

HINDI

निर्देश-(i) आठवें प्रश्न का उत्तर उसके साथ दिए हुए खाली स्थान पर ही लिखें.

(ii) शेष सभी प्रश्नों के साथ उनके चार-चार उत्तर दिए हैं. इनमें से केवल एक सही है. सही उत्तर पर घेरा (O) लगाएं.

1. निम्नलिखित वाक्यों में से शुद्ध वाक्य चुनिए—

- (A) आप हमारे घर कब आओगे ?
(B) आप हमारे घर कब आ रहे हो ?
(C) आप हमारे घर कब आएंगे ?
(D) आप हमारे घर से कब आइएगा ?

उत्तर—(C)

2. जीवन और मनुष्य के हाथ में नहीं है.

उपर्युक्त वाक्य के रिक्त स्थान के लिए सबसे उपयुक्त शब्द होगा—

- (A) मरण (B) निधन
(C) देहांत (D) अचेतन

उत्तर—(A)

3. 'पृथ्वी' का पर्यायवाची शब्द नहीं है—

- (A) अचल (B) अचला
(C) धरणी (D) धरती

उत्तर—(A)

4. उठिए, यहाँ से अब चले जाना चाहिए.

उपर्युक्त वाक्य में काले पद की व्याकरणिक कोटि (पद भेद) है—

- (A) संज्ञा (B) सर्वनाम
(C) क्रिया (D) क्रिया-विशेषण

उत्तर—(C)

5. 'चतुर' से बनी भाववाचक संज्ञा नहीं है—

- (A) चतुरी (B) चतुराई
(C) चातुर्य (D) चतुरता

उत्तर—(A)

6. तुम मेरी कही बात कभी मत भूलना, सोलह आने सच्ची है.

काले अंश के लिए उपयुक्त मुहावरा होगा—

- (A) कान खोलकर सुनना
(B) गॉंठ बाँध लेना
(C) तोता रटत करना
(D) दिल पर लेना

उत्तर—(B)

7. "सोचते क्या हो ? मेहनत नहीं की, इसलिए सफल नहीं हुए !"

उपर्युक्त कथन के समर्थन में किस लोकोक्ति का प्रयोग उपयुक्त होगा ?

- (A) एक-एक ग्यारह होते हैं
(B) न नौ मन तेल होगा न राधा नाचेगी
(C) अब पछताए होत क्या चिड़िया चुग गई खेत
(D) खरी मजूरी चोखा काम

उत्तर—(C)

8. किसी एक विषय पर एक अनुच्छेद लिखिए—

- (क) मित्र/सखी की प्रतीक्षा करते हुए
(ख) किसान का संकट
(ग) जब मुझे झूठ बोलना पड़ा

.....
.....

उत्तर—उपकार प्रकाशन द्वारा प्रकाशित पुस्तक 'हिन्दी निबन्ध' पढ़ें.

निर्देश—निम्नलिखित अनुच्छेद को पढ़कर अन्त में पूछे गए प्रश्नों के वैकल्पिक उत्तरों में से उचित का चुनाव करके उन पर घेरा (O) लगाइए—

एक बार गांधीजी के आश्रम में कुछ दर्शनार्थी पहुँचे. उन्होंने एक आश्रमवासी से पानी माँगा. वह आश्रमवासी नया-नया आया था. उसे आश्रम के नियमों की जानकारी नहीं थी. उसने कुएँ से पानी निकालकर दर्शनार्थियों को पिला दिया. अन्य आश्रमवासियों को यह बात पता चली तो उन्होंने

नए आश्रमवासी को बताया कि उसका दर्शनार्थियों को पानी पिलाना आश्रम के नियमों के विरुद्ध था. नए आश्रमवासी ने जब नियम के बारे में गांधीजी से पूछा तो उन्होंने कहा कि बीमार और कमजोर व्यक्तियों की मदद करना हमारा कर्तव्य है पर पूरी तरह स्वस्थ और समर्थ व्यक्ति की सहायता करना अनुचित है. ऐसा करने से आप श्रम के महत्व को कम कर रहे हैं. स्वस्थ और समर्थ व्यक्ति को मुफ्त में भोजन-पानी देना उसे आलसी और भिखारी बनाना है. हमें लोगों को आत्मनिर्भर बनाना है, न कि परावलम्बी. यदि आपको भोजन-पानी चाहिए तो उसके लिए शारीरिक श्रम करना होगा. कुएँ पर रस्सी और बाल्टी रखी है, जिसे प्यास लगी है, वह पानी खींचकर अपनी प्यास बुझा ले.

9. आश्रमवासी द्वारा दर्शनार्थियों को पानी पिलाना नियम विरुद्ध क्यों था ?

- (A) नया होने के कारण
- (B) नियमों की जानकारी न होने के कारण
- (C) स्वस्थ-समर्थ की सेवा करने के कारण
- (D) गांधीजी के नियम तोड़ने के कारण

उत्तर-(C)

10. गांधीजी के आश्रम का नियम क्या था ?

