PRELIMINARY PHYSICS

PHYSICS PAPER 2

PART A

1. A current of 5.0 A flows in a circuit. This means that

(A) Five electrons pass through the circuit each second,
(B) 5.0 C of charge passes through the circuit each second,
(C) 8.0×10^{-16} C of charge passes through the circuit in one second,
(D) Electrons flow through the circuit at a speed of 5.0 ms^{-1}.

2. The velocity of an object is

(A) equal to the distance travelled divided by the time taken,
(B) equal to the area under a displacement-time graph,
(C) its rate of change of displacement,
(D) its rate of change of distance.

3. A 40 Ω resistor and a 60 Ω resistor are connected in series across a 200 V supply. The potential difference across the 60Ω is

(A) 40 V
(B) 80 V
(C) 120 V
(D) 200 V

4. When a collision occurs:

(A) kinetic energy is always conserved,
(B) momentum is always conserved,
(C) different sized forces act on each colliding object,
(D) energy is not conserved.

5. Which of the following factors does not determine the power of a light globe?

(A) the resistance of the globe,
(B) the current in the globe,
(C) the potential difference across the globe,
(D) the amount of time the globe carries a current.

6. The speed of a wave does not depend on its

(A) frequency,
(B) wavelength,
(C) period,
(D) amplitude.

7. Which of the following cannot travel through a vacuum?

(A) sound waves,
(B) radio waves,
(C) X-rays,
(D) ultraviolet light.

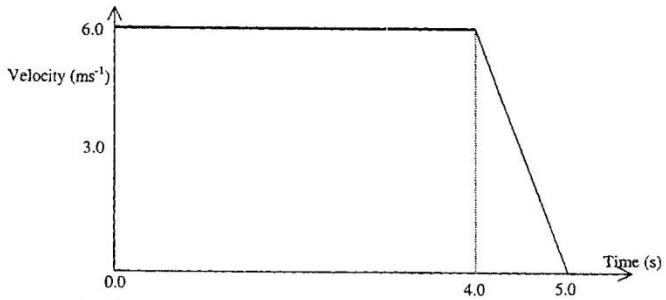
8. The table below shows the power of four household items when used on a 240 V supply.

Appliance	Power (W)
VCR	60
Television	120
Clothes dryer	150
Stove	200

Which item has the lowest resistance?

(A) VCR,
(B) television,
(C) clothes dryer,
(D) stove.

9. The velocity-time graph of an object moving in a straight line is shown below.



The average velocity during the 5.0 s is

(A) 3.0 ms^{-1},
(B) 4.0ms^{-1},
(C) 5.0 ms^{-1},
(D) 5.4 ms^{-1}

10. Which of the following sound waves has the lowest volume and the highest pitch?

	Amplitude (metres)	**Frequency (cycles per second)**
(A)	0.2	330
(B)	0.2	500
(C)	0.5	330
(D)	0.5	500

11. A radio signal is received at an intensity of 64 units at a receiver which is 100km from the source of transmission. At what strength would the signal be received at 150km from the source?

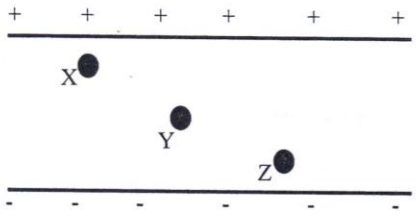
(A) 28.4 units
(B) 42.7 units
(C) 52.3 units
(D) 144 units

12. Two light globes are rated: **Globe X = 12V, 144W**
Globe Y = 240V, 60W

Which statement about the above globes is correct?

(A) Globe Y draws more electrical current than globe X.
(B) Globe Y has a higher electrical resistance than globe X.
(C) Globe Y produces more light energy than globe X.
(D) Globe Y is more expensive to run than globe X.

13. The diagram below shows an electric field between two oppositely charged parallel plates. Three identical, positive charges are place at points X, Y and Z.



Which statement about forces due to the electric field acting on these charges is correct?

a) The force on the charge at X is the largest.
b) The force on the charge at Z is less than the force on the charge at Y.
c) The force on the charge at Y is larger than the force on the charge at X.
d) All three charges have the same force acting on them.

14. Which of the following answers contains only adherents of the heliocentric system:

(A) Copernicus, Aristotle, Ptolemy
(B) Newton, Galileo, Brahe
(C) Aristarchus, Copernicus, Ptolemy
(D) Aristarchus, Galileo, Newton

15. The main source of energy of a red giant is due to the nuclear fusion of:

(A) hydrogen atoms
(B) helium atoms
(C) carbon atoms
(D) none of the above

16. Which alternative is the most correct comparison of alpha, beta and gamma radiation?

		Alpha	**Beta**	**Gamma**
(A)	**Nature**	hydrogen nucleus	electron	electromagnetic radiation
(B)	**Ionising power**	least	intermediate	highest
(C)	**Effect of magnetic field**	not deflected	deflected	deflected
(D)	**Penetrating power**	least	intermediate	highest

17. How does the radiation emitted by a hot body change as its temperature decreases?

(A) The wavelength increases and its intensity decreases
(B) The wavelength increases and its intensity increases
(C) The wavelength decreases and its intensity decreases
(D) The wavelength decreases and its intensity increases

18. Our sun has a surface temperature of 6000K. A star Q has a surface temperature of 3500K and a diameter 300 times greater than our Sun. To which group does Q belong?

