



SEPTEMBER 2012  
KB, MA, IC, CO

**ALEXANDER ROAD HIGH SCHOOL**  
**PHYSICAL SCIENCE CONTROL TEST**  
**GRADE 10**

1 HOUR  
TOTAL = 60

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Instructions

- The question paper consists of 6 questions.
- Answer all the questions.
- Answer section A on the answer sheet provided AND section B on folio sheets.
- Rule off after each question in Section B.
- A non-programmable calculator may be used.
- Number the answers correctly according to the numbering system.
- A Periodic Table is provided for your use.
- Round of to two decimal places where necessary.

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**SECTION A**

- Answer on the answer sheet -

**QUESTION 1: One-word questions**

Give one word/term for each of the following descriptions.

- 1.1 The name of the chemical formula which indicates the actual ratio in which the atoms of the different elements is found in a compound. (1)
- 1.2 The breakaway of ions from an ionic crystal when dissolving in water. (1)
- 1.3 The single vector whose effect is the same as the individual vectors acting together. (1)
- 1.4 The product of the force applied on an object and the magnitude of the displacement of the object in the direction of the force (1)
- [4]**

**QUESTION 2: Multiple choice**

Each question has only 1 correct answer. Choose the correct answer and make a Cross (X) over the letter (A – D) next to the relevant question number (2.1 – 2.4)

- 2.1 Mr Clifford is training for a race and decides to go out for a cycle. He rides for 9km on a bearing of  $15^{\circ}$  then 7km on a bearing of  $110^{\circ}$  and then 6 km on a bearing of  $220^{\circ}$ .

It takes him 1hr and 30 min to reach his end point.

Which of the following best indicates his speed, velocity and resultant displacement?

	<b>SPEED</b>	<b>VELOCITY</b>	<b>RESULTANT DISPLACEMENT</b>
A	4,07 m.s <sup>-1</sup>	1,02 m.s <sup>-1</sup>	5,5 km
B	1,02 m.s <sup>-1</sup>	4,07 m.s <sup>-1</sup>	4 km
C	1,02 m.s <sup>-1</sup>	1,02 m.s <sup>-1</sup>	5,5km
D	4,07 m.s <sup>-1</sup>	4,07 m.s <sup>-1</sup>	4km

2.2 Which of the following combinations of ions will NOT form a precipitate?

- A. Ba<sup>2+</sup> and NO<sub>3</sub><sup>-</sup>                      B. Ba<sup>2+</sup> and SO<sub>4</sub><sup>2-</sup>  
C. Ca<sup>2+</sup> and CO<sub>3</sub><sup>2-</sup>                      D. Ag<sup>+</sup> and Br<sup>-</sup>

2.3 A mole of oxygen molecules (O<sub>2</sub>) has a mass (in grams) of ...

- A. 32    B. 16  
C. 8    D. 4

2.4 An alien with a weight of 2100N on mars finds himself on the earth where its weight is 1176N. Which of the following statements are true with respect to the alien...

- i. Its gravitational acceleration on earth is 9.8m.s<sup>-2</sup>  
ii. Its mass is greater on earth than on mars  
iii. The gravitational acceleration on mars is 17.5m.s<sup>-2</sup>  
iv. The gravitational acceleration on mars is 0.06m.s<sup>-2</sup>
- A. i, and iii                                      B. ii, iii and iv  
C. i and iv                                        D. i, ii and iv

[ 4 x 2 = 8 ]  
**SUB – TOTAL: 12**

## SECTION B

### QUESTION 3

- 3.1 A sample of an oxide of aluminium is analysed and it is found that the sample contains 5,4g aluminium and 4,8g oxygen. Determine the empirical formula of this compound. (5)
- 3.2 The following equation represents the reaction between hydrogen sulphide and sulphur dioxide:



