

Candidate's name:

Signature:

Random No.						Personal No.		

(Do not write your School/Centre Name or Number anywhere on this booklet.)

535/1
PHYSICS
Paper 1
July/Aug. 2019
2¼ hours



MASAKA DIOCESE EXAMINATION BOARD

UCE Joint Mock Examinations 2019

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Section A contains **40** objective type questions. You are required to write the correct answer **A, B, C, or D** in **blue or black** ink 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.

Mathematics tables and silent non-programmable calculators may be used.

Acceleration due to gravity = 10ms^{-2}

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

For Examiner's Use Only

Q.41	Q.42	Q.43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQ	Total

SECTION A: (40 MARKS)
*Answer **all** questions from this section.*

1. Capillary rise in a tube dipped in water is due to:

- A. Surface tension
- B. high vapour present
- C. Cohesive force being greater than adhesive force.
- D. The atmospheric pressure acting on the surface of the water.

☐

2. Which of the following is the correct definition of a Newton?

- A. Unit of force
- B. Force which produces an acceleration of 1ms^{-1} .
- C. Force which gives a mass of 1kg an acceleration of 1ms^{-2} .
- D. Force which gives any mass an acceleration of 1ms^2 in 1s

☐

3. The graph below shows a velocity time graph of a body

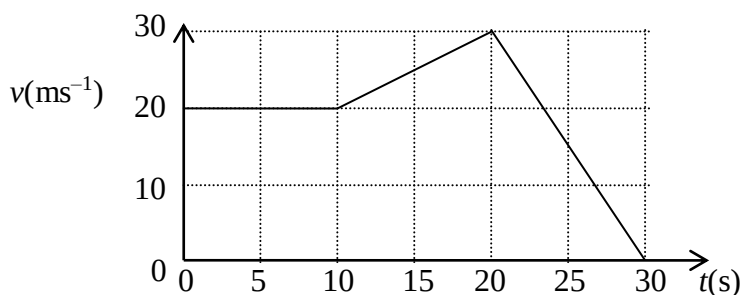


Figure 1

The total distance travelled by the body is

- | | |
|---------|---------|
| A. 150m | B. 200m |
| C. 250m | D. 600m |

☐

4. Which of the following shows the order of increasing wavelength of the members of the electromagnetic spectrum?

- A. Ultraviolet, X-rays, radio waves, infrared.
- B. Gamma rays, Ultra violet, radio waves, Infrared.
- C. X-rays, ultraviolet, Infrared, radio waves.
- D. Radio waves, infrared, X-rays, ultra violet.

☐

5. The graph in Figure 2 below shows ice being heated from -10°C to 15°C .

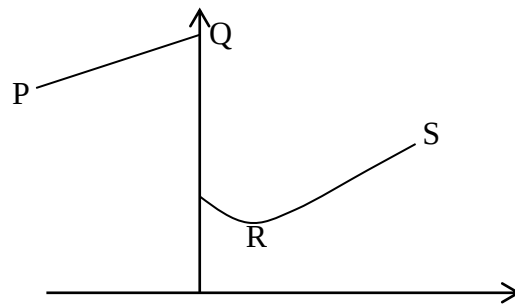


Figure 2

At what point does the substance have maximum density?

- A. P B. Q
C. R D. S



6. A mass of 200g of water at 30°C is added to 40g of water at 78°C. The final temperature of the mixture is

- A. 35 °C
C. 48 °C
- B. 38 °C
D. 55 °C



7. UMEME charges sh.450/= per unit of electrical energy consumed. What is the total cost of operating six light bulbs rated at 100W for 12hours?

- A. 7200/= B. 22500/=
- C. 3750/= D. 3240/=

8. For safety in a house, a circuit breaker and a switch are connected to;

	Circuit breaker	Switch
A.	Live wire	Neutral wire
B.	Neutral wire	Earth wire
C.	Live Wire	Live Wire
D.	Earth wire	Neutral wire

9. Which pair below represents complimentary colours?

- A. Magenta and Cyan
B. Red and Green
C. Blue and Yellow
D. White and Black.

