Name:...

Index Number:...

THE WEST AFRICAN EXAMINATIONS COUNCIL
West African Senior School Certificate Examination (WASSCE)
for Private Candidates, 2020 - First Series

(PC1) 2020   PHYSICS 1 $1\frac{1}{4}$ hours

OBJECTIVE TEST

[50 marks]

Do not open this booklet until you are told to do so. While you are waiting, write your **name** *and* **index number** *in the spaces provided at the top right-hand corner of this booklet and thereafter, read the following instructions carefully.*

1. Use **HB pencil** throughout.
2. If you have got a blank answer sheet, complete its top section as follows.
   (a) In the space marked *Name*, write in capital letters your **surname** followed by your **other names**.
   (b) In the spaces marked *Examination, Year, Subject* and *Paper*, write '**WASSCE (PC1)**', '**2020**', '**PHYSICS**' and '**1**' respectively.
   (c) In the box marked *Index Number*, write your **index number** vertically in the spaces on the left-hand side. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
   (d) In the box marked *Paper Code*, write the digits **512113** in the spaces on the left-hand side. Shade the corresponding numbered spaces in the same way as for your index number.
   (e) In the box marked *Sex*, shade the space marked **M** if you are **male**, or **F** if you are **female**.
3. If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in 2 above. In the boxes marked *Index Number, Paper Code* and *Sex*, reshade each of the shaded spaces.
4. An example is given below. This is for a **male** candidate whose name is Chinedu Oladapo DIKKO, whose **index number** is 5251102068 and who is offering Physics 1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK-LETTERS

Name: **DIKKO CHINEDU OLADAPO** Examination: **WASSCE (PC1)** Year: 2020
     Surname   Other Names

Subject: **PHYSICS** Paper: 1

INDEX NUMBER	PAPER CODE	SEX
5	5	Indicate your sex by shading the space marked M (for Male) or F (for Female) in this box: M F
2	1	
5	2	
1	1	
1	1	
0	3	
2		
0		
6		
8		

For Supervisors only.
If candidate is absent shade this space: ☐

INSTRUCTIONS TO CANDIDATES
1. Use grade HB pencil throughout.
2. Answer each question by choosing one letter and shading it like this: [A] [B] [C] ▬
3. Erase completely any answers you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right-hand edge of your answer sheet.

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Answer **all** *the questions.*

Each *question is followed by* **four** *options lettered* A *to* D. *Find the correct option for* **each** *question and shade* **in pencil** *on your answer sheet, the answer space which bears the same letter as the option you have chosen. Give only* **one** *answer to* **each** *question.*

An example is given below.

One important application of the bimetallic strip is in the operation of the

A. pressure cooker.

B. thermostat.

C. fuse.

D. thermos flask.

The correct answer is thermostat *which is lettered* B *and therefore, answer space* B *would be shaded.*

[A]　　　　　█　　　　　[C]　　　　　[D]

Think carefully before you shade the answer spaces; erase completely any answer you wish to change.

Do **all** *rough work on this question paper.*

Now answer the following questions.

1. Roads are banked to

   A. ensure side-slip.

   B. maximize speed.

   C. ensure safe overtaking.

   D. prevent skidding-off.

2. A body is said to be in neutral equilibrium when under the action of a force

   A. it returns to its original position.

   B. its centre of gravity is lowered.

   C. its centre of gravity remains unchanged.

   D. it topples over to a new position.

3. A device used in electrical appliances to regulate the effect of heating is the

   A. thermometer.

   B. thermocouple.

   C. thermistor.

   D. thermostat.

4. When the resultant displacement of two waves produces a higher amplitude than that of each of the separate waves at a point, the phenomenon is

   A. constructive interference.

   B. destructive interference.

   C. plane polarization.

   D. stationary waveform.

5. Which of the following devices does **not** use a magnet in its operation?

   A. Moving-coil loudspeaker

   B. Telephone earpiece

   C. Vehicle traffic indicator

   D. Electric bell

6. A galvanometer can be calibrated to measure

   A. electric current only.

   B. voltage only.

   C. electric power only.

   D. electric current or voltage.

7. The restoring force acting on a body executing simple harmonic motion is always

   A. a scalar quantity.

   B. directed towards a fixed point.

   C. acting to increase the amplitude of oscillation.

   D. directed towards the centre of gravity of the body.

8. The commercial unit of electrical energy is
   A. joule.
   B. joule per second.
   C. kilowatt-hour.
   D. watt per second.

