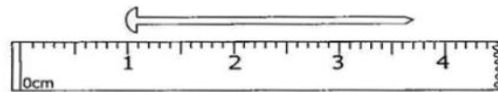
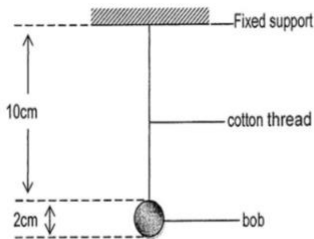


SECTION A [20 MARKS]

1. All measurable features or properties of objects are called ...
 - a. SI units
 - b. Measurements
 - c. Physical quantities
 - d. Derived units
2. Which of the following is not an SI unit?
 - a. m/s
 - b. N
 - c. °C
 - d. W
3. Which of the following instruments would be used to accurately measure the inside diameter of a bottle neck?
 - a. Ruler
 - b. Vernier caliper
 - c. Engineers caliper
 - d. Micrometer screw gauge
4. The diagram below shows part of a ruler used by Mr. M'tonga to find the length of a nail with the pupils of blessing private academy.



What is the length of the nail?

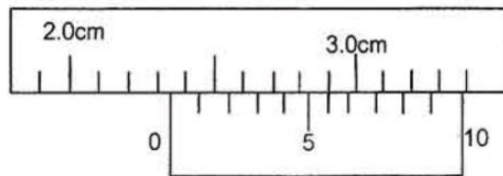
- a. 2.2cm
 - b. 2.7cm
 - c. 3.2cm
 - d. 3.7cm
5. The diagram below represents a pendulum.

The length of the pendulum is ...

 - a. 2cm
 - b. 10cm
 - c. 11cm
 - d. 12cm
 6. Which of the following numbers has three significant figures?
 - a. 0.0003

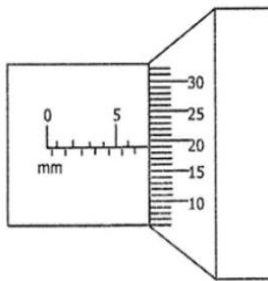
- b. 0.0030
- c. 0.0300
- d. 0.3000

7. The diagram below part of a vernier caliper used to measure the width of a rectangular glass block.



The correct reading is ...

- a. 1.46cm
 - b. 2.25cm
 - c. 2.36cm
 - d. 2.54cm
8. The diagram below shows part of the micrometer screw gauge. What is the reading shown in the diagram?



- a. 6.69mm
 - b. 6.86mm
 - c. 6.68mm
 - d. 5.68mm
9. If Mr. Mtonga has a mass of 69kg, what is his weight on the moon where gravitational field strength is 1.6N/kg?
- a. 690N
 - b. 110.4N
 - c. 69N
 - d. 0N
10. A stone of mass 400g is lowered into a measuring cylinder containing water. The water level rises from 300cm³ to 500cm³. What is the density of the stone?
- a. 0.50g/cm³
 - b. 0.80g/cm³
 - c. 1.33g/cm³
 - d. 2.00g/cm³
11. A motorist travels 320km at 80km/h and then 320km at 100km/h. What is the average speed of the motorist for the entire trip?

- a. 84km/h
- b. 89km/h
- c. 90km/h
- d. 91km/h

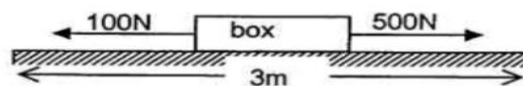
12. Which of the following quantities changes when a body is accelerating?

- a. Mass of the body
- b. Weight of the body
- c. Velocity of the body
- d. The force acting on the body

13. A parachutist of mass 60kg falls with constant velocity of 5m/s together with a parachute of mass 20kg. Taking g to be 10N/kg, what is the resultant force on the system?

- a. 0N
- b. 400N
- c. 600N
- d. 800N

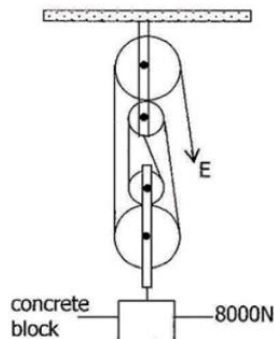
14. Mercy exerts a horizontal force of 500N on a box which also experiences a friction force of 100N.



How much work is done against friction when the box moves a horizontal distance of 3m?

- a. 1800J
- b. 1500J
- c. 1200J
- d. 300J

15. The diagram below shows a frictionless pulley used to lift an 8000N block of concrete.



What is the minimum effort required to raise the block?

- a. 1600N
- b. 2000N
- c. 3600N
- d. 8000N

16. A dog running at constant speed of 3m/s increases its speed to 7m/s upon seeing a lion. If the mass of the dog is 20kg, calculate the work it does on achieving the new speed.

