

# NEW STANDARD ACADEMY

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## PHYSICS

1. A body travels the first half of the total distance with a velocity  $v_1$  and the second half with a velocity  $v_2$ . Calculate the average velocity.
2. A car covers the first half of the distance between two places at a speed of  $40 \text{ km h}^{-1}$  and second half with a speed of  $60 \text{ km h}^{-1}$ . What is average speed of car?
3. A boy reached a railway station 4 km away from his house running with a uniform speed in 1-0 hour. He took rest for 0-5 hour at the station and then came back to his house walking with uniform speed in 1-5 hour. Represent the whole journey of the boy by a time-displacement graph and determine his average speed.
4. A car moving on a straight road covers one-third of the distance with  $20 \text{ km/h}$  and the rest with  $60 \text{ km/h}$ . What is the average speed of car?
5. A train  $600 \text{ m}$  long crosses a bridge of  $1000 \text{ m}$  in  $10 \text{ s}$ . Find the average speed of the train when it just crosses the bridge.

## CHEMISTRY

1.  $1.5 \text{ g}$  of impure sodium sulphate on treating with excess of barium chloride solution gives  $1.74 \text{ g}$   $\text{BaSO}_4$ . What is the % purity of sodium sulphate in the sample?
2.  $1.2 \text{ g}$  sample of impure sodium chloride on treatment with excess of  $\text{AgNO}_3$  solution gave  $2.4 \text{ g}$   $\text{AgCl}$ . Calculate the % purity of sodium chloride sample.
3.  $40\%$   $\text{HCl}$  by mass is ₹ 2 per kg.  $80\%$   $\text{H}_2\text{SO}_4$  by mass is ₹ 1 per kg. Now each acid is used to neutralise  $28 \text{ kg}$   $\text{KOH}$ . Which acid is cheaper?
4. A sample of chalk contains  $96.5\%$   $\text{CaCO}_3$ . Calculate the mass of this sample required to produce  $5 \text{ litre}$   $\text{CO}_2$  at STP. The sample is treated with excess of dil.  $\text{H}_2\text{SO}_4$ .
5. Calculate the mass of  $60\%$   $\text{H}_2\text{SO}_4$  required to decompose  $50 \text{ g}$  of chalk ( $\text{CaCO}_3$ ).

## BIOLOGY

1. Who said 'Protoplasm is the physical basis of life'?
2. Who coined the term 'protoplasm'?
3. Name three most abundant elements in protoplasm.
4. Which biomolecule is the principal source of energy for our body?
5. Which sugar is present in ATP?
6. What is the chemical formula of the glucose?
7. Name a non-reducing sugar
8. Give an example of unsaturated fatty acid?
9. Which biomolecule is the most concentrated source of stored energy?
10. Name the principle polysaccharide stored in human body.

## MATH

1. If a relation  $R = \{(-2, 1), (0, 2), (3, 1), (0, -1), (4, 2), (5, 1)\}$ , then write its domain and range.
2. If  $A = \{2, 3, 5\}$ ,  $B = \{2, 4, 6\}$  and  $R$  is the relation from  $A$  to  $B$  defined by  $R = \{(x, y) : x \in A, y \in B \text{ and } x < y\}$ , then write  $R$  in the roster form.
3. If  $A = \{1, 3, 5, 7, 8\}$  and  $B = \{2, 3, 4, 6, 8, 10\}$  and  $R$  be the relation 'is one less than' from  $A$  to  $B$ , then write  $R$  in the roster form.
4. If  $A = \{2, 3, 4\}$ ,  $B = \{4, 6, 9, 10\}$  and  $R = \{(x, y) : (x, y) \in A \times B \text{ such that } x \text{ is a factor of } y\}$ , then write  $R$  in roster form.
5. Write the domain and the range of the relation  $(x, y) : x = 3y$  and  $x$  and  $y$  are natural numbers less than  $10$ .
6. Let  $A = \{-2, -1, 0, 1, 2\}$ , list the ordered pairs satisfying each of the following relations on  $A$ :  
(i) 'is greater than'.  
(ii) 'is the square of'.  
(iii) 'is the negative of'.
7. If  $A = \{1, 3, 5, 6\}$  and  $B = \{3, 4, 5\}$ , write the relation  $R$  as a set of ordered pairs if  
(i)  $R = \{(x, y) : (x, y) \in A \times B : x + y \text{ is even}\}$   
(ii)  $R = \{(x, y) : (x, y) \in A \times B : xy \text{ is odd}\}$ .
8. Let  $R = \{(x, y) : x, y \in \mathbb{Z}, y = 2x - 4\}$ . If  $(a, -2)$  and  $(4, b^2)$  belong to  $R$ , find the values of  $a$  and  $b$ .
9. Find the linear relation between the components of the ordered pairs of the relation  $R$  where  
(i)  $R = \{(-1, -1), (0, 2), (1, 5), \dots\}$ .  
(ii)  $R = \{(0, 2), (-1, 5), (2, -4), \dots\}$ .
10. Let  $R$  be a relation from  $\mathbb{N}$  to  $\mathbb{N}$  defined by  $R = \{(a, b) : a, b \in \mathbb{N} \text{ and } a = b^2\}$ . Are the following true?  
(i)  $(a, a) \in R$  for all  $a \in \mathbb{N}$   
(ii)  $(a, b) \in R$  implies  $(b, a) \in R$