



ALEXANDER ROAD HIGH SCHOOL

MARCH 2011

1 HOUR

PHYSICAL SCIENCE CONTROL TEST

MA, IC, CO

TOTAL = 60

GRADE 12

Instructions

- The question paper consists of 8 questions
- Answer all the questions
- Answer section A on the answer sheet provided
- Answer section B on the folio sheets and answer each question on a new side of a page.
- A non-programmable calculator may be used
- Number the answers correctly according to the numbering system used on this question paper.
- A data sheet will be provided for your use.
- Round off to two (2) decimal places where necessary.
- LO 2,3 AS 1,2, 3

SECTION A

- Answer on the answer sheet -

QUESTION 1: One-word questions

- 1.1 The unit for the rate at which energy is transferred. (1)
- 1.2 The phenomenon where there is a perceived change in frequency that occurs between a sound source and a listener when there is relative motion between the source and listener. (1)
- 1.3 The type of electromagnetic wave found in conventional ovens. (1)
- [3]**

QUESTION 2: Multiple choice

Four possible options are provided as answers to the following questions. Each question has only ONE correct answer. Choose the answer and make a cross (X) in the block (A–D) next to the question number (2.1 – 2.6) on the attached ANSWER SHEET.

- 2.1 An object projected vertically upwards reaches its maximum height and returns to its original point of projection. Ignoring the effects of friction, the direction of the acceleration of the object during its motion is
- A. always vertically downwards.
- B. first vertically upwards and then vertically downwards.
- C. first vertically downwards and then vertically upwards.
- D. always vertically upwards.

- 2.5 The correct function of slip rings is:
- A. Let the current direction change every half a turn in the motor.
 - B. Let the loop's turning direction remain the same in the motor.
 - C. Let the current direction change every half a turn in the generator.
 - D. Let the loop turn smoothly without wire twisting in the generator.

- 2.6 In South-Africa the AC-cycle is:
- A. one change of direction of current in one second.
 - B. two changes of direction of current every second.
 - C. 50 changes of directions of current every second.
 - D. 100 changes of direction of current every second.

[6 x 2 = 12]
SUB – TOTAL: 15

SECTION B

QUESTION 3

3. A supervisor, 1,8 m tall, visits a construction site. A brick resting at the edge of a roof 50 m above the ground suddenly falls. At the instant when the brick has fallen 30 m the supervisor sees the brick coming down directly towards him from above.

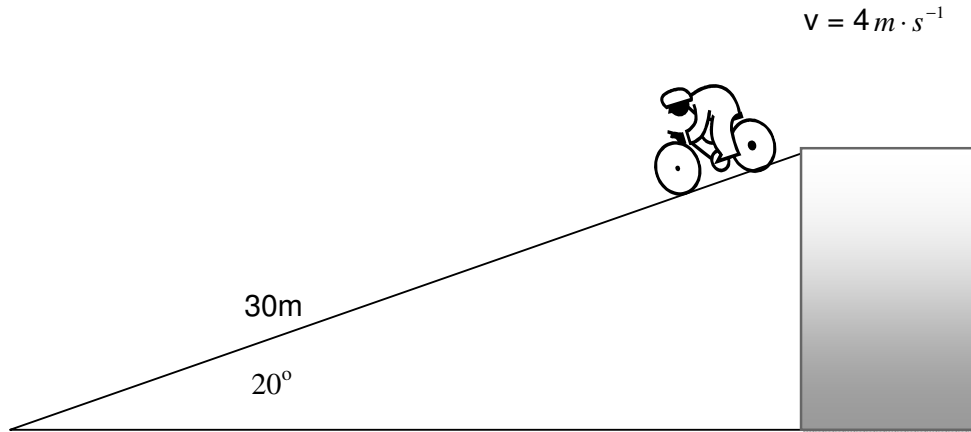
Ignore the effects of friction and take the downwards motion as positive.

- 3.1. Calculate the speed of the brick after it has fallen 30 m. (3)
- 3.2 The average reaction time of a human being is 0,4 s. With the aid of a suitable calculation, determine whether the supervisor will be able to avoid being hit by the brick. (5)

[8]

QUESTION 4

4. A young boy cycles down a rough incline 30m long. The incline makes an angle of 20° with the horizontal as shown, and the boy's velocity as he descends down the incline is $4 \text{ m} \cdot \text{s}^{-1}$.



The total mass of the boy and his bicycle is 70kg. There is a constant frictional force of 50N opposing the cyclist's motion.

- 4.1 Calculate the magnitude of the cyclist's velocity at the bottom of the 30m incline. (7)

[7]

QUESTION 5

An ambulance, with its siren on, is moving at $10 \text{ m} \cdot \text{s}^{-1}$ on its way to a motor vehicle accident. A person standing on the side of the road with a detector, measures the frequency of the sound emitted by the siren to be 450Hz. The measured frequency is HIGHER than the frequency of the sound emitted by the siren.

- 5.1 Is the truck moving towards or away from the person? (1)
- 5.2 Calculate the frequency of the siren if the speed of sound in air is $340 \text{ m} \cdot \text{s}^{-1}$. (5)
- 5.3 What is the detected frequency the moment the ambulance passes the person? (1)

[7]

QUESTION 6

A learner uses a single slit to determine the wavelength of a blue laser light. The width of the slit is $7,25 \times 10^{-6} \text{ m}$ and the distance between the screen and the slit is 0,4m.

- 6.1 If the learner measures the distance between the midpoint of the central band and the first dark band to be 35mm, calculate the wavelength of the blue laser light. (7)
- 6.2 What will happen to the width of the central maximum if the blue laser light is replaced with a red laser light? Write only INCREASES, DECREASES or STAYS THE SAME. (1)

[8]

QUESTION 7

7. A hair dryer is marked 1800W, 50 Hz, 230 V ~.
- 7.1 What does the marking, ~ , mean? (1)
- 7.2 What is the power reading of this hair dryer? (1)
- 7.3 What does it mean in terms of energy? (1)
- 7.4 Calculate the peak voltage of this supply. (3)
- 7.5 Calculate the rms current through this hair dryer. (4)

[10]

QUESTION 8

8. The generator needed to generate energy for a commercial plant where electrical drills are used, delivers current at a certain voltage. The current travels over a long distance and therefore needs a specific voltage in order for the drills to function properly.
- 8.1 What type of generator is used here? (1)
- 8.2 Will the voltage of the generated current be high or low? Give a reason. (2)
- 8.3 Draw two cycles of the voltage vs time graph for the generated current if the loop of the generator is in vertical position initially. (2)

[5]

TOTAL 60 MARKS

