



Roll No.

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Candidates must write the code on the title page of the answer-book.

- Please check that this question paper contains **15** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-sheet by the candidate.
- Please check that this question paper contains **39** questions.
- **Please write down the Serial Number of the question before attempting it.**

## **SCIENCE (Theory)**

*Time allowed : 3 hours*

*Maximum Marks : 70*

### **General Instructions :**

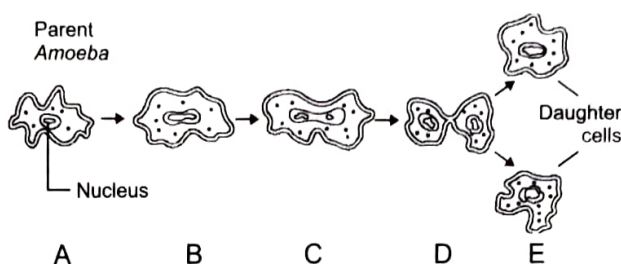
- This question paper consists of **39** questions in **5** sections.*
- All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
- Section A** consists of **20** Objective type questions carrying **1** mark each.*
- Section B** consists of **6** Very Short questions carrying **2** marks each. Answers to these questions should be in the range of **30** to **50** words.*
- Section C** consists of **7** Short Answer type questions carrying **3** marks each. Answers to these questions should be in the range of **50** to **80** words*
- Section D** consists of **3** Long Answer type questions carrying **5** marks each. Answer to these questions should be in the range of **80** to **120** words.*
- Section E** consists of **3** Source-based / Case-based units of assessment of **4** marks each with sub-parts.*

## SECTION - A

Select and write one most appropriate option out of the four options given for each of the questions 1-20:

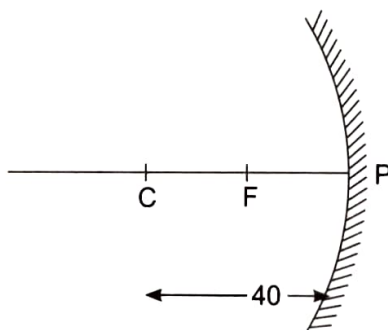
1. In the following figure, different stages of binary fission in *Amoeba* are depicted. Which of the following stage/stages shows the division of parent *Amoeba* to two daughter amoebae?

1



- (a) A and B  
(b) Only C  
(c) Only D  
(d) D and E
2. Find out the focal length of the given mirror. Use the information given along.

1



- (a) -40 cm  
(b) + 20 cm  
(c) -20 cm  
(d) + 40 cm
3. What is the number of electrons which constitute one coulomb charge?
- (a)  $1.6 \times 10^{-19}$   
(b)  $1.6 \times 10^{19}$   
(c)  $6.0 \times 10^{18}$   
(d)  $6.0 \times 10^{-18}$

1

4. The given figure shows that a child has attached earlobes.



Select the correct option.

1

- (a) Attached earlobes is a recessive trait.
- (b) Both parents have attached earlobes.
- (c) Mother has attached earlobes.
- (d) Father has attached earlobes.

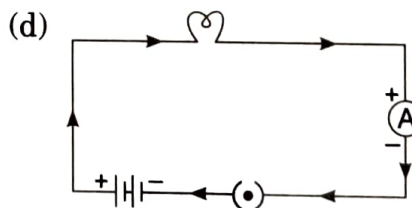
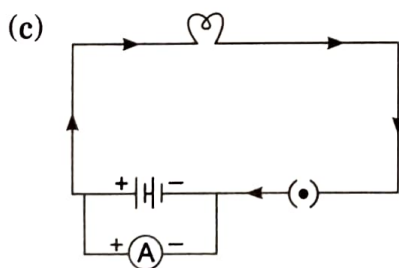
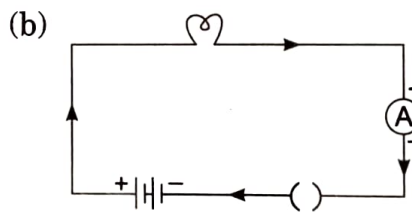
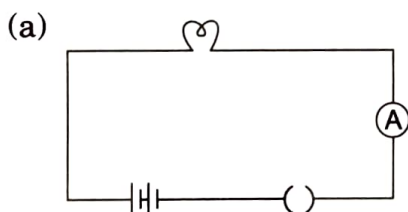
5. Which of the following compounds has  $\text{—CHO}$  (aldehyde) as the functional group?

