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PHYSICS

August 2018

Paper 1

2 Hours 15 Minutes



TORORO GIRLS' SCHOOL
UGANDA CERTIFICATE OF EDUCATION
MOCK EXAMINATION 2018
PHYSICS
PAPER ONE
TIME: 2 HOURS 15 MINUTES

INSTRUCTIONS TO CANDIDATES:

Section A contains 40 objectives type questions. You are required to write the correct answer A, B, C or D against each question in the box on the right hand side.

Section B contains 10 structured questions. Answers are to be written in the spaces provided on the question paper.

Where necessary, assume:-

Acceleration due to gravity, $g = 10\text{ms}^{-2}$

Specific heat capacity of water = $4200\text{JKg}^{-1}\text{K}^{-1}$

Speed of light in a vacuum = $3.0 \times 10^8\text{ms}^{-1}$

Density of water = 1000kgms^{-3}

Specific latent heat of Vaporization = $2,260,000\text{Jkg}^{-1}$

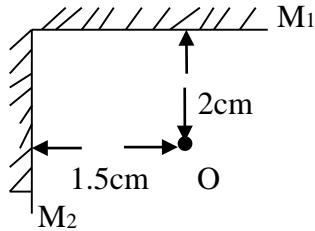
Speed of sound in air = 330ms^{-1}

SECTION A

1. The rate at which the velocity of an object falling changes with time is referred to as

- A. rate of change of momentum B. acceleration
 C. rate of change of displacement D. acceleration due to gravity

2. An object O is placed 2cm and 1.5cm from two plane mirrors M₁ and M₂ placed at 90° to each other.



What is the shortest distance between the two images formed by the mirrors?

- A. 3.5cm B. 4cm C. 5cm D. 6.25cm

3. A material rod is placed near a bar magnet as shown below.



If there is repulsion, it can be concluded that rod PQ is

- A. a North pole B. a magnetic material C. a magnet D. an insulator

4. A musical note from a stretched string has a frequency of f. If the length of the string is reduced by half,

- A. the amplitude of the wave reduces by half B. the frequency of the note doubles
 C. the wave length reduces by half D. the thickness of the string doubles

5. A disco light flashes red, green and yellow lights in the order given. Jane is wearing a blue party dress. What would be the order of Appearance of her dress when the light shines upon her?

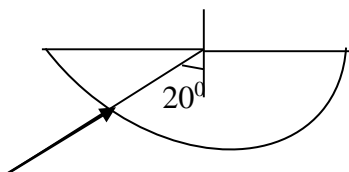
- A. Black, Black and Blue B. Red, green and yellow
 C. Blue, red, and green D. Cyan, yellow and Blue

6. When ice at -15°C heated, the water produced is observed to have a low volume when the temperature reaches 4°C. Which of the following statements is correct?

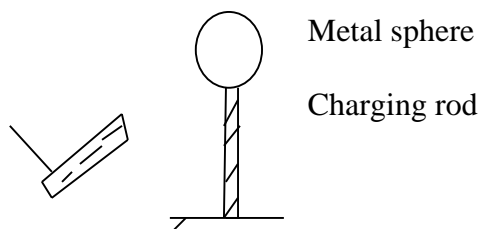
- A. The melting point of ice is 4°C. B. The density of water is a maximum at 4°C

C. Water has the lowest heat capacity at 4°C. D. Ice boils at 40C.

7. The diagram below shows a ray of light incident on a semi-circular glass block. If the refractive index of glass is 1.5, the angle of refraction would be:-
 A. 20° B. 60° C. 70° D. 30.9°

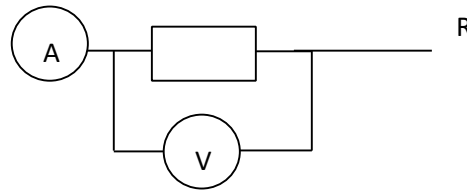


8. The diagram below shows a stage in the charging process of a metal sphere. When the sphere is touched temporarily and the charging rod with drawn, a positive charge is detected on the metal sphere.