10. When the pressure of a fixed mass of gas is doubled its volume
- A. Doubles at constant volume.
 - B. is halved at constant temperature.
 - C. Does not change at constant temperature.
 - D. is halved if the temperature is doubled.
11. A magnet is said to be magnetically saturated when
- A. it has similar polarity at both its ends.
 - B. it is heated and has lost all its magnetism.
 - C. the dipoles in the same domain are brought into alignment.
 - D. all its dipoles in the different domains are brought into alignment.
12. Name the device that converts alternating current to direct current.
- A. Transformer
 - B. Transistor
 - C. Dynamo
 - D. Diode.
13. The temperature at which all the heat energy is removed from a substance is called
- A. Freezing point
 - B. Celsius temperature
 - C. Kelvin temperature.
 - D. Absolute zero temperature
14. The reading of a spring balance is 7.0N when a solid metal is suspended in air. The density of the metal is 8750kgm^{-3} . The solid metal is then fully immersed in water. What is the reading of the spring? (Density of water = 1000kgm^{-3})
- A. 7.8N
 - B. 6.2N
 - C. 6.5N
 - D. 0.8N
15. Which of the following applies an electromagnet in its action?
- A. Transformer
 - B. Electric motor
 - C. Moving coil galvanometer
 - D. A plotting compass needle

16. The type of waves that are used to monitor the development of an unborn baby in hospitals is?

- A. x-rays.
- B. sound waves
- C. Ultraviolet waves.
- D. Ultrasonic waves

7

17.

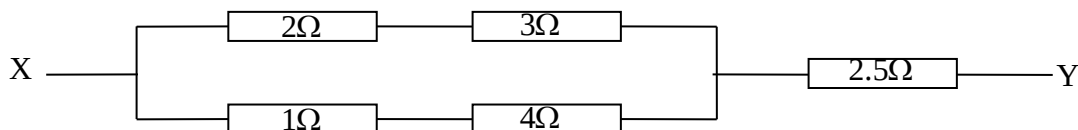


Figure 3

Figure 3 shows a network of resistors. The effective resistance between X and Y is

- A. 12.5Ω
B. 5.0Ω
C. 4.5Ω
D. 1.25Ω

1

18. Isotopes are nuclides with the same number of

- A. protons but different number of electrons.
B. protons but different number of neutrons.
C. neutrons but different number of protons.
D. electrons and the same number of neutrons.

11

19. Which of the following object can be charged by friction?

- A. Safety pin
C. Razor blade
- B. Copper plate
D. Plastic ruler

7

20. The unit of the resistivity of a material in form of a wire is

- A. Ωm^{-1}
B. Ωm^2
C. Ωm
D. $\Omega^{-1}\text{m}^{-1}$

11

21. A transformer is used to step up voltage from 12V to 240V. Calculate the number of turns on the secondary coil if the primary coil has 1200 turns.

- A. 4
B. 12
C. 60
D. 24000

22. Two forces of 8N and 6N act at a point at right angles to each other. Find the magnitude of the resultant force.

A. 14N
C. 2N

B. 10N
D. 1.5N

23. ${}_{90}^{228}\text{Th} \longrightarrow {}_Z^AX + \text{alpha particle.}$

The above equation represents an activity in which thorium decays and emits an alpha particle. Find the value of A and Z.

A. A = 224 and Z = 88
C. A = 228 and Z = 91

B. A = 228 and Z = 89
D. A = 224 and Z = 92

24. The loudness of sound depends on;

A. Velocity.
C. Amplitude

B. Frequency
D. Wavelength

25. When a force of 97N is applied on a body of mass 13kg, it accelerates uniformly at a rate of 7ms^{-2} along a horizontal table. What is the resistance it faces?

A. 91 N
C. 7.46N

B. 13.86N
D. 6.00N.

26. When a hydrometer is placed in two liquids P and Q, it sinks to a greater depth in P than in Q its due to the fact that

A. the density of P is greater than that of Q
B. the expansivity of Q is smaller than that of P
C. it displaces a greater mass of P than of Q.
D. the density of Q is greater than that of P.

27. A weight lifter lifts a mass of 120kg through a vertical height of 2.5m. He holds the load up for 14s before releasing it to drop. The amount of work done is

A. 2.4J
C. 6,720J

B. 3,000J
D. 42,000J.

28 Which of the following statements are not true about a liquid flowing through a uniform tube?

- (i) An increase in speed leads to an increase in pressure.
- (ii) An increase in speed may leads to turbulence.
- (iii) A reduction in speed leads to an increase in pressure.

