



XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN

Preliminary Examination 1998

SCIENCE(PHYS/CHEM) 5142 / PAPER 1
SECONDARY 4 EXPRESS / 5 NORMAL
THURSDAY, 3 SEPTEMBER 1998
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VETTERS: M SHONE, TAN HP & TEO SC

Name: _____ () Class: _____

INSTRUCTIONS TO CANDIDATES

- 1 Fill in your name, register number and class in the space above.
- 2 Time allowed: 1 hour.
- 3 Answer all of the questions on the OAS provided.
- 4 Calculators may be used.
- 5 This booklet consists of 11 numbered pages.

Periodic table provided

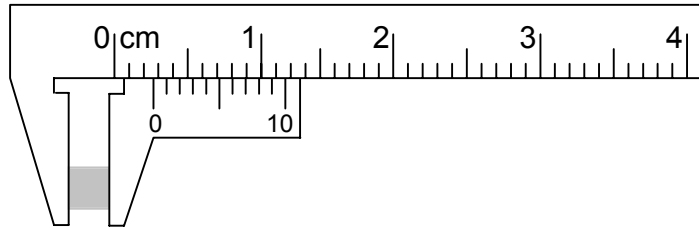
Where necessary assume the following values:

Speed of light, $c = 3 \times 10^8$ m/s

Acceleration due to gravity, $g = 10$ m/s²

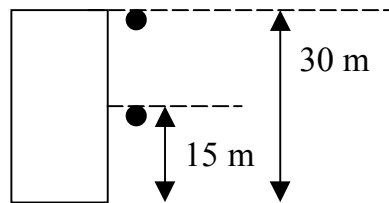
- 1 The diagram below shows vernier callipers set to measure a wooden cube. State the width of the cube as shown on the vernier scale.

- A 12.70 cm
- B 8.10 cm
- C 2.97 cm
- D 0.27 cm



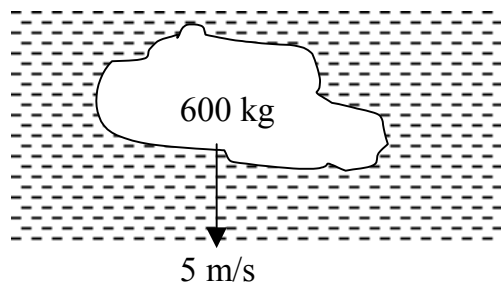
- 2 Two similar tennis balls are released from a 30 m tower at the same time. One falls from the top, the other from half way up, as shown. Which quantity is the same for both balls?

- A Acceleration
- B Final velocity
- C Time of travel
- D Increase in velocity

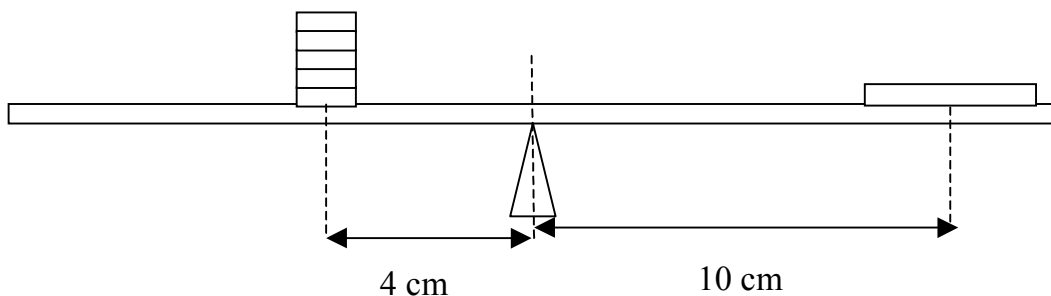


- 3 A large piece of rock of mass 600 kg sinks in a lake with a uniform speed of 5 m/s. What is the resultant force exerted on the rock as it sinks?

- A 0 N
- B 30 N downwards
- C 3000 N downwards
- D 6000 N downwards



- 4 A pupil found that his 30 cm rule balanced at its mid-point. When he put one large coin on the right 10 cm from the pivot and five small coins on the left 4 cm from the pivot, the rule balanced again.



