## MATHEMATICS

1. Four-fifth of one-eighth of $\left(\frac{3}{4}\right)^{\text {th }}$ of $x$ is 64 what is the cube root of $\left(\frac{3}{5}\right)^{\text {th }}$ of $x$ ?
(a) 5
(b) 8
(c) 3
(d) 4
2. What is the least perfect square which is divisible by 2,4 and 6 ?
(a) 36
(b) 64
(c) 16
(d) 18
3. Simplify: $\frac{\frac{2}{9}\left(1 \frac{2}{3}-\frac{3}{8} \text { of } 1 \frac{4}{9}\right)+\frac{4}{17}}{\frac{3}{4} \times 1 \frac{4}{7} \div 1 \frac{1}{2}-\frac{11}{28}} \times \frac{\frac{2}{4}}{\frac{3}{4}}-\frac{2}{3}$
(a) 18
(b) 19
(c) 21
(d) 0
4. If $(504+\mathrm{p})$ is a perfect cube number, whose cube root is p , then $\mathrm{p}=$ ?
(a) 6
(b) 4
(c) 2
(d) 8
5. If $x+\frac{1}{x}=5$ then the value of $x^{4}+\frac{1}{x^{4}}$ is:
(a) 526
(b) 527
(c) 528
(d) 529
6. The difference between the squares of two numbers is 275 . If the square root of the smaller of the two numbers is 5 , then the cube of the larger number is:
(a) 64000
(b) 216000
(c) 1728000
(d) 27000
7. Find the number of coins, each of which is 1.5 cm in diameter and 0.2 cm thick, required to form a right circular cylinder of height 10 cm and diameter 4.5 cm :
(a) 450
(b) 250
(c) 350
(d) 400
8. A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to eight times itself?
(a) 10 years
(b) 12 years
(c) 14 years
(d) 16 years
9. By selling 33 meters of cloth, one gains the selling price of 11 metres. Then the gain percent is:
(a) $50 \%$
(b) $25 \%$
(c) $45 \%$
(d) $60 \%$
10. One of the factor of $a^{2}-2 a b-c^{2}+b^{2}$ is:
(a) $\mathrm{a}-\mathrm{b}+2 \mathrm{c}$
(b) $a+b-c$
(c) $a+b+c$
(d) $a-b+c$
11. If the area of a rectangular field is $\left(x^{4}+x^{2}+1\right)$ sq. units, then its perimeter is:
(a) $2\left(\mathrm{x}^{2}+\mathrm{x}+1\right)$
(b) $4\left(\mathrm{x}^{2}+1\right)$
(c) $2\left(\mathrm{x}^{2}+1\right)$
(d) $6\left(\mathrm{x}^{2}+1\right)$
12. The value of $\frac{\left(x^{a+b}\right)^{2} \times\left(x^{b+c}\right)^{2} \times\left(x^{c+a}\right)^{2}}{\left(x^{a} \cdot x^{b} \cdot x^{c}\right)^{4}}-\left[\left(\frac{x^{a}}{x^{b}}\right)^{c+d} \times\left(\frac{x^{b}}{x^{c}}\right)^{d+a} \times\left(\frac{x^{c}}{x^{d}}\right)^{a+b} \times\left(\frac{x^{d}}{x^{a}}\right)^{b+c}\right]$
(a) 1
(b) -1
(c) 0
(d) 2
13. The compound interest on $₹ 8000$ at the rate of $15 \%$ per annum for 2 years 4 months when the interest is compounded annually is:
(a) ₹ 3209
(b) ₹ 3109
(c) ₹ 3309
(d) ₹ 3409
14. The length, breadth and height of a cuboid are $(5 x-7),(2 x+3)$ and $(7 x-8)$ respectively, then the volume of the cuboid is:
(a) $70 x^{3}-73 x^{2}-155 x+168$
(b) $73 \mathrm{x}^{3}-70 \mathrm{x}^{2}-155 \mathrm{x}+168$
(c) $73 \mathrm{x}^{3}-70 \mathrm{x}^{2}-155 \mathrm{x}+186$
(d) $70 x^{3}-73 x^{2}-155 x+186$
15. The length of a rectangle is $(p+3) \mathrm{cm}$ and its breadth is $(2 p-5) \mathrm{cm}$. If its perimeter is 26 cm , then the area of the rectangle is:
(a) $13 \mathrm{~cm}^{2}$
(b) $40 \mathrm{~cm}^{2}$
(c) $48 \mathrm{~cm}^{2}$
(d) $56 \mathrm{~cm}^{2}$
16. The salary of an officer has been increased by $50 \%$. By what percent must the new salary be reduced to restore the original salary?
(a) $63 \frac{1}{3} \%$
(b) $53 \frac{1}{3} \%$
(c) $43 \frac{1}{3} \%$
(d) $33 \frac{1}{3} \%$
17. In a Mess there are 200 men. There is enough food for them for 30 days. If 200 more men arrive at the Mess, for how many days will the food last?
(a) 14 days
(b) 15 days
(c) 16 days
(d) 17 days
18. The following pie chart shows the favourite tourist destinations in India:


If 1500 people participated in the survey, how many people voted for Mumbai?
(a) 375
(b) 300
(c) 325
(d) 400
19. How many sides does a regular polygon have if the measure of an exterior angle is $20^{\circ}$ ?
(a) 12
(b) 13
(c) 18
(d) 16
20. In the given figure ABCD is a rhombus and PBAQ is a square. Find $\angle \mathrm{ADQ}$.

