education

Department of Education
FREE STATE PROVINCE

PROVINCIAL PRACTICAL TASK

GRADE 11

PHYSICAL SCIENCES

MARCH 2017

MARKS: 40

TIME: 1 HOUR

This paper consists of six pages.

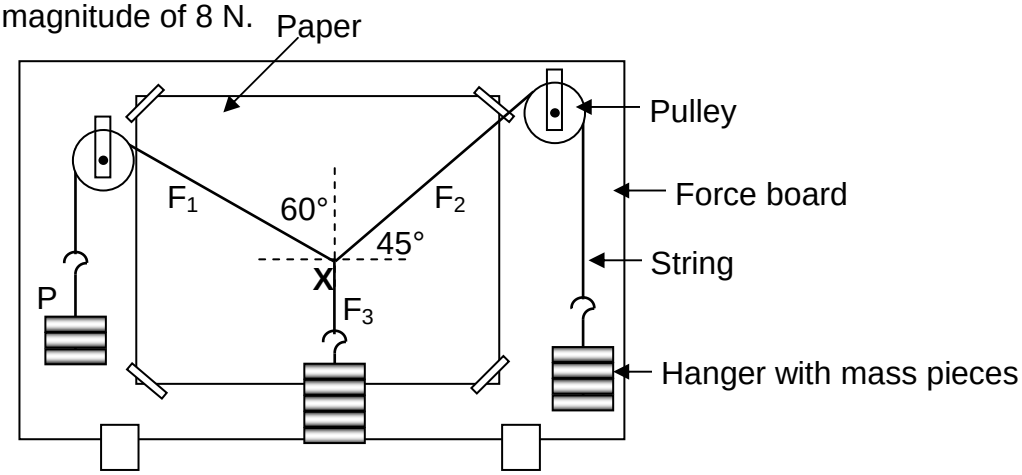
Name of learner ..... Grade .....

INSTRUCTIONS AND INFORMATION

1. Write your name and grade in the appropriate spaces on the FRONT PAGE of this question paper.
2. Answer ALL questions in the spaces provided in THIS QUESTION PAPER.
3. Non-programmable pocket calculators may be used.
4. Appropriate mathematical instruments may be used.
5. Give brief motivations, discussions, et cetera where required.
6. Formulae you might need are: $F_{net} = ma$ $T = \frac{1}{f}$ $w = mg$

QUESTION 1

A force board is used to investigate three forces that are in equilibrium. Forces F_1, F_2 and F_3 are acting on a knot at point **X**. The angle between F_1 and the vertical is 60°. The angle between F_2 and the horizontal is 45°. F_1 has a magnitude of 6,6 N and F_2 has a magnitude of 8 N.