His experiment shows that the large coin weighs the same as

- A two small coins
- B four small coins
- C three small coins
- D five small coins

5 A glass jug cracked when boiling water is poured into it. Four explanations are given:

- I Thick glass was used.
- II Thin glass was used.
- III Glass which expands greatly when heated was used.
- IV Glass which expands little when heated was used.

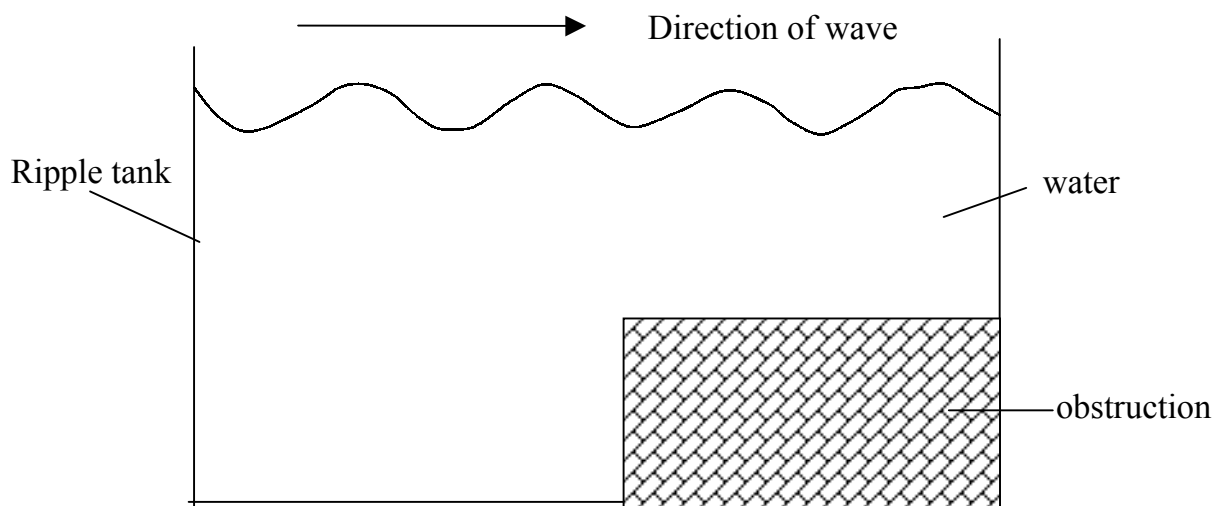
Which two explanations would best account for the cracking of the glass?

- A I and IV B I and III C II and III D II and IV

6 The table gives the melting points and boiling points of four elements. Which element is a liquid at 1200 °C?

	<u>Element</u>	<u>Melting point / °C</u>	<u>Boiling point / °C</u>
A	iron	1540	2750
B	chlorine	-101	-35
C	aluminium	660	2470
D	mercury	-39	357

7 The diagram shows waves moving into shallower water.



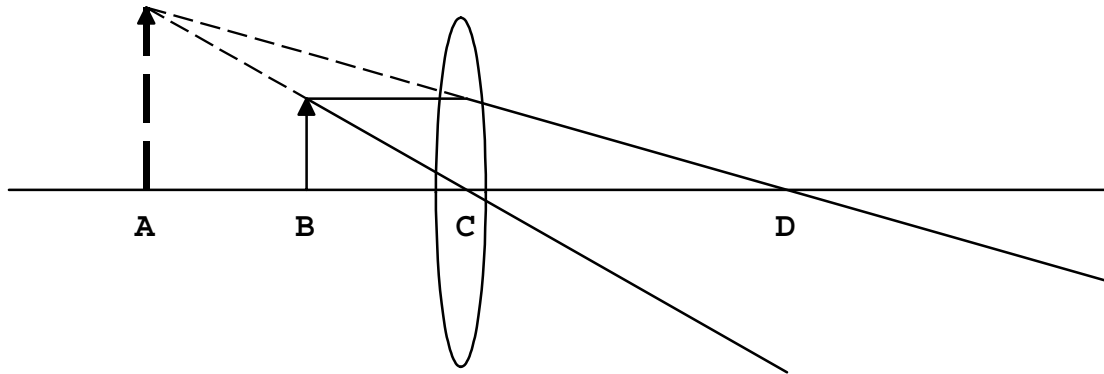
The wavelength of the waves is reduced because

- A only the velocity increases.
- B only the frequency increases.
- C both the frequency and velocity decreases.
- D only the velocity decreases.