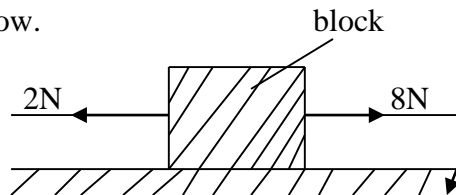


Which of the following is true

- A. The electrons flow to the earth when the metal sphere is touched.
 B. the protons are attractive from the charging rod.
 C. the sphere gives the charging rod a negative charge
 D. Protons flow from the earth to the metal sphere
9. When a bullet is fired from a rifle, the rifle recoils with a much lower Velocity than the bullet. This is because
 A. the bullet moves at a very high speed B. the bullet is higher than the gun
 C. the gun has a lower momentum D. the bullet passes Kinetic energy while the gun possesses potential energy.
10. A car decelerates to rest in five minutes at a rate of 40km/hr . The initial Velocity of the car is
 A. 8ms^{-1} B. 200ms^{-1} C. $8 \times 10^3\text{ms}^{-1}$ D. $3.33 \times 10^3\text{ms}^{-1}$
11. A spring of natural length 8cm stretches 12cm when a force of 6N is applied at one of its ends. What would be the length of the spring if a mass of 900g ia suspended on the spring?
 A. $\left(8 + \frac{9}{1.5}\right)\text{cm}$ B. $\left(12 + \frac{9}{1.5}\right)\text{cm}$ C. $\left(\frac{6}{8 \times 12}\right)\text{cm}$ D. $\left(\frac{12}{8} + \frac{9}{1.5}\right)\text{cm}$
12. In the circuit diagram above;

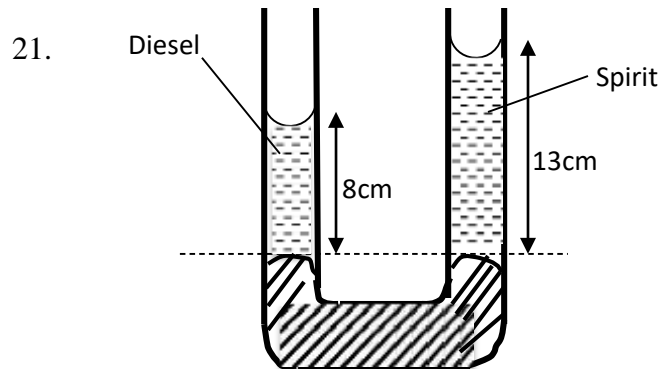


- A. A measures the current through V
 - B. V measures the current through R
 - C. V measures the potential difference across R
 - D. R measures the Voltage through V
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13. A boy kicks a ball with the air. If the ball rises to a height of 12 metres above the ground and changes its direction to descend back to the ground. At what Velocity did the boy kick the ball?
 A. 1.2ms^{-1} B. 240 ms^{-1} c. 120 ms^{-1} D. 15.5 ms^{-1}
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14. The notch effect can be increased by
 A. Making the notch to be under tension B. Making the notch to be under compression
 C. Making the notch smooth D. Putting a support under the notch
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15. The sharpness of an image formed in a pin hole camera can be increased by
 A. Widening the pin hole B. Narrowing the pin hole
 C. Moving the object closer to the pin hole D. Making the pin hole camera shorter
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16. Rare reflectors on a Fuso truck work on the phenomenon of
 A. Selective absorption B. a mirage
 C. dispersion D. total internal reflection
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17. An oil drop of volume $2 \times 10^{-3}\text{mm}^3$ forms a patch of area 100cm^2 on the surface of water dusted with lycopodium powder. Find the thickness of the patch formed.
 A. $2 \times 10^{-10}\text{m}$ B. $2 \times 10^{-4}\text{m}$ C. $2 \times 10^{-6}\text{m}$ D. $2 \times 10^{-12}\text{m}$
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18. Upper fixed point of a thermometer can be defined as
 A. temperature of steam from boiling water B. temperature of boiling water
 C. Melting point of ice D. Saturated temperature of water
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19. Five nodes on a plucked string occupy a length of 16cm of the plucked string. Calculate the frequency of the sound produced by the string.
 A. $8.25 \times 10^3\text{Hz}$ B. $1.03 \times 10^4\text{Hz}$ C. $2.06 \times 10^1\text{Hz}$ D. $8.0 \times 10^1\text{Hz}$
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20. Two forces of 8N and 2N act on a block of mass 800g resting on a rough horizontal surface as shown below.



