MATIGO EXAMINATIONS BOARD

STUDENT'S NAME:

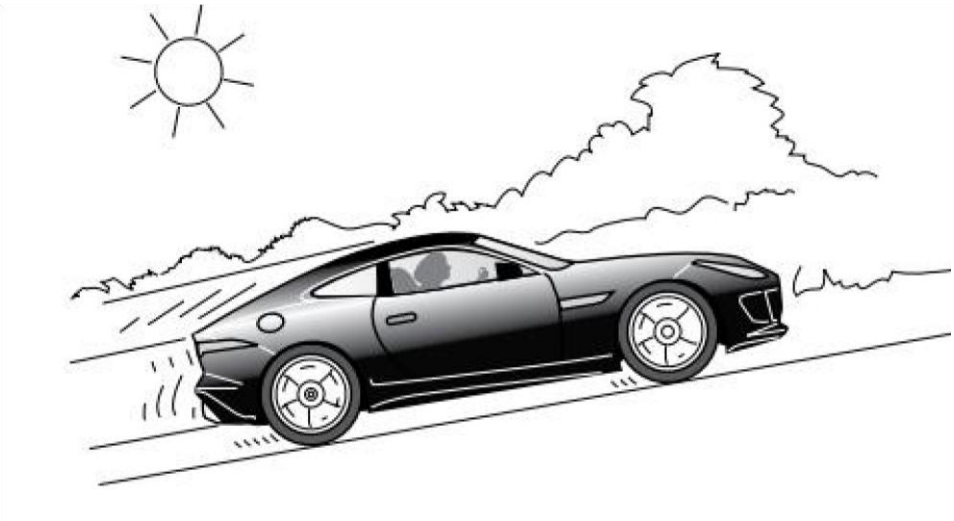
PHYSICS	SENIOR TWO
Paper 1	2022
You must answer on the question paper	2HOURS

READ THESE INSTRUCTIONS FIRST

- Write in dark blue or black pen.
- You may use an HB pencil for any diagrams or graphs.
- Answer all questions.
- Write your answers in the spaces provided on the Question Paper.
- Electronic calculators may be used.
- You may lose marks if you do not show your working or if you do not use appropriate units.
- At the end of the examination, fasten all your work securely together.
- The number of marks is given in brackets () at the end of each question or part question

Turn Over

1. The figure below shows a black car going up a hill on a sunny day



(a) State:

(b) (i) one way in which the car is gaining thermal energy (01mark)

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(ii) one way in which the car is losing thermal energy. (01mark)

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(c) At one point in the motion, the kinetic energy of the car is 90 kJ. The mass of the car is 800 kg.

Calculate the speed of the car. (03marks)

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(d) Explain why its not advisable to park a car in sunshine weather for a long period of time (03marks)

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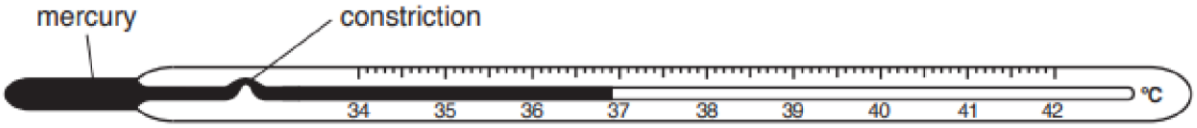
3. A nurse uses a mercury-in-glass, clinical thermometer to measure the temperature of a patient. The figure below shows the structure of a clinical thermometer.



(a) The clinical thermometer has a small range and a high sensitivity. State what is meant by

(i) Range (01mark)

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(ii) Sensitivity (01mark)

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(b) State and explain one feature of this clinical thermometer that produces a high sensitivity. (02marks)

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(c) State the purpose of the constriction in the clinical thermometer.
(01mark)

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(d) Explain, in terms of the mercury molecules, how an increase in temperature produces an increased reading on the thermometer.
(03marks)

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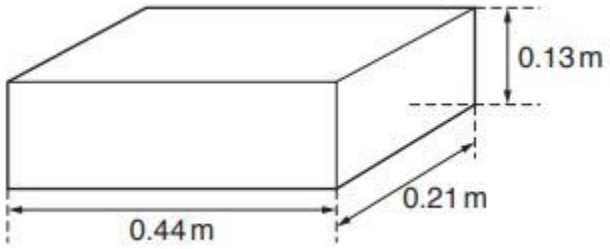
4. A solid, rectangular concrete block is lying horizontally on flat ground with one of its largest sides in contact with the ground. Fig. shows the dimensions of the block.



(a) If the block has a mass of 5kg

(i) Calculate the volume of the block (02marks)

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(ii) Calculate the density of the concrete block (03marks)

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(b) Give three differences between mass and weight (03marks)

