535/1

PHYSICS

Paper 1

June 2017

2¼ hours

RESOURCE MOCK EXAMINATIONS, 2017

Uganda Certificate of Education

S.4

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **two** *sections;* **A** *and* **B.** *Section* ***A*** *contains 40 objective type of questions and you are required to write a letter* **A**, **B**, **C** *or* **D** *in the answer grid below.*

Section ***B*** *contains 10 structured questions and you are to write answers in the spaces provided on the question paper.*

Write in blue or black ink only. You may use pencil for diagrams or graphs only.
All *the necessary working must be clearly shown.*
Silent non-programmable scientific calculators may be used.

Where necessary, use;

Acceleration due to gravity, **g**	=	$10ms^{-2}$
Speed of light	=	$3.0 \times 10^{8}m/s$
Specific heat capacity of water	=	$4200Jkg^{-1}k^{-1}$
Speed of sound in air	=	$330ms^{-1}$

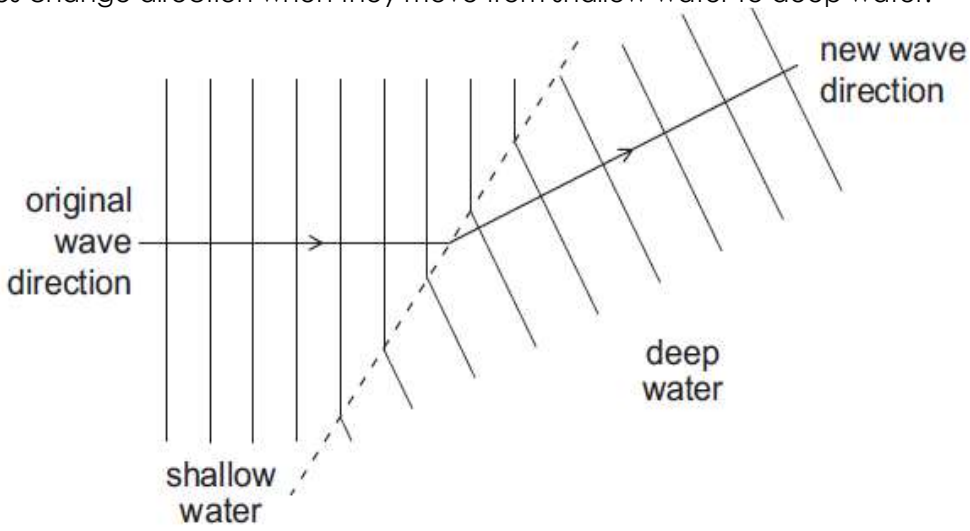
ANSWERS FOR SECTION A;

1		**9**		**17**		**25**		**33**	
2		**10**		**18**		**26**		**34**	
3		**11**		**19**		**27**		**35**	
4		**12**		**20**		**28**		**36**	

5		13		21		29		37	
6		14		22		30		38	
7		15		23		31		39	
8		16		24		32		40	

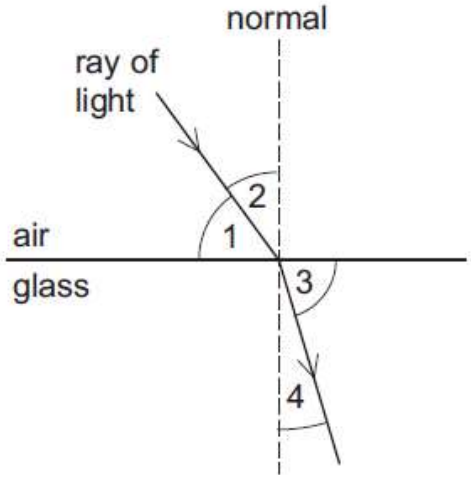
SECTION A: (40 MARKS)

1. Water waves change direction when they move from shallow water to deep water.



What is the name of this effect?
A diffraction B dispersion C reflection D refraction

2. The diagram shows a ray of light entering a block of glass.



Which numbered angles are the angles of incidence and of refraction?

