ALEXANDER ROAD HIGH SCHOOL

TERM 1 2020 60 MIN

PHYSICAL SCIENCE CONTROL TEST (PART 1)

JA, PE TOTAL = 50

GRADE 11

Instructions

- The question paper consists of 5 questions.
- Answer all the questions.
- Answer section A on the answer sheet provided AND section B on folio sheets.
- A non-programmable calculator may be used.
- Number the answers correctly according to the numbering system.
- Round off to two (2) decimal places where necessary.
- A formula sheet has been provided on the back of the answer sheet.

SECTION A

- Answer on the answer sheet -

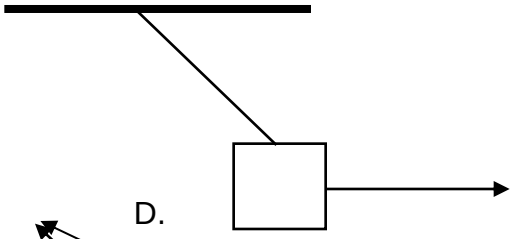
QUESTION 1: Multiple choice

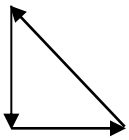
Four possible options are provided as answers to the following questions. Each question has only 1 correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.10) on the answer sheet.

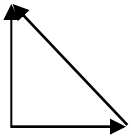
1.1 Two forces of 10N and 15N act on an object. Which one of the following CANNOT be a resultant?
A. 25N
B. 19N
C. 4N
D. 7N

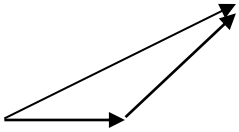
1.2 A train stops suddenly. A standing passenger tumbles forward because of her...
A. ...velocity.
B. ...acceleration.
C. …inertia
D. ...weight.

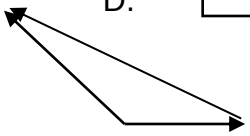
1.3 An object suspended from the ceiling is pulled to the side. Which diagram below shows the correct addition of the forces acting on the object?



A. 

B. 

C. 

D. 

1.4 The resultant vector is **defined** as…

A. …three or more vectors which form a closed vector diagram.

B. …a single vector having the same effect as two or more vectors together.

C. …the net force.

D. …a vector whose magnitude can be determined using Pythagoras.

1.5 The net force **F** acting on an object with mass **m** has an acceleration **a**. If the net force acting on the object is tripled and its mass is halved, the new acceleration will be…

A. …2**a**

B. …1,5**a**

C. …3**a**

D. …6**a**

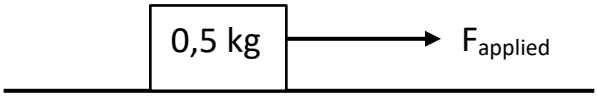
TOTAL SECTION A: [10]

SECTION B

-Answer on folio paper-

QUESTION 2:

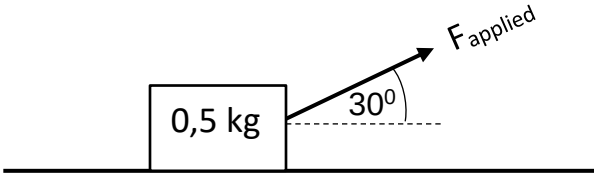
A person is doing an investigation into friction. She pulls a 0,5 kg block along a surface with a spring scale. It takes 3,2 N to get it moving and only 2,8 N to keep it moving at CONSTANT VELOCITY.



2.1 Draw a force diagram showing all the forces acting on the object whilst it is moving at CONSTANT VELOCITY. (4)

2.2 Calculate the coefficient of kinetic friction of these surfaces. (4)

2.3.1 What would happen to the size of the friction force if the applied force is at an angle of 30^0 above the horizontal? You may assume the block remains moving at a constant velocity. Write just INCREASES, DECREASES or REMAINS THE SAME.