8 When viewed normally, a rectangular block of glass appears to be 5 cm thick. If the refractive index of the glass is 1.50, find the true thickness of the block.

- A 7.5 cm B 2.5 cm C 6.5 cm D 3.3 cm

9 Given the diagram below, which shows a magnifying glass in action, which one of the points A-D is the principal focus of the lens?

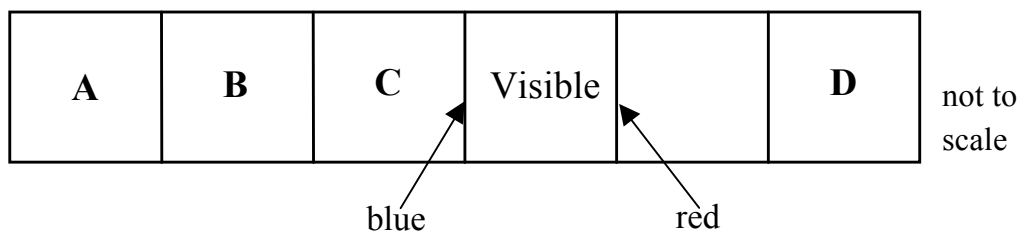


10 To form a **real** image by converging lens of focal length f , the distance between the object and the image should be

- A greater than or equal to f . C exactly f .
 B greater than or equal to $2f$. D greater than or equal to $4f$.

11 Below is a diagram that shows an electromagnetic spectrum. The blue end and red end of the visible spectrum are marked. Of one of the sections of the spectrum it can be said "Produced by electrical oscillations in a circuit, long wavelength". Which one is it?

The Electromagnetic Spectrum



- 12 The table shows how the speed of sound varies with substances of different densities at room temperature.

Substance	Speed of sound in substance (m/s)	Density of substance (kg/m ³)
Air	330	1.29
Oxygen	320	1.43
Aluminium	5100	2710
Iron	5000	7870
Lead	1200	11300

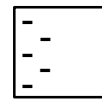
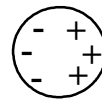
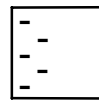
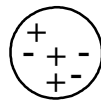
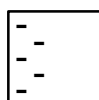
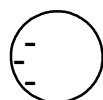
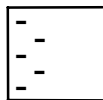
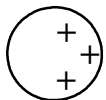
What conclusion about the speed of sound can be drawn from this information?

- A The speed increases as the density of the substance increases.
 - B The speed is greater in less dense substances.
 - C The speed is greater in metals than in gases.
 - D The speed is greatest in the densest metal.
- 13 Below is a diagram that shows two bar magnets close together. Which of the following statements is/are true?
1. The two magnets attract each other
 2. There is a neutral point between the two magnets.
 3. Force between the two magnets is increased if a soft iron bar is placed between them.



- A Only 2 is correct.
- B Only 3 is correct.
- C Only 2 and 3 are correct.
- D Only 1 and 3 are correct.

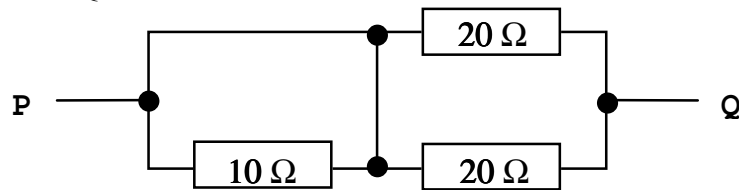
- 14 When a negatively charged polythene rod is brought close to (but not touching) an uncharged metal sphere, some effects take place. Which of the following diagrams best represent this distribution of charge on the sphere?



- A
- B
- C
- D

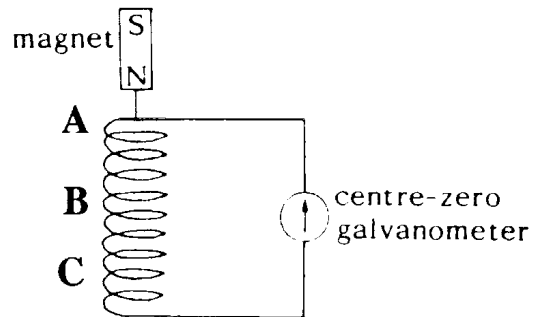
15 The diagram below shows a circuit. What is the effective resistance between terminals P and Q?

