education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES P1 (PHYSICS)

COMMON TEST

MARCH 2020

TIME: 1 hour

MARKS: 50

This question paper consists of 8 pages and 1 data sheet.

INSTRUCTIONS AND INFORMATION TO CANDIDATES

1. Write your name on the **ANSWER BOOK.**
2. This question paper consists of **FIVE** questions. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Leave ONE line between two subsections, for example between QUESTION 2.1 and QUESTION 2.2.
6. You may use a non-programmable calculator.
7. You may use appropriate mathematical instruments.
8. You are advised to use the attached DATA SHEET.
9. Show ALL formulae and substitutions in ALL calculations.
10. Round off your final numerical answers to a minimum of TWO decimal places.
11. Give brief motivations, discussions, et cetera where required.

QUESTION 1: MULTIPLE CHOICE QUESTIONS

Four options are provided as possible answers to the following questions.
Each question has only ONE correct answer. Write only the letter (A - D) next to the question number (1.1 — 1.4) in the ANSWER BOOK, for example 1.5 D.

1.1 The statements below refer to vector and scalar quantities.

(i) A vector has magnitude and direction, while a scalar has magnitude only.
(ii) A scalar quantity can always be added to a vector quantity.
(iii) Force is an example of a vector quantity, while distance is an example of a scalar quantity.

Which of the above statements is/are TRUE?

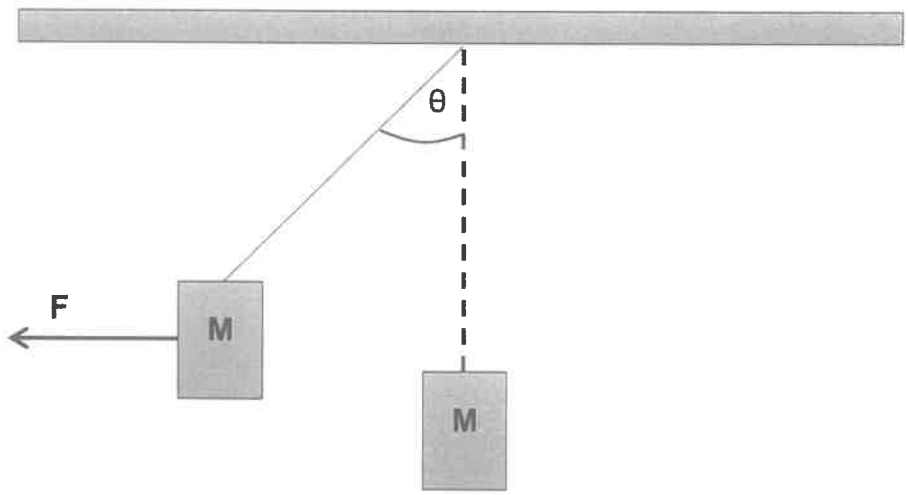
A (i) and (ii) only

B (i) and (iii) only

C (ii) and (iii) only

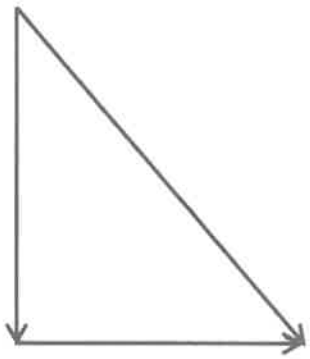
D (i) only (2)

1.2 A force F is used to pull an object of mass **M**, which is suspended from a string, to one side as shown in the diagram below. The object is in equilibrium.

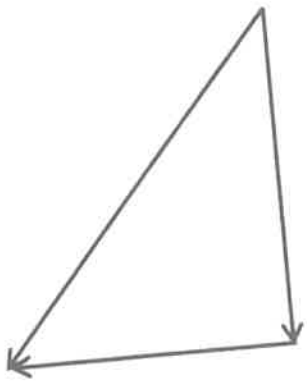


Which ONE of the following vector diagrams CORRECTLY represents all the forces acting on the object?

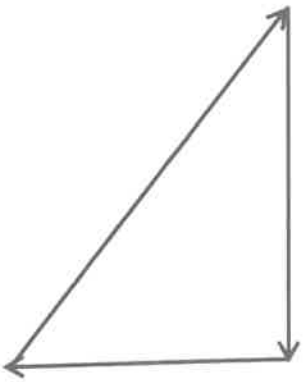
A



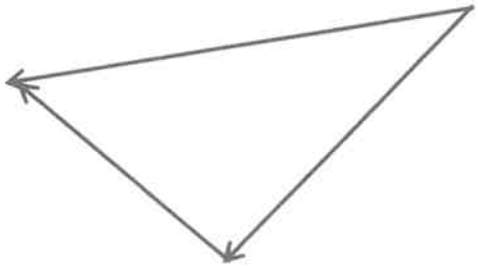
B



C



D



(2)

