NAME: …… STREAM: ……

535/1
PHYSICS
PAPER I
$2^1/_4$ Hours
June, 2023

PRE-MOCK EXAMINATIONS

Uganda Certificate of Examinations

S.4 PHYSICS

PAPER 1

2 Hours 15 Minutes

A	
B	
T	

INSTRUCTIONS:

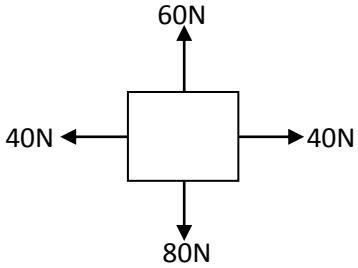
- This paper consists of two sections **A** and **B**.
- Attempt all questions in both sections.
- Use the answer grid below to answer the questions in section A.
- Use only the spaces provided to answer the questions in section B.
- Where necessary,
  - Acceleration due to gravity, $g = 10ms^{-2}$
  - Velocity of light in vacuum = $3.0\text{x}10^8ms^{-1}$
  - Velocity of light in air = $330ms^{-1}$

ANSWER GRID 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. Which one of the following groups consists of vectors only?
   A. Force, weight, work, energy
   B. Velocity, displacement, acceleration, weight
   C. Momentum, power, work, energy
   D. Velocity, work, power, energy.
2. Liquid X of volume $0.5m^3$ and density $900kgm^{-3}$ was mixed with liquid Y of volume $0.4m^3$ and density $800kgm^{-3}$. What was the density of the mixture?
   A. $8500kgm^{-3}$ **B.** $770kgm^{-3}$ **C.** $1889kgm^{-3}$ **D.** $856kgm^{-3}$
3. An object is placed 20cm in front of a plane mirror. If the object is moved a distance 5cm towards the mirror, find the distance between the object and the mirror.
   A. 30cm **B.** 40cm **C.** 10cm **D.** 35cm
4. The figure below shows forces of 80N, 40N, 60N and 40N acting on a body.



   In which direction does the body move?
   A. To the left **B.** Downwards **C.** To the right **D.** Upwards
5. Soap is used to wash clothes because it;
   A. Increases surface tension allowing water to penetrate the dirt more easily.
   B. Increases capillarity in the clothes.
   C. Reduces surface tension allowing water to penetrate the dirt more easily.
   D. Increases capillarity in the clothes.
6. In a ripple tank, destructive interference occurs when;
   A. The wave is stationary **C.** The wave meets an obstacle
   B. A crest overlaps a crest **D.** A crest overlaps with a trough
7. A student writes three statements about what happens when the air in a balloon cools.
   (i) The molecules move closer together.
   (ii) The molecules become smaller.
   (iii) The mass of the molecules decreases,
   Which statements are correct?
   A. (i) only **B.** (i) and (ii) only
   B. (ii) and (iii) only **C.** (i), (ii) and (iii)
8. Which of the following statements is true about mass and weight of an object?
   A. They are both affected by changes in the acceleration of free fall.
   B. They are both forces.
   C. They have different units.
   D. Weight is calculated by dividing mass by the acceleration of free fall.
9. The lowest possible temperature on the Kelvin scale is called the;
   A. Steam point **B.** Ice point **C.** Dew point **D.** Absolute Zero
10. A radioactive nuclide normally disintegrates mainly to;

A. Gain stability **C.** Absorb energy

B. Increase in mass **D.** Increase its half life

11. A turning fork of frequency 610Hz is producing a sound wave whose velocity is $330ms^{-1}$. What is the wave length of the sound wave?

A. 540m **B.** 1.85m **C.** 185m **D.** 0.54m

12. An object is placed between the focal point and the centre of curvature of a concave mirror. Which of the following fully describes the image formed?

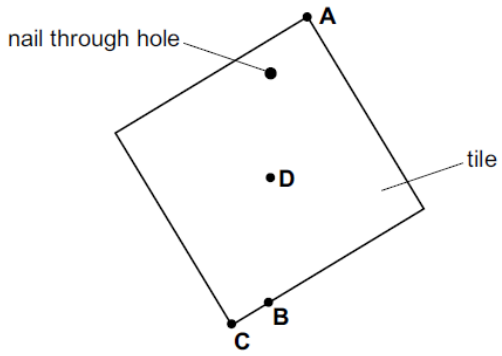
A. Real, inverted, magnified **C.** Virtual, erect, magnified

B. Real, inverted, diminished **D.** Real, erect, diminished.

13. A B-52 bomber fighter aircraft drops a bomb that takes 80seconds to reach the target and destroys the rebel hideout. Find how far up the sky is the bomber air craft.