- A. (i) and (ii)
- B. (ii) and (iii)
- C. (i) and (iii)
- D. (i), (ii) and (iii)

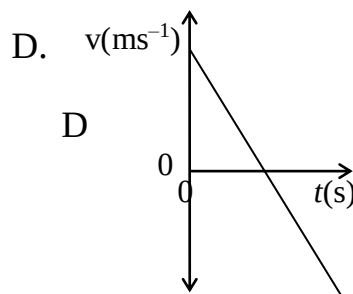
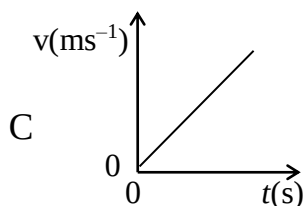
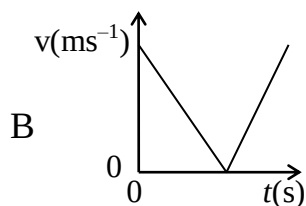
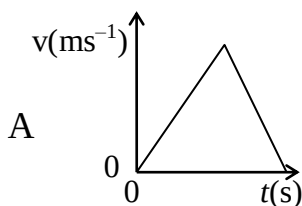
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29. Which of the following is true about a body that is uniformly accelerated,

- A. There is a resultant force on it in the direction of motion.
- B. It covers equal distance in equal intervals of time.
- C. Its momentum is constant.
- D. Its acceleration is zero.

☐

30. If a stone projected vertically upwards goes up and falls back to its point of projection. Which one of the following sketches of velocity-time graphs represents the motion of the stone up to the time it returns to its point of projection?


☐

31. Which of the following statements is true about a dynamo? It changes,

- A. Kinetic energy to electrical energy.
- B. Electrical energy to kinetic energy
- C. Kinetic energy to chemical energy
- D. Chemical energy to electrical energy

☐

32. The arrangement in the Figure 4 is used to produce an e.m.f. What causes the e.m.f?

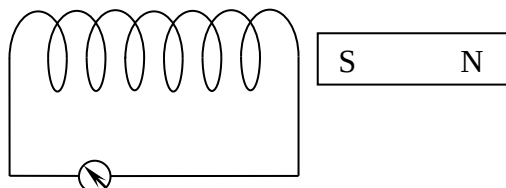


Figure 4

- A. The south pole of the magnet.
- B. The magnet placed close to the coil.
- C. The attraction between the coil and the magnet.
- D. The variation of the magnetic field lines linking the coil.

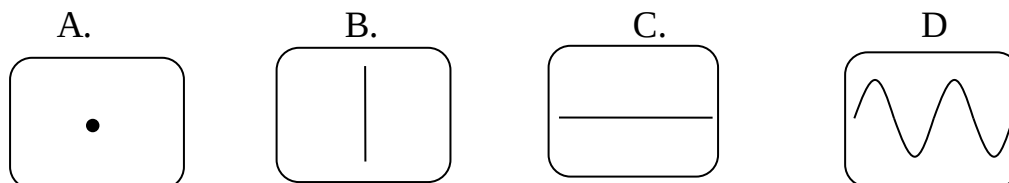
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33. When reflection occurs in a plane mirror for a real object,

- A. The image is real, erect and magnified.
- B. The image is virtual, erect, same size.
- C. The angle of incidence is greater than the angle of reflection.
- D. The image is virtual, inverted and same size as the object.

☐

34. Which of the following diagrams shows the correct display on the screen of a C.R.O when an alternating current is connected to the Y – plates and the time base is switched off?


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35. When a saturated vapour is compressed

- A. more liquid evaporates
- B. its mass remains constant
- C. more vapour condenses
- D. it becomes unsaturated

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36. A concave mirror may be used for all but one of the following:

- A. a magnifying mirror
- B. a torch reflector
- C. a dentist's mirror
- D. a car driving mirror

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37. A current of 5A flows through a given point in a circuit for 2 minutes. Calculate the quantity of charge that passes the point.

- A. 2.5 C
- B. 10 C
- C. 300 C
- D. 600 C

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38. When does the eclipse of the moon occur?