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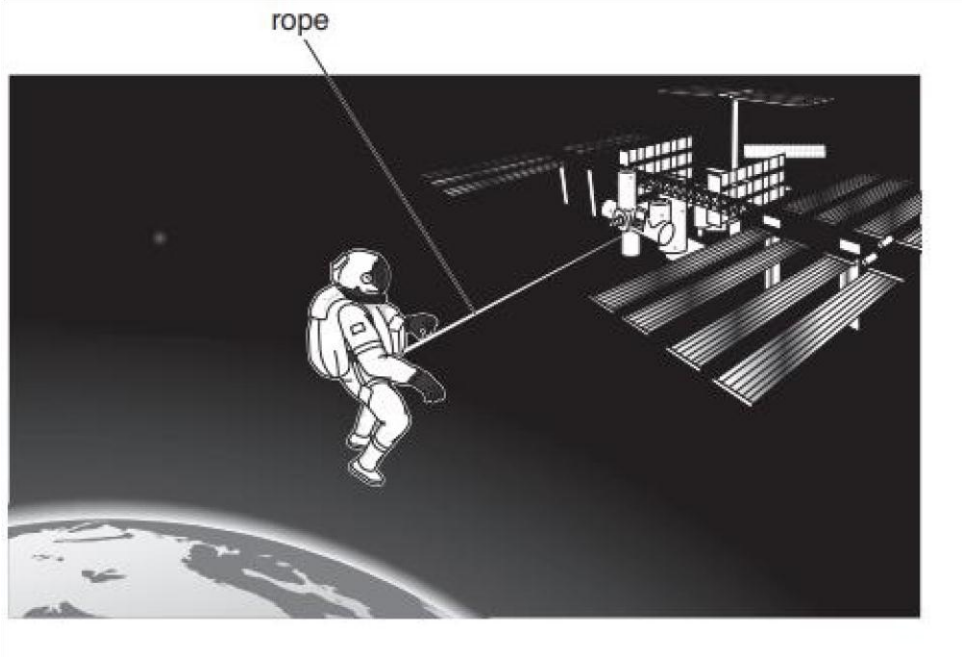
5. (a) An astronaut with a mass of 60kg left earth and went to moon as shown in figure below. If he weighs 450N at moon find the acceleration due to gravity at moon (02marks)



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(b)(i) if the he came back on earth, explain the changes if there is any to his mass and weight

Mass (02marks)

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Weight (02marks)

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(c) calculate the astronaut's weight on earth (take g as $10ms^{-2}$)

(02marks)

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6. In an experiment to determine density of water and paraffin using a density bottle of $50cm^3$, the following measurements were taken.
   - Mass of empty density bottle = 50g
   - Mass of a bottle full of paraffin = 250g
   - Mass of a bottle full of water = 400g

(a) Find the

(i) mass of water (02marks)

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(ii) mass of paraffin

(02marks)

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(iii) Find the density of paraffin (03marks)

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(b) State one application of density measurement (01mark)

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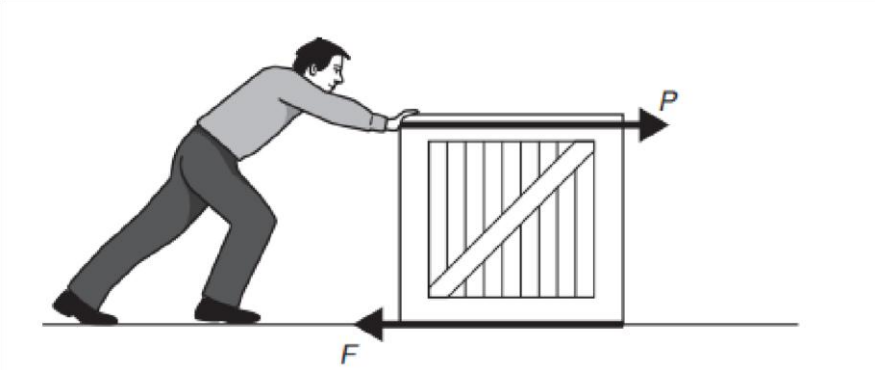
7. The figure below shows a man pushing a heavy box with a force P. A frictional force F acts in a horizontal direction.



(a) The forces on the box are balanced and the box is stationary.

(i) State what is meant by balanced forces. (02marks)

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(ii) The frictional force in Fig. does not produce any heating effect. State what must happen for the frictional force to produce heating.
(02marks)

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(b) Look at the soles of shoes A and B. (i) which one would you be comfortable wearing on slippery ground? Why? (02marks)

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(ii) Suggest two ways in which friction can be useful to society.
(02marks)

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8. (a) A house has several solar panels on the roof. These panels use energy from the Sun both to generate electricity and to raise the temperature of water that passes through tubes inside the panels.

The panels on the roof of the house have a black surface.

(i) State how energy from the Sun travels through space before it reaches the Earth. (02marks)

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(ii) Explain the advantage of using panels that have a black surface.
(02marks)

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(b) Mercury freezes at -40^{0}C. What is this temperature on the Kelvin scale? (02marks)

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(c) Give two reasons why mercury is a suitable liquid for use in a thermometer (02marks)

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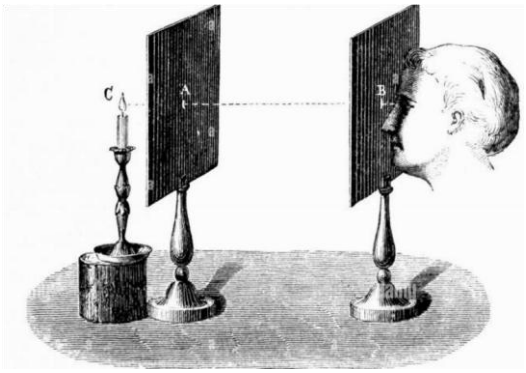
9. (a) Classify the sources of light as either natural or artificial. Fill in the table below. List only 3 for each (06marks)

Natural sources	Artificial sources of light

(b) Two cardboards A and B with holes were arranged in in a straight line as shown below.



(i) State property of light this experiment demonstrates.(01mark)

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(ii) State one application of the property above in everyday life (01mark)

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