	Angle of incidence	Angle of refraction
A	1	3
B	1	4
C	2	3
D	2	4

3. Which type of wave cannot travel through a vacuum?
   A infra-red radiation B microwaves
   C sound waves D X-rays

4. How can a permanent magnet be demagnetised?
   A cool the magnet for a long time
   B hit the magnet repeatedly with a hammer
   C leave the magnet in a coil which carries direct current
   D pass a small current through the magnet

5. An electromagnet is used to separate magnetic metals from non-magnetic metals. Why is steel unsuitable as the core of the electromagnet?
   A It is a good conductor of electricity.
   B It forms a permanent magnet.
   C It has a high density.
   D It has a high thermal capacity.

6. A polythene rod repels an inflated balloon hanging from a nylon thread. What charges must the rod and the balloon carry?
   A The rod and the balloon carry opposite charges.
   B The rod and the balloon carry like charges.
   C The rod is charged but the balloon is not.
   D The balloon is charged but the rod is not.

7. Which statement is correct?
   A. A fuse is included in a circuit to prevent the current becoming too high.
   B. A fuse should be connected to the neutral wire in a plug.
   C. An electric circuit will only work if it includes a fuse.
   D. An earth wire is needed to prevent the fuse blowing.

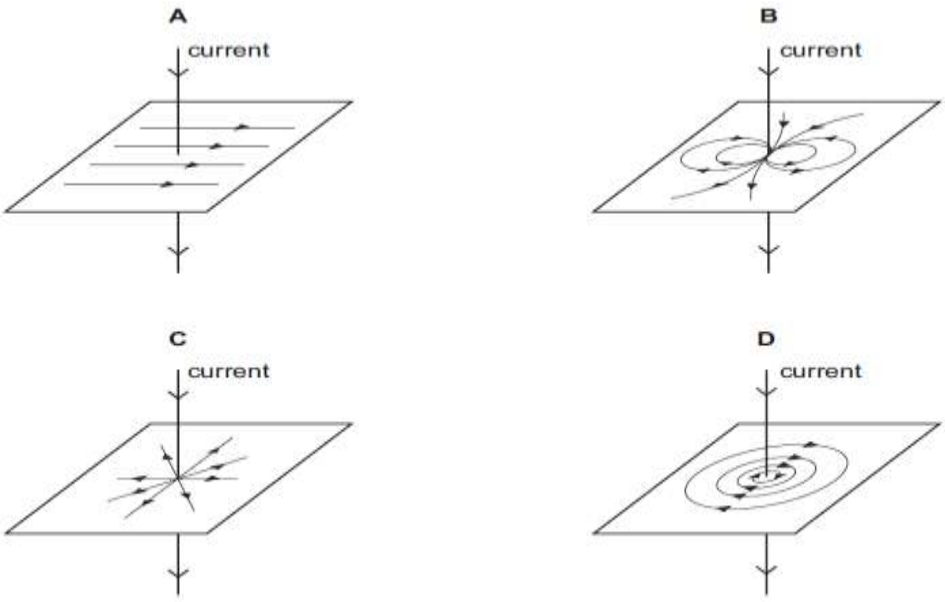
8. The equation shows the decay of the nuclide X.

$$^{226}_{88}X \rightarrow {}^{P}_{Q}Y + {}^{4}_{2}\alpha$$

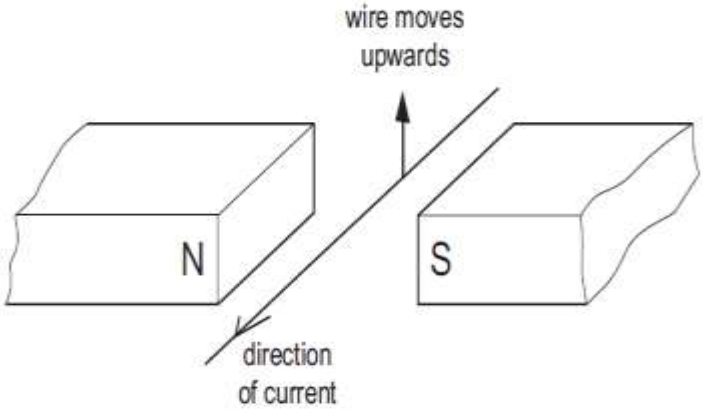
   What are the values of P and Q respectively?
   A) 230, 90 B) 230, 86 C) 222, 90 D) 222, 86