9. The uncharged particle found in the nucleus of an atom is
   A. electron.
   B. ion.
   C. neutron.
   D. proton.

10. A stone of weight W, is attached to a vertical spring. The stone is pulled vertically downward with a force F and then released to perform vertical oscillations. What are the forces acting on the stone as it oscillates? (Ignore the mass of the spring.)
    A. F, W and the force exerted by the spring
    B. F and W
    C. F and the force exerted by the spring
    D. W and the force exerted by the spring

11. Which of the following statements is/are **correct** about electromagnetic waves? They
    I.   transfer energy.
    II.   can travel through vacuum.
    III. travel at the same speed in vacuum.
    IV.   have the same wavelength.

    A. I, II and III only
    B. II only
    C. I, II and IV only
    D. I, II, III and IV

12. The function of a step-down transformer in an electrical circuit is to
    A. increase the voltage and current in the secondary coil.
    B. increase the voltage and decrease the current in the secondary coil.
    C. decrease the voltage and increase the current in the secondary coil.
    D. decrease the voltage and current in the secondary coil.

13. In the vacuum flask, heat loss through radiation is minimized by the silver coating on the inner surfaces through
    A. continuous reflection.
    B. multiple refraction.
    C. absorption of radiant heat.
    D. diffraction of radiant heat.

14. The purpose of stirring a mixture gently in a calorimeter during a thermal experiment is to
    A. minimize heat loss.
    B. prevent loss of mass of the mixture.
    C. ensure even distribution of heat.
    D. ensure minimum temperature.

15. Which of the following graphs **correctly** represents the motion of a body falling through a fluid?
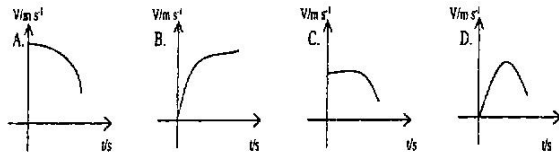

16. The refractive index of water is 1.33, calculate the angle of refraction in water when a ray of light strikes the air-water boundary at an incident angle of 50°.

    A. 1°
    B. 25°
    C. 35°
    D. 50°

17. Which of the following defects best describes the condition of a person whose near point and far point are 30 cm and 80 cm respectively?
    A. Astigmatism
    B. Hypermetropia
    C. Myopia
    D. Presbyopia

18. A lamp rated 120 W, 240 V has a resistance of

A. 0.5 Ω.
B. 2.0 Ω.
C. 120.0 Ω.
D. 480.0 Ω.

19. Which of the following statements about $a.c.$ and $d.c.$ in electrical circuits is **correct**?

A. Charged particles move in one direction in both circuits.
B. In $a.c.$ charged particles reverse direction several times in a second while in $d.c.$ charged particles move in one direction only.
C. Charged particles move to and fro in both circuits.
D. In $a.c.$ charged particles flow steadily in one direction, while in $d.c.$ charged particles move to and fro.

20.
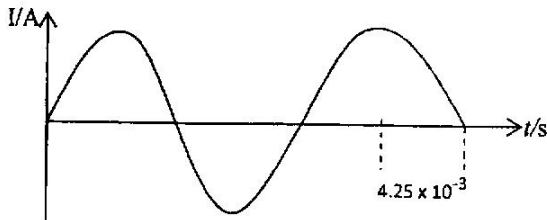
The sketched graph above shows the variation of $a.c.$ with time. Determine the frequency of the circuit.