- A. When a bright ring of sunlight shows around the edge of the moon.
- B. When the moon is between the sun and the earth.
- C. When the earth is between the sun and the moon.
- D. When the sun is totally eclipsed by the moon

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39.

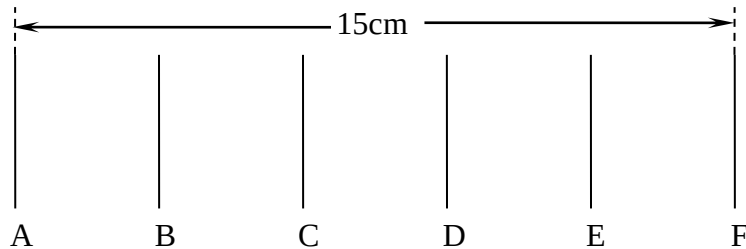


Figure 5

Figure 5 shows straight waves A, B, C, D, and F. If after 15s, A occupies the position now F, find the velocity of the waves.

- | | |
|---------------------------|---------------------------|
| A. 0.01 ms^{-1} | B. 1.00 ms^{-1} |
| C. 9 ms^{-1} | D. 15 ms^{-1} |

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40. The half-life of a radioactive material is 20 days. Find the initial mass of the material if 2 g of it remains after 80 days.

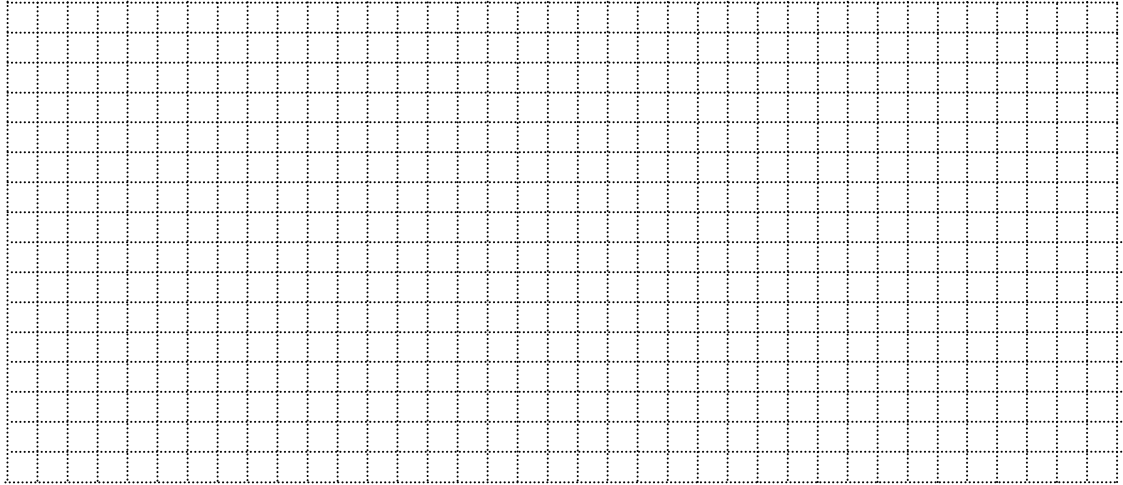
- | | |
|--------|---------|
| A. 4 g | B. 16 g |
| C. 8 g | D. 32 g |

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SECTION B: (40 MARKS)

41. A train, starting from rest, accelerated uniformly at 2ms^{-2} for 10s. It then travels for 30s at the velocity reached, and is brought to rest with uniform deceleration after 5s more.

(a) Draw a velocity- time graph for the motion. (2 marks)



(b) From the graph above, find the total distance travelled (2 marks)

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42. (a) State Archimedes' principle (1 mark)

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- (b) A solid of weight 6.0N is suspended by a string in water. The tension in the string is 4.5N . Find the volume of the solid (3 marks)

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43. (a) What do you understand by a saturated vapour? (1 mark)

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- (b) The cooling system of a refrigerator extracts 1200J of heat every second from its content. How long will it take the refrigerator to cool 0.75 kg of water from 70°C to 10°C ? (3 marks)

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44. (a) Define the following terms as used with concave lenses;
(i) Principal focus (1 mark)

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(ii) Focal length.

