Coaching in: PHYSICS & CHEMISTRY — yrs 11 – 12
SCIENCE — yrs 7 – 10

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REVISION

PHYSICS PAPER 1

PART A

1. As the distance between compressions and rarefactions for a sound wave decreases, the frequency:

   (A) stays the same
   (B) increases
   (C) decreases
   (D) none of the above

2. The property of waves most related to the phenomenon of echoes is:

   (A) reflection
   (B) refraction
   (C) diffraction
   (D) interference

3. Which of the following properties of sound waves has the most influence on the loudness of the sound?

   (A) frequency
   (B) speed
   (C) period
   (D) amplitude

4. A 240 V electric toaster draws a current of 10 A. Its resistance and heat output while making a slice of toast for 45 seconds would respectively be:

   (A)   2400 Ω, 1080 J
   (B)   2400 Ω, 108000 J
   (C)   24 Ω, 1080 J
   (D)   24 Ω, 108000 J

5. In the circuit below:
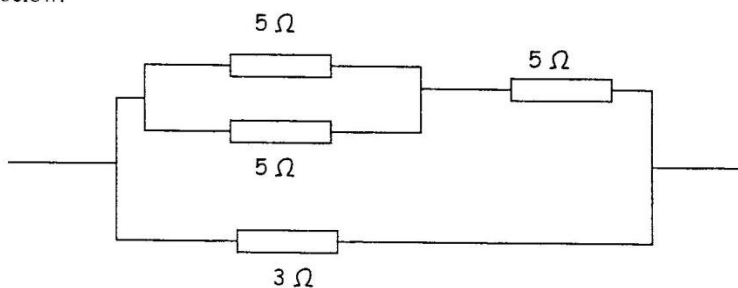
   The total effective resistance is approximately:
   (a)   21 Ω
   (b)   3.1 Ω
   (c)   2.2 Ω
   (d)   8.1 Ω

6.   When a 100W, 240V light globe is operated at 100 V, the current flowing through it would be:

(a)   0.17 A
(b)   0.35 A
(c)   0.42 A
(d)   5.0 A

7.   A piece of metallic conductor to be manufactured to minimize its resistance to electric currents. Its original dimensions are length L and cross sectional area A. Its new dimension should be:

(a)   Length L and cross-sectional area A
(b)   Length 2L and cross-sectional area A/2
(c)   Length L/2 and cross-sectional area 2A
(d)   Length L/2 and cross-sectional area A/2

8.   Two linear air track vehicles, P and Q, are projected towards each other as shown in the diagram. The masses of P and Q are 0.4kg and 0.2kg respectively and their velocities are as indicated.

Linear Air Track
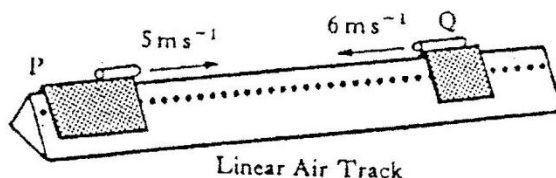
If vehicle Q rebounds to the right with a velocity of 2 ms^{-1}, what happens to vehicle P?

(A) It is stationary after the collision
(B) It rebounds to the left with a velocity of 1 ms^{-1}
(C) It continues to the right with a velocity of 1 ms^{-1}
(D) It rebounds to the left with a velocity of 7 ms^{-1}

9.   When a car crashes into a cliff, which is the best scenario to reduce the possibility of serious injury to the occupants?

(A) Apply a greater force over a shorter time span
(B) Apply a smaller force over a longer time span
(C) Apply a smaller force over a very short time span
(D) Apply a greater force over a longer time span

10.   Besides distance from the Earth, what else affects the apparent brightness of a star?

(A) Luminosity
(B) The speed of rotation
(C) The amount of planets in orbit around it
(D) Whether it has an atmosphere or not

11. Stars are classified according the wavelength that predominate in their spectra. Each class of star is denoted by a letter of the alphabet as shown in the table below.

Spectral Class	Surface Temperature ($\times 10^3 K$)	Colour
O	30	blue
B	15–30	blue-white
A	10–15	white
F	7–10	white-yellow
G	5–7	yellow
K	4–5	orange
M	3–4	red
N	3	infrared

A certain star has a surface temperature of 7500 K and the frequency of its emitted radiation is detected to be 4.0×10^{16} Hz. Its colour and wavelength at which most energy is radiated is :

(A)   white and 3.85 nm
(B)   white-yellow and 7.5 nm
(C)   yellow and 7.5 nm
(D)   white-yellow and 3.85 nm

12. Two stars that appear to be equally bright when view from the Earth:

a)   must have equal luminosity
b)   must be equally distant from the earth
c)   could only have equal luminosity if they were different distances from the Earth
d)   could only be different distances from the Earth provided they had different luminosity.

13. Which of the following **did not** directly contribute to the formation of stars as the Universe expanded in the early stages

a)   The uneven distribution of matter allowing for gravitational collapse
b)   Particles gradually lost kinetic energy
c)   Gravity is present between particles
d)   Light is traveling at 3×10^8 ms^{-1}.