1

- (a) Propanol
- (b) Propanal
- (c) Propionic acid
- (d) Propanone

6. Schematic diagrams of four electric circuit composing battery, electric bulb, ammeter, and plug key are given. Select the correct circuit.

1



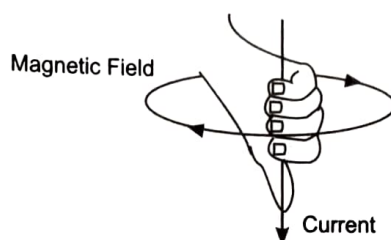
7. Organisms of higher trophic level which feed on several type of organisms belonging to a lower trophic level constitute

1

- (a) food chain
- (b) food web
- (c) ecosystem
- (d) ecological pyramid

8. A child is holding a current carrying conductor in his right hand. What does the direction of thumb indicate?

1



- (a) Magnetic field
- (b) Current
- (c) Circular loop
- (d) Solenoid

9. A mirror is fitted in a wall of Agra Fort to see the full length image of Taj Mahal. Which type of mirror is it?

1

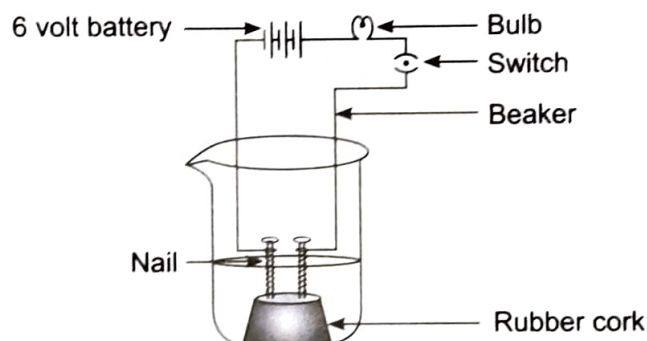
- (a) Concave mirror
- (b) Plano concave mirror
- (c) Convex mirror
- (d) Plane mirror

10. The strength of a magnetic field inside a long current carrying straight solenoid is

1

- (a) maximum in the middle
- (b) maximum at the ends
- (c) more at the ends than at the centre
- (d) same at all points

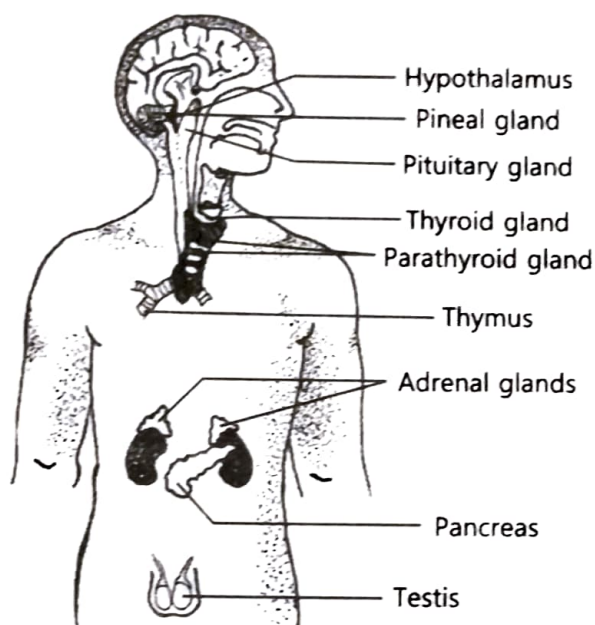
11. Which of the following does not belong to the same homologous series? 1
- (a)  $\text{CH}_3\text{OH}$  (b)  $\text{C}_2\text{H}_5\text{OH}$   
(c)  $\text{C}_3\text{H}_6\text{OH}$  (d)  $\text{C}_4\text{H}_9\text{OH}$
12. The resistance of each conductor is  $\frac{1}{2}$  ohm. What will be the net resistance when these are connected in series? 1
- (a)  $0.1 \Omega$  (b)  $1.0 \Omega$   
(c)  $1.5 \Omega$  (d)  $2.0 \Omega$
13. In an attempt to demonstrate the conduction of electricity, Adi sets up the following apparatus and made certain observations. Which of the following observations are correct?