1.3 A book is at rest on a horizontal table. By Newton's Third Law, the reaction to the gravitational force acting on the book is:

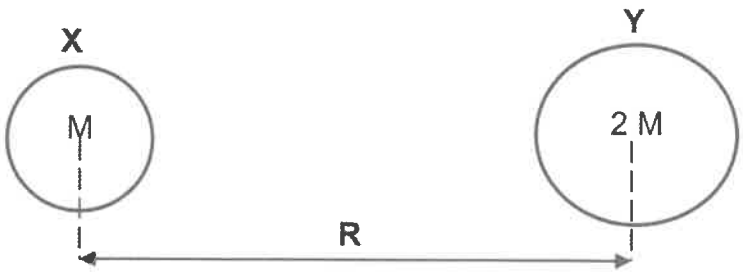
A The force that the book exerts on the earth.

B The force that the table exerts on the book.

C The force that the earth exerts on the book.

D The normal force acting on the book. (2)

1.4 Two bodies, X and Y, of mass M and 2 M respectively exert a force **F** on each other when their centres are **R** metres apart.



The mass of object Y is reduced to 0,5 M and the distance between their centres is reduced to 0,25 R.
What is the new force that the bodies exert on each other, in terms of F?

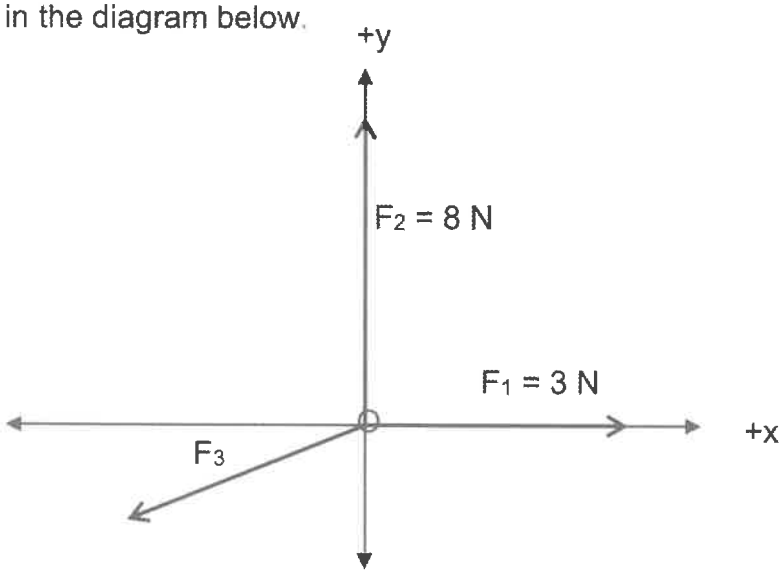
A 16 F
B 8 F
C 4 F
D 2 F

(2)
[8]

QUESTION TWO

2.1 Define Resultant Vector. (2)

2.2 Three forces F_1, F_2, and F_3 act simultaneously at a common point O as shown in the diagram below.



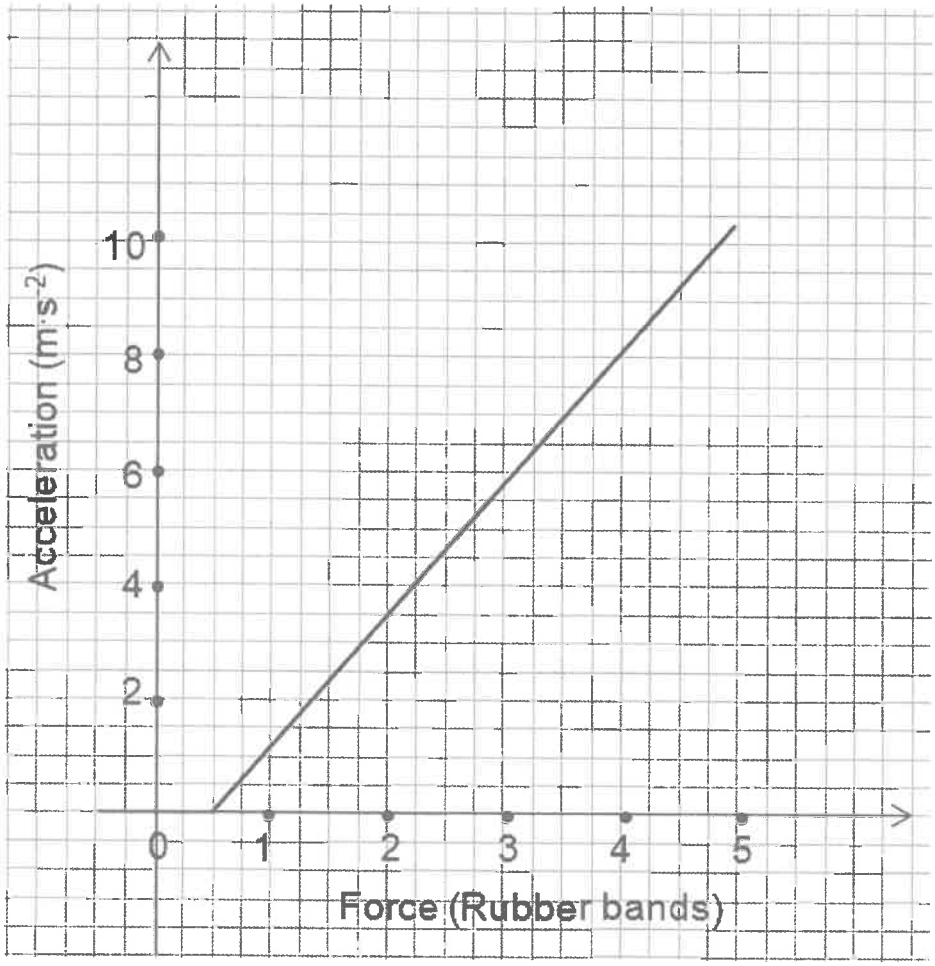
F_1 is a 3 N force, acting at 90^0 and F_2 is a 8N force acting at at 0^0.
F_3 has an x-component of –4 N and a y-component of –3 N.

