfer to low to be 240V AC, which is used in telegraph.