- a. 40J

- b. 160J
- c. 400J
- d. 580J

17. A toy car of mass 600g moves through 6m in 2 seconds. Calculate the average kinetic energy of the toy car.

- a. 0.027J
- b. 0.27J
- c. 2.7J
- d. 66.67J

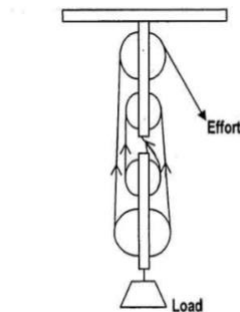
18. Starting from rest at $t=0$, an object moves in a straight line with a constant acceleration of 2m/s^2 . At what time is the speed of the object 10m/s ?

- a. 0s
- b. 1s
- c. 2s
- d. 5s

19. Which property of a body cannot be changed if a force is applied to it?

- a. Velocity
- b. Volume
- c. Shape
- d. Mass

20. The diagram below shows an ideal system of pulleys.

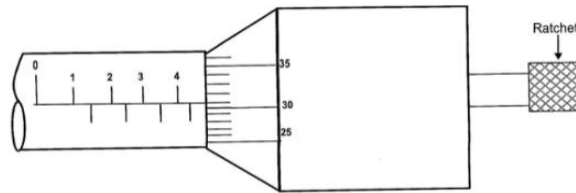


The mechanical advantage of the system is ...

- a. 6
- b. 5
- c. 4
- d. 2

SECTION B [45 MARKS]

1. The figure below shows part of a micrometer screw gauge, an instrument used to measure a physical quantity.



a. What is the reading shown on the micrometer screw gauge?

[2]

b. What physical quantity is measured by the instrument?

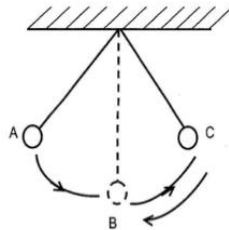
..... [1]

c. What is the function of the ratchet?

..... [1]

TOTAL: 4 MARKS

2. The figure below shows a simple pendulum that oscillates between position A and C. It takes 2.05 seconds to go from A to C and back to midpoint B.



a.

i. Calculate the period of the pendulum.

[2]

ii. Calculate the frequency of the pendulum.

[2]

b. Briefly describe how the period of a pendulum would be measured.

..... [2]

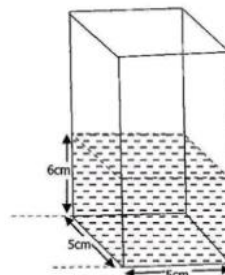
TOTAL: 6 MARKS

3.

a. What is the difference density and relative density?

..... [1]

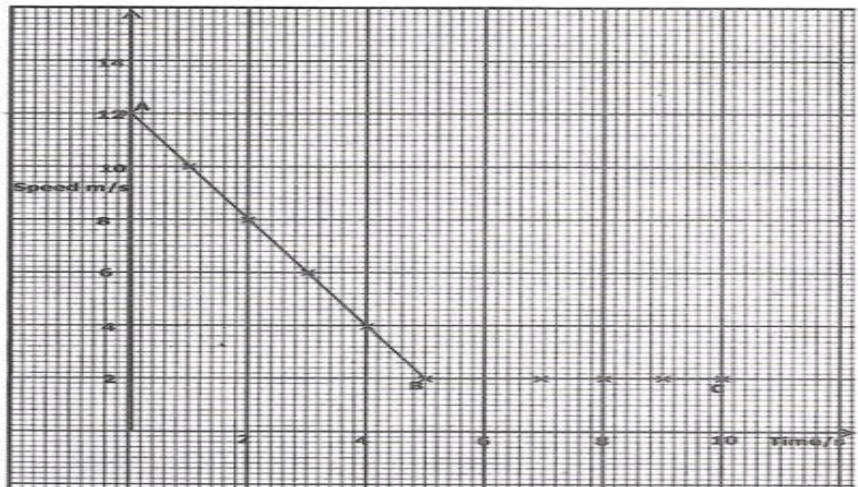
b. The figure below shows a cuboid container that has a 5cm square base and is filled with water to a height of 6cm.



- i. What is the volume of the water? [1]
- ii. A stone is immersed into the water in the cuboid causing the water to rise to a height of 8cm. Determine the volume of the stone. [2]
- c. If the mass of the stone is 80g, calculate its density. [2]

[2]
TOTAL: 6 MARKS

4. The figure below shows a graph of how the velocity of a car changed when the driver applied brakes upon seeing a herd of cattle crossing the road ahead.

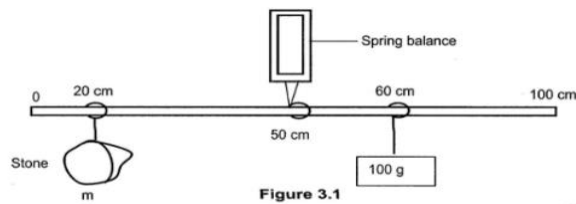


Use the information on the graph to calculate:

- a. Deceleration of the car between points A and B. [2]
- b. Distance moved by the car in 10 seconds. [2]
- c. Average speed of the car. [2]

[2]
TOTAL: 6 MARKS

5. The figure below shows a uniform metre rule of mass 120g suspended at its mid-point from a spring balance, which is calibrated in newtons (N).