- (A) अतिथियों की खूब सेवा की जाए
- (B) स्वस्थ और समर्थ व्यक्ति को अपना काम स्वयं करने दिया जाए
- (C) स्वस्थ और समर्थ लोग बीमार और कमजोर लोगों की सहायता करें
- (D) मुफ्त में किसी की भी सहायता न की जाए

उत्तर-(B)

11. गांधीजी द्वारा श्रम को महत्व देने का उद्देश्य लोगों को

- (A) स्वस्थ बनाना था
- (B) आत्मनिर्भर बनाना था
- (C) देशभक्त बनाना था
- (D) सेवा का महत्व बताना था

उत्तर-(B)

12. गांधीजी के अनुसार हमारा कर्तव्य है-

- (A) रोगियों की मुफ्त चिकित्सा करना
- (B) आश्रम के अतिथियों की सेवा करना
- (C) देश सेवा में सबसे आगे रहना
- (D) रोगियों और दुर्बलों की सहायता करना

उत्तर-(D)

ENGLISH

13. Read the passage given below and answer the questions that follow—

One afternoon, after lunch (or tiffin, as we called it then), I was rummaging in a box of old books and family heirlooms that I had found in the box room. There was not much to interest me except a book on butterflies, and as I was going through it I found a small photograph in between the pages. It was a faded picture, a little yellow and foggy—a picture of a girl standing against a wall; and from the other side of the wall a pair of hands reached up, as though someone were about to climb over it. There were flowers growing near the girl, but I could not tell what they were; there was a small tree, too, but it was just a tree to me.

(A) What was the author doing after lunch ?

.....
.....

(B) Which object interested him ?

.....
.....

(C) What was interesting about it ?

.....
.....
.....

(D) Which word in the passage means 'searching for something' ?

.....
.....

Ans.—(A) The author was searching for books and property papers after lunch.

Ans.—(B) He was interested in the book on butterfly.

Ans.—(C) In the book on butterfly, there was a faded picture of a little girl standing against a wall. From the other side of the wall a pair of hands reaching up as someone were climbing over the wall. There were flowers and a small tree near the girl's picture.

Ans.—(D) Rummaging.

14. Write a paragraph in about 50 words on the topic, 'Importance of Travelling'. Use the hints given below—
- increase in our knowledge of different places—beautiful scenes
 - meet new people, learn about their customs, behaviour, language, food habits, etc.
 - some places of historical importance
18. Fill in the blank with the correct form of the verb in the following sentence :
The train (reach) Bangalore at 10 : 30 p. m.
19. Fill in the blank in the following sentence with an appropriate determiner :
..... dog barked loudly.

Ans.— Importance of Travelling

The knowledge acquired by reading book is theoretical. In day to day life we cannot be successful with more theoretical knowledge. Travelling takes us from the field of bookish knowledge to the field of practical knowledge. By travelling our mental horizon is broadened. We see beautiful scenes at different places. We meet people, learn their customs, behaviour, language and food habits. We make friends and enjoy with them. Some places we see buildings, forts, famous temples etc. Thus we enrich our knowledge by travelling.

15. Look at the words and phrases given below. Rearrange them to form a meaningful sentence :
- during our / went / last year / vacation / we / winter / to Goa.

Ans.—During our winter vacation last year we went to Goa.

16. Rewrite the following sentence as directed :
Our team won the match.
(Begin with 'The match')

Ans.—The match was won by our team.

17. Rewrite the following sentence after changing the underlined phrase into a clause :
The boy with a flag was standing at the stage.

MATHEMATICS

Directions—(Q. 20–54) For each question, four possible answer choices have been given, out of which only one is correct. You are to select the correct answer and encircle the letter by its side.

20. If $\sqrt{15625} = 125$, then $\sqrt{1.5625} + \sqrt{156.25} + \sqrt{15625}$ equals—

- (A) 15.625 (B) 13.875
(C) 138.75 (D) 125.125

Ans. (C)

Hint— $\because \sqrt{15625} = 125$

$$\begin{aligned} \sqrt{1.5625} + \sqrt{156.25} + \sqrt{15625} \\ &= 1.25 + 12.5 + 125 \\ &= 13.75 + 125 \\ &= 138.75 \end{aligned}$$

21. The simplification of $\sqrt{81} + \sqrt{0.81} + \sqrt{0.0081}$ is—

- (A) 99.9 (B) 9.99
(C) 90.9 (D) 9.09

Ans. (B)

Hint— $\sqrt{81} + \sqrt{0.81} + \sqrt{0.0081}$

$$\begin{aligned} &= 9 + 0.9 + 0.09 \\ &= 9.99 \end{aligned}$$

22. $\sqrt[3]{-108} \times \sqrt[3]{686}$ is equal to—

- (A) -42 (B) 42
(C) -63 (D) 84

Ans. (A)

Hint— $\sqrt[3]{-108} \times \sqrt[3]{686} = -3 \times 2^{2/3} \times 7 \times 2^{1/3}$
 $= -21 \times 2^{2/3} \times 2^{1/3}$
 $= -21 \times 2^{2/3+1/3}$
 $= -21 \times 2$
 $= -42$

