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Aakash + BYJU'S

Corporate Office **:** Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

Aakash National Talent Hunt Exam 2021

(*for Class X Studying Moving to Class XI*)

Sample Paper

ANSWERS

1. (2)
2. (4)
3. (2)
4. (4)
5. (2)
6. (1, 3)
7. (2, 3)
8. (1)
9. A(P, Q, S); B(Q); C(R); D(P)
10. (2)
11. (3)
12. (4)
13. (1)
14. (2)
15. (2, 4)
16. (1, 4)
17. (3)
18. A(R); B(R); C(Q, S); D(P)
19. (2)
20. (1)
21. (4)
22. (2)
23. (3)
24. (1)
25. (2, 3)
26. (1, 2, 3)
27. (1)
28. A(Q, S); B(Q, S); C(P, R); D(P, R)
29. (2)
30. (3)
31. (4)
32. (1)
33. (3)
34. (1)
35. (2, 4)

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ANSWERS & SOLUTIONS

1. Answer (2)

$$P = \frac{1}{f}$$

2. Answer (4)

The angle between two lateral faces of a prism is called the angle of the prism or the prism angle. When the light ray is allowed to pass through the prism, it makes the emergent ray bend at an angle to the direction of the incident ray. This angle is called the angle of deviation for the prism.

3. Answer (2)

$\because \quad V = IR$

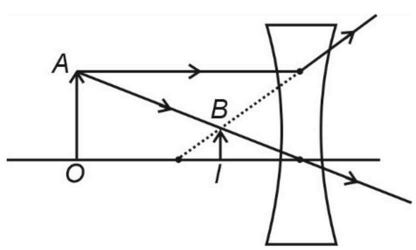
$$R = \frac{V}{I} = \frac{0.5-0.25}{0.2-0.1} = \frac{0.25}{0.1} = 2.5\ \Omega$$

$$I = \frac{V}{R} = \frac{0.85}{2.5} = 0.34\ \text{A}$$

4. Answer (4)

The resistivity of a conductor depends on the nature of material of conductor, not on its shape and size.

5. Answer (2)



A concave lens always form a virtual and erect image.

6. Answer (1, 3)

$$R_{AB} = 5+3+\frac{(2+4+6)\times 4}{2+4+6+4}$$

$$R_{AB} = 8+\frac{48}{16} = 11\,\Omega$$

$$R_{CD} = 5+3+\frac{48}{16} = 11\,\Omega$$

$$R_{AC} = 5+3+\frac{2\times 14}{16} = \frac{39}{4}\,\Omega$$

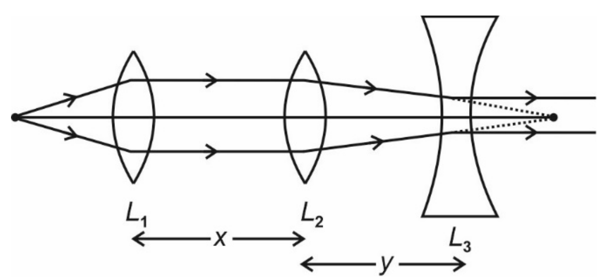
$$R_{BD} = 5+3+\frac{6\times 10}{16} = \frac{47}{4}\,\Omega$$

$$R_{BC} = 3+3+\frac{6\times 10}{16} = \frac{39}{4}\,\Omega$$

$$R_{AD} = 5+5+\frac{6\times 10}{16} = \frac{55}{4}\,\Omega$$

Hence $R_{AB} = R_{CD}$; $R_{AC} = R_{BC}$

7. Answer (2, 3)



The image formed by lens L_2 should be focused on second focus of lens L_3.

So for second lens L_2

$u = -\infty$

$v = y + 10$

$\because \quad \frac{1}{f}=\frac{1}{v}-\frac{1}{u}$

$\Rightarrow \quad \frac{1}{40}=\frac{1}{(y+10)}-\frac{1}{-\infty}$

$\Rightarrow \quad y + 10 = 40$

$\Rightarrow \quad y = 30$ cm

So, for any value of x and y = 30 cm, final rays comes out parallel to the principal axis.

8. Answer (1)
9. Answer A(P, Q, S); B(Q); C(R); D(P)
10. Answer (2)

    It is a redox reaction in which hydrogen sulphide is oxidised.

11. Answer (3)

    $3MnO_2(s) + 4Al(s) \rightarrow 3Mn(l) + 2Al_2O_3(s)$

12. Answer (4)

$$\underset{M}{Zn} \xrightarrow{+\text{dil. HCl}} \underset{A}{ZnCl_2(aq)} + \underset{G}{H_2(g)}$$

$$\underset{M}{Zn} \xrightarrow{+\text{dil. } H_2SO_4} \underset{B}{ZnSO_4(aq)} + \underset{G}{H_2(g)}$$

$$\underset{M}{Zn} \xrightarrow{+NaOH(aq)} \underset{C}{Na_2ZnO_2(aq)} + \underset{G}{H_2(g)}$$

13. Answer (1)

    Gypsum is calcium sulphate dihydrate ($CaSO_4 \cdot 2H_2O$)

14. Answer (2)

    $3BaCl_2(aq) + Al_2(SO_4)_3(aq) \rightarrow 2AlCl_3(aq) + BaSO_4(s)$ (White ppt)

15. Answer (2, 4)

    Milk of magnesia and sodium hydroxide are bases. So their aqueous solution becomes pink on addition of few drops of phenolphthalein.