Find the co-efficient of friction between the block and the rough surface.

- A. $\frac{10 \times 1000}{800}$ B. $\frac{800 \times 10}{6 \times 1000}$ C. $\frac{6 \times 1000}{800 \times 10}$ D. $\frac{6 \times 10}{800 \times 1000}$



In the figure, the density of diesel is 960 kgm^{-3} . Calculate the density of spirit

- A. 4800 kgm^{-3} B. $20,160 \text{ kgm}^{-3}$ C. 1560 kgm^{-3} d. 590.8 kgm^{-3}

22. In an experiment using a gold leaf electroscope (GLE), a material was brought near the cap of positively charged electroscope and the divergence of the leaf was seen to decrease. When the electroscope was charged negatively and the body brought back near the cap, the leaf was seen to collapse. What can be concluded about the body?

- A. the body was a conductor B. the body was an insulator
C. the body was negatively charged D. the body was positively charged

23. A jet fighter is sharp pointed and highly streamlined in order

- A. to save on the cost of materials used B. to reduce viscosity and achieve high speeds
C. to increase on the pressure of the fighter D. to launch missiles at high momentum

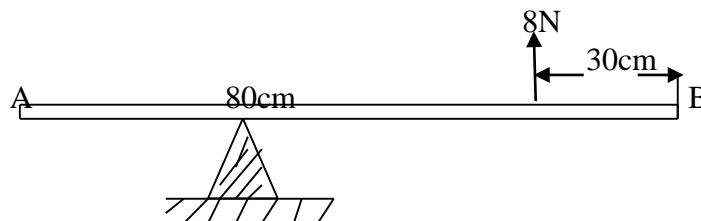
24. The same amount of heat which raises the temperature of 0.1 kg of water from 25°C to 60°C is used to heat a metal rod of mass 1.7 kg and specific heat capacity $300 \text{ JKg}^{-1}\text{K}^{-1}$. If the initial temperature of the rod is 20°C , Calculate the final temperature of the rod.

- A. 35°C B. 28.8°C C. 8.6°C D. 15°C

15. Dew point refers to the;

- A. Point on a surface where dew forms
B. temperature at which dew is formed
C. temperature at which water starts to form ice
D. temperature at which air is just saturated with water vapour.

26. A metal weighs 45N in air. When completely immersed in oil, it weighs 25N and it weighs 20N when completely immersed in water. What is the relative density of the oil?
 A. 0.8 B. 1.25 C. 1.07 D. 0.93
27. A stone is thrown vertically upwards from the ground level with a velocity of 40ms^{-1} . The total time taken by the ball to return to the ground is
 A. 80seconds B. 4 seconds C. 8 seconds D. 400 seconds
28. Hot water is a better cleaning agent than cold water because:-
 A. there is less friction with hot water than with cold water
 B. cold water makes scum while hot water does not
 C. Molecules of hot water move at greater speeds, reducing surface tension while molecules of cold water move at low speeds increasing surface tension.
 D. Molecules of hot water move at greater speeds increasing surface tension while molecules of Cold water move at low speeds decreasing surface tension.
29. A machine requires 2000J of energy to lift a load of 400N through a distance of 2.5metres. Calculate the efficiency of the machine.
 A. $\frac{400 \times 2.5}{2000} \times 100\%$ B. $\frac{2000 \times 2.5}{400} \times 100\%$ C. $\frac{400 \times 2000}{2.5} \times 100\%$ D. $\frac{2000 \times 400}{2000+400} \times 100\%$
30. Which of the following can be used as an altimeter in an aeroplane?
 A. Ladder B. Bourdon gauge C. Aneroid barometer D. Periscope
31. Five successive threads of a screw jack cover a length of 1 metre. If the handle of the screw jerk is 14cm long, What is the velocity ratio? (Take $\pi = 3.14$)
 A. 5 B. 15.7 C. 3.5 D. 2.8
32. A Pascal is
 A. a unit for measuring pressure
 B. a pressure exerted normally on a body of area 1m^2 by a force of 1N
 C. a force exerted on a body of area 1m^2 by a pressure of 1Nm^{-2}
 D. a pressure at sea level
33. A uniform rod AB of length 2 metres is pivoted at the 80cm from A as shown below.



