LIMPOPO

PROVINCIAL GOVERNMENT

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF

EDUCATION

CAPRICORN DISTRICT

NATIONAL
SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES
CONTROLLED TEST NO. 1
20 MARCH 2015

NAME OF SCHOOL ____

MARKS: **100**
TIME: 2 HOURS

This paper consists of 12 pages including the cover page and the data sheets

INSTRUCTIONS AND INFORMATION

1. The paper consists of TWO sections.

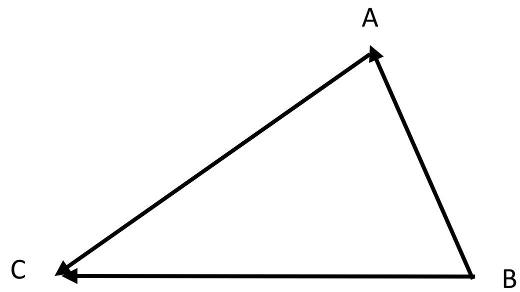
   SECTION A (20)

   SECTION B (80)
2. Answer ALL the questions in the answer book
3. No-programmable calculators may be used
4. Appropriate mathematical instruments may be used in this question paper
5. Data sheets are attached for your use
6. Give brief motivations, discussions, et cetera where required
7. Number the answers correctly according to the numbering system used in this question paper

SECTION A
QUESTION 1
MULTIPLE CHOICE QUESTIONS

Various options are provided as possible answers to the questions. Each question has only one correct answer. Write only the letter (A-D) next to the question number (1.1-1.10) in the answer book.

1.1. Consider the following vector diagram



The vector which represents the resultant force of the other two, is…

A. AB

B. BC

C. AC

D. CB (2)

1.2. Tsholo, standing in a lift, observes a 10 N mass-piece suspended from a spring balance fixed to a roof of the lift. He sees that the reading on the spring balance is less than 10 N for a short time interval. During this short time interval the lift is …

A. not moving

B. accelerating upwards

C. accelerating downwards

D. moving with a constant velocity (2)

1.3. A learner is riding his bicycle in a school yard on a level ground. The bicycle hits the wall of a classroom and reverses. The learner is injured. This can be explained in terms of ……..

A. Newton's Second Law of motion

B. Inertia

C. Newton's Third Law of motion

D. Newton's Law of Universal Gravitation (2)

1.4. A car moving forward experiences a decrease in its velocity. This could be due to ……….

A. The inertia of the car is too little

B. The resultant force acts in the backward direction

C. The resultant force acts in the forward direction

D. The balanced forces that act upon it while the road is rough. (2)

1.5. The gravitational force which the earth exerts on the moon is

A. Directly proportional to the distance between their centres

B. Inversely proportional to the mass

C. Inversely proportional to the product of the mass of the moon and the mass of the earth

D. Inversely proportional to the square of the distance between their centres. (2)

1.6. Two forces of magnitude 7 N and 3 N respectively, act simultaneously on an object. Which one of the following cannot be the resultant of the two forces?

A. 3 N

B. 5 N

C. 9 N

D. 10 N (2)

1.7. The phenomenon that allows water strider to walk on water'

A. Capillarity

B. Adhesion

C. Evaporation

D. Surface Tension (2)

1.8. What forces occur between molecules of ammonia (NH3)?

A. Ion-ion forces

B. Non-polar – non-polar forces

C. London forces

D. Hydrogen bonds (2)

1.9. According to the VSEPR theory, the shape of a aluminium chloride ($AlCl_3$) molecule is:

A. Trigonal planar

B. Trigonal bi-pyramidal

C. Trigonal pyramidal

D. Tetrahedral (2)

1.10. Which one of the following properties of H_2O (s) causes it to be less dense than H_2O (l)?

A. Dipole-dipole forces

B. Hydrogen bonding

C. Van der Waals forces

D. Ionic dipole (2)

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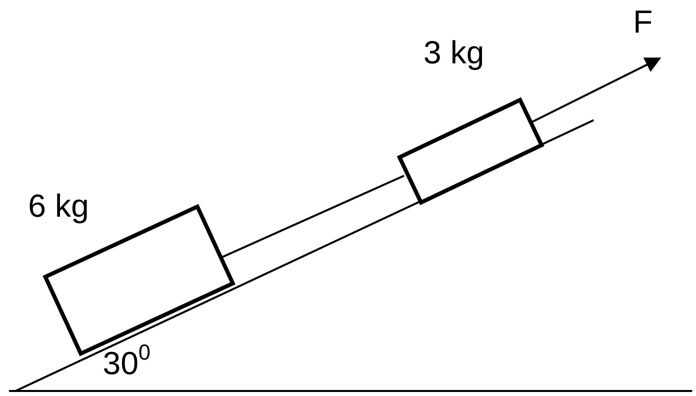
SECTION B

QUESTION 2

A light inelastic string connects two objects of mass 6 kg and 3 kg respectively. They are pulled up an inclined surface that makes an angle of 30^0 with the horizontal, with a force of magnitude *F.* Ignore the mass of the string.



The coefficient of kinetic friction for the 3 kg object and the 6 kg object is 0.1 and 0.2 respectively.