- (i) Bulb will glow when solution of glucose is taken.  
(ii) Bulb will glow when solution of sulphuric acid is taken.  
(iii) Bulb will glow when solution of sodium hydroxide is taken.  
(iv) Bulb will glow when solution of alcohol is taken. 1
- (a) (i) and (ii) (b) (i) and (iii)  
(c) (ii) and (iii) (d) (iii) and (iv)

14. Observe the diagram and name the gland that secretes both enzymes and hormones.

1



- (a) Pituitary gland
- (b) Adrenal gland
- (c) Testis
- (d) Pancreas
15. Resistance of copper wire is  $10\ \Omega$  and that of nichrome wire is  $15\ \Omega$ . Both the wires have same length and same cross sectional area. Select the correct option.

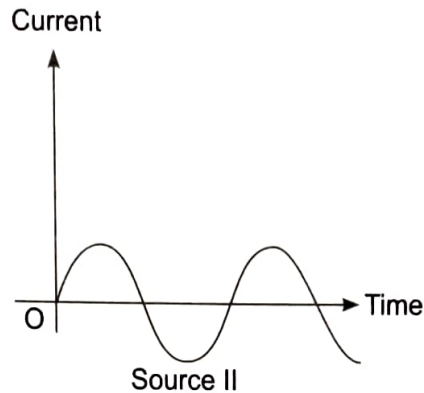
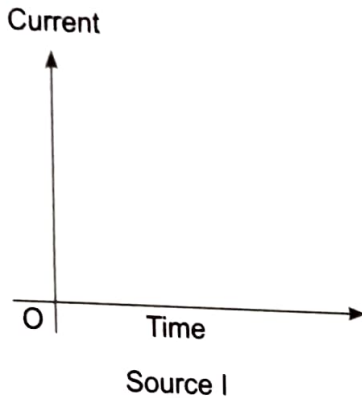
1

- (a) Nichrome wire has more resistivity than copper.
- (b) Both the wires have same resistivity.
- (c) Copper wire has more resistivity than nichrome.
- (d) Resistivity depends upon the nature of the material.



16. Vikas draws the following current time graphs for two different sources. What is the frequency of current in source II in India?

1



- (a) 50 Hz  
(b) 100 Hz  
(c) 110 Hz  
(d) 220 Hz

**Q. no 17 to 20 are Assertion – Reasoning based questions.**

**These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true and R is not the correct explanation of A.  
(c) A is true but R is false.  
(d) A is false but R is true.

17. **Assertion (A):** Dispersion is caused by the difference in deviation angles for light rays of different wavelengths.

**Reason (R):** The violet light has minimum wavelength, so, it deviates the maximum.

1

18. **Assertion (A):** The fore-brain and hind-brain are the main thinking parts of the brain.

**Reason (R):** Separate areas of fore-brain are specialised for hearing, smell, sight and so on.

1

**19. Assertion (A):** Sodium metal is stored in water.

**Reason (R):** The reaction between sodium and water is highly exothermic and the hydrogen gas evolved immediately catches fire.

1

**20. Assertion (A):** The chemicals which are sprayed on the crop plants to protect them are non-biodegradable.

**Reason (R):** These chemicals get accumulated and the maximum concentration occurs at the producers level.

1

### SECTION - B

**Q. no. 21 to 26 are very short answer questions.**

**21.** The absorption of digested food takes place mainly in small intestine in case of human beings. Explain.

2

**OR**

Name the process by which copper must be obtained in its pure form.  
Draw its well labelled diagram.

**22.** How is roasting of zinc ore different from calcination of zinc ore?

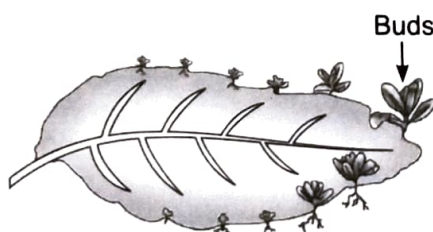
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**23.** (a) Which is the basic event in reproduction?