23. The smallest number that should be multiplied to 3456 so that the product becomes a perfect cube is—

- (A) 2 (B) 4
 (C) 7 (D) 6

Ans. (B)

Hint—

2	3456	3456 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3
2	1728	× 3 × 3
2	864	= 2 ³ × 3 ³ × 2 ³ × 2
2	432	∴ Therefore 3456 should be multiplied by 2 × 2 = 4 to make its a perfect cube.
2	216	
2	108	
2	54	
3	27	
3	9	
	3	

24. The value of x such that

$$\left(\frac{5}{9}\right)^{-2} \times \left(\frac{18}{25}\right)^{-2} = x^{-2}$$

becomes true is—

- (A) $\frac{5}{2}$ (B) $\left(\frac{5}{2}\right)^{-2}$
 (C) $\left(\frac{-5}{2}\right)^4$ (D) $\frac{2}{5}$

Ans. (D)

Hint— $\left(\frac{5}{9}\right)^{-2} \times \left(\frac{18}{25}\right)^{-2} = x^{-2}$
 $\Rightarrow \left(\frac{5}{9} \times \frac{18}{25}\right)^{-2} = x^{-2}$
 $\Rightarrow \left(\frac{2}{5}\right)^{-2} = x^{-2}$
 $\therefore x = \frac{2}{5}$

25. The value of $\left[\left(\frac{4}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}\right]^{-2}$ is —

- (A) $-\frac{4}{13}$ (B) $\frac{16}{169}$
 (C) -9 (D) 9

Ans. (B)

Hint— $\left[\left(\frac{4}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}\right]^{-2}$
 $= \left[\frac{3}{4} - 4\right]^{-2}$
 $= \left(\frac{3-16}{4}\right)^{-2}$
 $= \left(-\frac{13}{4}\right)^{-2}$
 $= \left(-\frac{4}{13}\right)^{+2}$
 $= \frac{16}{169}$

26. If $a = 3, b = 2$ then the value of $4a^2 + 3ab - b^2$ is—

- (A) 14 (B) 36
 (C) 50 (D) 54

Ans. (C)

Hint— $a = 3, b = 2$
 The value of $4a^2 + 3ab - b^2$
 $\therefore = 4 \times (3)^2 + 3 \times 3 \times 2 - (2)^2$
 $= 4 \times 9 + 18 - 4$
 $= 36 + 18 - 4$
 $= 54 - 4$
 $= 50$

27. The product of $(2a + 3x)$ and $(2x + 3b)$ is—

- (A) $6x^2 + 9ax + 4bx + 6ab$
 (B) $6x^2 + 9ax - 4bx - 6ab$
 (C) $6x^2 + (4a + 9b)x + 6ab$
 (D) $6x^2 + (4a - 9b)x + 6ab$

Ans. (C)

Hint— $(2a + 3x)(2x + 3b)$
 $= 4ax + 6ab + 6x^2 + 9bx$
 $= 6x^2 + 4ax + 9bx + 6ab$
 $= 6x^2 + x(4a + 9b) + 6ab$

28. If $a + b = 4$ and $ab = 5$, then $a^3 + b^3$ equals—

- (A) 124 (B) 84
 (C) 44 (D) 4

Ans. (D)

Hint—Given $a + b = 4$ and $ab = 5$
We know that—

$$a^3 + b^3 = (a + b)^3 - 3ab(a + b)$$

$$\Rightarrow a^3 + b^3 = 4^3 - 3 \times 5 \times 4$$

$$= 64 - 60$$

$$= 4$$

29. If $a + b + c = 9$ and $ab + bc + ca = 23$, then the value of $a^2 + b^2 + c^2$ equals—
 (A) 35 (B) 81
 (C) 127 (D) 217

Hint—We know that $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

$$\Rightarrow 9^2 = a^2 + b^2 + c^2 + 2 \times 23$$

$$\Rightarrow 81 = a^2 + b^2 + c^2 + 46$$

$$\Rightarrow 81 - 46 = a^2 + b^2 + c^2$$

$$\Rightarrow a^2 + b^2 + c^2 = 35$$

30. The factorization of $x^2 + 2x - 35$ is—
 (A) $(x - 7)(x - 5)$ (B) $(x + 7)(x + 5)$
 (C) $(x - 7)(x + 5)$ (D) $(x + 7)(x - 5)$

Hint— $x^2 + 2x - 35 = x^2 + 7x - 5x - 35$

$$= x(x + 7) - 5(x + 7)$$

$$= (x + 7)(x - 5)$$

31. If $(5x^2 - 20x) - 8y + 2xy = (x + A)(Bx + Cy)$, then the value of $A + B + C$ is—
 (A) 2 (B) 3
 (C) 4 (D) 6

Hint— $(5x^2 - 20x) - 8y + 2xy = (x + A)(Bx + Cy)$

$$\Rightarrow 5x^2 - 20x - 8y + 2xy = Bx^2 + Cxy + ABx + ACy$$

 Comparing the coefficients of x^2, x, y and xy .
 $B = 5, AB = -20, C = 2$
 $\therefore A = -\frac{20}{5} = -4$
 $C = 2$
 $\therefore A + B + C = -4 + 5 + 2 = 3$