9. A plane mirror is on a wall. Which is a correct description of the image formed by the mirror?
   A the right way up and smaller than the object
   B the right way up and the same size as the object
   C upside down and smaller than the object
   D upside down and the same size as the object

10. A straight wire carrying a current produces a magnetic field. Which diagram shows the correct shape of the field?

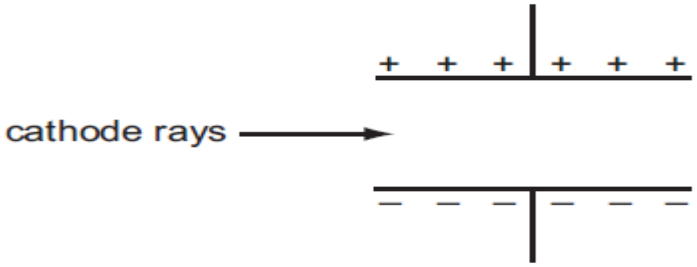


11. A student carries out an experiment to see the effect of a magnetic field on a wire carrying a current. The wire moves upwards as shown.



What should the student do to make the wire move downwards?
A change the direction of the current
B move the poles of the magnet closer together
C send a smaller current through the wire
D use a stronger magnet

12. A beam of cathode rays passes through an electric field between two parallel plates.



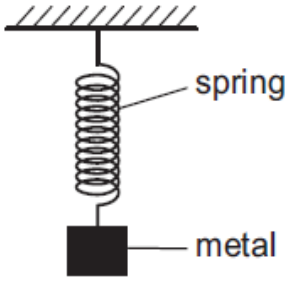
In which direction is the beam deflected?
A into the page
B out of the page
C towards the bottom of the page
D towards the top of the page

13. Which line correctly describes a-particles?

	Electric charge	Penetrates 1cm of aluminium
A	negative	yes
B	negative	no
C	positive	yes
D	positive	no

14. A small amount of a radioactive isotope contains 72 billion unstable nuclei. The half-life of the isotope is 4 hours. How many unstable nuclei would remain after 12 hours?
A 6 billion
B 9 billion
C 18 billion
D 24 billion

15. A spring is stretched by hanging a piece of metal from it. What is the name given to the force that stretches the spring?

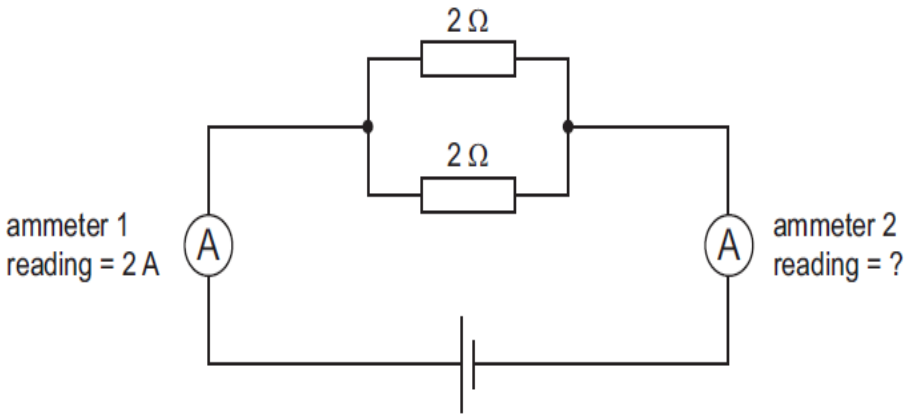


A friction
B mass
C pressure
D weight

16. To mark the lower fixed point of a Celsius scale on a thermometer, the thermometer should be placed in
A pure alcohol.
B pure distilled water.
C pure melting ice.
D pure mercury.