(b) What is the information source for making proteins?

2

**OR**



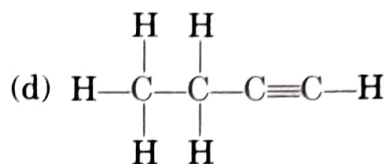
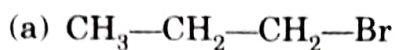
(a) Identify the type of reproduction shown in the above diagram.

(b) Write one advantage of this type of reproduction.



24. How would you name the following compounds?

2

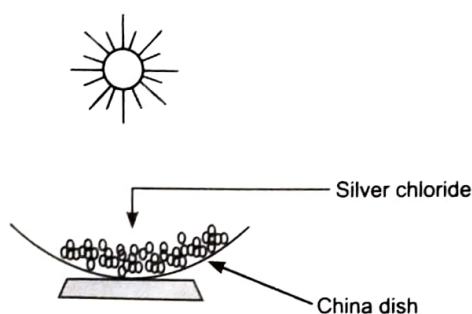


25. (a) Why is it important for us to take iodised salt in our diet?

(b) What is the function of the hormone secreted by thyroid gland?

2

26. The following diagram displays a chemical reaction.



(a) (i) Identify the type of chemical reaction.

(ii) Write the chemical equation of the reaction.

(b) Mention one commercial use of this salt.

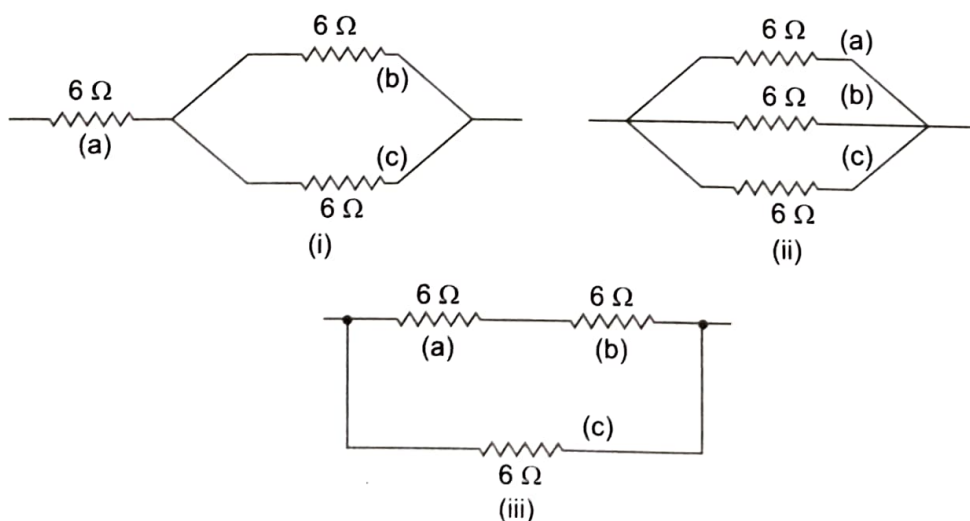
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### SECTION - C

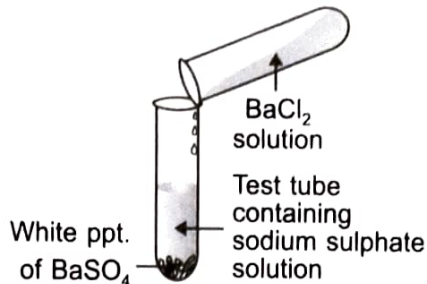
Q.no. 27 to 33 are Short answer questions.

27. Calculate the resistance of the resistors of the following combinations.

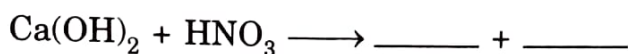
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28. Advitya mixed 3 ml of sodium sulphate solution to 3 ml of barium chloride solution as shown in the figure.



- (a) Identify the type of reaction shown and define it.
- (b) Write the type of chemical reaction that takes place.
- (c) Complete and balance the given equation.



3

29. (a) How can you prepare hard water in Chemistry laboratory?
- (b) What happens when hard water is treated with soap?
- (c) Write a difference between soap and detergent on the basis of their cleansing action.