32. The value of a such that $(x - 3)$ is a factor of polynomial $3x^2 - 11x + a$ is—
 (A) 3 (B) -3
 (C) 6 (D) 9
Ans. (C)

Hint— $x - 3$ is a factor of $3x^2 - 11x + a$.
Therefore, if we put $x = 3$, the value of the expression

$$3x^2 - 11x + a = 0$$

$$\Rightarrow 3(3)^2 - 11(3) + a = 0$$

$$\Rightarrow 27 - 33 + a = 0$$

$$\Rightarrow -6 + a = 0$$

$$\Rightarrow a = 6$$

33. On dividing 200 into two parts such that $\frac{1}{3}$ of the first part and $\frac{1}{2}$ of the second part are equal. The larger of the two parts is—
 (A) 120 (B) 80
 (C) 40 (D) 150

Ans. (A)
Hint—Let x and $(200 - x)$ be two parts of 200

$$\Rightarrow \frac{1}{3}x = \frac{1}{2}(200 - x)$$

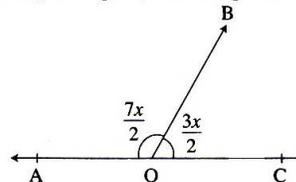
$$\Rightarrow 2x = 600 - 3x$$

$$\Rightarrow 5x = 600$$

$$\Rightarrow x = 120$$

 Therefore, the larger part is 120.

34. In the given figure, $\angle AOB$ equals—



- (A) 36° (B) 72°
 (C) 108° (D) 126°

Hint—In the given figure

$$\frac{3x}{2} + \frac{7x}{2} = 180^\circ$$

$$\Rightarrow \frac{10x}{2} = 180^\circ$$

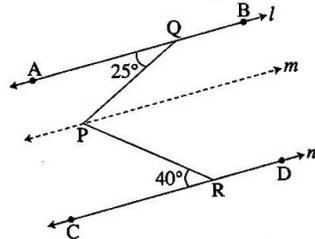
$$\Rightarrow 5x = 180^\circ$$

$$\Rightarrow x = 36^\circ$$

$$\angle AOB = \frac{7x}{2}$$

$$\therefore \angle AOB = \frac{7}{2} \times 36^\circ = 126^\circ$$

35. In the given figure, $l \parallel m \parallel n$, $\angle PQA = 25^\circ$ and $\angle PRC = 40^\circ$, then $\angle QPR$ equals—



- (A) 115° (B) 105°
(C) 95° (D) 65°

Ans. (D)

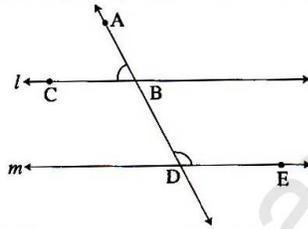
Hint—In the given figure $l \parallel m$

$\angle AQP = \angle QPM = 25^\circ$ (Alt. angles)
 $\Rightarrow \angle QPM = 25^\circ$

Also $\angle CRP = \angle RPM = 40^\circ$
 $\Rightarrow \angle RPM = 40^\circ$

$\angle QPR = \angle QPM + \angle RPM$
 $= 25^\circ + 40^\circ$
 $= 65^\circ$

36. In the given figure, if $\angle ABC = (2x + 17)^\circ$ and $\angle BDE = (3x + 8)^\circ$, then the value of $5x$ is—



- (A) 45 (B) 90
(C) 105 (D) 155

Ans. (D)

Hint—In the given figure

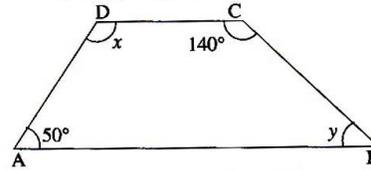
$\angle ABC = (2x + 17)^\circ$
 and $\angle BDE = (3x + 8)^\circ$

Given $l \parallel m$

$\angle ABC = \angle BDM$ (Alt. angles)
 $\therefore \angle BDM = 2x + 17^\circ$

Also $\angle BDM + \angle BDE = 180^\circ$
 $\Rightarrow 2x + 17^\circ + 3x + 8^\circ = 180^\circ$
 $\Rightarrow 5x + 25^\circ = 180^\circ$
 $\therefore 5x = 180^\circ - 25^\circ = 155^\circ$

37. In the given figure, ABCD is a trapezium in which $AB \parallel DC$. If $\angle DCB = 140^\circ$ and $\angle DAB = 50^\circ$, then $(x + y)$ equals.



