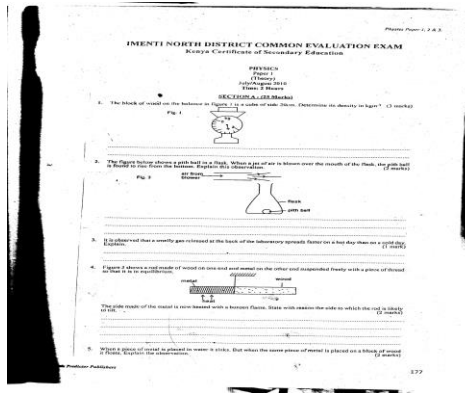


# FORM 3 END TERM 2 2020

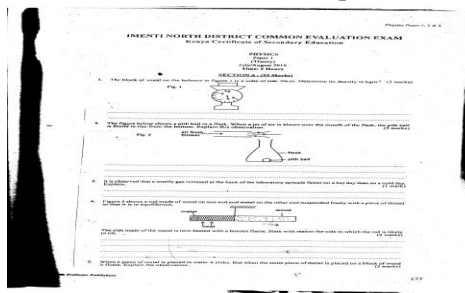
## PHYSICS PAPER 2

### SECTION A 25MARKS

1. The block of wood on the balance in the figure below is a cube of side 20cm Determine its density in  $\text{kgm}^{-3}$  (3mks)



2. The diagram below shows a pith ball in a flask. When a jet of air is blown over the mouth of the flask, the pith ball is found to rise from the bottom. Explain this observation (2mks)



3. It is observed that a smelly gas released at the back of the laboratory spreads faster on a hot day than on a cold day. Explain (1mk)

4. The diagram below shows a rod made of wood on one end and metal on the other end suspended freely with a piece of thread so that it is in equilibrium



The side made of the metal is now heated with a Bunsen flame. State with reason the side to which the rod is likely to tip (2mks)

5. When a piece of metal is placed in water it sinks. But when the same piece of metal is placed on a block of wood it floats explain the observation (2mks)
6. A bullet traveling at a speed of  $100\text{ms}^{-1}$  strikes a wall and penetrates 2cm. How long does the bullet take to stop after striking the wall? (3mks)

7. A balloon of volume  $1.5\text{cm}^3$  containing helium gas at a pressure of  $3.0 \times 10^6\text{pa}$  is released from the ground when the temperature is  $20^\circ\text{C}$ . What will be the pressure when it reaches a point where the volume becomes  $3.0\text{m}$  and the temperature  $5^\circ\text{C}$  (3mks)
8. Explain why mercury forms a convex meniscus and water a concave meniscus in a tube (2mks)
9. A force of  $3500\text{N}$  acts on a stationary body of mass  $20\text{kg}$  for  $0.02$  seconds. Calculate the velocity attained by the body (2mks)
10. The diagram below shows two identical iron rods, one is placed on a wooden block and the other on a metal block. The ends of the rods are heated as shown.



State with reason the piece of wax that melts first (2mks)

11. A stone is tied to a string and whirled in a horizontal circle at a constant speed. In which direction is the stone being accelerated at each point of its path? (1mk)
12. A force of 2.0N compresses a spring by 1.0mm. Determine the energy stored in the spring

### SECTION B 55MKS

13. a) Define the term 'velocity'. (1mk)  
 b) The following figure shows velocity –time graph for the journey of a car in 100minutes.

(i) Determine the acceleration of the car between A and B and between C and D. (2 marks)

(ii) Determine the distance covered by the car during the journey. (2 marks)

(iii) Determine the average velocity of the car. (2 marks)

(iv) A ball rolls off a platform of height 1.8 m at a horizontal speed of 4.0 m s<sup>-1</sup>. How far off the edge of the platform does it land? (2 marks)

(v) Write the expression for the equation of continuity and explain each component of the equation. (2 marks)

18. (a) You are provided with the following:

- a test tube
- lead shot
- water in a beaker
- a liquid of a density different from that of water.