(a) $10^{\circ}$
(b) $15^{\circ}$
(c) $20^{\circ}$
(d) $25^{\circ}$
21. Multiplicative inverse of $2 \frac{3}{11}$ is:
(a) $-2 \frac{3}{11}$
(b) $2 \frac{11}{3}$
(c) $\frac{25}{6}$
(d) 0.44
22. The given figure shows a parallelogram $A B C D$. $M$ is a point on $C D$ such that $A M=B M$. If $\angle D A M=25^{\circ}$ and $\angle \mathrm{ADC}=100^{\circ}$, the measure of $\angle \mathrm{AMB}$ is:

(a) $55^{\circ}$
(b) $70^{\circ}$
(c) $90^{\circ}$
(d) $80^{\circ}$
23. In the figure, ABCD is a parallelogram and $\mathrm{AB}=6 \mathrm{~cm}$. AB is produced to E . If the area of $\triangle \mathrm{ADE}$ is $\frac{3}{4}$ that of parallelogram ABCD , then find the length of BE .

(a) 1 cm
(b) 2 cm
(c) 3 cm
(d) 4 cm
24. On the Republic Day, sweets were to be distributed among 450 children. But that day 150 children were absent and therefore each child got 3 extra sweets. How many sweets did each child get?
(a) 15
(b) 6
(c) 9
(d) 12
25. Cards marked with numbers $12,13,14, \ldots \ldots .21,22$ are placed in a bag and mixed thoroughly. One card is drawn randomly from the bag. Find the probability that the number on the card drawn is not divisible by 3 .
(a) $\frac{7}{11}$
(b) $\frac{6}{11}$
(c) $\frac{7}{10}$
(d) $\frac{3}{5}$

## CHEMISTRY

26. Which of the following is the oldest synthetic plastic?
(a) Polyester
(b) Bakelite
(c) Melamine
(d) Polyethene
27. Match column I with column II and choose the correct option from the code given below.

|  | Column I |  | Column II |
| :--- | :--- | :---: | :--- |
| P | Nylon | (i) | Artificial Silk |
| Q | Rayon | (ii) | Man-made fibre. |
| R | Cotton | (iii) | Obtained by chemical treatment of wood pulp. |
| S | Polyester | (iv) | PET, Terylene |
|  |  | (v) | Natural Fibre |
|  |  | (vi) | Prepared from coal, water and air. |

(a) P-(ii); Q-(ii),(iii); R-(v); S-(ii),(iv)
(b) P-(ii),(vi); Q-(i),(ii),(iii); R-(v); S-(ii),(iv)
(c) P-(i),(ii); Q-(ii),(iii); R-(v); S-(iv)
(d) P-(ii),(iv); Q-(i),(ii),(iii); R-(v); S-(ii),(vi)
28. When a copper vessel is exposed to moist air for long, it acquires a dull green coating. The green material in the coating is-
(a) A mixture of copper carbonate and copper sulphide.
(b) A layer of copper carbonate only.
(c) A mixture of copper carbonate and copper hydroxide.
(d) A mixture of copper oxide and copper hydroxide.
29. Magnesium ribbon burns in air with a white dazzling flame forming a white powder of magnesium oxide, the powder obtained on burning magnesium ribbon, is dissolved in water. After dissolution the following observations were made;

1. Solution obtained turns blue litmus to red.
2. Solution obtained turns red litmus to blue.
3. Solution is acidic in nature.
4. Solution is basic in nature.
5. In general, metallic oxides are basic in nature.

Choose the correct response from the given code below:
(a) 2,3 and 5
(b) 2, 4 and 5
(c) 1, 3 and 5
(d) 2 and 4
30. Which of the following is called as black gold?
(a) Petroleum
(b) Coal
(c) Coke
(d) Coal Tar
31. The rubbing surface of a matchbox contains
(a) Antimony trisulphate
(b) White Phosphorus
(c) Potasium Chlorate
(d) Powdered glass
32. The correct increasing order of the calorific values of the fuels are:
(a) Diesel < Wood < Coal < CNG
(b) LPG < CNG < Petrol < Diesel
(c) Coal < Diesel < Methane < LPG
(d) Wood $<$ Coal $<$ LPG $<$ CNG
33. Observations are made by analyzing different zones of candle flame.
P. The hottest part of the flame has yellow color and is a non luminous zone.
Q. The moderately hot part of the flame has blue colour and is a luminous zone.
R. The least hot part of the flame has a black colour and is a dark zone.
S. The hottest part of the flame has a blue colour and is luminous zone.