- (A) 40° (B) 130°
(C) 150° (D) 170°

Ans. (D)

Hint—In the given trapezium $AB \parallel CD$

$\angle A + \angle D = 180^\circ$ (Interior angles)
 $50 + x = 180^\circ$
 $\Rightarrow x = 130^\circ$

$\angle B + \angle C = 180^\circ$ (Interior angles)
 $\Rightarrow y + 140^\circ = 180^\circ$
 $\Rightarrow y = 180^\circ - 140^\circ$
 $\Rightarrow y = 40^\circ$
 $\therefore x + y = 130^\circ + 40^\circ$
 $= 170^\circ$

38. If one of the diagonals of a rhombus is equal to one of its sides, then the angles (interior angles) of the rhombus are—

- (A) $50^\circ, 130^\circ, 50^\circ, 130^\circ$
(B) $90^\circ, 90^\circ, 90^\circ, 90^\circ$
(C) $60^\circ, 120^\circ, 60^\circ, 120^\circ$
(D) $60^\circ, 120^\circ, 140^\circ, 40^\circ$

Ans. (C)

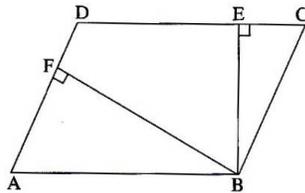
Hint—

ABCD is a Rhombus. Diagonal $BD = AB = BC = CD = AD$

\therefore In $\triangle ABD$ three sides are equal
 $\angle DAB = \angle ABD = 60^\circ$
 $\therefore \angle ABC = 60^\circ + 60^\circ = 120^\circ$

Therefore, interior angles of the Rhombus are $60^\circ, 120^\circ, 60^\circ$ and 120° .

39. In the given figure, ABCD is a parallelogram in which AB = 16 cm, BE = 8 cm and BF = 10 cm. The measure of BC will be—



- (A) 8 cm (B) 12 cm
(C) 12.8 cm (D) 14.5 cm

Ans. (C)

Hint— From the given fig.

$$\angle AFB = \angle BEC = 90^\circ$$

$$\angle FAB = \angle ECB$$

(opposite angles of a || gm)

$$\triangle AFB \sim \triangle CEB$$

$$\frac{AF}{CE} = \frac{AB}{CB} = \frac{BF}{BE}$$

$$\therefore \frac{AB}{BC} = \frac{10}{8}$$

Here $AB = 16 \text{ cm}$

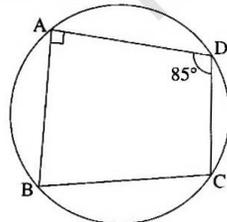
$$\therefore \frac{16}{BC} = \frac{10}{8}$$

$$\therefore 10 BC = 16 \times 8$$

$$\therefore 10 BC = 128$$

$$\therefore BC = 12.8 \text{ cm}$$

40. In the given figure, ABCD is a cyclic quadrilateral where $\angle BAD = 90^\circ$ and $\angle ADC = 85^\circ$, then the measure of $\angle ABC$ is—



- (A) 95° (B) 85°
(C) 105° (D) 90°

Ans. (A)

Hint— We know that opposite angles of a cyclic quadrilateral are supplementary.

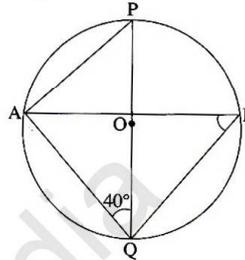
Let $\angle ABC = x$

$$x + 85^\circ = 180^\circ$$

$$\Rightarrow x = 180^\circ - 85^\circ$$

$$\therefore x = 95^\circ$$

41. In the given figure, POQ is a diameter of the circle with centre O. If $\angle AQP = 40^\circ$, then $\angle ABQ$ equals—



- (A) 140° (B) 100°
(C) 90° (D) 50°

Ans. (D)

Hint— In the given figure POQ is a diameter of the circle.

$$\angle PAQ = 90^\circ$$

(Angle in a semi-circle)

Given— $\angle AQP = 40^\circ$

In $\triangle APQ$

$$\angle PAQ + \angle AQP + \angle APQ = 180^\circ$$

$$90^\circ + 40^\circ + \angle APQ = 180^\circ$$

$$\angle APQ = 180^\circ - 130^\circ$$

$$\angle APQ = 50^\circ$$

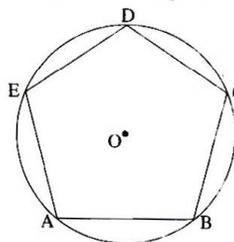
But

$$\angle APQ = \angle ABQ$$

(Angles in the same segment)

$$\therefore \angle ABQ = 50^\circ$$

42. ABCDE is a regular pentagon inscribed in a circle with centre O as shown in the figure. The measure of $\angle OAB$ equals—



- (A) 72° (B) 54°
 (C) 48° (D) 36°

Ans. (B)