17. A beaker of water is heated at its base. Why does the water at the base rise?
A It contracts and becomes less dense.
B It contracts and becomes more dense.
C It expands and becomes less dense.
D It expands and becomes more dense.

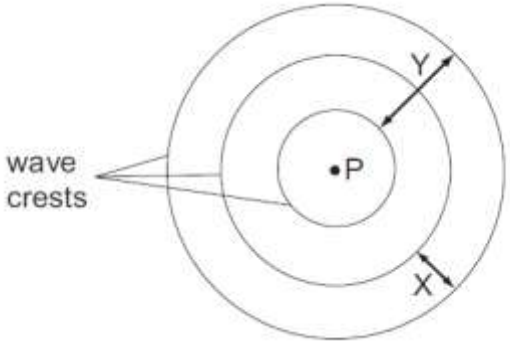
18. In the circuit shown, the reading on ammeter 1 is 2 A.



What is the reading on ammeter 2?
A. 0 A B. 1 A C. 2 A D. 4 A

19. Which particles are emitted during thermionic emission?
A. electrons B. ions C. neutrons D. protons

20. A vertical stick is dipped up and down in water at P. In two seconds, three wave crests are produced on the surface of the water.



Which statement is true?
A Distance X is the amplitude of the waves.
B Distance Y is the wavelength of the waves.
C Each circle represents a wave-front.
D The frequency of the waves is 3Hz21.

21. A car starts from rest and accelerates uniformly at $2ms^{-2}$. Find the distance it covers in 6s.
A. 12m B. 36m C. 72m D. 108m

22. A force of 50N moves an object through a distance of 200m in 40 s. Find the power used.
A. 100W B. 160W C. 200W D. 250W

23. A notch on a material spreads more rapidly when the material is
A. in tension B. in compression
C. pre-stressed D. reinforced

24. A body of mass 0.4 kg freely falls from a height of 5m from the ground. Find the kinetic energy with which the body hits the ground.

A. 2 joules B. 4 joules C. 20 joules D. 50 joules

25. Which of the following statements is false with respect to convex mirrors?
A. Images are virtual for all real object positions
B. images are diminished for all object positions
C. the image is always between the pole and focal point
D they are used as rear-view mirrors in vehicles

26. Two forces of 6N and 8N act on an object P as shown in the figure3 below. The resultant force on the object is

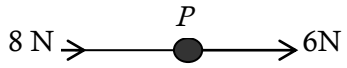


Fig. 3

A. 1.33 N B. 2 N C. 10 N D. 14N

27. A body starting from rest is uniformly accelerated to a velocity of 40 m/s in 5 seconds. Calculate the distance traveled in this time interval.
A. 8m B. 100 m C. 200 m D. 320 m

28. Which one of the following is not a factor on which the frequency of waves produced in strings depend?
A. length of the string
B. Nature of material from which the string is made
C. Tension in the string
D. wavelength of the wave

29. The graph in figure5 below shows the variation of efficiency of a block and tackle pulley system with load.

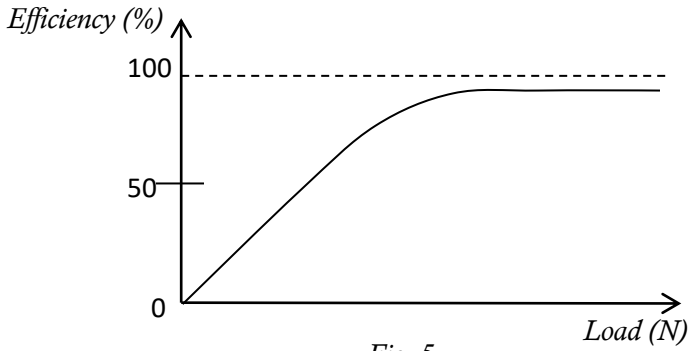


Fig. 5

The graph tends towards 100% efficiency as the load increases since
A. Mechanical advantage is directly proportional to the applied force
B. Mechanical advantage is never equal to velocity ratio
C. Energy is wasted in overcoming friction
D. the weight of the string and moving pulley becomes negligibly small as the load increases