A. 32m **B.** 32000m **C.** 320m **D.** 3200m

14. A hole is made in a square tile of uniform thickness. The diagram below shows the tile hanging loosely from the nail.



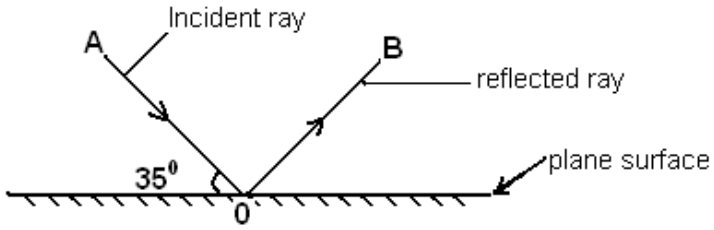
At what position is the centre of gravity likely to lie?

15. Which of the following statements is NOT true about pressure in liquids?

A. It increases with depth **C.** It is lowest at the surface

B. It is the same throughout the liquid **D.** It acts equally in all directions.

16. In figure 2 below, a ray of light **AO** incident on a plane surface is reflected along **OB**, as shown below;



The angle of reflection is;

A. 60^0 **B.** 40^0 **C.** 35^0 **D.** 55^0

17. An observer hears an echo of a gun he has fired, 4 seconds after being reflected from a high wall which is 770metres away. The velocity of sound in air is;

A. $385ms^{-1}$ **B.** $192.5ms^{-1}$ **C.** $375ms^{-1}$ **D.** $3080ms^{-1}$

18. The reciprical of the focal length expressed in metres, is known as;

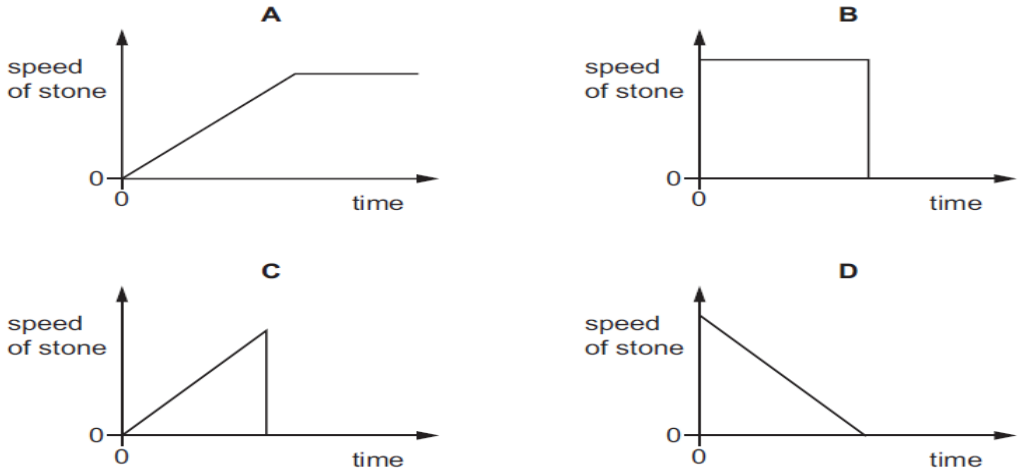
A. The dioptre of a lens. **C.** the magnification of a lens

B. The focus of a lens **D.** the power of a lens

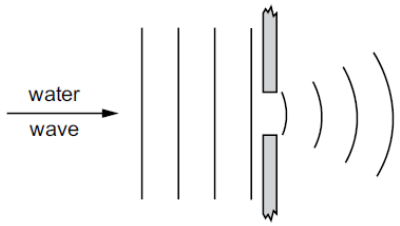
19. Which one of the following sources of energy is renewable?