Hint—Each angle of the regular pentagon

$$= \left(\frac{5-2}{5}\right) 180^\circ$$

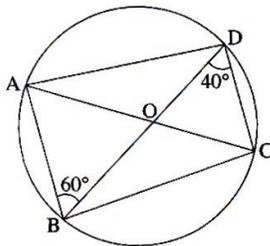
$$= 3 \times 36^\circ = 108^\circ$$

$$\therefore \angle OAB = \frac{1}{2} \angle EAB$$

$$= \frac{1}{2} \times 108^\circ$$

$$= 54^\circ$$

43. In the given figure, $\angle ABD = 60^\circ$ and $\angle BDC = 40^\circ$, then $\angle AOB$ equals—



- (A) 40° (B) 60°
 (C) 80° (D) 90°

Ans. (C)

Hint—In the given figure

$$\angle ABD = 60^\circ$$

and

$$\angle BDC = 40^\circ$$

$$\angle BAC = \angle BDC = 40^\circ$$

(Angles in the same segment)

$$\therefore \angle BAC = 40^\circ$$

or

$$\angle BAO = 40^\circ$$

In $\triangle AOB$

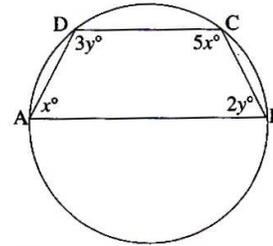
$$\angle AOB + \angle ABO + \angle BAO = 180^\circ$$

$$\angle AOB + 60^\circ + 40^\circ = 180^\circ$$

$$\therefore \angle AOB = 180^\circ - 100^\circ$$

$$= 80^\circ$$

44. In the given figure, ABCD is a cyclic quadrilateral in which $\angle A = x^\circ$, $\angle B = 2y^\circ$, $\angle C = 5x^\circ$ and $\angle D = 3y^\circ$. The measure of $\angle A + \angle B$ is—



- (A) 66° (B) 102°
 (C) 116° (D) 146°

Ans. (B)

Hint—We know that opposite angles of a cyclic quadrilateral are supplementary.

$$\therefore \angle A + \angle C = 180^\circ \text{ and } \angle B + \angle D = 180^\circ$$

$$\therefore x^\circ + 5x^\circ = 180^\circ \quad 2y^\circ + 3y^\circ = 180^\circ$$

$$\therefore 6x^\circ = 180^\circ \quad 5y^\circ = 180^\circ$$

$$\therefore x = 30^\circ \quad \therefore y = 36^\circ$$

$$\therefore \angle A = 30^\circ \quad \angle B = 2 \times y$$

$$= 2 \times 36^\circ$$

$$= 72^\circ$$

$$\angle A + \angle B = x + 2y$$

$$= 30^\circ + 72^\circ$$

$$= 102^\circ$$

45. The sides of a triangle are 16 cm, 30 cm and 34 cm. Its area (in cm^2) is—

- (A) 120 (B) 240
 (C) 480 (D) 272

Ans. (B)

Hint—In the given triangle

$$a = 16, b = 30, c = 34$$

$$\therefore s = \frac{a + b + c}{2}$$

$$= \frac{16 + 30 + 34}{2}$$

$$= \frac{80}{2} = 40 \text{ cm}$$

$$s - a = 40 - 16 = 24; s - b = 40 - 30 = 10, s - c = 40 - 34 = 6$$

Area of a triangle

$$= \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{40 \times 24 \times 10 \times 6}$$

$$= \sqrt{10 \times 4 \times 24 \times 10 \times 6}$$

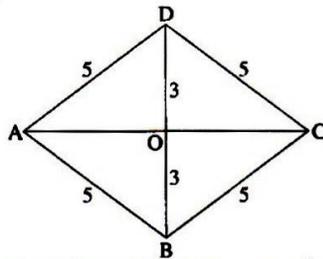
$$= \sqrt{10 \times 10 \times 6 \times 4 \times 6 \times 4}$$

$$= 10 \times 6 \times 4$$

$$= 240 \text{ cm}^2$$

46. The length of a side of a rhombus is 5 cm. If one of the diagonals is 6 cm, its area is—
 (A) 12 cm² (B) 24 cm²
 (C) 30 cm² (D) 15 cm²
Ans. (B)

Hint—



In the above figure AC and BD are two diagonals of the Rhombus ABCD.

Given AD = 5 cm
 We know that diagonals of a Rhombus bisect each other at right angles.

$$\begin{aligned} \therefore AO^2 + OD^2 &= AD^2 \\ \text{or } AO^2 &= AD^2 - OD^2 \\ \Rightarrow AO^2 &= 5^2 - 3^2 \\ \Rightarrow AO^2 &= 16 \\ \Rightarrow AO &= 4 \\ AC &= 2 \times AO \\ AC &= 2 \times 4 = 8 \text{ cm} \end{aligned}$$

We know that the area of a rhombus

$$\begin{aligned} &= \frac{1}{2} d_1 \times d_2 \\ &= \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2 \end{aligned}$$

47. The area of a trapezium is 600 cm². If the length of one of its parallel sides is 30 cm and altitude is 10 cm, then the length of the other parallel side is—
 (A) 15 cm (B) 25 cm
 (C) 40 cm (D) 90 cm
Ans. (D)

Hint—Let the length of the other parallel side be x cm.