3

30. (a) Why reflex action has to take place in animals?
- (b) Define geotropism. Draw a labelled diagram of a plant showing geotropic movements of its parts.

3

31. (a) What is magnetic field? Why are magnetic field lines shown closer together in and around some parts?
- (b) What precautions should be taken to avoid the overloading of domestic electric circuits?
- (c) Why is metal casing of the electric appliances is earthed?

3

32. (a) How is brain protected from injury and shock?
- (b) State the significance of peripheral nervous system (PNS). Name the components of PNS and distinguish their origin.

3

**OR**

- (a) What is chemotropism? Give one example.
- (b) Name a plant growth hormone which is synthesized at the shoot tip.  
Why does a plant shoot bend towards light during its growth?

**33.** (a) List any two methods by which solid wastes of urban areas are disposed off.

(b) The existence of decomposers is essential in a biosphere. Explain. **3**

**OR**

(a) List two natural ecosystems.

(b) In the given food chain

Grass → Deer → Lion

Which one will have highest concentration of pesticides and why?

(c) Give any two ways in which non-biodegradable substances affect the environment.

### SECTION – D

**Q.no. 34 to 36 are Long answer questions.**

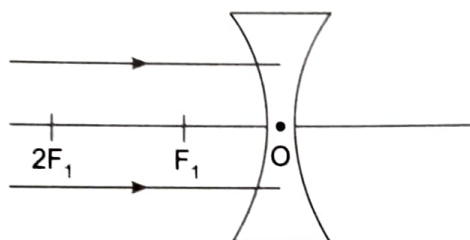
**34.** (a) Why do acids not show acidic behaviour in absence of water?

(b) An element 'A' burns with a golden flame. It reacts with another element 'B' having atomic number 17 to give 'C'. An aqueous solution of 'C' on electrolysis gives a compound 'D' and liberates two gases which are collected at two electrodes. Identify A, B, C and D. Name the gases and the electrodes at which these get collected. Write the equations involved. **5**

**OR**

- (a) The formula of plaster of Paris is  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  and that of gypsum is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . Is it possible for a salt to have  $\frac{1}{2}$  a molecule of water as water of crystallisation? Justify your answer.
- (b) How do farmers neutralise the effect of acid rain in their fields?
- (c) What is dilution? Why should acid always be added slowly to water with constant stirring?

**35.** (a) Complete the given ray diagram.



- (b) A doctor has prescribed a corrective lens of power + 2.5D. Find the focal length of the lens. Is the prescribed lens diverging or converging?
- (c) The image of a needle placed 15 cm from a lens is formed on a wall 30 cm on the other side of the lens. Find the focal length of the lens and size of image formed, if the size of object needle is 3 cm.

**5**

**OR**

- (a) Velocity of light in diamond having refractive index 2.42 is minimum whereas optical density is maximum. Explain.
- (b) Which mirror is used by a dentist and why?
- (c) A concave lens is kept in contact with a convex lens of focal length 30 cm. The combination works as a converging lens of focal length 90 cm. Calculate power of lens. Also, calculate the focal length of the lens.

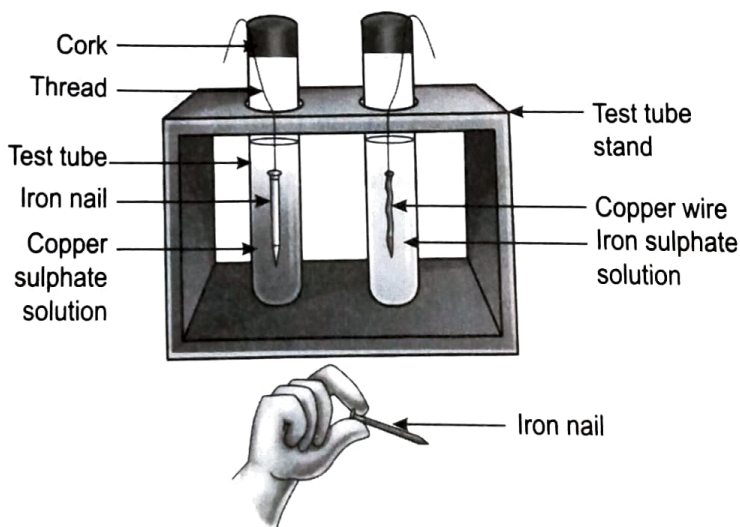
36. (a) What are unisexual flowers? Give two examples. What type of pollination is seen in such flowers? Name two pollinating agents.
- (b) Draw longitudinal section of a flower and label—
- (i) female reproductive parts
  - (ii) male reproductive parts
  - (iii) non reproductive parts