30. A body weighs 80N in air and 60N when fully immersed in a liquid. Find the volume of liquid displaced by the body if density of the liquid is 800 kg/m^3
A. 40 m^3 B. 20 m^3 C. 0.25 m^3 D. 0.0025 m^3

31. A certain F.M radio station operates at a frequency 108 x 10^6 Hz. Calculate wavelength of the radio waves.
A. 2.96 x 10^{-6} m B. 2.78 m C. 0.36m D. 3.375×10^5m

32. An object is placed *15 cm* in front of a convex lens of focal length *10cm*. The position of the image from the lens is
A. 6 cm B. 30 cm C. 25 cm D. 20 cm

33. When a capillary tube is dipped into mercury;
A. cohesion between the mercury molecules is greater than the adhesion of the molecules for glass so the liquid rises in the tube
B. cohesion between the mercury molecules is greater than the adhesion of the molecules for glass so there is capillary depression
C. adhesion forces between the liquid and glass is greater hence capillary rise
D. Adhesion forces between the liquid and glass is greater hence capillary depression.

34. Choose the odd statement with respect to action of the lightning conductor.
A. A charged cloud near a lightning conductor induces charges in the conductor
B. the similar charge to the one on the cloud is repelled to the ground
C. the sharp end of the lightning conductor serves to pierce the cloud
D. point action occurs at the sharp point owing to the high charge density at the point

35. An S1 student made a record *1.34 cm* in a lesson on measurements. If taken correctly, which instrument did the student use to take the measurement?
A. metre rule B. micrometer screw gauge
C. vernier calipers D. tape measure.

36. Water is preferred to alcohol as a coolant in cooling fins because
A. water has a higher specific heat capacity than alcohol
B. water moves at a higher speed in the coolant than alcohol
C. Water is a better conductor of heat than alcohol
D. water is more viscous than alcohol

37. A student of mass *40kg* runs up a stair case of *8steps* each *13cm* high. Find the work done by the student.
A. 41.6J B. 416J C. 4160J D. 4610J

38. The power developed when one joule of work is done in one second is known as,
A. a watt B. a joule second
C. a Newton D. Newton second

39. Which of the following statements are conditions for a body to stay in mechanical equilibrium?
(i) The sum of forces in one direction is equal to the sum of forces in the opposite direction.
(ii) The clockwise forces are equal to anticlockwise forces.
(iii) The sum of moments about a chosen point is zero.
(iv) The body rotates in one direction.

A. (i) and (iv) only B. (ii) and (iii) only

C. (i),(ii)and(iii)only D. (i) and(iii) only

40. The figure1 below shows a uniform meter rule is pivoted at its center. A mass of *200g* is hanging at the *5cm-mark* and the meter rule balances horizontally when a mass, m_1 is hang at the *70cm-mark*.

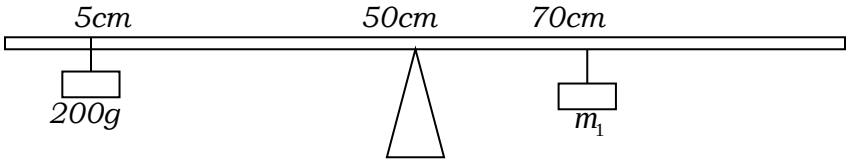


Fig. 1

Calculate the value of m_1.

A. 14.3g
B. 45.0g
C. 143g
D. 450g

SECTION B:(40MARKS)

41. (a) Distinguish between **tensile stress** and **tensile strain** *(02 marks)*

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(b) A piece of wire 1.0 long and of cross-sectional area 2.0×10^{-8} m^2 is acted upon by a tensile force of 50N. Calculate the tensile stress on the wire.