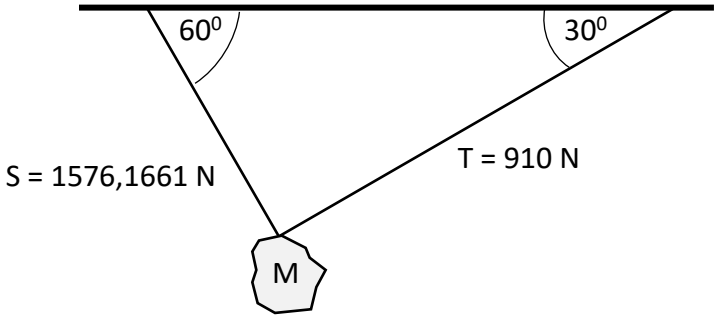
(1)

(1)

2.3.2 Explain your answer in 2.3.1. **[10]**

QUESTION 3:

A rock of unknown mass hangs from two ropes as shown in the diagram. The tension in rope S is 1576,1661 N and in Rope T is 910 N and the angles of the ropes are shown in the drawing.



3.1 Determine the resultant between S and T. (2)

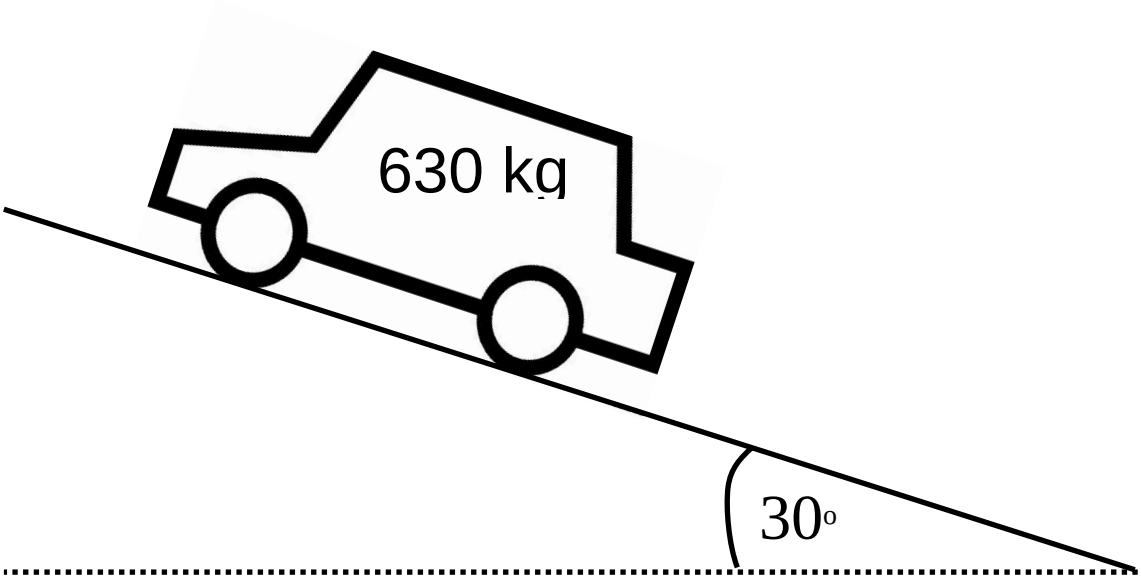
3.2 Why would the forces acting on the rock form a closed vector diagram? (1)

3.3 Determine the **mass** of the rock. (3)

[6]

QUESTION 4:

Natasha and her friends park their car on a rough slope inclined at 30° to the horizontal. The combined mass of the car, Natasha and her friends is 630 kg. To just stop the car from sliding down the slope, the car's brakes produce a force of 4000 N up the slope.