5

### SECTION - E

**Q.no. 37 to 39 are case-based/data-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.**

37. Kabir sets up the following apparatus to study the reaction of metals with salt solution. He puts the clean copper wire in a solution of iron sulphate and the iron nail in a solution of copper sulphate. He records his observations after 20 minutes.



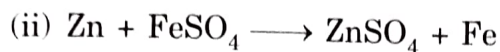
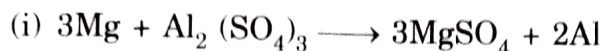
- (a) In which test tube did he find that a reaction has occurred? What is the type of reaction?
- (b) Write a chemical equation for the reaction that has taken place.
- (c) On what basis can he say that a reaction has taken place?

4



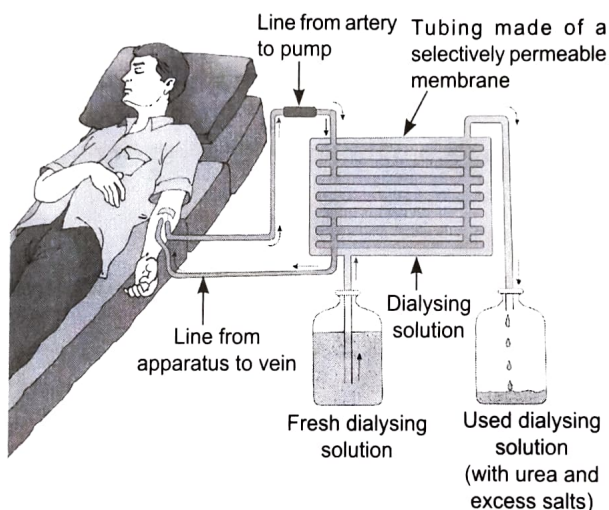
**OR**

(c) Study the following reactions.



Find out which is the most reactive metal. Arrange the metals in the order of decreasing reactivity.

38. Ankit's father has to undergo dialysis after every fortnight as his father's kidneys are not working. If he does not undergo the procedure of dialysis, poisonous wastes get accumulated in the body and that may lead to the death of a person.



- (a) How do unicellular organisms remove harmful metabolic waste from their bodies?
- (b) Draw a diagram of excretory system in human beings. Label the following parts and write one function of each.
- |                       |              |
|-----------------------|--------------|
| (i) Kidneys           | (ii) Ureters |
| (iii) Urinary bladder | (iv) Urethra |

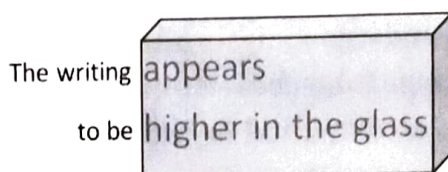
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**OR**

- (b) Name the basic filtration unit present in the kidneys of human beings. Draw its well labelled diagram.



- 39.** Refractive index is also called index of refraction. It is the phenomenon of change in the path of light in going from one medium to another. The refractive index is used to determine the purity of a sample and also the drug concentration in pharmaceutical industry. Unknowingly Ram placed a slab of glass over the newspaper, he found the words look closer to the surface. The same day he observed while looking through a glass jar, the objects look smaller and slightly lifted. He searched on the internet to find out more about refraction and refractive index.



- (a) Why does a ray of light bend when it travels from one medium into another? Show this by taking two media – water and air.
- (b) Give two examples of phenomenon of refraction on of light in everyday life situations.
- (c) The speed of light in air is  $3 \times 10^8 \text{ ms}^{-1}$ . Calculate speed of light in diamond of refractive index 2.42.

4

**OR**

- (c) What is lateral displacement? What happens when a light ray is incident normally to the interface of two media?