- 3.2.1 Determine the limiting reagent if 3 mol H<sub>2</sub>S reacts with 3 mol SO<sub>2</sub>. (2)
- 3.2.3 Calculate the mass of sulphur formed when the limiting reagent from above reacts completely. (3)
- 3.3 Which one of the following calculations will give the mass (in grams) of a calcium atom? Write only the letter.  
(1 amu = 1,66 x 10<sup>-24</sup> and Avogadro's number = 6,02 x 10<sup>23</sup>)
- A. 6,02 x 10<sup>23</sup> x 1,66 x 10<sup>-24</sup>
- B. 1 x 40 x 1,66 x 10<sup>-24</sup>
- C. 1 x 1,66 x 10<sup>-24</sup>
- D. 1,66 x 10<sup>-24</sup> x 40 x 6,02 x 10<sup>23</sup> (2)

**[12]**

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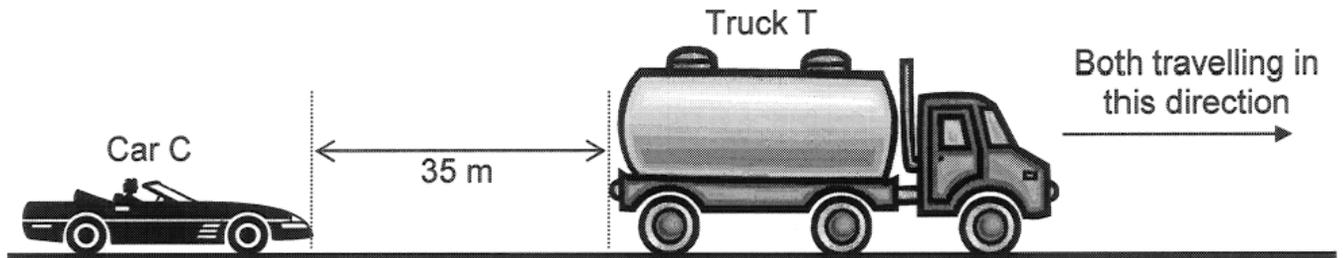
### QUESTION 4

- 4.1 A learner is supplied with three aqueous solutions. The three solutions are: a tap water solution, a hydrogen chloride solution and a sugar solution. Using this information, answer the following questions
- 4.1.1 Explain the difference between an electrolyte and a non electrolyte (4)
- 4.1.2 Using the solutions given, give an example of an electrolyte and a non electrolyte (2)
- 4.1.3 Using the solutions given, give an example of a strong electrolyte (1)
- 4.2.1 Write an equation to illustrate the process occurring when NH<sub>4</sub>Cl is dissolved in water. (3)
- 4.2.2 Is this an example of Dissociation or Ionisation? (1)
- 4.3 What chemical solution is added to test for the presence of a halide in solution? (1)

**[12]**

### QUESTION 5

5. A car is following 35m behind a truck. Both are traveling at  $30 \text{ m}\cdot\text{s}^{-1}$ . The truck driver sees a herd of cows crossing the road ahead. He breaks immediately and comes to rest in 12 s



- 5.1 Calculate the deceleration of the truck. (4)