Which of the following option is correct?
(a) P, Q and R
(b) $\mathrm{Q}, \mathrm{R}$ and S
(c) Q and R
(d) R only

## PHYSICS

34. If a rock is brought from the surface of the moon :
(a) Its mass will change
(b) Its weight will change, but not mass
(c) Both mass and weight will change
(d) Its mass and weight will remain the same
35. The maximum force of friction when a body is just beginning to move is known as the -
(a) limiting friction
(b) rolling friction
(c) static friction
(d) none of these
36. A ray of light is incident on a plane mirror at an angle of incidence of $30^{\circ}$. The deviation produced by the mirror is -
(a) $30^{\circ}$
(b) $60^{\circ}$
(c) $90^{\circ}$
(d) $120^{\circ}$
37. When two plane mirrors are kept at $90^{\circ}$, we get -
(a) only one image
(b) two images
(c) three images
(d) infinite number of images
38. For an echo to be distinguishable from sound, the minimum time difference is -
(a) 1 sec
(b) 0.1 sec
(c) 0.01 sec
(d) 10 sec
39. Action and reaction forces act on -
(a) the same body
(b) different bodies
(c) the horizontal surface
(d) Nothing can be said
40. The accelerated motion of a body can occur -
(a) due to change in its speed only
(b) due to change in direction of motion only
(c) due to change in either speed or direction of motion
(d) due to constancy of velocity.
41. Read the following statements:
(i) Electroplating is based on chemical effect of current
(ii) Atmospheric pressure is measured by Manometer

Choose the correct option-
(a) Only statement (i) is correct
(b) Only statement (ii) is correct
(c) Both statements (i) and (ii) are correct
(d) Neither statement (i) nor statement (ii) is correct
42. Read the following statements:
(i) Speed of light increases as it goes from denser to rarer medium.
(ii) Light bends toward the normal as it goes from rarer to denser medium.

Choose the correct option-
(a) Only statement (i) is correct
(b) Only statement (ii) is correct
(c) Both statements (i) and (ii) are correct
(d) Neither statement (i) nor statement (ii) is correct

## BIOLOGY

43. Match Column-I with Column-II.

|  | Column-I |  | Column-I |
| :--- | :--- | :--- | :--- |
| A. | Yellow vein mosaic of lady's finger | i. | Bacteria |
| B. | Malaria | ii. | Fungi |
| C. | Rust of wheat | iii. | Protozoa |
| D. | Typhoid | iv. | Virus |

Choose the correct options-
(a) $\mathrm{A} \rightarrow$ iv, $\mathrm{B} \rightarrow$ iii, $\mathrm{C} \rightarrow$ ii, $\mathrm{D} \rightarrow$ i
(b) $\mathrm{A} \rightarrow$ i, B $\rightarrow$ ii, C $\rightarrow$ iv, D $\rightarrow$ iii
(c) A $\rightarrow$ iv, $\mathrm{B} \rightarrow$ ii, C $\rightarrow$ iii, $\mathrm{D} \rightarrow$ i
(d) $\mathrm{A} \rightarrow$ i, $\mathrm{B} \rightarrow$ ii, $\mathrm{C} \rightarrow$ iii, $\mathrm{D} \rightarrow$ iv
44. Read the following statements and identify $P, Q, R$ and $S$ :

Statement (1) : I am present in a hen's egg and I solidify on boiling. I am found just below the shell. $\operatorname{Iam}(\mathrm{P})$.

Statement (2) : I am present in human blood, I am single celled and I can change my shape. I am (Q).
Statement (3) : 1-2 drops of mine is used in preparation of temporary mount of human cheek cell. I am (R).

Statement (4) : I am the entire content of a living cell. I include cytoplasm and the nucleus. I am (S).
(a)

| P | Q | R | S |
| :--- | :--- | :--- | :--- |
| Yolk | White blood cell | Methylene blue | Protoplasm |
| Albumin | White blood cell | Methylene blue | Cell organelle |
| Albumin | White blood cell | Methylene blue | Protoplasm |
| Albumin | Red blood cell | Methylene blue | Protoplasm |

45. Which option is correct regarding chromosomes?
(1) Thread-like structure
(2) It carries gene
(3) Can be seen only when cell divides
(4) Generally present in nucleolus
(5) It helps in inheritance of characters from parents to the offspring
(a) 1,2,3 and 5 are correct but 4 is incorrect
(b) 1,2, 4 and 5 are correct but 3 is incorrect
(c) 1, 3, 4 and 5 are correct but 2 is incorrect
(d) 2, 3, 4 and 5 are correct but 1 is incorrect
46. In sexually reproducing organisms, the new individual begins its life from a-
(a) sperm
(b) ova
(c) zygote
(d) Both (a) and (b)
47. Analyze the given flow chart and choose the correct option -