14. The following diagram illustrates a sound wave appearing on the screen of an oscilloscope.
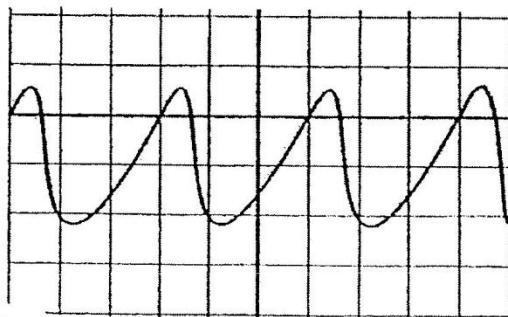
The speed of the wave is 343 m/s. Each horizontal grid division on the screen represents 5×10^{-3} seconds. The wavelength of the wave is:

(A)   5.1 m
(B)   15 m
(C)   69 m
(D)   1700 m

15.   Place these different stages in the formation of the universe into their correct order:

(i)   expansion and cooling of the universe
(ii)   the Big Bang
(iii)   gravitational attraction between particles
(iv)   transformation of radiation into matter
(v)   lumpiness of the gas cloud that allowed gravitational collapse

(A)   (iv), (ii), (i), (v), (iv)
(B)   (i), (ii), (iii), (iv), (v)
(C)   (ii), (iii), (iv), (v), (i)
(D)   (ii), (i), (iv), (iii), (v)

PART B

16.   A recent change in radio broadcasting has allowed more local radio stations in Australia. As you move from one town to another, different stations can be selected which are very close to each other on the wave band.

(a)   If two stations have almost identical frequencies, why can you only receive one station in your area?
                                                                                        (1 mark)

(b)   Many stations now broadcast on FM as well as AM. Explain what is meant by AM and why there is a change to FM.   (2 marks)

17.   Two waves A and B are in the same place at the same time and are shown below.
        Draw the resultant wave in a colour other than black.   (2 marks)
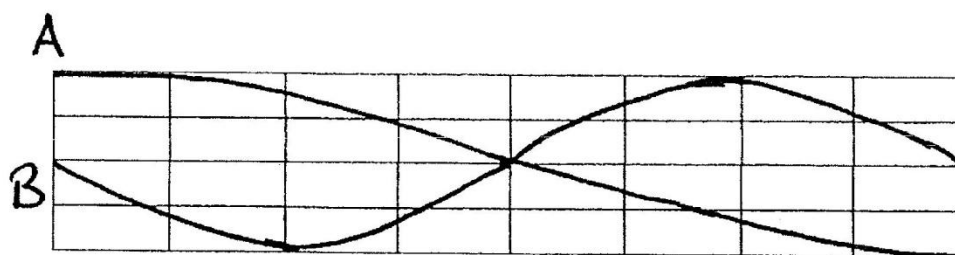
18.   In the electrical circuit in a house, a circuit breaker is used as a safety device.
        With an aid of diagram, explain how the circuit breaker works.   (3 marks)

19. Refer to the circuit below:
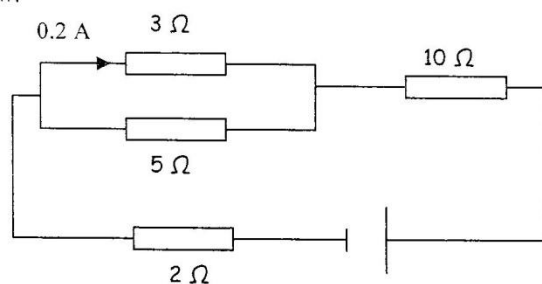
Given that the current through the 3 Ω resistor is 0.2 A. Find:

a) The current through the 10 Ω resistor   (2 marks)

b) The potential difference of the voltage supplied.   (2 marks)

20. Identify a type of radiation which: (2 marks)

a) is emitted by a hot object   _____

b) is used in satellite communication   _____

c) can cause flourescence   _____

d) not absorbed by the atmosphere   _____

21. Peter was driving his small car at a speed of 15ms⁻¹. The total mass of driver and vehicle was 600 kg. Peter accelerated over a period of 1.5 s. During this time the car kinetic energy was increased by 32 500 J.

a) Calculate the speed of the vehicle after the period of acceleration.   (3 marks)

b) Calculate the force during the period of acceleration.   (2 marks)

22. Compare the energy source characteristics of a white dwarf with a main sequence star.   (2marks)

23. Compare the surface temperature of the Sun to a star that would be on the far right of the main sequence on a H-R diagram and explain the cause of the difference.   (2 marks)

24. " Advance in scientific knowledge are often the result of a hypothesis and experimental evidence consequently found supporting or rejecting the hypothesis. This may involve the contribution of different scientists".

Use the discovery of the expansion of the universe to justify the above statement.   (3 marks)

25. Describe the nature of the sunspot activity on the Sun and explain how the effects of this activity reach the Earth, disrupting power grid and satellite communication. (4 marks)

26. Fill the blanks in the following table: (3 maks)

Type of radiation	Identity	Penetrating power	Ionising power
Alpha		Low	
Beta			Moderate
Gamma	Electromagnetic wave		

27. Briefly describe the stellar evolution (5 marks)