We know that $\frac{1}{2}$ (sum of the parallel sides) \times height = area of a trapezium

$$\begin{aligned} \frac{1}{2} (30 + x) \times 10 &= 600 \\ \Rightarrow \frac{1}{2} (30 + x) &= 60 \\ \Rightarrow 30 + x &= 120 \\ \therefore x &= 120 - 30 \\ \Rightarrow x &= 90 \text{ cm} \end{aligned}$$

48. If the area of an equilateral triangle is $64\sqrt{3}$ cm², then the side of the triangle is—
 (A) $18\sqrt{3}$ cm (B) 9 cm
 (C) 16 cm (D) $3\sqrt{2}$ cm
Ans. (C)

Hint—We know that area of an equilateral triangle = $\frac{\sqrt{3}}{4} a^2$ where a is the length of the side

$$\begin{aligned} \therefore \frac{\sqrt{3}}{4} a^2 &= 64\sqrt{3} \\ \therefore a^2 &= 64 \times 4 \\ \therefore a &= 8 \times 2 \\ \therefore a &= 16 \text{ cm} \end{aligned}$$

49. The area of a triangle is 60 cm². If its base is $20\sqrt{2}$ cm long, then the altitude of the triangle (in cm) is—
 (A) $3\sqrt{2}$ (B) 6
 (C) $6\sqrt{2}$ (D) 3
Ans. (A)

Hint—Area of a triangle = $\frac{1}{2} \times \text{Base} \times \text{altitude}$

$$\begin{aligned} 60 &= \frac{1}{2} \times 20\sqrt{2} \times h \\ h &= \frac{60 \times 2}{20\sqrt{2}} \\ h &= 3\sqrt{2} \end{aligned}$$

50. 3 cubes, each of side 5 cm, are arranged next to each other. The surface area of the resulting cuboid is—
 (A) 27 cm² (B) 375 cm²
 (C) 350 cm² (D) 125 cm²
Ans. (C)

Hint—If three cubes are arranged next to each other, the cube will become a cuboid. Here length of one side of the cube is 5 cm.

Length of the cuboid = (5 + 5 + 5) cm = 15 cm
 Breadth of the cuboid = 5 cm
 Height of the cuboid = 5 cm

Surface area of the resulting cuboid.

$$\begin{aligned} C &= 2(l \times b + b \times h + l \times h) \\ &= 2(15 \times 5 + 5 \times 5 + 15 \times 5) \\ &= 2(75 + 25 + 75) \\ &= 2 \times 175 \\ &= 350 \text{ cm}^2 \end{aligned}$$

51. What is the surface area of a solid cylinder whose radius of the base is 14 cm and height is 1 cm more than the base radius ?

(A) 2552 sq. cm (B) 2252 sq. cm
(C) 2522 sq. cm (D) 2512 sq. cm

Ans. (A)

Hint—Radius of the base (r) of the cylinder
 $= 14$ cm
 Height (h) $= 14 + 1 = 15$ cm
 Surface area of the solid cylinder
 $= 2\pi r(r + h)$
 $= \frac{2 \times 22}{7} \times 14(14 + 15)$
 $= 22 \times 4 \times 29$
 $= 88 \times 29$
 $= 2552 \text{ cm}^2$

53. The ratio of the volumes of a cube of side 2π cm and a cylinder of radius 2π cm and height 6 cm is—

(A) 1 : 3 (B) 3 : 1
(C) 2 : 3 (D) 3 : 2

Ans. (A)

Hint—Volume of the cube of side 2π cm.
 $= 2\pi \times 2\pi \times 2\pi \text{ cm}^3$
 $= 8\pi^3 \text{ cm}^3$
 Volume of a cylinder whose radius is 2π cm. and height is 6 cm.
 $= \pi \times (2\pi)^2 \times 6$
 $= 24\pi^3$
 $\therefore \frac{\text{Volume of the cube}}{\text{Volume of the cylinder}} = \frac{8\pi^3}{24\pi^3}$
 $= \frac{1}{3}$

52. What is the volume of the largest right circular cone that can be carved out of a cube whose edge is 3 cm ? (Use $\pi = 3.14$)—

(A) 7.70 cc (B) 7.07 cc
(C) 7.007 cc (D) 77 cc

Ans. (B)

Hint—

Edge of the cube $= 3$ cm
 Height of the cone that can be carved out of this cube
 $= 3$ cm
 radius of the cone $= 1.5$ cm
 Maximum volume of the cone
 $= \frac{1}{3} \pi r^2 h$
 $= \frac{1}{3} \times 3.14 \times 1.5 \times 1.5 \times 3$
 $= 3.14 \times 2.25$
 $= 7.07 \text{ cm}^3$ (Approximate)

54. The ratio of the volumes of a cylinder, a cone and a hemisphere of same radii and same height is—

(A) 1 : 3 : 4 (B) 3 : 2 : 1
(C) 1 : 2 : 3 (D) 3 : 1 : 2

Ans. (D)

Hint—Volume of a cylinder : Volume of a cone : Volume of hemisphere.
 $= \pi r^2 h : \frac{1}{3} \pi r^2 h : \frac{2}{3} \pi r^3$
 $= \pi r^2 \times r : \frac{1}{3} \pi r^2 \times r : \frac{2}{3} \pi r^3$
 $= 1 : \frac{1}{3} : \frac{2}{3}$
 $= 3 : 1 : 2$

GENERAL SCIENCE

Directions—(Q. 55–89) For each question, four possible answer choices have been given, out of which only one is correct. You are to select the correct answer and encircle the number by its side.