(a) i - Boy, ii - Girl, iii - Girl, iv - Boy
(b) i - Girl, ii - Boy, iii - Girl, iv - Boy
(c) i - Boy, ii - Girl, iii - Boy, iv - Girl
(d) i - Girl, ii - Boy, iii - Boy, iv - Girl
48. Which option shows correct pathway for excretion of urine in the excretory system?
(a) Kidney $\rightarrow$ Urethra $\rightarrow$ Ureter $\rightarrow$ Urinary bladder
(b) Kidney $\rightarrow$ Ureter $\rightarrow$ Urethra $\rightarrow$ Urinary bladder
(c) Kidney $\rightarrow$ Ureter $\rightarrow$ Urinary bladder $\rightarrow$ Urethra
(d) Kidney $\rightarrow$ Urinary bladder $\rightarrow$ Urethra $\rightarrow$ Ureter
49. Match Column-I with Column-II.

|  | Column-I |  | Column-I |
| :--- | :--- | :--- | :--- |
| A. | Ripened ovary develops into | i. | Seeds |
| B. | Ovules develop into | ii. | Endosperm |
| C. | Zygote develops into | iii. | Embryo |
|  |  | iv. | Fruits |
|  |  | v. | Plants |

Choose the correct option-
(a) $\mathrm{A} \rightarrow \mathrm{iv}, \mathrm{B} \rightarrow \mathrm{i}, \mathrm{C} \rightarrow$ iii
(b) $\mathrm{A} \rightarrow$ i, B $\rightarrow$ ii, $\mathrm{C} \rightarrow$ iii
(c) $\mathrm{A} \rightarrow \mathrm{i}, \mathrm{B} \rightarrow \mathrm{ii}, \mathrm{C} \rightarrow \mathrm{v}$
(d) $\mathrm{A} \rightarrow$ iii, $\mathrm{B} \rightarrow$ iv, $\mathrm{C} \rightarrow \mathrm{v}$
50. We know one breath means one inhalation and one exhalation. During breathing we observe some changes in the thoracic cavity, these are -
(1) Diaphragm moves down wards
(2) Ribs move outwards
(3) Diaphragm moves upwards
(4) Ribs move inwards

Choose the correct option-
(a) 1,2-denote inhalation and 3, 4 - denote exhalation.
(b) 1, 4 - denote inhalation and 2, 3 - denote exhalation.
(c) 1,2-denote exhalation and 3,4-denote inhalation.
(d) 1, 4- denote exhalation and 2,3-denote inhalation.

## DETAIL SOLUTION OF SET -A

## MATHEMATICS

1. (b)

As per given condition,

$$
\begin{aligned}
\frac{4}{5} \times \frac{1}{8} \times \frac{3}{4} \times x & =64 \\
\Rightarrow \quad x & =\frac{64 \times 5 \times 8}{3}
\end{aligned}
$$

Now cube root of $\left(\frac{3}{5}\right)^{\text {th }}$ of $x$

$$
\begin{aligned}
\therefore & \sqrt[3]{\frac{3}{5} \times x} \\
& =\sqrt[3]{\frac{3}{5} \times \frac{64 \times 5 \times 8}{3}} \\
& =\sqrt[3]{(4 \times 4 \times 4) \times(2 \times 2 \times 2)} \\
& =4 \times 2 \\
& =8
\end{aligned}
$$

2. (a)
L.C.M. of $(2,4,6)=12$
least perfect square which is a multiple of 12 is 36 .
3. (c)
$=\frac{\frac{2}{9}\left(\frac{5}{3}-\frac{3}{8} \times \frac{13}{9}\right)+\frac{4}{17}}{\frac{3}{4} \times \frac{11}{7} \div \frac{3}{2}-\frac{11}{28}} \times \frac{\left(\frac{9+8}{12}\right)}{\left(\frac{9-8}{12}\right)}$
$=\frac{\frac{2}{9}\left(\frac{5}{3}-\frac{13}{24}\right)+\frac{4}{17}}{\frac{3}{4} \times \frac{11}{7} \times \frac{2}{3}-\frac{11}{28}} \times \frac{17}{(1)}$
$=\frac{\frac{2}{9}\left(\frac{40-13}{24}\right)+\frac{4}{17}}{\frac{22}{28}-\frac{11}{28}} \times 17$
$=\frac{\frac{2}{9}\left(\frac{27}{24}\right)+\frac{4}{17}}{\left(\frac{11}{28}\right)} \times 17$
$=\frac{\left(\frac{1}{4}+\frac{4}{17}\right)}{\left(\frac{11}{28}\right)} \times 17$
$=\left(\frac{17+16}{68}\right) \times\left(\frac{28}{11}\right) \times 17$
$=\frac{33}{68} \times \frac{28}{11} \times 17$
$=21$
4. (d)

Given: $(504+\mathrm{p})^{1 / 3}=\mathrm{p}$
$\Rightarrow 504+\mathrm{p}=\mathrm{p}^{3}$
$\Rightarrow \mathrm{p}^{3}-\mathrm{p}=504$
$\Rightarrow \mathrm{p}\left(\mathrm{p}^{3}-1\right)=504$
$\Rightarrow \mathrm{p}(\mathrm{p}-1)(\mathrm{p}+1)=504$
$\Rightarrow(\mathrm{p}-1) \mathrm{p}(\mathrm{p}+1)=7 \times 8 \times 9$
$\Rightarrow \mathrm{p}=8$
5. (b)

$$
x+\frac{1}{x}=5
$$

Squaring both sides,
$\left(x+\frac{1}{x}\right)^{2}=(5)^{2}$
$x^{2}+2+\frac{1}{x^{2}}=25$
$\Rightarrow \mathrm{x}^{2}+\frac{1}{\mathrm{x}^{2}}=23$