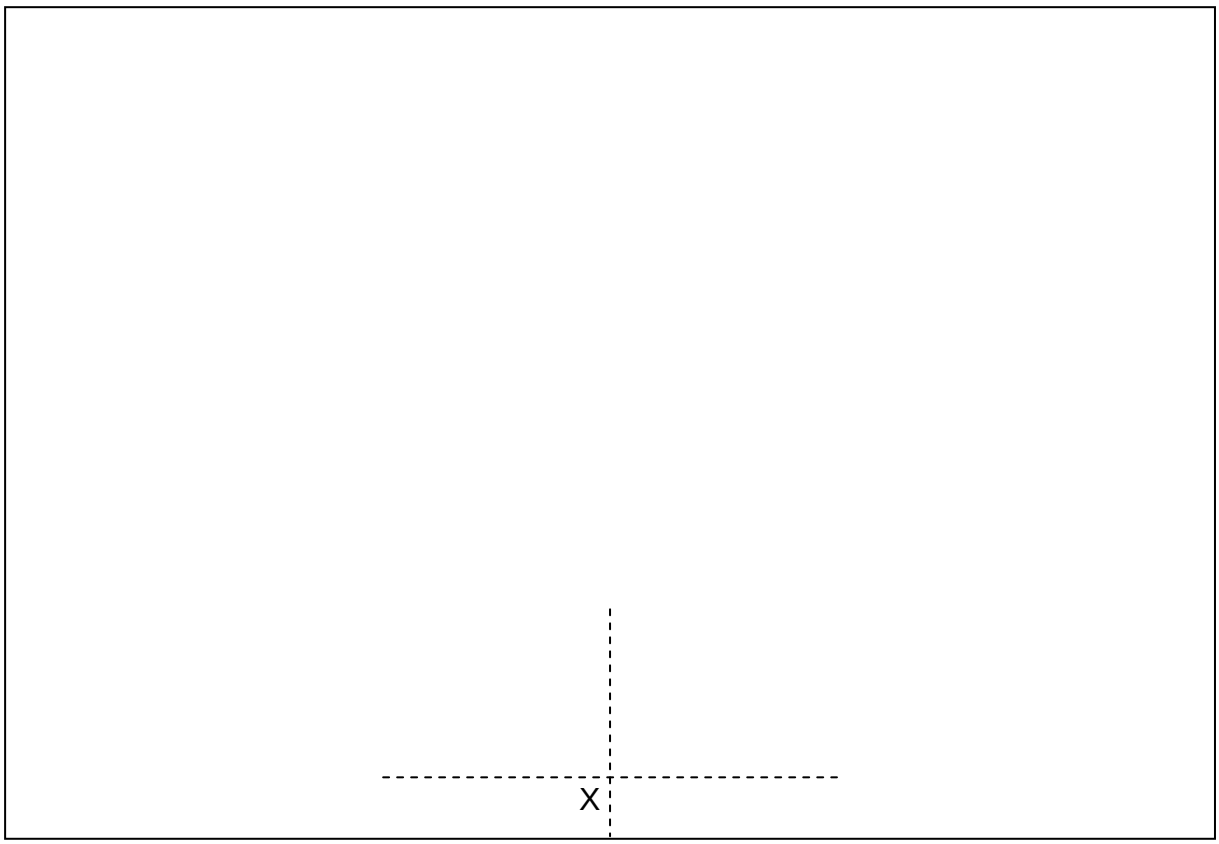


1.1 What can be used to ensure that the positions of the three strings are correctly transferred to the paper on the force board?

_____ (1)

1.2 In the block on the next page, point **X** is marked. Use a scale of 10 mm to represent 1 N and do the following:

- Construct forces F_1 and F_2 in magnitude and direction, with the tails of the vectors at point **X**.
- Complete a PARALLELOGRAM with F_1 and F_2 as two sides of the parallelogram and determine the RESULTANT of F_1 and F_2.
- Supply suitable labels for all the forces in your construction.
- Indicate the magnitudes of two angles in your construction.



(7)

1.3 What is the magnitude and direction of F_3?

_____ (2)

1.4 F_3 keeps F_1 and F_2 in equilibrium. Give a "term" for F_3 based on this ability.

_____ (1)

1.5 What is the magnitude of the resultant of ALL THREE forces F_1, F_2 and F_3?

_____ (1)

1.6 What figure is obtained if you construct F_1, F_2 and F_3 by using the tail-to-head method?

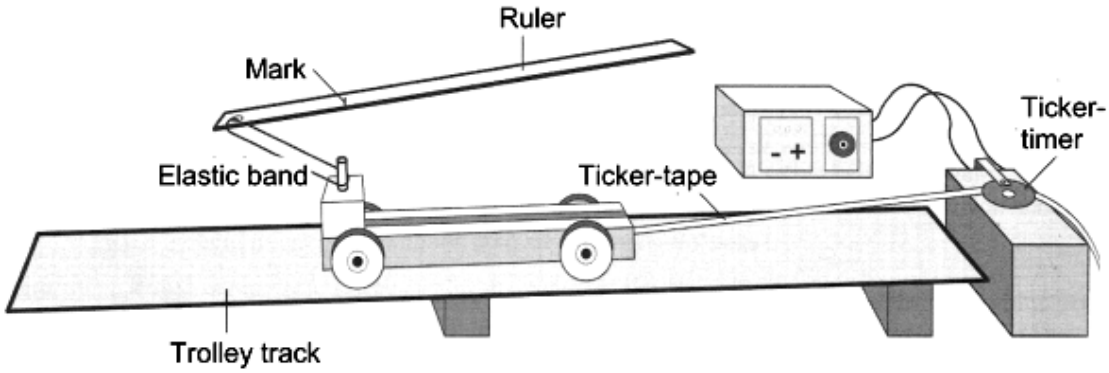
_____ (1)

1.7 Hanger **P**, with its mass pieces, is responsible for force F_1. Calculate the total mass of **P**, with its mass pieces, in kg. Hint: A mass of 1 kg has a weight of 9,8 N.

_____ (2)
[15]

QUESTION 2

You are using the apparatus below to investigate the relationship between NET FORCE and ACCELERATION for constant mass.

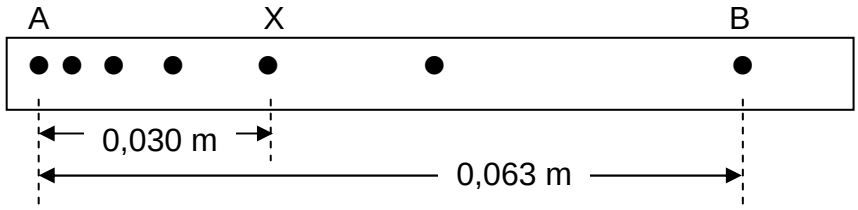


2.1 The relationship refers to "net force". How do you eliminate the effect of friction on the trolley?

_____

_____ (1)

A section of the ticker-tape is shown below. The distance from **A** to **X** is 0,030 m and the distance from **A** to **B** is 0,063 m.