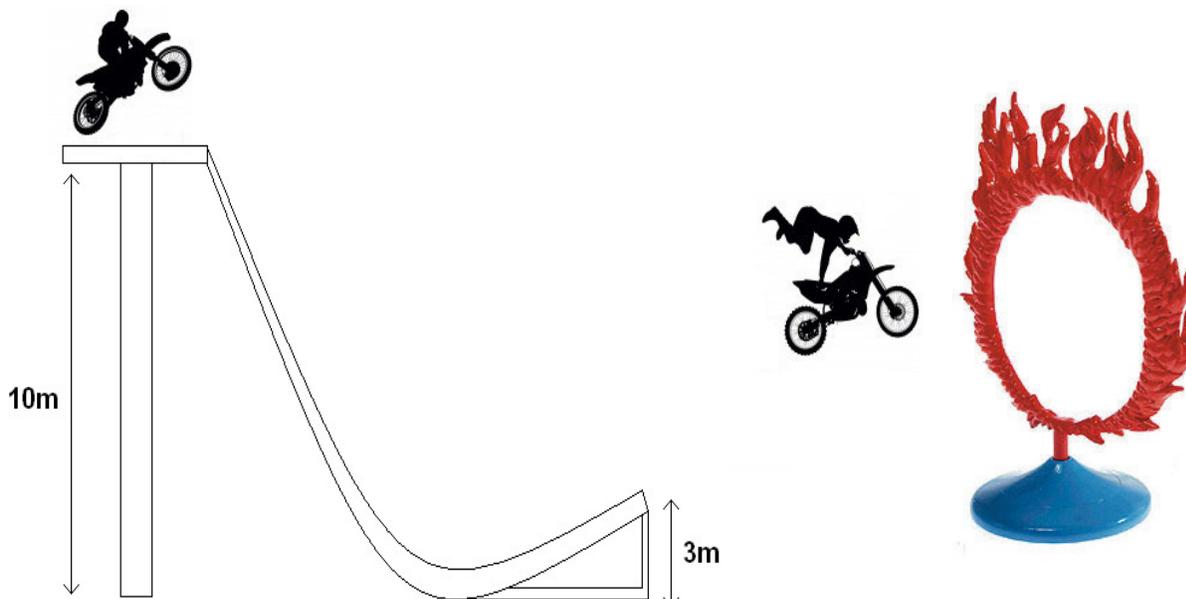
*The car applies its brakes 0,8s after the truck. It decelerates at  $2 \text{ m}\cdot\text{s}^{-2}$ .*

- 5.2 Calculate the distance traveled by the car in the 0,8s before brakes are applied. (3)
- 5.3 Calculate the distance traveled by the truck while it is braking. (4)
- 5.4 If the car travels 225m after it started braking will the car collide with the truck. (1)

**[12]**

### QUESTION 6

Mr Oosthuisen used to ride stunt bikes in his university days. The one stunt involved him moving up a lift to the top of a 10m high platform then riding down a frictionless ramp and launching himself through a ring of ignited hydrogen gas. The mass of the bike and Mr Oosthuisen together is 400kg.



- 6.1 Calculate the potential energy of the bike and Mr Oosthuisen at the top of the platform. (3)
- 6.2 State the law of conservation of mechanical energy. (2)
- 6.3 Calculate the maximum speed reached by the bike and Mr Oosthuisen. (3)
- 6.4 Calculate the speed at which the bike and Mr Oosthuisen leave the ramp. (4)

[12]

**TOTAL: 60 MARKS**

A small piece of sodium which lived in a test tube fell in love with the Bunsen burner: "Oh Bunsen, my flame. I melt whenever I see you . . .", the sodium pined. "It's just a phase you're going through", replied the Bunsen burner.

## **DATA**

**TABLE 1: PHYSICAL CONSTANTS / TABEL 1: FISIIESE KONSTANTES**

NAME / NAAM	SYMBOL / SIMBOOL	VALUE / WAARDE
Acceleration due to gravity <i>Swaartekragversnelling</i>	$g$	$9,8 \text{ m}\cdot\text{s}^{-2}$
Speed of light in a vacuum <i>Spoeed van lig in 'n vakuum</i>	$c$	$3,0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$

**TABLE 2: FORMULAE / TABEL 2: FORMULES**

### **MOTION / BEWEGING**

$v_f = v_i + a \Delta t$	$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$
$v_f^2 = v_i^2 + 2a \Delta x$	$\Delta x = \left( \frac{v_f + v_i}{2} \right) \Delta t$

### **WEIGHT AND MECHANICAL ENERGY / GEWIG EN MEGANIESE ENERGIE**

$F_g = mg$	$U = E_p = mgh$
$K = E_k = \frac{1}{2} mv^2$	