Again squaring both sides,

$$
\begin{aligned}
& \left(x^{2}+\frac{1}{x^{2}}\right)^{2}=(23)^{2} \\
\Rightarrow & x^{4}+2+\frac{1}{x^{4}}=529 \\
\therefore & x^{4}+\frac{1}{x^{4}}=527
\end{aligned}
$$

6. (d)

Let the two numbers be x and y , where x is greater than y
According to the question:

$$
x^{2}-y^{2}=275 \text { and } \sqrt{y}=5
$$

$\therefore \mathrm{y}=25 \quad$ (smaller number)
and $x^{2}=275+y^{2}$

$$
\begin{aligned}
& \mathrm{x}^{2}=275+625 \\
& \mathrm{x}^{2}=900 \\
& \mathrm{x}=30
\end{aligned}
$$

Hence, the larger number is 30 and its cube is 27000 .
7. (a)

Let the number of coins be N
$\mathrm{N}=\frac{\text { Volume of cylinder }}{\text { Volume of a coin }}$

$$
=\frac{\pi\left(\frac{4.5}{2}\right)^{2} \times 10}{\pi\left(\frac{1.5}{2}\right)^{2} \times 0.2}
$$

$$
\begin{aligned}
& =\frac{4.5 \times 4.5 \times 10}{1.5 \times 1.5 \times 0.2} \times \frac{1000}{1000} \\
& =\frac{45 \times 45 \times 100}{15 \times 15 \times 2} \\
& =9 \times 50 \\
& =450
\end{aligned}
$$

8. (b)

Let p be the principal and r be the rate of interest
Given: $2 \mathrm{p}=\mathrm{p}\left(1+\frac{\mathrm{r}}{100}\right)^{4}$
$\Rightarrow\left(1+\frac{\mathrm{r}}{100}\right)^{4}=2$
$\Rightarrow\left(1+\frac{\mathrm{r}}{100}\right)=2^{\frac{1}{4}}$

Let in t years, the amount will be eight times itself
$\Rightarrow 8 \mathrm{p}=\mathrm{p}\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}$
$\Rightarrow\left(1+\frac{\mathrm{r}}{100}\right)^{\mathrm{t}}=8$
$\Rightarrow\left(2^{\frac{1}{4}}\right)^{t}=8$
(from equation (i))
$\Rightarrow 2^{1 / 4}=2^{3}$
$\Rightarrow \frac{\mathrm{t}}{4}=3$
$\Rightarrow \mathrm{t}=12$ years

Hence required time is 12 years.
9. (a)
$(S . P$. of 33 m$)-($ C.P. of 33 m$)=$ Gain
$\Rightarrow(S . P$. of 33 m$)-($ C.P. of 33 m$)=$ S.P. of 11 m
$\Rightarrow$ S.P. of $22 \mathrm{~m}=$ C.P. of 33 m
Let C.P. of each metre be ₹ 1
$\therefore \quad$ C.P. of $22 \mathrm{~m}=₹ 22$
S.P. of $22 \mathrm{~m}=₹ 33$
(from eqation (i))
$\therefore \quad$ Gain $=₹(33-22)=11$
$\therefore \quad$ Gain $\%=\frac{11}{22} \times 100=50 \%$
10. (d)
$=\mathrm{a}^{2}-2 \mathrm{ab}-\mathrm{c}^{2}+\mathrm{b}^{2}$
$=a^{2}-2 a b+b^{2}-c^{2}$
$=(a-b)^{2}-c^{2}$
$=(\mathrm{a}-\mathrm{b}+\mathrm{c})(\mathrm{a}-\mathrm{b}-\mathrm{c})$
11. (b)

Let $\ell$ be the length and $b$ be the breadth of rectangle.
Area of a rectangle $=x^{4}+x^{2}+1$
$\Rightarrow \ell b=x^{4}+x^{2}+1$
$\Rightarrow \mathrm{lb}=\left(\mathrm{x}^{2}\right)^{2}+2 \mathrm{x}^{2}+1-\mathrm{x}^{2}$
$\Rightarrow \ell b=\left(x^{2}+1\right)^{2}-(x)^{2}$
$\Rightarrow l b=\left(x^{2}+1+x\right)\left(x^{2}+1-x\right)$
$\Rightarrow l b=\left(x^{2}+x+1\right)\left(x^{2}-x+1\right)$
perimeter $=2(\ell+b)$

$$
\begin{aligned}
& =2\left(\mathrm{x}^{2}+\mathrm{x}+1+\mathrm{x}^{2}-\mathrm{x}+1\right) \\
& =2\left(2 \mathrm{x}^{2}+2\right) \\
& =4\left(\mathrm{x}^{2}+1\right)
\end{aligned}
$$