2.2 The ticker-timer makes 20 dots in ONE second. Calculate the PERIOD of the ticker-timer.

_____ (3)

2.3 Calculate the magnitude of the average velocity in interval **AX**.

_____

_____ (3)

2.4 Calculate the magnitude of the average velocity in interval **XB**.

_____

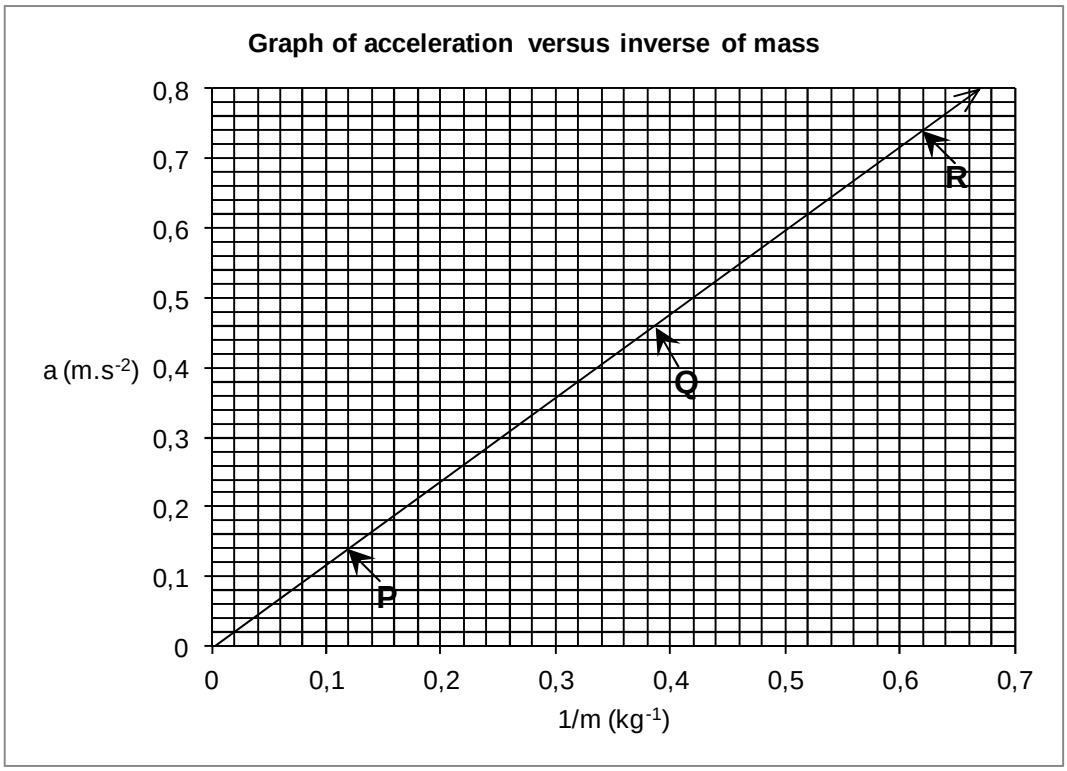
_____ (3)

2.5 Use your answers to questions 2.3 and 2.4 to calculate the magnitude of the acceleration of the trolley.

_____

_____ (4)

In a follow-up experiment the relationship between acceleration and mass was investigated and the following graph was obtained.



2.6 You want to calculate the gradient of the graph by using the points indicated either by **P** and **Q** or by **P** and **R**.

2.6.1 Why is it **better to use R with P** than **Q** with **P**?

_____

_____ (1)

2.6.2 Calculate the gradient by using points **P** and **R**.

_____

_____

_____ (4)

2.7 What is represented by the gradient?

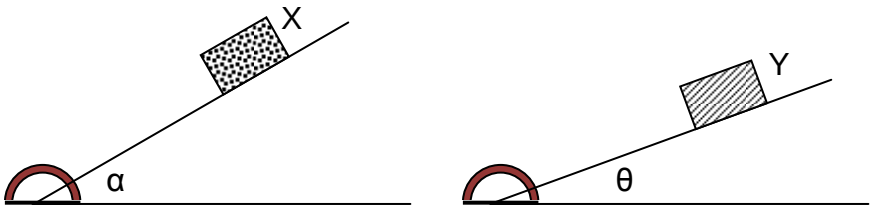
_____ (1)

2.8 What conclusion can be made from this graph?

_____ (1)
[21]

QUESTION 3

You have investigated the effect of the kind of material on the static frictional force. Each of two objects, **X** and **Y**, were placed on separate, identical wooden planks. One end of each plank was raised until the object started to move. Object **X** started to move at angle α and object **Y** started to move at angle θ, with α > θ.



3.1 Identify the dependent variable in this investigation.

_____ (1)

3.2 How must the mass of **X** compare to that of **Y** to make it a fair test?

_____ (1)

3.3 At θ = 30° the maximum static frictional force is obtained for **Y**. Calculate the VALUE of the static coefficient of friction if $f_s(max) = \mu N$.

_____

_____ (2)
[4]

GRAND TOTAL: 40