2.1. State Newton's Second law of Motion in words. (2)

2.2. Draw a labelled free-body diagram indicating all the forces acting on the 6 kg object as it moves up the inclined surface. (4)

2.3. Calculate the:

2.3.1. Tension in the string if the system accelerates up an inclined plane at 4 $m.\ s^{-2}$. (6)

2.3.2. How would the tension in the string, calculated in QUESTION 2.3.1, be affected if the system accelerates up a frictionless inclined surface at 4 $m.\ s^{-2}$? Write down only INCREASES, DECREASES OR REMAINS THE SAME. (1)

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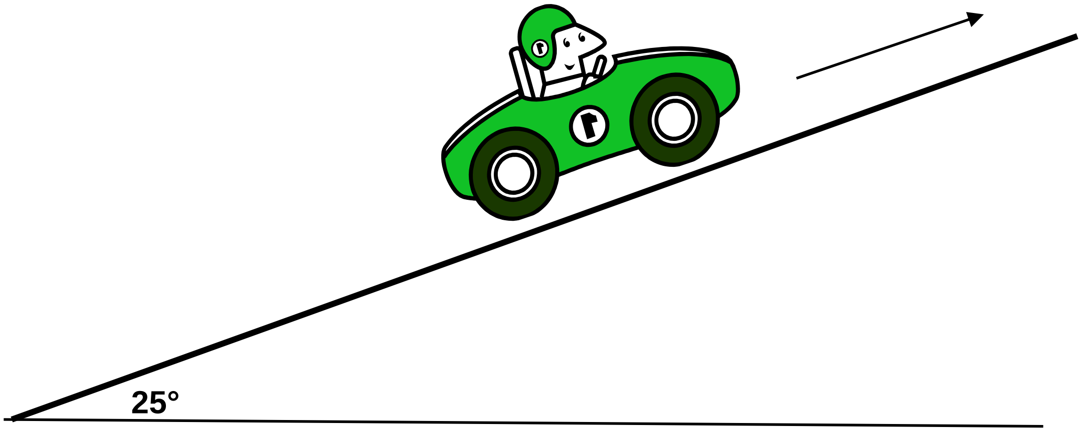
QUESTION 3



A car with a mass of 1 400 kg is accelerated up a hill while experiencing a net force of 7400 N. The hill makes an angle of 25° with the horizontal and the coefficient of dynamic friction is equal to 0, 23.

3.1 Draw a labelled force diagram for ALL the forces acting on the car. (4)

Calculate:

3.2. The acceleration of the car (3)
3.3. The magnitude of the friction force (3)
3.4. The applied force (3)

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QUESTION 4

Satellite A with a mass of 615 kg is in orbit around the Earth

4.1. State Newton's Law of Universal Gravitation. (2)
4.2. The Earth exerts a force of 5000 N on satellite A to keep it in orbit, calculate the height, in kilometres, of the satellite above the surface of the Earth. (5)
4.3. Another satellite of a mass double that of the satellite A, orbits at a distance twice that of satellite A from the centre of the Earth. Write down the magnitude of the force of attraction of the Earth on this satellite. (3)

[10]

OUESTION 5

A lady injured her back when she slipped and fell in a supermarket. She holds the owner of the supermarket accountable for her medical expenses. The owner claims that the floor covering was not wet and meets the accepted standards. He therefore cannot accept responsibility.

The matter eventually end in court. Before passing judgement, the judge approaches you, a science learner, to determine whether the coefficient of static friction is a minimum of 0.5 as required. He provides you with a tile from the floor as well as one of the shoes the lady was wearing on the day of the incident.

5.1. Write down an expression for the coefficient of static friction (2)

5.2. Plan an investigation that you will perform to assist the judge in the judgement. Follow the steps outlined below to ensure that your plan meets the requirements:

5.2.1 Formulate an investigative question (2)

5.2.2. Apparatus: List all the apparatus, except the tile and the shoe that you will need. (2)

5.2.3. A step-wise method: How will you perform the investigation? Include the relevant free body diagram (5)

5.2.4. Results: What will you record? (2)

5.2.5. Conclusion: How will you interpret the results to draw a conclusion? (2)

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QUESTION 6

The table below shows bond energies, measured in Kilojoules per mole.

BOND	BOND ENERGY (KJ/mol)
F-F	158
Br-Br	193
H-H	436
H-F	565
H-Br	365

6.1. Define the term *bond energy* (2)

6.2. Select the strongest bond. Give a reason for the answer (2)

6..3. Ammonia is an important chemical in industry. It is used to make fertilizers and explosives. Ammonia is made via the Haber process by combining hydrogen (H_2) and Nitrogen (N_2) gas

6.3.1 Write down the balanced chemical equation for the production of Ammonia (3)

6.3.2. What type of interatomic bonds form In N_2 and NH_3? Use the electronegativity table to verify your answer (2)

6.3.3. Draw a Lewis diagram of the NH_3 molecule (2)

6.3.4 What is the shape of the NH_3 molecule? (2)

6.3.5. Is the NH_3 polar or Non-polar? Explain the answer. (2)

6.4 What type of forces-interatomic or intermolecular- are involved in the following? (2)

6.4.1. Forces that prevents ice cubes from adopting the shape of the container. (2)

6.4.2. Forces that overcome when Ice melts (2)

6.4.3. Forces that are overcome when gaseous water is converted to hydrogen gas and oxygen gas. (2)

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QUESTION 7

Climates are generally more moderate near the coast. During summers, land areas near a large body of water may not heat up as much as areas that are not close to water. Coastal areas also tend to be less cold during winters than individual areas

7.1 Explain which property of water is responsible for the low fluctuations in temperature between winter and summer. (2)

7.2. Explain why water has this property (2)

7.3. How do you think our country would be affected if we did not have such large amounts of water? (2)

[6]

TOTAL MARKS: 100