A. 235.5 Hz
B. 120.5 Hz
C. 58.8 Hz
D. 40.0 Hz

21. A 2.0 m long wire experiences a magnetic force of 0.25 N due to a uniform magnetic field. If the wire carries a current of 5.0 A, calculate the magnitude of the component of the magnetic field perpendicular to the wire.

A. 0.025 T
B. 0.050 T
C. 0.075 T
D. 0.100 T

22. The relationship between mass and energy is

A. $E = mc^2$.
B. $E = mc$.
C. $E = \dfrac{h}{mc}$.
D. $E = \frac{1}{2}mc$.

23. Which of the following statements is **not** correct? The strength of an electromagnet is

A. determined by the number of turns in the coil.
B. determined by the amount of electric current passing through the coil.
C. enhanced by the presence of laminated sheets of soft iron.
D. enhanced by a high resistance coil.

24. The effect of heat on matter includes change in

I. colour.
II. density
III. temperature
IV. electrical resistance.

Which of the statements above are **correct**?

A. I and III only
B. I, II and III only
C. I, III and IV only
D. I, II, III and IV

25. A 3.0 x 10^{-6} F capacitor is connected to a 20 V battery. Determine the electrical potential energy stored in the capacitor.

A. 6.0 x 10^{-4} J
B. 2.2 x 10^{-4} J
C. 1.2 x 10^{-3} J
D. 3.0 x 10^{-5} J

26. The frequency obtained from a plucked string under a 1 N tension is 200 Hz.
Calculate the frequency when the tension is 4 N.

A. 2 Hz
B. 100 Hz
C. 200 Hz
D. 400 Hz

27. Which of the following devices apply the law of flotation in their operation?
I. Balloon
II. Hydrometer
III. Hygrometer
IV. Submarine

A. I and IV only
B. II and IV only
C. I, II and IV only
D. I, III and IV only

28. When water waves travel to a shallower region

A. the wavelength is unaltered.
B. the frequency changes.
C. both wavelength and frequency change.
D. the velocity decreases.

29. The half-life of a radioactive carbon is 4000 years. How long will it take to decay to one-fifth of its original mass?

A. 400 years
B. 800 years
C. 9288 years
D. 18576 years

30. The ratio $\frac{pico}{femto}$ is equivalent to

A. kilo.
B. mega.
C. milli.
D. nano.

31. A 1 m long uniform rod is balanced horizontally under the action of forces 2 N and 1 N as illustrated in the diagram below.

←—30 cm—→   1 N↑

2 N   W
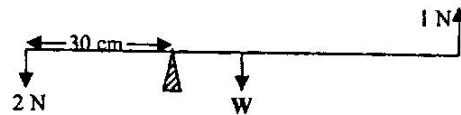
The weight of the rod is

A. 0.5 N.
B. 3.0 N.
C. 5.5 N.
D. 6.5 N.

32. It takes 4 *minutes* to complete a journey when a car is pulled up a slope by a force of 5000 N at a uniform speed of 6 $m\ s^{-1}$. How much work is done in getting the car to the top of the slope?

A. $7.2 \times 10^6\ J$
B. $1.2 \times 10^5\ J$
C. $1.2 \times 10^{-5}\ J$
D. $7.2 \times 10^{-6}\ J$

33. The joule as a unit is equivalent to

A. $kg\ m\ s^{-2}$.
B. $kg\ m\ s^{-3}$.
C. $kg\ m^2\ s^{-2}$.
D. $kg\ m^2\ s^{-1}$.

34. A telescope is said to be in normal adjustment only when the

A. objective lens is convex and the eyepiece is concave.
B. final image is 25 cm from the eyepiece.
C. objective and the eyepiece lenses have the same focal length.
D. final image is formed at infinity.

35. Which of the following graphs **correctly** illustrates that a body is stationary?
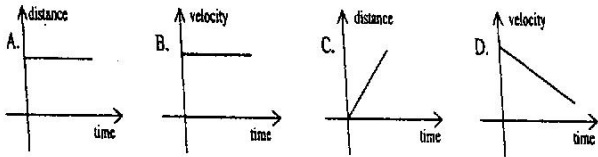
36. A celestial body requires a **minimum** velocity of $1.1 \times 10^4 \ m \ s^{-1}$ to overcome the gravitational influence of the earth. If the earth is assumed to be a sphere of radius $6.4 \times 10^6 \ m$, the value of g is approximately
A. $9.45 \ m \ s^{-2}$.
B. $9.98 \ m \ s^{-2}$.
C. $10.00 \ m \ s^{-2}$.
D. $18.90 \ m \ s^{-2}$.