(1 mark)

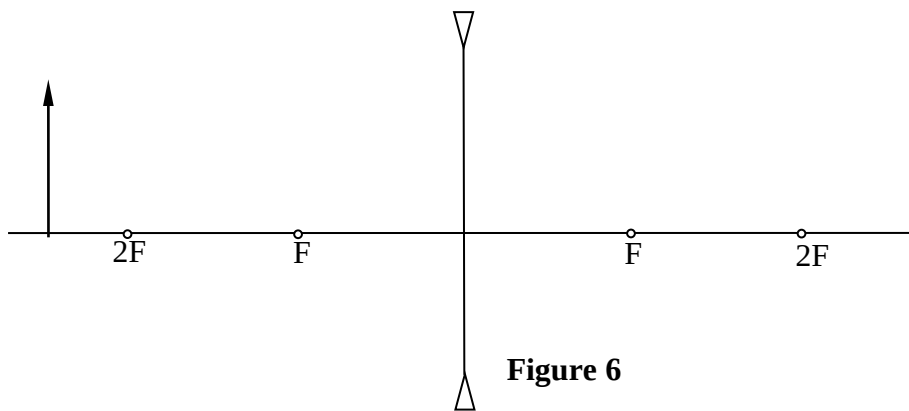
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(b) An object is placed perpendicularly and onto the principal axis of a concave lens as shown in Figure 6. Complete the diagram to find the image.

(2 marks)



45. (a) State Ohm's law.

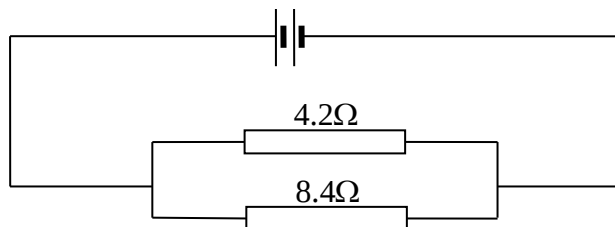
(1 mark)

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(b) Two cells, each of e.m.f 1.5V and internal resistance 0.1Ω are connected to two resistors of 4.2Ω and 8.4Ω as shown in Figure 7.



Find the power dissipated in the 8.4Ω resistor

(3 marks)

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46. (a) Define;

(i) Wave length

(1 mark)

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(ii) Frequency

(1 mark)

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(b) A wave produces waves of frequency 500Hz and velocity 340ms^{-1} . Calculate

(i) Wave length

(1 mark)

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(ii) Periodic time (1 mark)

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47. (a) Define efficiency of a machine (1 mark)

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(b) A machine is run by a motor. If the machine can lift a load of 6000N through a distance of 4m in 1 minute and its efficiency is 80%, calculate the power output of the motor. (3 marks)

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48. (a) The specific heat capacity of water is $4200\text{Jkg}^{-1}\text{K}^{-1}$. What does this statement mean? (1 mark)

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(b) (i) The temperature of 0.2kg of water is raised from 10°C to the boiling point in 5 minutes by a steady supply of heat. Calculate the rate of heat supply. (2 marks)

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(ii) Calculate the power of the heater. (1 mark)

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49. (a) (i) What are cathode rays (1 mark)

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(ii) State any two properties of cathode rays. (1 mark)

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(b) A sample initially contains 6.4kg of carbon. Calculate the time taken for 6.0kg of it to decay. (Half-life of carbon = 5600 years) (2 marks)

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50. (a) State the law of electrostatics (1 mark)

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- (b) Draw the electric field pattern of the charges arranged as shown below. (2 marks)



- (c) State any two uses of a gold leaf electroscope. (1 mark)