Determine the weight of the uniform rod

- A. $\left(\frac{8 \times 90}{20}\right) N$ B. $\left(\frac{20 \times 90}{8}\right) N$ C. $\left(\frac{80 \times 8}{30}\right) N$ D. $\left(\frac{8 \times 110}{20}\right) N$

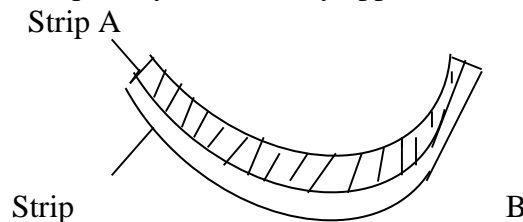
34. Which of the following sets of apparatus is suitable for measurement of derived quantities.

- A. metre rule, thermometer and stop clock
 B. tap measure, spring balance and density bottle
 C. calorimeter, Vernier caliper and stop clock
 D. bourdon gauge, spring balance and density bottle

35. During a thunderstorm, a girl sees a flash and counts four beats of her heart before hearing the thunder. If her heart beat is 72 beats per minute, how far is the thunderstorm from the girl?

- A. $\left(\frac{330 \times 72}{4 \times 72}\right) m$ B. $\left(\frac{330 \times 4 \times 60}{72}\right) m$ C. $\left(\frac{72 \times 60}{330 \times 4}\right) m$ D. $\left(\frac{330 \times 4}{60 \times 72}\right) m$

36. The figure below shows two metal strips A and B tightly fitted together. When the strips are subjected to the same quantity of heat, they appear as below.



What can be concluded about the metal strips?

- A. Strip A is a better conductor of heat than strip B
 B. Strip B is a better conductor of heat than strip A.
 C. Strip A has a high thermal expansion than strip B D. Strip B has a high thermal expansion than strip A.

37. Which of the following is true for a person suffering from myopia?

- A. eye ball too long, eye lens too thick, image formed before retina
 B. eye ball too short, eye lens too thin, image formed behind retina
 C. focuses near objects and corrected using convex lens
 D. focuses far objects and corrected using concave lens

38. For a body in unstable equilibrium,

- A. centre of gravity remains the same when slightly displaced
 B. centre of gravity is raised and Vertical line through centre of gravity falls inside the base after slight displacement
 C. Centre of gravity is lowered and vertical line through centre of gravity falls outside the base, after slight displacement.
 D. has its center of gravity in the middle.

39. During the down stroke of a lift pump,

- A. handle moves upwards, plunger moves downwards, upper valve opens and lower valve closer.
- B. handle moves upwards, plunger moves upwards, lower valve closes and upper valve opens.
- C. handle moves downwards, plunger moves upwards, upper valve closes and lower valve opens
- D. handle moves downwards, plunger moves downwards, upper valve closes and lower valve opens.

40. During the Induction stroke of a four-stroke engine,

- A. outlet valve opens, inlet valve closes and piston moves downwards
- B. outlet valve closes, inlet valve opens and piston moves downwards
- C. outlet valve opens, inlet valve closes and piston moves upwards.
- D. outlet valve closes, inlet valve opens and piston moves upwards.