37. An $8 \ \Omega$ resistor is connected in series with a parallel arrangement of $3 \ \Omega$ and $6 \ \Omega$ resistors. If the $p.d.$ across the arrangement is $30 \ V$, find the current in the $3 \ \Omega$ resistor.

A. $2 \ A$
B. $3 \ A$
C. $10 \ A$
D. $15 \ A$

38. An object is placed $15 \ cm$ in front of a concave mirror of focal length $20 \ cm$. The image formed is

A. virtual and four times smaller.
B. laterally inverted and four times larger.
C. real and $60 \ cm$ in front of the mirror.
D. virtual and four times larger.

39. γ-rays differ from X-rays in that, γ-rays

A. are electrically neutral.
B. are produced from the nuclei of atoms.
C. travel at $3.0 \times 10^8 \ m \ s^{-1}$.
D. belong to the invisible region of the electromagnetic spectrum.

40. A $30.0 \ cm$ long uniform metal rod is heated from $25 \ ^{\circ}C$ to $85 \ ^{\circ}C$. Calculate the fractional increase in length of the rod. [$\alpha = 1.5 \times 10^{-4} \ K^{-1}$]

A. 9.0×10^{-3}
B. 2.7×10^{-3}
C. 2.7×10^{-1}
D. 9.0×10^{-1}

41. Which of the following statements is **correct** when a vertical electron beam passes through a uniform magnetic field?

A. The beam is deflected into a circular path.
B. A horizontal force acts on the beam.
C. A vertical force acts on the beam.
D. The beam travels undeflected.

42. A lens is an optical device which is always

I. transparent.
II. made of glass.
III. functionally refracting.
IV. bounded by geometric surfaces.

Which of the statements above are **true**?

A. I and II only
B. I, II and III only
C. I, III and IV only
D. I, II, III and IV

43. The velocity of a body A relative to a body B when they both are in uniform linear motion is the velocity of A assuming that

A. B is at rest.
B. B is accelerating.
C. both A and B are at rest.
D. neither A nor B is at rest.

44. Which of the following graphs **correctly** represents the behaviour of water with changes in temperature?
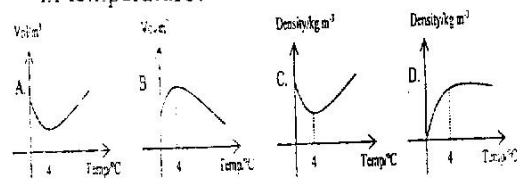
45. In an electrostatic field, the work done per unit charge

A. obeys the inverse square law.

B. is measured both in joules and volts.

C. is independent of the magnitude of the charge brought to the field.

D. is independent of the magnitude of the field strength.

46. Which of the following quantities can be obtained from a velocity time graph?

I. Acceleration

II. Displacement

III. Kinetic energy

IV. Maximum velocity

A. I only

B. I and II only

C. I, II and IV only

D. I, II, III and IV

47. Recorded audio tapes should **not** be left close to a television set in operation. This is because the recording could be damaged by

A. high energy electrons.

B. electric voltage.

C. sound waves.

D. strong magnetic fields.

48. Rainbow formation is a natural phenomenon of

A. dispersion caused by rain droplets.

B. deviation caused by rain water.

C. refraction with rain water as the denser medium.

D. diffraction caused by rain droplets.

49. Which of the following radiations **cannot** penetrate a thin piece of paper?

A. Beta particles

B. Gamma rays

C. Alpha particles

D. X - rays.

50. The *SI* unit of latent heat is

A. $J kg^{-1}$.

B. $J K^{-1}$.

C. J.

D. W.

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