4.1 State *Newton's First Law of Motion* in words. (2)

4.2 Draw a free-body diagram showing ALL the forces acting on the car. (3)

4.3 Calculate:

4.3.1 The magnitude of the frictional force acting on the car. (3)

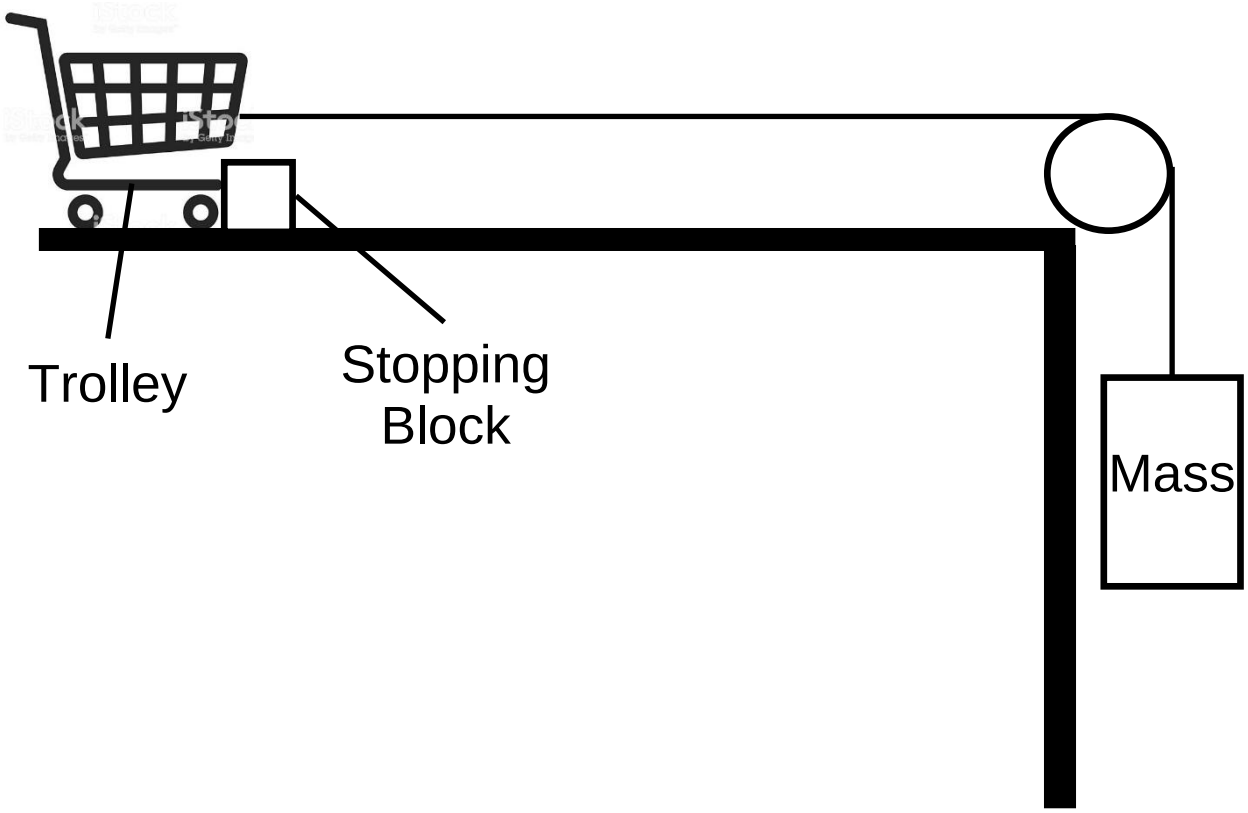
4.3.2. The coefficient of static friction between the car's tyres and the road's surface. (4)

4.4 How will the magnitude of the normal force be affected if two of Natasha's friends get out of the car? Write only INCREASES, DECREASES or REMAINS the SAME. (1)

[13]

QUESTION 5:

Bill sets up the following experiment.