12. (c)
$\frac{x^{4 a+4 b+4 c}}{x^{4 a+4 b+4 c}}-x^{(a-b)(c+d)} \cdot x^{(b-c)(d+a)} \cdot x^{(c-d)(a+b)} \cdot x^{(d-a)(b+c)}$
$=1-x^{a c+a d-b c-b d+b d+a b-d c-a c+a c+b c-a d-b d+b d+c d-a b-a c}$
$=1-\mathrm{x}^{0}$
$=1-1$
$=0$
13. (b)

Here, Principal $=₹ 8000$
Rate of interest $=15 \%$ p.a.
and $\quad \mathrm{n}=2$ years 4 months

$$
\begin{aligned}
& =2 \frac{4}{12} \text { years } \\
& =2 \frac{1}{3} \text { years }
\end{aligned}
$$

Amount after 2 years and 4 months

$$
\begin{aligned}
A & =p\left(1+\frac{\mathrm{R}}{100}\right)^{2}\left[1+\frac{\mathrm{R} / 3}{100}\right] \\
& =8000\left(1+\frac{15}{100}\right)^{2}\left(1+\frac{15}{3(100)}\right) \\
& =8000\left(1+\frac{3}{20}\right)^{2}\left(1+\frac{1}{20}\right) \\
& =8000\left(\frac{23}{20}\right)^{2}\left(\frac{21}{20}\right) \\
& =8000\left(\frac{23}{20}\right)^{2} \times \frac{21}{20} \\
& =8000 \times \frac{23 \times 23 \times 21}{20 \times 20 \times 20} \\
& =23 \times 23 \times 21 \\
& =₹ 11109
\end{aligned}
$$

$\therefore$ Compound Interest $=$ Amount - Principal

$$
\begin{aligned}
& =₹(11109-8000) \\
& =₹ 3109
\end{aligned}
$$

14. (a)

Length $(\ell)=5 x-7$
Breadth $(b)=2 x+3$
Height (h) $=7 x-8$
Volume of cuboid $=\ell \mathrm{bh}$

$$
=(5 x-7)(2 x+3)(7 x-8)
$$

$=\left[10 x^{2}+15 x-14 x-21\right](7 x-8)$
$=\left(10 x^{2}+x-21\right)(7 x-8)$
$=70 x^{3}+7 x^{2}-147 x-80 x^{2}-8 x+168$
$=70 x^{3}-73 x^{2}-155 x+168$
15. (b)

Let $\ell$ be the length and $b$ be the breadth of rectangle


Perimeter $=2(\ell+b)$

$$
26=2(p+3+2 p-5)
$$

$\Rightarrow 26=2(3 p-2)$
$\Rightarrow 26=6 \mathrm{p}-4$
$\Rightarrow 6 \mathrm{p}=30$
$\Rightarrow \quad \mathrm{p}=5$
$\therefore \quad$ Area of rectangle $=(p+3)(2 p-5)$

$$
\begin{aligned}
& =(5+3)(2 \times 5-5) \\
& =(8(10-5) \\
& =8 \times 5
\end{aligned}
$$

$$
=40 \mathrm{~cm}^{2}
$$

16. (d)

Let original salary be ₹ 100 .
Then, increase in the salary $=50 \%$ of $₹ 100$

$$
\begin{aligned}
& =₹\left(\frac{50}{100} \times 100\right) \\
& =₹ 50
\end{aligned}
$$

$$
\text { Salary after increment }=₹ 100+₹ 50
$$

$$
=₹ 150
$$

Now, in order to restore the original salary, a reduction of ₹ 50 should be made on ₹ 150 .
Thus, Reduction on ₹ $150=₹ 50$
$\Rightarrow \quad$ Reduction on $₹ 1=₹ \frac{50}{150}$
$\Rightarrow \quad$ Reduction on $₹ 100=₹\left(\frac{100}{3}\right)$

$$
=₹ 33 \frac{1}{3}
$$

$\therefore$ Reduction on new salary $=33 \frac{1}{3} \%$.
17. (b)

Men in the beginning $=200$
Men now $=200+200=400$
Let the required time be $x$ days.
Thus, we have

| Number of Men | 200 | 400 |
| :--- | :--- | :--- |
| Number of Days | 30 | $x$ |

This is a case of inverse proportion
So, $200 \times 30=400 \times x$
$\Rightarrow \mathrm{x}=\frac{200 \times 30}{400}=15$ days
18. (a)

Percentage for Mumbai $=[100-(12+8+15+8+32)] \%$

$$
=25 \%
$$

$\therefore$ Number of people voted for Mumbai $=25 \%$ of $1500=\frac{25}{100} \times 1500=375$
19. (c)

Sum of all exterior angles $=360^{\circ}$
$\Rightarrow \quad$ No. of sides $\times 20^{\circ}=360^{\circ}$
$\Rightarrow \quad$ No. of sides $=\frac{360^{\circ}}{20^{\circ}}=18$
20. (d)