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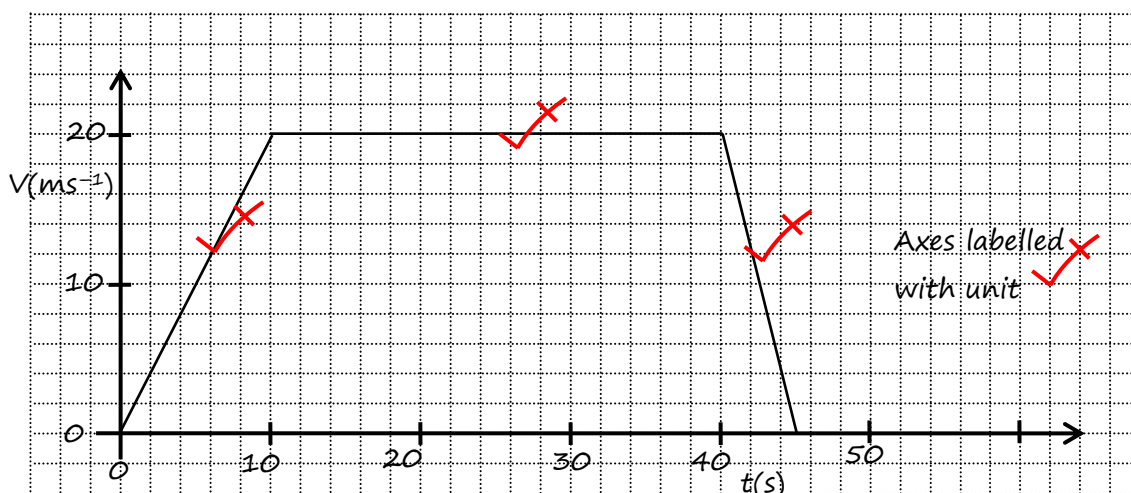
535/1 PHYSICS PAPER 1 MARKING GUIDE

Section A

1.	A	11.	D	21.	D	31.	A
2.	C	12.	D	22.	B	32.	D
3.	D	13.	D	23.	A	33.	B
4.	C	14.	B	24.	C	34.	B
5.	C	15.	A	25.	D	35.	C
6.	B	16.	D	26.	D	36.	D
7.	D	17.	B	27.	B	37.	D
8.	C	18.	B	28.	B	38.	C
9.	C	19.	D	29.	A	39.	A
10.	B	20.	C	30.	D	40.	D

Section B

41. (a)



(b) Total distance is the area under the graph

$$\text{Distance} = \frac{(a+b)}{2} \times h = \frac{(30+45)}{2} \times 20 = \underline{750\text{m}}$$

42. (a) When a body is partly or totally immersed in a fluid, it experiences an up-thrust equal to the weight of the fluid displaced.

(b) Up-thrust = $W_a - W_{app} = 6 - 4.5 = \underline{1.5\text{N}}$

But Up-thrust = $V\rho g$

$$1.5 = V \times 1000 \times 10 \Rightarrow V = \underline{1.5 \times 10^{-4}\text{m}^3}$$

43. (a) A saturated vapour is one which is in a dynamic equilibrium with its own liquid or solid.

(b) From $Q = mc\theta$

$$Q = 0.75 \times 4200 \times (70 - 10)$$

$$Q = 189,000\text{J (With or without unit)}$$

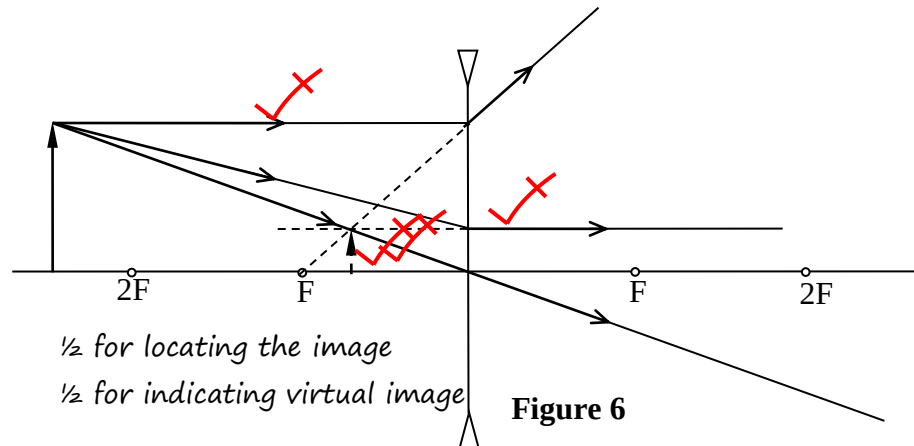
$$t = \frac{\text{Total energy extracted}}{\text{Energy extracted per second}} = \frac{189,000}{1,200} = \underline{157.5\text{s}}$$

44. (a) (i) Principal focus is a point on the principal axis where all rays originally parallel and close to the principal axis appear to diverge from after passing through the lens.

(ii) Focal length is the distance between the principal focus and the optical centre of the lens.