A. Coal **B.** Natural gas **C.** Oil **D.** Wind

20. A man climbs a ladder. Which quantities can be used to calculate the useful power of the man?
    A. Weight of the man and time taken only.
    B. Weight of the man and the vertical distance moved only.
    C. Work done by the man and the time taken only.
    D. Work done by the man and the vertical distance moved only.
21. The force which holds water molecules together with the molecules of glass when water drops remain on glass is;
    A. Cohesion **B.** Capillarity **C.** Adhesion **D.** surface tension
22. A girl is standing in front of two mirrors inclined at an angle of 30^0 to each other. How many images of the girl can be seen?
    A. 11 **B.** 12 **C.** 9 **D.** 6
23. Which one of the following radiations carry charge ?
    A. Gamma rays and alpha particles **C.** Alpha particles and beta particles
    B. Gamma rays and beta particles **D.** Gamma rays only
24. A machine lifts a load of 200g through a vertical height of 10m in 2 seconds. Find the power produced in watts.
    A. 10 **B.** 1000 **C.** 20 **D.** 40
25. A stone is dropped from rest from the top of a ladder. It falls and hits the ground without rebounding. Which of the speed-time graph is correct?



26. In a shallow tank, a water wave moves through a barrier with a narrow gap. The diagram below shows the waves on the left-hand side and the right-hand side of the barrier.



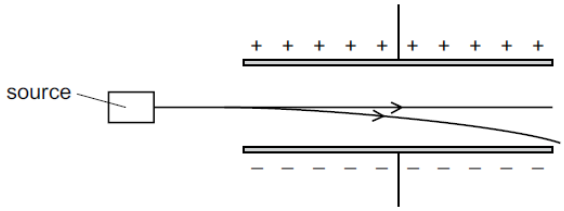
    Which term describes the effect shown above?
    A. Reflection **B.** Dispersion **C.** Refraction **D.** Diffraction
27. A car starts from rest and accelerates uniformly at a rate of $80ms^{-2}$. Find the time it takes to cover a distance of 640m.
    A. 4 seconds **B.** 8 seconds **C.** 0.125 seconds **D.** 25seconds
28. A satellite is in a circular orbit around a planet. Which statement is correct?

A. Its acceleration is constant in direction but not in size.
B. Its acceleration is constant in size but not in direction.
C. Its gravitational potential energy varies.
D. Its velocity is constant.

29. A body of mass 60kg weighs 390N on planet K. Which one of the following statements is true?
A. The mass of the body is less on earth than it is on K.
B. The acceleration due to gravity on K is less than it is on the earth.
C. The acceleration due to gravity on earth is less than it is on K.
D. The mass of the body is less on K than it is on earth.

30. A straight line through the origin of a velocity time graph shows that the;
A. Motion is a retardation **C.** Velocity is uniform
B. The acceleration is uniform **D.** Distance is increasing uniformly

31. The diagram below shows emissions from a source passing into the electric field between two charged plates.



What is emitted by the source?
A. Neutrons and gamma rays only **C.** Alpha particles and gamma rays only
B. Alpha particles and beta particles only **D.** Beta particles and gamma rays only

32. The number of vibrations a wave makes in one second is the;
A. wave length **B.** frequency **C.** amplitude **D.** period

33. Which property of an object resists a change in its state of rest or motion?
A. Acceleration **B.** density **C.** mass **D.** velocity

34. An object of mass 10kg falling freely in the gravitational field close to the moon's surface has an acceleration of $1.6ms^{-2}$. What is the gravitational field strength on the moon?
A. $0Nkg^{-1}$ **B.** $1.6Nkg^{-1}$ **C.** $10Nkg^{-1}$ **D.** $16Nkg^{-1}$

35. The effect produced when many echoes merge into one prolonged sound is known as
A. Harmonics **B.** Reverberation **C.** Pitch **D.** Noise

36. A stick with one end immersed in water appears bent at the surface of water because of;
A. Interference **B.** Refraction **C.** Reflection **D.** Diffraction

37. Sound travels much faster through;
A. Water **B.** Wood **C.** Nitrogen gas **D.** Steel

38. The three fundamental physical quantities are;
A. Mass, weight and force. **C.** Length, mass and time
B. Mass, time and metre **D.** Length, metre and a second.