All sides of a rhombus are equal
$\therefore \mathrm{AB}=\mathrm{BC}=\mathrm{CD}=\mathrm{DA}$
$\Rightarrow \mathrm{AB}=\mathrm{BC} \quad \Rightarrow \quad \angle \mathrm{BAC}=\angle \mathrm{BCA}=70^{\circ}$
Now, $\quad B C \| A D$
$\therefore \quad \angle \mathrm{DAC}=\angle \mathrm{BCA}=70^{\circ}$
$\angle \mathrm{BAD}=\mathrm{BAC}+\angle \mathrm{DAC}=70^{\circ}+70^{\circ}=140^{\circ}$
$\angle \mathrm{QAB}=90^{\circ}$
Now, $\angle \mathrm{QAB}+\angle \mathrm{BAD}+\angle \mathrm{DAQ}=360^{\circ}$
$\Rightarrow 90^{\circ}+140^{\circ}+\angle \mathrm{DAQ}=360^{\circ}$
$\Rightarrow \quad \angle \mathrm{DAQ}=130^{\circ}$
(angle of a square)
(complete angle)
(opposite sides of a rhombus are parallel)
(alt. int. angles)
(complete angle)

Now, PBAQ is a square
$\therefore \quad \mathrm{PB}=\mathrm{BA}=\mathrm{AQ}=\mathrm{QP}$
From (i) and (ii), we have
$\mathrm{AQ}=\mathrm{AD} \quad \Rightarrow \quad \angle \mathrm{AQD}=\angle \mathrm{ADQ}$
In $\triangle \mathrm{AQD}$,

$$
\begin{aligned}
& \angle \mathrm{DAQ}+\angle \mathrm{AQD}+\angle \mathrm{ADQ}=180^{\circ} \\
\Rightarrow & 130^{\circ}+2 \angle \mathrm{ADQ}=180^{\circ} \\
\Rightarrow & \quad 2 \angle \mathrm{ADQ}=50^{\circ} \Rightarrow \angle \mathrm{ADQ}=25^{\circ} \\
\therefore & \angle \mathrm{ADQ}=25^{\circ}
\end{aligned} \quad \text { (from (iii)) }
$$

21. (d)
$2 \frac{3}{11}=\frac{25}{11}$
$\therefore \quad$ Multiplicative inverse of $2 \frac{3}{11}$ is $\frac{11}{25}=0.44$
22. (b)
$\angle \mathrm{ADC}+\angle \mathrm{DAB}=180^{\circ}$
(co-int. angles)
$\Rightarrow 100+\angle \mathrm{DAB}=180^{\circ}$
$\Rightarrow \quad \angle \mathrm{DAB}=80^{\circ}$
$\angle \mathrm{MAB}=\angle \mathrm{DAB}-\angle \mathrm{DAM}$

$$
=80^{\circ}-25^{\circ}=55^{\circ}
$$

Now, $\mathrm{AM}=\mathrm{BM} \quad \Rightarrow \quad \angle \mathrm{MAB}=\angle \mathrm{MBA}=55^{\circ}$
In $\triangle \mathrm{AMB}$

$$
\begin{aligned}
& & \angle \mathrm{AMB}+\angle \mathrm{MAB}+\angle \mathrm{MBA} & =180^{\circ} \\
\Rightarrow & & \angle \mathrm{AMB}+55^{\circ}+55^{\circ} & =180^{\circ} \\
\Rightarrow & & \angle \mathrm{AMB} & =70^{\circ}
\end{aligned}
$$

23. (c)

Draw $\mathrm{DM} \perp \mathrm{AB}$
Area of parallelogram $\mathrm{ABCD}=$ base $\times$ height $=\mathrm{AB} \times \mathrm{DM}$
Area of $\triangle \mathrm{ADE}=\frac{1}{2} \times$ base $\times$ height

$$
=\frac{1}{2} \times \mathrm{AE} \times \mathrm{DM}
$$

According to question,

$\operatorname{ar}(\triangle \mathrm{ADE})=\frac{3}{4} \times \operatorname{ar}\left(\|^{\|^{\mathrm{gm}}} \mathrm{ABCD}\right)$
$\Rightarrow \frac{1}{2} \times \mathrm{AE} \times \mathrm{DM}=\frac{3}{4} \times \mathrm{AB} \times \mathrm{DM}$
$\Rightarrow \frac{\mathrm{AE}}{\mathrm{AB}}=\frac{3}{4} \times 2=\frac{3}{2}$
$\Rightarrow \frac{\mathrm{AE}}{6}=\frac{3}{2} \quad(\because \mathrm{AB}=6 \mathrm{~cm})$
$\Rightarrow \mathrm{AE}=9 \mathrm{~cm}$
$\therefore \quad \mathrm{BE}=\mathrm{AE}-\mathrm{AB}=9-6=3 \mathrm{~cm}$
24. (c)

Let each child got $x$ sweets. Then initially he was to get $(x-3)$ sweets.
According to question,

$$
\begin{aligned}
& 450(\mathrm{x}-3)=(450-150) \mathrm{x} \\
\Rightarrow & 450 \mathrm{x}-1350=450 \mathrm{x}-150 \mathrm{x} \\
\Rightarrow & \quad 150 \mathrm{x}=1350 \\
\Rightarrow & \quad \mathrm{x}=\frac{1350}{150}=9
\end{aligned}
$$