He measures the mass of the trolley then removes the stopping block allowing it to move to the right. Bill uses a motion capture device to measure the acceleration of the trolley. He repeats this experiment, systematically increasing the mass of the trolley (by placing mass pieces on top of it) and measuring the corresponding acceleration each time. Bill obtains the following sets of results:

Mass (g)	**Acceleration (m/s^2)**
300	17
350	14.3
400	12.5
450	11.1
500	10.0

5.1 State *Newton's 2nd Law of Motion* in words. (2)

5.2 Identify:

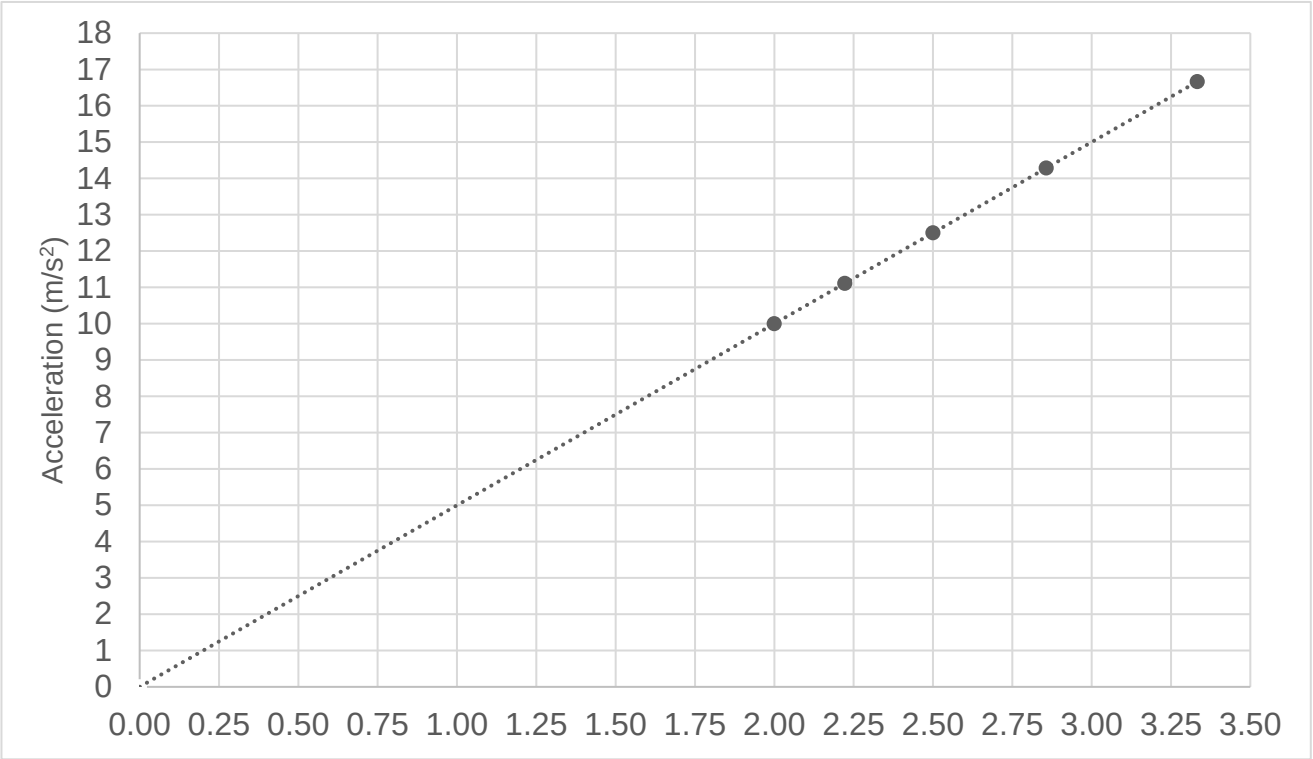
5.2.1 The independent variable. (1)

5.2.2 The dependent variable. (1)

5.2.3 The control variable. (1)

5.3 Write an investigative question for this experiment. (2)

Bill uses the data to plot the graph shown below. He draws a line of best fit. When Bill extrapolates his line of best fit, he discovers it passes through the origin.



5.4 What did Bill plot on the *x*-axis to obtain the graph shown above? (1)

5.5 **Using the graph**, calculate the size of the resultant force. (3)

[11]

TOTAL SECTION B: [40]