16. Answer (1, 4)

    Magnesium does not react with cold water. It reacts with hot water to evolve H_2 gas. Silver neither reacts with oxygen nor with water.

17. Answer (3)

    Alkali metals like sodium and potassium have low densities and low melting points.

18. Answer A(R); B(R); C(Q, S); D(P)

	Column I		Column II
(A)	Sodium chloride	(R)	Neutral salt
(B)	Potassium nitrate	(R)	Neutral salt
(C)	Sodium acetate	(Q)	Basic salt
		(S)	pH value more than 7
(D)	Aluminium chloride	(P)	Acidic salt

19. Answer (2)

    Mid-point of C and D is same as mid-point of line segment AB, because it is given that $AC = CD = DB$.

$\therefore$ Mid-point of CD = $\left(\frac{-5+9}{2}, \frac{4-2}{2}\right)$

$= (2, 1)$

20. Answer (1)

    For rational roots of any quadratic equation, D must be a perfect square

$\therefore \quad D = a^2 - b \qquad \left[\because\ x^2+ax+\frac{b}{4}=0\right]$

So, possible pairs of (a, b) for which D is a perfect square are (1, 1), (2, 4), (3, 5), (2, 3). So, number of possible pairs are 4.

21. Answer (4)

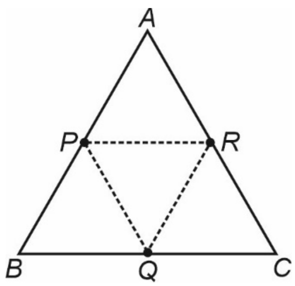
    Statement I : (7 × 3 × 5 × 4 × 2 + 14) = 14 (3 × 5 × 4 + 1), since it has more than two factors. So, it is a composite number.

    Statement II : Only 2 is an even prime number, rest of all other prime numbers are odd. And the sum of any two odd numbers is always an even number.

    Statement III : We know $5^1 = 5$, $5^2 = 25$, $5^3 = 125$ … and so on.

$\therefore$ $(25)^n$ for any positive integer 'n' always ends with 5.

22. Answer (2)



Given P, Q and R are respectively the mid-points of AB, BC and AC.

$\therefore\ PR = \dfrac{BC}{2} \Rightarrow BC = 2PR$ [Mid-point theorem]

Similarly, $AC = 2PQ$ and $AB = 2QR$

Here,

$|PQ| = \sqrt{(-4-1)^2 + (2-1)^2} = \sqrt{25+1} = \sqrt{26}$ units

$|QR| = \sqrt{(1+2)^2 + (1-6)^2} = \sqrt{9+25} = \sqrt{34}$ units

$|PR| = \sqrt{(-4+2)^2 + (2-6)^2} = \sqrt{4+16} = \sqrt{20}$ units

$\therefore$ Perimeter of $\Delta ABC = 2(PQ + QR + PR)$

$= 2\left[\sqrt{26} + \sqrt{34} + 2\sqrt{5}\right]$

$= 2\left[\sqrt{26} + \sqrt{34} + 2\sqrt{5}\right]$ units

23. Answer (3)

Since, $kx + (k+3)y = 7$ and $(k+4)x + (7k+1)y = 10$ are parallel lines.

$\therefore\ \dfrac{k}{k+4} = \dfrac{k+3}{7k+1} \neq \dfrac{7}{10}$

$\Rightarrow\ 7k^2 + k = k^2 + 7k + 12$

$\Rightarrow\ 6k^2 - 6k - 12 = 0$

$\Rightarrow\ k^2 - k - 2 = 0$

$\Rightarrow\ k^2 - 2k + k - 2 = 0$

$\Rightarrow\ k(k-2) + 1(k-2) = 0$

$\Rightarrow\ k = -1, 2$

24. Answer (1)

Given, $S_n = 5n^2 + 2n$

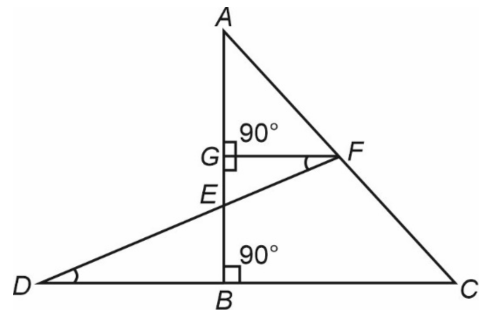
$\therefore\ a_5 = S_5 - S_4$

$= 5(5)^2 + 2 \times 5 - 5(4)^2 - 2 \times 4$

$= 125 + 10 - 80 - 8$

$= 47$

25. Answer (2, 3)



$\therefore\ \Delta GFE \sim \Delta BDE$ [By A–A similarity]