- A 10 Ω
- B 20 Ω
- C 40 Ω
- D 50 Ω



16 Below is a diagram of a sensitive centre-zero galvanometer. A short but strong magnet then falls through the vertical solenoid ABC which is connected to it. What are the correct deflections as the magnet passes through A, B and C?

	At A	At B	At C
A	Right	Left	Left
B	Right	Right	Right
C	Left	Zero	Right
D	Left	Zero	Left



17 Rotating in a magnetic field is a coil of wire. In its rotation, it generates an alternating e.m.f.. If the rate of rotation is increased, how will it affect the frequency and the peak value of the e.m.f.?

	Frequency	Peak value
A	Stays the same	Stays the same
B	decreases	Increases
C	Increases	Increases
D	Increases	Stays the same

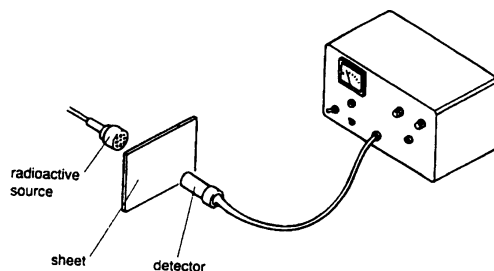
18 Electricity is transmitted at high voltage rather than at low voltage because

- A it requires less insulation.
- B it is safer as the current flow will be very small.
- C it is generated at high voltage.
- D it is more efficient to do so.

19 A resistor is used in an electronic circuit but it quickly burns out. What is the reason for this?

- A The resistor's power rating is too high.
- B The current flowing is too low.
- C The resistor's power rating is too low.
- D A fuse has blown in the circuit.

20 The radiation from a source passes through a sheet of solid material before reaching a detector.



The following count-rates (in counts per minute c.p.m.) are recorded.

<i>no sheet</i>	:	<i>5,000 c.p.m.</i>
<i>sheet of paper</i>	:	<i>4,992 c.p.m.</i>
<i>3 mm sheet of aluminium</i>	:	<i>1,011 c.p.m.</i>

What types of particles are being emitted by the source?

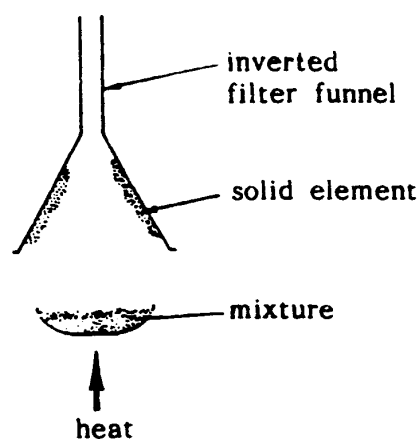
- A β -particles only
- B α -particles and γ -rays
- C α - and β -particles
- D β -particles and γ -rays

21 Which one of the following processes most clearly suggests the kinetic theory of motion?

- A melting
- B diffusion
- C combustion
- D neutralisation

22 The diagram below shows a method by which a certain solid element can be separated from a mixture of that solid with sodium chloride. Which one of the following could be the element?

- A iodine
- B magnesium
- C carbon
- D copper



23 A pure compound **X** has a melting point of 800 °C and is soluble in water. Which one of the following is **X** likely to be?

- A** calcium carbonate **B** ethanol
C polyethene **D** sodium chloride

24 Using the Periodic Table, which of the following ions has the same number of electrons as a krypton atom, atomic number 36?

- A** hydrogen **B** sodium
C chloride **D** rubidium

25 Which of the following statements about the halogens is true?

- A** Fluorine is less reactive than iodine.
B Their silver salts are soluble in water.
C They are diatomic molecules.
D Iodide ions are smaller than fluoride ions.

26 100 cm³ of hydrogen is reacted with 200 cm³ of oxygen. What is the volume of gas remaining?
(All volumes measured at room temperature and pressure)

- A** 50 cm³ **B** 150 cm³ **C** 100 cm³ **D** 200 cm³

27 Which of the following will be observed on placing a zinc metal strip in aqueous copper(II) sulphate?

- (1) The zinc metal is coated with reddish-brown powder.
(2) The zinc metal dissolves.
(3) The blue colour of the solution fades off gradually.

