LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF EDUCATION
SEKHUKHUNE DISTRICT

PHYSICAL SCIENCES CONTROLLED TEST GRADE 11

MARKS: 100 DATE: 11-03-2016 DURATION: 2 Hrs

INSTRUCTIONS AND INFORMATION

1. Answer all questions.
2. Non-programmable calculators may be used.
3. Appropriate mathematical instruments may be used.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Be brief whenever motivations, discussions, et cetera, are required
6. Where needed, data sheets and graph papers will be provided by school.
7. Show the formulae and substitutions in ALL calculations.
8. Round off your final answer to a minimum of two (2) decimal places, unless otherwise stated.

QUESTION 1: MULTIPLE CHOICE QUESTIONS

Various possible options are provided as answers to the following questions. Choose the correct answer and write only letters (A –D) next to the question numbers (2.1 – 2.10) in the ANSWER BOOK.

1.1 The driver of a motor car places a book on the level dashboard of his car in front of him. He observes that the book slides towards the windscreen when the brakes are applied.

Which of newton's laws best explains this motion of the book?

A. Newton's First Law.
B. Newton's Second Law.
C. Newton's Third Law.
D. Newton's Law of Universal Gravitation. (2)

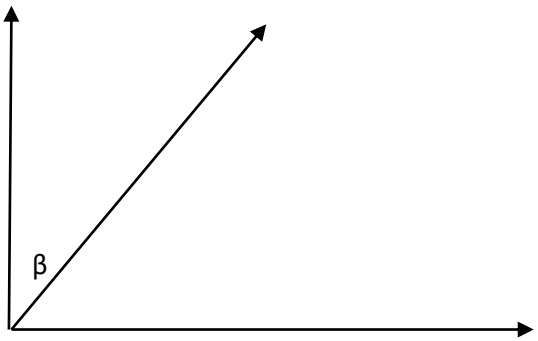
1.2 A body is moving northwards. Which one of the following physical quantities must also move northwards?

A. Resultant Force
B. Velocity
C. Kinetic Energy
D. Acceleration (2)

1.3 A force exerted by the surface on object in contact with it and is perpendicular to the surface is called a _____

A. Frictional Force
B. Applied Force
C. Normal Force
D. Weight (2)

1.4 The following diagram represents a force P acting at an angle β to the vertical axis.



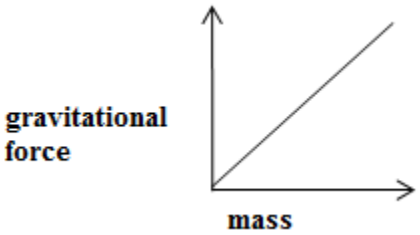
The Horizontal Component of P will be given by

A. P cos β
B. P cos (90)
C. P sin (90 – β)
D. P sin β (2)

1.5 Temba has a weight of 400N on the earth surface. What will be his weight on Jupiter, a planet which is twice the mass and twice the radius of earth?

A. 100N
B. 200N
C. 400N
D. 800N

1.6 The graph shows the relationship between gravitational force and mass for objects near the surface of the Earth.



The gradient of the graph can represent the:

A. Radius of the Earth.
B. Gravitational acceleration of the object.
C. Weight of the object.
D. Universal Gravitational Constant.

1.7 Which one of the following statements is FALSE about the formation of a chemical bond?

A. Different atoms, each with an unpaired valence electron can share these electrons to form chemical bond.

B. Different atoms with paired valence electrons can share these four electrons and form chemical bond.

C. Different atoms, with unpaired valence electrons can share these electrons and form multiple chemical bond

D. An atom with an incomplete complement of electrons in valence shell can share a lone pair of electrons from another atom to form dative covalent chemical bond. (2)

1.8. Which of the following molecules will be the most polar?

A. N_2

B. CF_4

C. HI

D. HF (2)

1.9. Electronegativity is related to electron affinity and ionization energy. Which statement is TRUE for Sodium (Na)?

A. Sodium has a low electron affinity and a high electronegativity

B. Sodium has a high electron affinity and a low electronegativity

C. Sodium has a low electron affinity and low ionization energy

D. Sodium has a low electron affinity and therefore does not lose electron easily (2)

1.10 The chemical bond with the highest bond energy

A. C – F

B. C – O

C. C – N

D. C – C (2)

[20]

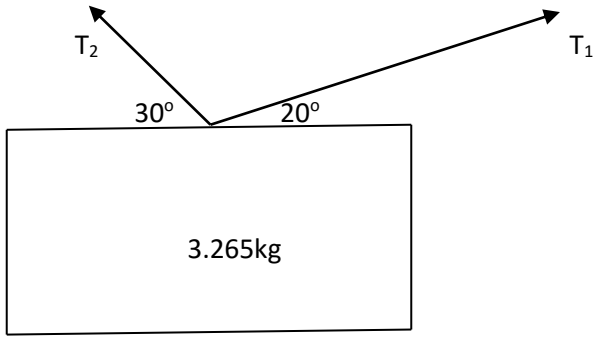
SECTION B

INSTRUCTIONS

1. Answer this section in the ANSWER BOOK.
2. In ALL calculations, formulae and substitutions must be shown.
3. Round off your answers to TWO decimal places.