39. Ten identical steel balls, each of mass 27g, are immersed in a measuring cylinder containing $20cm^3$ of water. The reading of the water level rises to $50cm^3$. What is the density of steel?
A. $0.90gcm^{-3}$ **B.** $8.10gcm^{-3}$ **C.** $9.00gcm^{-3}$ **D.** $13.50gcm^{-3}$

40. A boy who weighs 50N, runs up a flight of stairs 6.5 high in 7 seconds. Calculate the power he develops.
A. $\frac{6.5}{50 \times 7}$ W **B.** $\frac{7 \times 6.5}{50}$ W **C.** $\frac{50}{6.5 \times 7}$ W **D.** $\frac{50 \times 6.5}{7}$ W

SECTION B (40 Marks)

41. (a) Define the term density.

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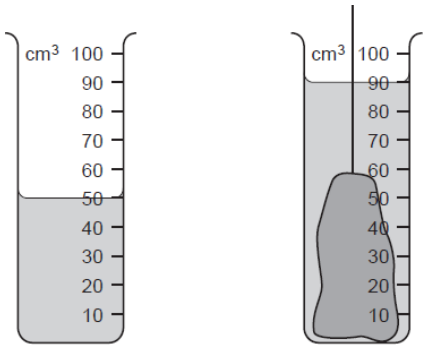
(01 mark)

(b) An object of mass 100g is immersed in water as shown in the diagram.



What is the density of the material from which the object is made?

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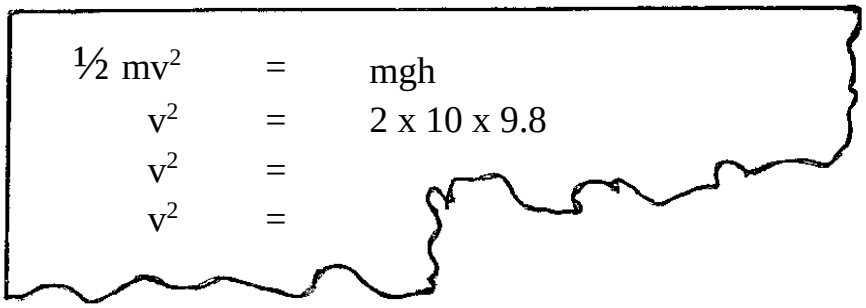
(03 marks)

42. Tom was calculating a problem about the energy of a falling object. After he had completed the calculation, his younger sister Cissy used the paper on which he had done the work to light a charcoal stove. The piece of paper which remained is shown below.



(a) From what distance did the object fall?

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(01 mark)

(b) What does m stand for?

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(01 mark)

(c) What is the value of v?

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(02 marks)

43. (a) What is a solar eclipse?

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(01 mark)

(b) (i) In the space provided, draw a diagram to show how a shadow is formed from an extended source of light.

(02 marks)

(ii) What effect does bringing the screen closer to the object have on the size of the image

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(01 mark)

44. (a) State the principle of moments.

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(01 mark)

(c) A uniform metre rule of weight 20N is pivoted at the 0.7m mark. Weights of 2N and PN are hung at the 0.1m and 1m marks respectively. Calculate the size of the force P required to keep the rule in equilibrium.

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(03 marks)

45. A coconut fruit falls from a coconut tree and takes 5 seconds to hit the ground. Find the;

(i) velocity of the coconut just before it hits the ground.

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(02 mark)

(b) height of the coconut tree.

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(02 marks)

46. A 60% efficient pulley system of velocity ratio 5 is used to lift a load of 60kg through a vertical height of 2m. What effort must be applied to the system?

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(04 marks)

47. (a) What is an echo?

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(01 mark)

(b) A man stands between two cliffs and makes a loud sound. He hears the first echo after one second and the second echo after two seconds. If the velocity of sound in air is $330ms^{-1}$, calculate the distance between the cliffs.

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(03 marks)

48. (a) Define surface tension.

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(01 mark)

(b) State any two factors that affect surface tension.

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(02 mark)

(c) Give one application of surface tension in everyday life.

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(01 mark)

49. State Hooke's law.

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(01 mark)

(b) A weight of 20N extends the string by 2cm. Find the extension caused by a mass of 4kg.

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(02 marks)

50. (a) Define the term radioactivity.

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(01 mark)

(b) A nuclide is symbolically represented as $^{37}_{17}X$.

(i) State the atomic number of the nuclide.

……

(01 mark)

(ii) Calculate the number of neutrons in the nuclide.

……
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(02 marks)

***** END *****