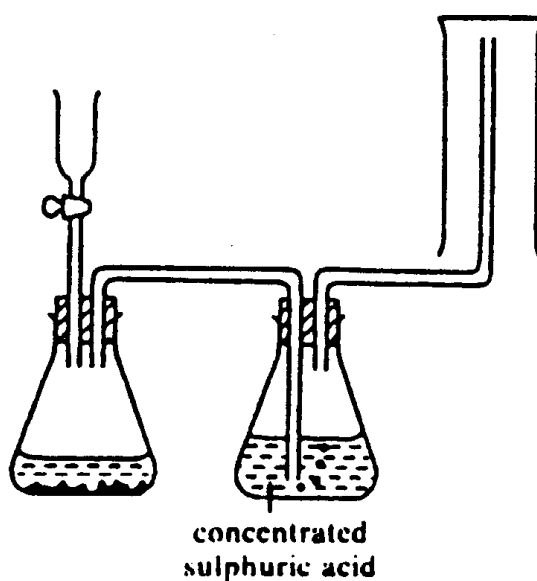
- A** (1) only **B** (3) only
C (1) & (2) only **D** (1) & (3) only

- 28** During the process of photosynthesis,
- A carbon dioxide is taken in and oxygen is formed.
 - B carbohydrate is decomposed and carbon dioxide is formed.
 - C carbohydrate is taken and oxygen is formed.
 - D oxygen is taken and carbohydrate is formed.
- 29** Which one of the following conversions is an example of reduction?
- A copper(II) oxide to copper
 - B copper(II) oxide to copper(II) sulphate
 - C hydrochloric acid to chlorine
 - D lead (II) nitrate to lead(II) chloride
- 30** Which of the following sets of conditions will make marble react most quickly with hydrochloric acid?
- A marble chips and dilute acid at 40 °C.
 - B marble powder and concentrated acid at 40 °C.
 - C marble chips and dilute acid at 20 °C.
 - D marble chips and concentrated acid at 20 °C.
- 31** A sample of ammonium sulphate crystals was warmed gently with aqueous sodium hydroxide. The gas
- A produced a white precipitate in lime water.
 - B relit a glowing splint.
 - C gave a white smoke with hydrogen chloride.
 - D gave a 'pop' sound with a burning splint.

32 Which of the following statements indicates that diamond and graphite are allotropic forms of carbon?

- A Graphite conducts electricity whereas diamond does not.
- B Both have giant molecular structures.
- C Both are crystalline solids.
- D Complete combustion of equal masses of both solids produce equal masses of carbon dioxide as the only product.

33 Which one of the following gases could be prepared and collected in the apparatus shown?



- A oxygen
- B carbon dioxide
- C ammonia
- D hydrogen

34 The ionic equation that best represents the reaction between silver nitrate solution and sodium chloride solution is

- A $\text{H}^+ + \text{OH}^- \longrightarrow \text{H}_2\text{O}$
- B $\text{Ag}^+ + \text{Cl}^- \longrightarrow \text{AgCl}$
- C $\text{Na}^+ + \text{NO}_3^- \longrightarrow \text{NaNO}_3$
- D $2\text{Na}^+ + \text{NO}_3^- \longrightarrow \text{NaNO}_3$

35 Which one of the following contains the smallest molecules?

- A Natural gas
- B Diesel
- C Bitumen
- D Lubricating oil

36 Which one of the following shows the compounds containing the correct linkages?

Ester link

- A Terylene
- B Carbohydrates
- C Nylon
- D Terylene

Amide link

- Protein
- Nylon
- Terylene
- Carbohydrates

37 Which compound undergoes an addition reaction with hydrogen?

- A CH_4
- B C_2H_6
- C C_3H_6
- D C_4H_{10}

38 What is produced when ethanol is boiled with acidified potassium dichromate?

- A ethane
- B carbon monoxide
- C ethanoic acid
- D ethene

39 Which term correctly describes the conversion of protein to amino acids?

- A fermentation
- B condensation
- C esterification
- D hydrolysis

40 Which statement about alkanes is correct?

- A They have the same molecular formula.
- B They can be polymerised.
- C They contain carbon and hydrogen only.
- D They do not burn.