QUESTION 2

A square wooden block is suspended from the roof by means of two cords that makes angles of 30^o and 20^o with the horizontal respectively as shown below:



The mass of the block is 3.265kg.

2.1 Define the term RESULTANT VECTOR. (2)

2.2 Write down the magnitude of the resultant force on the block mention above. Briefly explain your answer. (2)

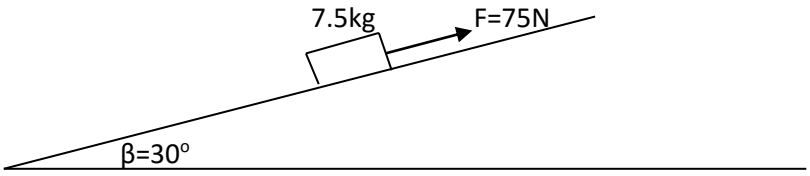
2.3 Determine the magnitude of T_1 and T_2 using the scale diagram. Use the scale, 1mm:1N. (6)

[10]

QUESTION 3

3.1 Define the term NORMAL FORCE (2)

3.2 A block of mass 7.5kg is at rest on an incline as shown in the diagram below. The angle between The horizontal and the incline $\beta=30^o$. A force of 75N is applied upwards parallel to the incline.



3.2.1 Draw a free-body diagram all the forces acting on the block (4)

If the block slides upwards at a CONSTANT VELOCITY. Determine:

3.2.2 the frictional force (3)

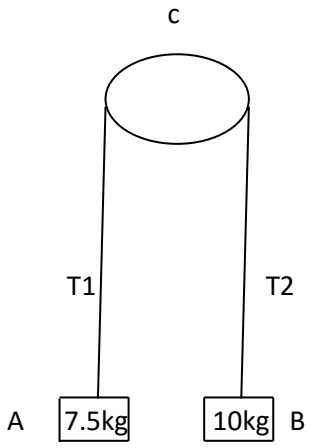
3.2.3 the coefficient of friction (3)

3.2.4 name the type of friction calculated in 4.2.1 and explain (2)

[14]

QUESTION 4

Two masses A and B connected by an inextensible light string are suspended (hanged) over a pulley C as shown in the diagram below. The tension in the portion AC of the string is T_1 and that of BC is T_2. The mass of A is 7.5kg and B is 10kg (IGNORE FRICTION)



4.1 State Newton's second law of motion in words (2)

4.2 Draw a force diagram for all the forces acting on A and B (4)

4.3 Calculate:

4.3.1 the acceleration of the system (6)

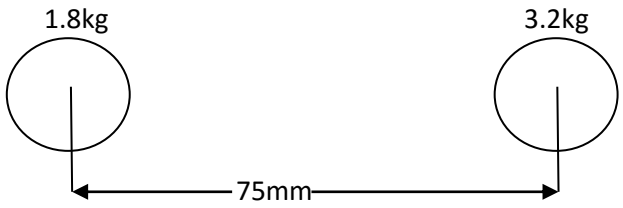
4.3.2 T1 (2)

4.3.3 T2 (1)

[15]

QUESTION 5

The distance between the centres of two spherical mass pieces of 1.8kg and 3.2kg is 75mm as shown in the diagram below.



5.1 State Newton's Law of Universal Gravitation in words. (2)

5.2 Calculate the magnitude of the gravitational force that the two mass pieces exert on each other.

(4)

5.3 How will the magnitude of the gravitational force (write the answers in terms of F) change if:

5.3.1 mass piece of 1.8 is doubled? (2)

5.3.2 distance is halved? (2)

[10]

QUESTION 6

6.1 State the molecular shape of each of the following molecules

6.1.1 $BeCl_2$ (1)

6.1.2 BF_3 (1)

6.1.3 PCl_5 (1)

6.2 Draw the Lewis diagrams for

6.2.1 NH_3 (2)

6.2.2 C_2H_4 (2)

[7]

QUESTION 7

7.1 Define the term ELECTRONEGATIVITY. (2)

7.2 List any 4 elements with the highest electronegativity and write their electronegativity close to each. (4)

7.3 Complete the table below by writing the type of the BOND and INTERMOLECULAR FORCE in each case. Write letters a – h and next to each letter write correct answer.

	MOLECULES	TYPE OF BOND	TYPE OF INTERMOLECULAR FORCE
1	HCl	(a)	(e)
2	NaCl	(b)	(f)
3	H_2O	(c)	(g)
4	H_2	(d)	(h)

(8)

7.4 Explain why polar CO_2 and CCl_4 are not polar molecules although they have polar bonds. (4)

[18]

QUESTION 8

The boiling points of the hydrides of group 15, labelled **A- D**, are shown in the table below.

	HYDRIDE	**BOILING POINT**
A	NH_3	- 33
B	PH_3	- 88
C	AsH_3	- 55
D	SbH_3	- 17

8.1 Describe the trend in boiling points as one moves from hydrides **B to D**. (1)

8.2 Give a reason for the trend described in Question **8.1** (2)

8.3 Use your knowledge of intermolecular forces and ENERGY considerations to explain why the boiling point of hydride **A** does not follow the trend described in Question 8.1 (3) **[6]**