SECTION B: (40 MARKS)

41. a) Define the term specific latent heat of vaporization (01 mark)

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b) i) State any two factors that affect the rate of evaporation (01 mark)

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ii) Calculate the heat energy required to convert 0.8kg of water at 100⁰C to steam. (02 marks)

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42 a) What is meant by the term *Critical Angle*? (01 mark)

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b) The diagram below shows a ray of light incident on a semi-Circular glass block of Centre, C. Calculate the values of angle α , if the refractive index of glass is 1.52. (03 mks)

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43. a) State the law of charges (01 mark)

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b) i) Briefly, explain how a charged body attracts a neutral conductor. (02 marks)

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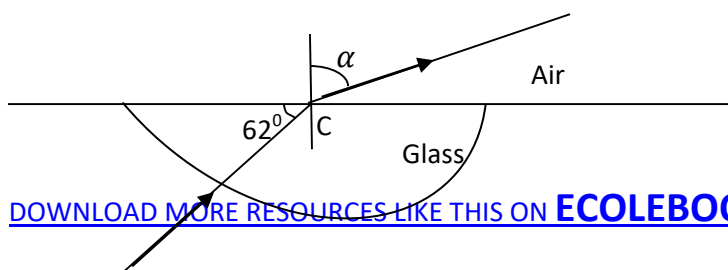
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ii) Draw the electric field pattern due to a positive point charge near a negatively charged plate

(01 mark)

44. a) What is meant by absolute zero temperature? (01 mark)

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b) The volume of a fixed mass of a gas at a constant pressure is tripled when its temperature is increased from 0°C to $\alpha^{\circ}\text{C}$. Find the value of α . (03 marks)

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45. a) i) What is a standing wave? (01 mark)

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ii) State any two conditions for formation of a standing wave. (01 mark)

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b) Explain why reverberation of a certain degree is necessary in a Concert Hall. (02 marks)

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46. a) (i) What is meant by a notch? (01 mark)

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(ii) State two ways in which the effect of a notch may be minimized. (01 mark)

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b) Give any two ways in which the strength of concrete may be improved (02 marks)

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47. a) i) Define the term acceleration. (01 mark)

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ii) Sketch the velocity time graph for a body thrown vertically upwards. (01 mark)

b) A ball is kicked horizontally from the top of a building with a velocity of 200ms^{-1} and hits the ground after 20 seconds . Calculate the height of the building. (02 marks)

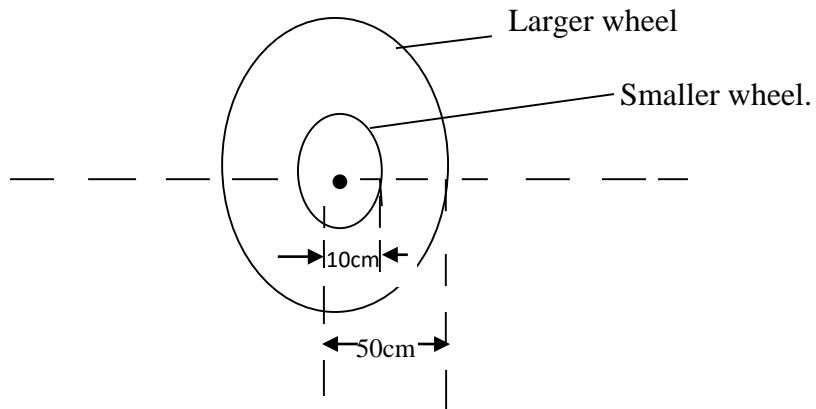
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48. a) What is meant by efficiency of a machine (01 mark)

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b) i) The diagram below shows a simple machine used to raise a load of 30N using an

effort of 10N.



Calculate the efficiency of the machine.

(02 marks)

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ii) Give any two ways of improving the efficiency of the machine in b) i) above.(01mrk)

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49. a) Define a **Joule**

(01 mark)

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b) i) State the principle of conservation of energy.

(01 mark)

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ii) A rubber ball of mass 0.4kg falls from rest at a height of 4m onto a horizontal platform and rebounds to a height of 2m. Calculate the kinetic energy of the ball just before hitting the platform. (02 marks)

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50. a) What is meant by magnetic meridian? (01 mark)

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b) i) Explain why the magnetism of a material may not be increased beyond a certain limit. (02 marks)

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ii) Give any two ways of demagnetizing a magnet. (01 mark)

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End