

Biology

1. Diagram 1 shows a plant and a human exposed to intense sunlight.

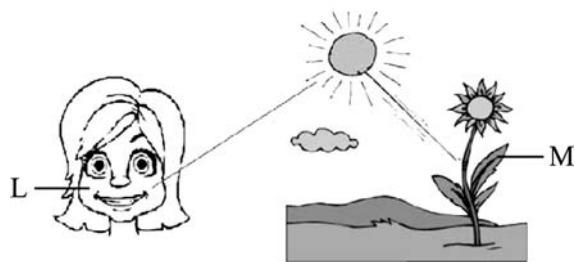


Diagram 1

Which pigment protects the parts L and M from the effect of intense sunlight?

- A. Chlorophyll a
- B. Chlorophyll b
- C. Xanthophyll
- D. Carotenoid

Answer: D

2. Diagram 2 represents a model of plasma membrane. Which of the labelled parts is hydrophobic in nature?

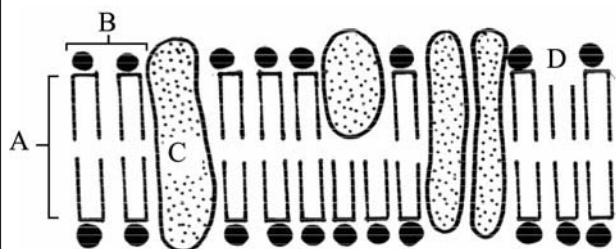


Diagram 2

Answer: A

Chemistry

3. Which of the following is a correct representation of Henderson's equation?

- A. $\text{pH} = \text{pKa} - \log \frac{[\text{salt}]}{[\text{acid}]}$
- B. $\text{pH} = \text{pKa} + \log \frac{[\text{salt}]}{[\text{acid}]}$
- C. $\text{pH} = \text{pKa} - \log \frac{[\text{acid}]}{[\text{salt}]}$
- D. $\text{pH} = \text{pKa} + \log \frac{[\text{acid}]}{[\text{salt}]}$

Answer: B

4. Which of the following carboxylic acids is more soluble in water?

- A. $\text{CH}_3\text{---CH}_2\text{---CH}_2\text{---COOH}$
- B. $\begin{array}{l} \text{CH}_3\text{---CH}_2\text{---CH}_2\text{---} \\ \text{CH}_2\text{---COOH} \end{array}$
- C. $\begin{array}{l} \text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---} \\ \text{CH---COOH} \end{array}$
- D. $\begin{array}{l} \text{CH}_3\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---} \\ \text{CH}_2\text{---CH}_2\text{---COOH} \end{array}$

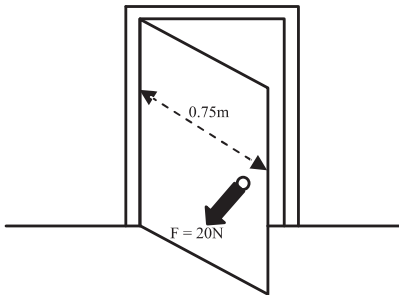
Answer: A

Physics

5. The mass-energy equivalence equation is $E = mc^2$. What is represented by the symbol c in this equation?
- The critical angle
 - The speed of neutrons
 - The speed of light in vacuum
 - The specific heat capacity of the material

Answer: C

6. A force of 20 N is applied to open the door. What torque will be produced?



- 10 Nm
- 15
- 20 Nm
- 25 Nm

Answer: B

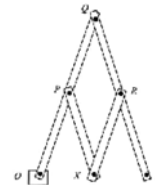
Science Reasoning

Questions 7-8 refer to the following information:

A pantograph is a four-bar linkage mechanism used for drawing. It consists of two long bars and two short bars pivoted to one another so that they can move freely in a plane. In the version shown in Figure 1 below, the short bars are half the length of the long ones.

The point O is held fixed. There is a pointer at X and a pencil at Y . As the pointer at X is traced over a shape, the pencil at Y draws the shape enlarged by a factor of two.

Figure 1: A Pantograph



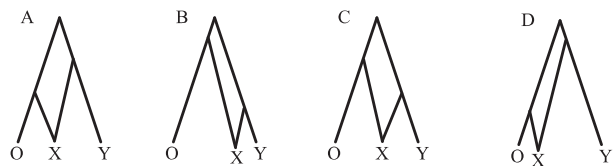
7. In Figure 1 if O and Q are both held fixed, the point Y

- cannot move.
- can move on a circular path.
- can move in a straight line.
- can move freely.

Answer: B

For Question 8 select the answer from the diagrams labelled A to D in Figure 2.

Figure 2



The size of the drawing traced out by the pencil depends upon the relative lengths of the bars in the pantograph.

8. Which of the pantographs in Figure 2 will produce the biggest enlargement of the original shape?

Answer: D

Mathematics Reasoning

Question 9 refers to the following information:

9. A farmer sold apples, pears, and tomatoes by the kilogram for a total receipt of Rs. 480.00. How many kilograms of apples did the farmer sell?

Which **two** of the following statements **together** provide sufficient information to answer the question?

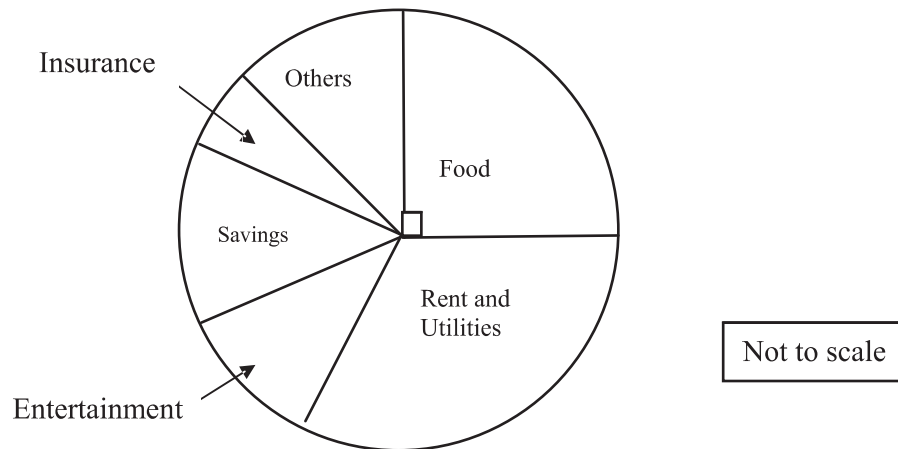
- I. Apples and pears were each sold at Rs.0.50 per kilogram
- II. A total of 780 kilograms of pears and tomatoes was sold.
- III. The total receipt for apples was equal to the combined receipt for pears and tomatoes.
- IV. The total receipt for apples was 4 times the total receipt for pears.
- V. The total receipt for tomatoes was 3 times the total receipt for pears.

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

Answer: D

Question 10 asks you to compare two quantities with the help of the information given below.

Distribution of the monthly budget of Rs. 4,500 for Salim's family



Quantity X: the monthly budget for food

Quantity Y: Rs. 1,000/-

10. Based on the above information, which of the following statements is correct for X and Y?

- A. Quantity X is greater than Quantity Y.
- B. Quantity Y is greater than Quantity X.
- C. Quantities X and Y are equal.
- D. The relationship cannot be determined from the information given.

Answer: A

END OF PAPER

Please use this page for rough work