(Mark wrong if pole is used instead of optical centre)

(b)



45. (a) At constant temperature, the current flowing through a metallic conductor is directly proportional to the potential difference between its ends.

(b) Total resistance, $R = \frac{\text{Product}}{\text{Sum}} + 0.2$

$$R = \frac{4.2 \times 8.4}{4.2 + 8.4} + 0.2 = 2.8 + 0.2 = \underline{3.0\Omega}$$

Current I in circuit $= \frac{V}{R} = \frac{3}{3} = \underline{1A}$

P.d, V in parallel circuit $= IR = 1 \times 2.8 = \underline{2.8V}$

Power $P = \frac{V^2}{R} = \frac{2.8^2}{8.4} = \underline{0.933W}$

46. (a) (i) Wavelength is the distance between two successive points on a wave which are in phase.
- (ii) Frequency is the number of oscillations per second.

(b) (i) Using $V = f\lambda$

$$340 = 500 \times \lambda$$

$$\Rightarrow \lambda = \underline{0.68m}$$

(ii) Period $T = \frac{1}{f} = \frac{1}{500} = \underline{0.002s}$

47. (a) Efficiency is the ratio of work output to work input expressed as a percent.
(Mark correct even when "expressed as a percent" is not written)
(Reject "ratio of mechanical advantage to velocity ratio expressed as a percent")

(b) Power output of motor = Power input of the machine

Power output, P_o , of the machine is given by

$$P_o = \frac{\text{Work}}{\text{Time}} = \frac{6000 \times 4}{60}$$
$$P_o = \underline{400W} \quad (\text{With or without unit})$$

$$\text{Using } \eta = \frac{\text{Power output}}{\text{Power input}} \times 100\%$$

$$80 = \frac{400}{\text{Power input}} \times 100\%$$

$$\text{Power input} = \underline{500W}$$

48. (a) It means 1kg of water requires 4200J of heat to raise its temperature by 1K

(b) (i) Using $Q = mc\theta$

$$Q = 0.2 \times 4200 \times (100 - 10)$$
$$Q = \underline{75,600J}$$

$$\text{Power } P = \frac{\text{Heat supplied}}{\text{Time}} = \frac{75,600}{5 \times 60} = \underline{252W}$$

49. (a) (i) Cathode rays are a stream of fast-moving electrons.

(ii) They are negatively charged.
They are deflected in an electric field. (First two)

They are deflected in a magnetic field.

They ionise gases

They cause fluorescence on certain materials

They affect photographic film

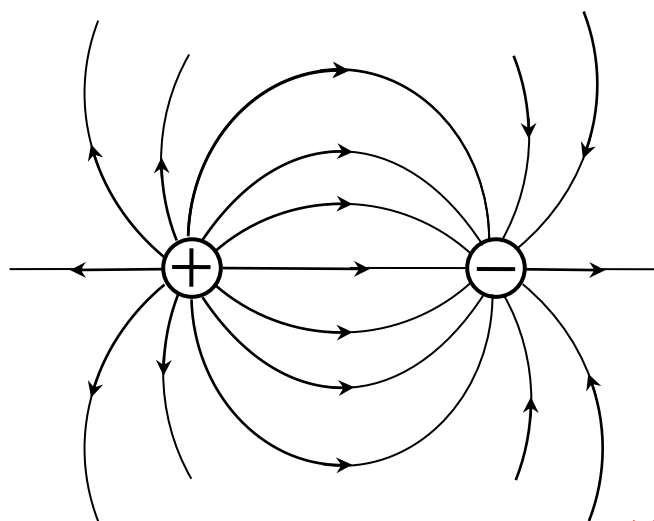
(b) Mass remaining = $6.4 - 6 = 0.4$

$$6.4 \rightarrow 3.2 \rightarrow 1.6 \rightarrow 0.8 \rightarrow 0.4 = 4 \text{ half lives}$$

$$4 \times 5600 = \underline{22,400 \text{ years}} \quad (\text{Any other method of calculation})$$

50. (a) Like charges repel and unlike charges attract.

(b)



Correct shape of field ✓

Correct direction ✓

(c) Detecting the presence of charge in a body ✓

Testing the sign of charge when it is charged. ✓

Testing insulating property of a material.

(First two)

END