(A) Main sequence
(B) White dwarf
(C) Red giant
(D) Nebulae

19. Which scientist first discovered the evidence to support the expansion of the universe?

(A) Friedman
(B) Einstein
(C) Hubble
(D) Newton

20. The higher temperatures within stars is due to:

(A) conversion of gravitational potential energy into heat
(B) nuclear fusion reactions
(C) nuclear fission reactions
(D) radioactivity within the core

21. Stars in the same spectral class have the same:

(A) colour
(B) temperature
(C) colour index
(D) all of the above

22. A Hertzprung-Russell diagram is a graph of a star's:

(A) luminosity versus surface temperature
(B) luminosity versus absolute magnitude
(C) absolute magnitude versus colour
(D) two of the above

23. Which of the following correctly describe the early universe?

(A) The gas clouds were uneven allowing for small amounts of matter to clump together and start the process of forming star systems
(B) Black holes were very numerous
(C) The temperature was a lot lower than it is now because the stars had not formed
(D) Space was not as dense as it is now because not a lot of matter had been created

24. The Earth is regularly bombarded by "Solar Maximums" from the sun as it becomes more active than normal. If the last one was about **three** years ago, when could we expect the next massive influx of solar particles?

(A) About 11 years from now
(B) About twelve months from now
(C) About 8 years from now
(D) About 16 years from now

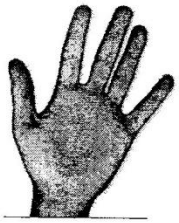
25. Newton's main contribution to the developing model of the Universe at the time was to:

(A) propose gravity as a mechanism for maintaining observed motions.
(B) state that only the planets actually moved through space.
(C) propose a heliocentric model.
(D) state that the Sun could not be at the centre of the solar system.

PART B

26. With the aid of a diagram, explain why parabolic reflectors are used to collect signals from outer space. (4marks)

27. The photos were taken by using visible light and x-rays



(a) List two differences between these two types of waves (2 marks)

(b) List two similarities between these two types of waves (2 marks)

28. Complete the following table (4 marks)

Electromagnetic wave	Detector	Can be produced by	Filtered out by atmosphere (yes or no)
X rays			
Visible light	eyes		
Gamma-ray			

29. Referring to theirs ideas on animal electricity, **assess** whether Galvani or Volta contributed more to our understanding of electricity. (4 marks)

30. Identify 2 safety devices used at home in household circuits and for each device named describe how this device performs its function and justify why spending money on the safety feature was necessary (4 marks)

31. Assess the impact of increased access to electricity for a community. (4 marks)

32. a) Define inertia. (1 mark)

b) Peter and Steven are fishing in a river from their stationary boat of mass 150kg. They decide to have a swim. Peter, who has a mass of 45 kg, dives from the front of the boat at a speed of $4ms^{-1}$. Steven, who has a mass of 60 kg, dives off the other end of the boat, in the opposite direction, at 3 ms^{-1} at exactly the same time with Peter.

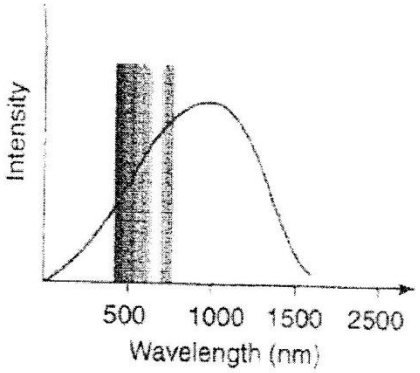
Calculate the velocity of the boat immediately after the boys have dived. (2 marks)

33. Each of the following workers proposed a model for the universe:

Aristotle, Ptolemy, Copernicus, Tycho Brahe, Kepler and Newton

Classify the models into three groups: *heliocentric*, *geocentric* and *a compromise between the two views*. (6 marks)

34. The diagram below shows the radiation curve of star S. The bar shows the position of the visible spectrum. (3 marks)



(a) Predict the surface temperature of star S.
(b) Predict its colour.
(c) Predict its spectral class.

35. On the unlabelled H-R diagram shown in Figure T8, indicate the approximate positions of the following stars: (7 marks)

(a) The Sun (star S).

(b) Star T, with the same temperature as the Sun, but with greater luminosity.

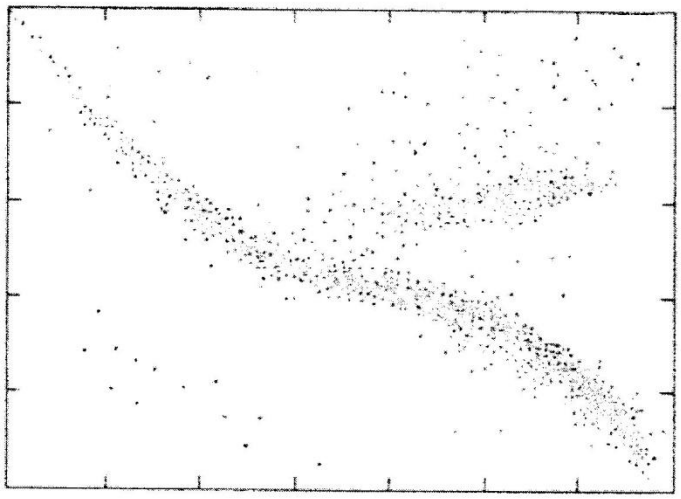
(c) Star U, a red giant.

(d) Star V, a blue-white supergiant.

(e) Star W, cooler than the Sun, and less luminous.

(f) Star X, a white dwarf with a very high temperature.

(g) Star Y, a cool, red star.



H-R diagram