So, each child got 9 sweets.
25. (a)

Possible outcomes: 12, 13, 1422

These are total 11 in numbers
Favourable outcomes: 13, 14, 16, 17, 19, 20, 22
These are total 7 in numbers

$$
\begin{aligned}
\text { Probability } & =\frac{\text { no. of favourable outcomes }}{\text { no. of possible outcomes }} \\
& =\frac{7}{11}
\end{aligned}
$$

## CHEMISTRY

26. (b)
$\left\{\right.$ Class $8^{\text {th }}$ NCERT Chapter-3 Synthetic Fibres \& Plastics $\}$
27. (b)

## Explanation:

P- Nylon $\rightarrow$ It is a man-made fibre, which is prepared from coal, water and air

Q- Rayon $\rightarrow$ It is a man-made fibre also known as Artificial Silk which is obtained by chemical treatment of wood pulp.

R- Cotton $\rightarrow$ It is a natural fibre.
S- Polyester $\rightarrow$ It is a man-made fibre, PET and Terylene are different forms of polyester.
$\left\{\right.$ Class $8^{\text {th }}$ NCERT Chapter-3 Synthetic Fibres \& Plastics $\}$
28. (c)
\{Class $8^{\text {th }}$ NCERT page no. 47\}
29. (b)
\{Class $8^{\text {th }}$ NCERT page no. 47 \}
30. (a)
$\left\{\right.$ Class $8^{\text {th }}$ NCERT page no. 60$\}$
31. (d)

## Explanation:

A mixture of antimony trisulphide, potassium chlorate and white phosphorus with some glue starch applied on the head of match and the rubbing surface has powdered glass on it.
\{Class $8^{\text {th }}$ NCERT page no. 67\}
32. (c)
\{Class $8^{\text {th }}$ NCERT page no. 73 , Table no. 6.4\}
33. (d)
\{Class ${ }^{\text {th }}$ NCERT page no. 72, Figure no. 6.13\}

## PHYSICS

34. (b) Mass is the amount of matter contained in a body, so it does not depend on gravity and is a constant, but weight, $\mathrm{w}=\mathrm{mg}$

So, weight will change, but not mass.
35. (a) Maximum value of static friction is called limiting friction. If a body is applied a force greater than the limiting friction, the body starts to move.
36. (d)

deviation produced by mirror

$$
\begin{aligned}
& =\theta \\
& =180^{\circ}-60^{\circ} \\
& =120^{\circ}
\end{aligned}
$$

37. (c) Image produced by two mirrors,

$$
=\frac{360}{\theta}-1
$$

$$
\begin{aligned}
& =\frac{360}{90}-1 \\
& =4-1=3
\end{aligned}
$$

38. (b) Minimum time difference between two sound to be distinguishable is 0.1 s .
39. (b)

action and reaction always act on the different bodies
40. (c) Acceleration is rate of change of velocity and velocity can be changed either by changing speed or direction. So, acceleration can occur due to change in both speed and direction.
41. (a) Electroplating uses chemical effect of current and transfers metal from anode to cathode. Barometer is used to measure atmosphere pressure.
Only statement (i) is correct
42. (c) $\mathrm{V}_{\text {medium }}=\frac{\mathrm{c}}{\mu}$
as $\mu$ increases, $\mathrm{v}_{\text {medium }}$ decreases.
So, speed of light in rarer medium is more than that in denser medium.
$\frac{\sin \mathrm{i}}{\sin \mathrm{r}}=\frac{\mu_{2}}{\mu_{1}}$
as we go from rarer to denser, $\frac{\mu_{2}}{\mu_{1}}>1$
$\frac{\sin i}{\sin r}>1$
$\sin \mathrm{i}>\sin \mathrm{r}$
$r<i$
light bends towards the normal.

## BIOLOGY

43. (a) (Class- $8^{\text {th }}$ NCERT, Page no. 24, 25)
44. (c) Statement (1) : (Class-8 ${ }^{\text {th }}$ NCERT, Page no. 93)

Statement (2) : (Class-8 ${ }^{\text {th }}$ NCERT, Page no. 92)
Statement (3) : (Class-8 ${ }^{\text {th }}$ NCERT, Page no. 94)
Statement (4) : (Class-8 ${ }^{\text {th }}$ NCERT, Page no. 95)
45. (a) (Class-8 $8^{\text {th }} N C E R T$, Page no. 95)
46. (c) (Class- $8^{\text {th }}$ NCERT, Page no. 104, 119)
47. (d) (Class $-8^{\text {th }}$ NCERT, Page no. 119)
48. (c) (Class- $7^{\text {th }}$ NCERT, Page no. 126, 127)
49. (a) (Class-7 ${ }^{\text {th }}$ NCERT, Page no. 138)
50. (a) (Class-7 ${ }^{\text {th }}$ NCERT, Page no. 113)