A stone suspended at the 20cm mark is balanced by a 100g mass suspended on the 60cm mark. Assume $g = 10\text{m/s}^2$.

a. Calculate the mass of the stone.

[2]

b. Why does the mass of the metre rule play no part in the calculation in (a)?

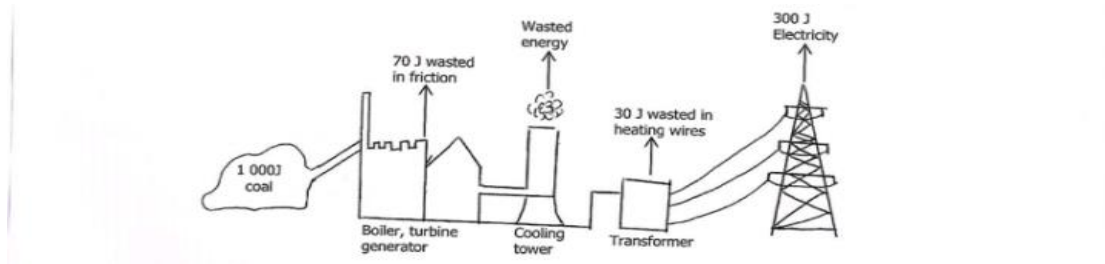
..... [2]

c. What is the reading on the spring balance?

[2]

TOTAL: 6 MARKS

6. The figure below shows some energy conversions in a coal powered station.



a. How much useful electrical energy is provided by the power station?

[2]

b. Calculate how much energy is wasted from the cooling tower.

[2]

c. Calculate the efficiency of the power station in the production of electrical energy.

[2]

TOTAL: 6 MARKS

7.

a. Define the following terms;

i. Work.

..... [1]

ii. Power.

..... [1]

b. Mercy of mass 59 kg climbs a flight of 20 stairs each having 2cm in 10 seconds.

Taking gravity to be 10N/Kg ,

i. Calculate Mercy's gain in potential energy.

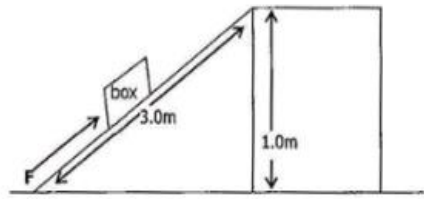
[2]

ii. Calculate her power output.

[2]

TOTAL: 6 MARKS

8. The figure below shows a ramp being used to lift a box weighing 480N through a distance of 3 metres and a height of 1 metre by applying a force F of 200N .



a. What is the meaning of the term simple machine?

.....
..... [1]

b. Calculate the mechanical advantage of the ramp shown above.

[2]

c. Calculate the efficiency of the ramp.

[2]

TOTAL: 5 MARKS

SECTION C [20 MARKS]

Answer any **two (2)** questions from this section.

1. A motorbike of mass 500kg started from rest and increased its speed uniformly to 9m/s in 30s . It maintained the same speed of 9m/s for another 500s .
 - a. Sketch the speed – time graph of the automobile for the journey described. [3]
 - b. Calculate the uniform acceleration of the motorbike. [2]
 - c. How much force was required to produce this acceleration? [1]
 - d. Calculate the distance covered by the motorbike when it was moving at constant speed. [2]
 - e. What was the average speed of the motorbike for the journey described? [2]
2. A spring with its upper end fixed hangs vertically alongside a metre rule. The table below shows the readings obtained when various masses were hung from it.

Mass (kg)	0	0.02	0.04	0.06	0.08	1.00
Reading (cm)	10.0	12.0	14.0	16.0	17.0	17.5
Applied force (N)	0					1.0
Extension (cm)	0					7.5

- State Hooke's law. [1]
 - Copy and complete the table for the values of force (N) and extension (cm) produced. [4]
 - Draw a graph of applied force against extension on a graph paper. [4]
 - On the graph paper, show the elastic limit. [1]
3. The figure below shows a ball as it rolls down an incline for 5.0s before reaching the horizontal ground.



The changes in gravitational potential energy of the ball as it rolls down to the horizontal ground are shown in the table below.

Time elapsed in seconds	0	1	2	3	4	5
Potential energy in joules	9	7.2	5.4	3.6	1.8	0

- State the law of conservation of energy. [1]
- Using the values in the table above, draw a graph of potential energy against time. [4]
- Calculate the height, h of the plane when potential energy was 9J and the mass of the ball was 900g. [3]
- Using the graph, estimate the potential energy of the ball at time:
 - 2.5 seconds
 - 4.5 seconds [2]