2.2.1 Calculate the magnitude of F_3. (2)

2.2.2 Calculate the magnitude and direction of the resultant force acting at point O. (5)
[9]

QUESTION THREE

The graph below was obtained from an experiment used to determine a relationship between the acceleration of a trolley and the force applied on the trolley. The mass of the trolley was kept constant during the experiment.



3.1 State Newton's Second Law of motion. (2)

3.2 What is the acceleration of the trolley when two rubber bands are used? (1)

3.3 Why does the graph not start at the origin? (1)

3.4 What is the magnitude of the frictional force acting on the trolley? (2)

3.5 Calculate the mass of the trolley if the gradient of the graph is 2,286. (2)

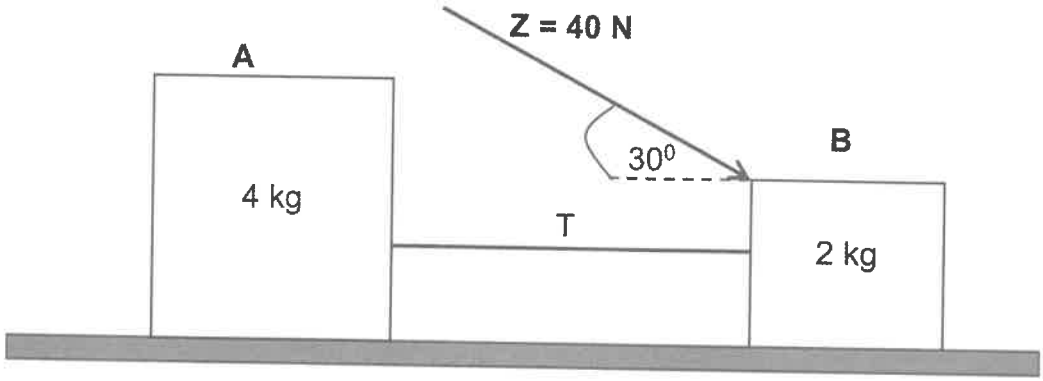
3.6 What change should be made to the experimental setup to verify the relationship between NET FORCE and ACCELERATION? (2)

3.7 The frequency of the ticker timer used in this experiment is 50 Hz. How would the gradient of the graph be affected if the frequency of the ticker-timer was reduced to 20 Hz?
Choose from INCREASES, DECREASES or REMAINS THE SAME. (1)

[11]

QUESTION FOUR

Two blocks A and B are connected by a string of negligible mass.
The mass of A is 4 kg and the mass of B is 2 kg.
Block B is pushed by a force Z of magnitude 40 N acting at an angle of 30^0 to the horizontal.
The coefficient of kinetic fiction between block B and the horizontal surface is 0,25. Block A experiences a frictional force of 9,8 N during its motion.
The system accelerates to the right.



4.1 Draw a free body diagram to show all the forces acting on the 2 kg block. (5)

4.2 The magnitude of the vertical component of force Z is 20 N.
Calculate the magnitude of the kinetic frictional force experienced by block B. (4)

4.3 Calculate the magnitude of the tension T in the string by applying Newton's Second Law of motion SEPARATELY to each of the blocks. (5)
[14]