(02 marks)

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42. (a) What is meant by ***photo electric emission***? *(01 mark)*

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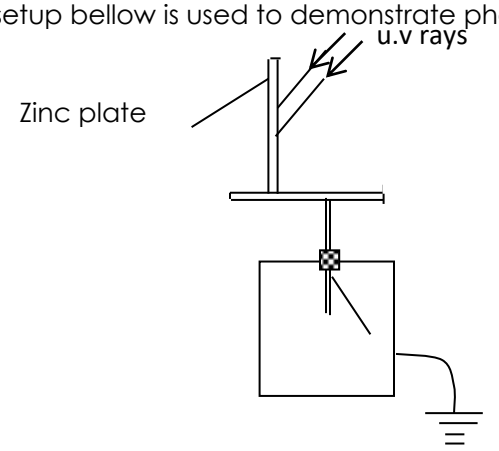
(b) The setup bellow is used to demonstrate photoelectric effect



(i) Why is *ultraviolet* (u.v) rays specifically illuminated on the zinc plate and ***NOT*** infra-red radiations? *(01 mark)*

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(ii) What is observed when uv. Rays falls on the zinc plate of an originally negatively charged zinc plate and gold leaf electroscope? *(02 marks)*

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43. (a) Give two physical properties of gases used in the measurement of temperature. *(01 mark)*

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(b) (i) State the ***equation of state of a gas***. *(01 mark)*

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(ii) The pressure of a fixed mass of gas is 760 mm Hg at a temperature 47°C. Its pressure is lowered to 190 mm Hg while the volume is kept constant. What is the new temperature of the gas? *(02 marks)*

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44. (a) Sketch the electric field pattern for two positively charged point charges near each other. *(02 marks)*

(b) A gold leaf electroscope carrying a positive charge has a diverging gold leaf. When its metal cap is touched,

(i) State what is observed *(01 mark)*

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(ii) Explain the observation in b (i) above *(01 mark)*

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45. (a) State the principle on which a hydraulic press works *(01 mark)*

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(b) A hydraulic press in which *piston A* carries a load *L* and an effort *E* is applied on *piston B*. If the area of cross section of piston A is ***3cm²*** and of piston B is ***900cm²***. Calculate the load L supported when an effort of *24N* is applied. *(03 marks)*

46. (a) State ***Ohm's law***. *(01 mark)*

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(b) *(03marks)*

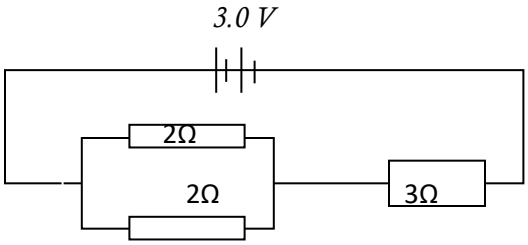

Fig. 11

(i) Find current that flows through the 3Ω resistor.

47. (a)What are **secondary colours**? *(1mark)*

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(b) What will be the appearance of a yellow dress in a room with a blue bulb?

(1mark)

.....

(c) A lens forms an image at 60cm in front of the lens of an object 5cm tall. If the height of the image is 20mm, find the distance of the object from the lens. *(2marks)*

48. (a) What is a **sound wave**? (1mark)

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(b) Write down three similarities between light waves and sound waves.

(3marks)

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49. (a) Define the term **uniform speed**. (1mark)

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(b) (i) There are 80km between Jinja and Kampala. A taxi takes 50minutes to move from one town to another. Find its average speed in ms^{-1}. (2marks)

50. (a)(i)What is meant by **anomalous expansion of water**? (1mark)

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(ii) State one practical importance of the anomalous expansion of water.

(1mark)

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(b) In the space below, sketch a graph of density against temperature for water between 0°c to 20°c. (2marks)

END *