Describe how you would construct and calibrate a simple hydrometer and use it to measure the density of the liquid. (5 marks)

(b) A block of wood of mass 5.000 kg and density 800 kg m<sup>-3</sup> floats on water. Determine the minimum weight that can be placed on the block to make it sink. (Density of water is 1 000 kg m<sup>-3</sup>). (5 marks)

**Paper 2**  
**Section A (25 marks)**

1. Determine the total capacitance of the arrangement below. (1 mark)

2. State what is meant by polarization in a simple cell. (1 mark)

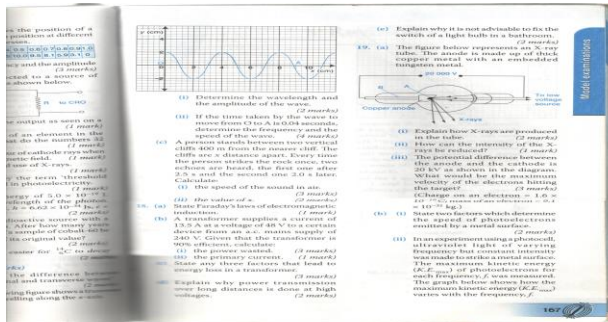
- i. Determine the acceleration of the car between A and B and between C and D (4mks)
- ii. Determine the distance covered by the car during the journey (3mks)
- iii. Determine the average velocity of the car (2mks)
- c) A ball rolls off a platform of height 1.8m at a horizontal speed of  $15 \text{ ms}^{-1}$ . How far off the edge of the platform does it land? (4mks)
14. A car of mass 2000kg travelling at  $5 \text{ ms}^{-1}$  collides with a minibus of mass 5000kg travelling in the opposite direction at  $7 \text{ ms}^{-1}$ . The vehicles stick and move together after collision. If the collision lasts for 0.1seconds;
- a) Determine the velocity of the system after collision of 3 decimal places. (3mks)
- b) Calculate the impulsive force on the minibus (3mks)

c) Calculate the change in kinetic energy of the system (3mks)

d) Explain the change in kinetic energy of the system (1mk)

15. a) What is the difference between longitudinal and transverse waves? (2mks)

b) The following figure shows a transverse wave travelling along the x-axis.



i. Determine the wave length and the amplitude of the wave. (2mks)

ii. If the time taken by the wave to move from O to A is 0.04 seconds, determine the frequency and the speed of the wave (4mks)

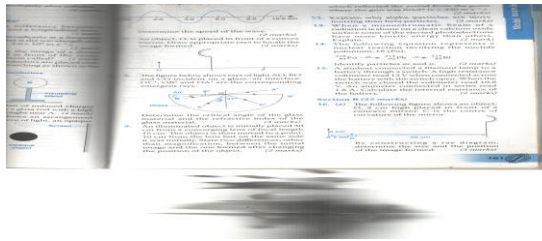
c) A person stands between two vertical cliffs 400m from the nearer cliff. The cliffs are  $x$  distance apart.

Every time the person strikes the rock once, two echoes are heard, the first one after 2.5s and the second one 2.0 s later. Calculate

i. the speed of the sound in air (3mks)

ii. the value of  $x$  (2mks)

16. a) The following figure shows an object, O, 3cm high placed in front of a concave mirror. C is the centre of curvature of the mirror.



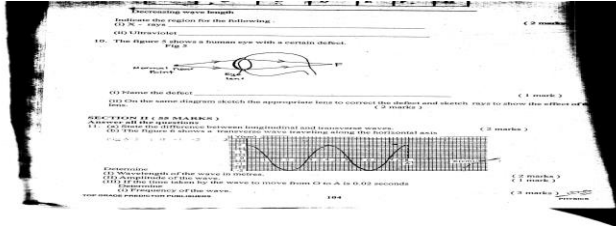
By constructing a ray diagram, determine the size and the position of the image formed. (3mks)

b) The table shows the object distance,  $u$ , and the corresponding image distance  $v$ , for an object placed in front of a concave mirror.

$u$ (cm)	20	25	30	40	50	70
$v$ (cm)	20	16.7	15	13.3	12.5	11.6
( $\text{cm}^{-1}$ )						
( $\text{cm}^{-1}$ )						

- Complete the table by filling in the values of  $\frac{1}{u}$  and  $\frac{1}{v}$  (2mks)
- plot a graph of  $\frac{1}{v}$  (y-axis) against  $\frac{1}{u}$  (5mks)
- From the graph, determine the focal length of the mirror. (3mks)

17. The figure 6 shows a transverse wave travelling along the horizontal axis



determine

- Wave length of the wave in metres (2mks)
- Amplitude of the wave (1mk)



iii. If the time take by the wave to move from O to A IS 0.02seconds Determine frequency of the wave (3mks)