Since, $GF \| BC$

$\therefore\ \dfrac{AG}{GB} = \dfrac{AF}{FC}$ [Basic proportionality theorem]

$\therefore\ AG \times FC = BG \times AF$

Also, $\Delta AGF \sim \Delta ABC$ [$\because\ GF \| BC$]

$\therefore\ \dfrac{AG}{AB} = \dfrac{GF}{BC}$

26. Answer (1, 2, 3)

$p(x) = x^4 - 8x^3 + 14x^2 + 8x - 15$

$\therefore\ p(1) = (1)^4 - 8(1)^3 + 14(1)^2 + 8 \times 1 - 15$

$= 0$

$\therefore\ (x-1)$ is the factor of $p(x)$

and $p(-1) = (-1)^4 - 8(-1)^3 + 14(-1)^2 + 8 \times (-1) - 15$

$= 1 + 8 + 14 - 8 - 15$

$= 0$

$\therefore\ (x+1)$ is also the factor of $p(x)$

$\therefore\ (x-1)(x+1) = (x^2 - 1)$ is one of the factor of $p(x)$

$$
\begin{array}{r l}
 & x^2 - 8x + 15 \\
x^2 - 1 \,\big) & x^4 - 8x^3 + 14x^2 + 8x - 15 \,\big(\\
 & -x^4 \qquad\quad \mp x^2 \\
\hline
 & -8x^3 + 15x^2 + 8x - 15 \\
 & \mp 8x^3 \qquad\quad \pm 8x \\
\hline
 & 15x^2 - 15 \\
 & 15x^2 - 15 \\
\hline
 & \times \quad \times \\
\hline
\end{array}
$$

$\therefore\ (x^2 - 8x + 15) = (x-3)(x-5)$

$\therefore\ -1, 1, 3$ and 5 are the zeroes of $p(x)$

$\therefore\ a = -1, b = 1, c = 3$ and $d = 5$

27. Answer (1)

$$5-\frac{1}{n}+5-\frac{2}{n}+5-\frac{3}{n}+\ldots+\text{ up to } n\text{-terms}$$

$$=5\times n-\frac{1}{n}[1+2+3+4+\ldots+n]$$

$$=5n-\frac{1}{n}\times\frac{n(n+1)}{2}\quad\left[\because \sum_{n=1}^{n} n=\frac{n(n+1)}{2}\right]$$

$$=5n-\frac{(n+1)}{2}$$

$$=\frac{(9n-1)}{2}$$

28. Answer A(Q, S); B(Q, S); C(P, R); D(P, R)

(A) $\frac{1}{\sin\theta}-\frac{\sin\theta}{\tan^2\theta+\sin\theta\tan^2\theta}=\frac{1}{\sin\theta}-\frac{\sin\theta}{\tan^2\theta(1+\sin\theta)}$

$$=\frac{1}{\sin\theta}-\frac{\sin\theta(1-\sin\theta)}{\tan^2\theta\cos^2\theta}=\frac{1}{\sin\theta}-\frac{\sin\theta(1-\sin\theta)}{\sin^2\theta}$$

$$=\frac{1}{\sin\theta}-\frac{(1-\sin\theta)}{\sin\theta}=\frac{1-1+\sin\theta}{\sin\theta}=1$$

(B) $(1+\cot^2\theta)(1-\cos\theta)(1+\cos\theta)=\operatorname{cosec}^2\theta\times\sin^2\theta$

$$=\frac{1}{\sin^2\theta}\times\sin^2\theta=1$$

(C) $\frac{\sin^2\theta}{1+\cos\theta}+\cos\theta+1=\frac{1-\cos^2\theta}{1+\cos\theta}+\cos\theta+1$

$$=1-\cos\theta+\cos\theta+1=2$$

(D) $\sin45^\circ\cos45^\circ+\cos30^\circ\cot30^\circ=\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}+\frac{\sqrt{3}}{2}\times\sqrt{3}$

$$=\frac{1}{2}+\frac{3}{2}$$

$$=2$$

29. Answer (2)

$2^2|3^2$, $3^2|5^2$, $5^2|7^2$, $7^2|11^2$, $11^2|13^2$ and so on.

30. Answer (3)

Total 11 triangles.

31. Answer (4)

Total cost = ₹ 10,00,000

Painting = 36° = 10% of 360°

$\Rightarrow$ Cost of painting = 10% of total cost

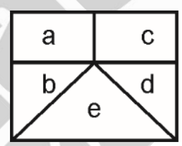
$\Rightarrow$ Cost of painting = ₹ 1,00,000

32. Answer (1)

TOM $\rightarrow$ (20 × 2 + 1) (15 × 2 + 1) (13 × 2 + 1)

TOM $\rightarrow$ 413127

33. Answer (3)



$\Rightarrow$ e = (a – b) × (c – d)

34. Answer (1)

49 is not a prime number.

35. Answer (2, 4)

abc : (a × b) + (b × c)

or

abc : b × (a + c)

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