55. Select from the following a group of elements only —

- (A) Air, water, hydrogen, gold
- (B) Silver, oxygen, iodine, nitrogen
- (C) Copper, brass, calcium, methane
- (D) Aluminium, bronze, steam, bauxite

Ans. (B)

56. Which of the following is a pure substance made up of a combination of two or more elements in a definite proportion ?
 (A) Coal (B) Milk
 (C) Air (D) Water
Ans. (D)
57. Two substances A and B react to form a product A_2B_3 according to the following reaction :

$$2A + 3B \rightarrow A_2B_3$$

 Select the correct statement about the product A_2B_3 .
 (A) The product will always have a fixed composition
 (B) The product cannot be a compound
 (C) The product must show the properties of A and B
 (D) The product is a homogeneous mixture of A and B
Ans. (A)
58. Select the correct statements about graphite—
 I. It is an allotropic form of carbon.
 II. It is used as a cutting tool.
 III. It is used as a lubricant.
 IV. It is a good conductor of electricity.
 (A) I, II and III (B) I, III and IV
 (C) II and III only (D) I and IV only
Ans. (D)
59. Consider the following pairs—
 1. Diamond and graphite
 2. Coal and graphite
 3. Fullerene and diamond
 4. Fullerenes and coal
 The pairs of allotropes of carbon are—
 (A) 1 and 2 (B) 1 and 3
 (C) 2 and 4 (D) 2 and 3
Ans. (B)
60. Which of the following is a group of products obtained from coal ?
 (A) Paraffin wax, lubricating oil, coke
 (B) Bitumen, paraffin wax, coal tar
 (C) Coke, coal tar, coal gas
 (D) Naphthalene, lubricating oil, bitumen
Ans. (C)
61. Which of the following substances is formed by the carbonization of dead vegetation ?
 (A) Coke (B) Coal gas
 (C) Coal tar (D) Coal
Ans. (D)
62. The most common form in which aluminium occurs in nature is—
 (A) Carbonate (B) Halide
 (C) Oxide (D) Sulphide
Ans. (C)
63. Which of the following is a group of metals that occur in nature in the form of carbonates ?
 (A) Calcium and zinc
 (B) Calcium and sodium
 (C) Aluminium and magnesium
 (D) Sodium and copper
Ans. (B)
64. Which of the following groups of metals is found native in nature ?
 (A) Silver and magnesium
 (B) Copper and iron
 (C) Gold and aluminium
 (D) Mercury and silver
Ans. (B)
65. Which one of the following is the most important ore of iron ?
 (A) Bauxite (B) Cinnabar
 (C) Galena (D) Haematite
Ans. (D)
66. An alloy is—
 (A) a compound
 (B) an element
 (C) a heterogeneous mixture
 (D) a homogeneous mixture
Ans. (D)
67. Which one of the following is a source of rayon ?
 (A) Coal
 (B) Petroleum
 (C) Wood pulp
 (D) Sheep
Ans. (C)

68. Consider the following materials—

1. Alumina
2. Iron oxide
3. Calcium carbonate
4. Gypsum
5. Clay
6. Sand

Out of these, the basic ingredients for making cement are—

- (A) 1, 2 and 3 (B) 1, 2 and 4
(C) 1, 3 and 5 (D) 2, 4 and 6

Ans. (A)

69. Which one of the following is a thermosetting plastic ?

- (A) Melamine (B) Nylon
(C) Polythene (D) PVC

Ans. (A)

70. Consider the following materials—

1. Glass
2. Soaps
3. Detergents
4. Plastics
5. Wool
6. Jute

Out of these, a group of biodegradable substances is—

- (A) 1, 3 and 5 (B) 2, 5 and 6
(C) 2, 4 and 5 (D) 1, 2 and 6

Ans. (B)

71. Consider the following statements—

- I. A freely suspended magnet always rests in geographical north-south direction.
- II. Similar poles repel each other.
- III. We can separate two poles of a magnet by cutting it.
- IV. North pole of a magnet is always more powerful than its south pole.

Out of these, the correct statements are—

- (A) I and II only (B) II and III only
(C) III and IV only (D) I and IV only

Ans. (A)

72. A child has a 5 cm long bar magnet N-S. He rolls it in a mixture of sand and iron filings. He observes that the iron filings—

- (A) do not move at all towards the magnet
(B) get attracted only to the end N of the magnet
(C) get attracted only to the end S of the magnet
(D) get attracted equally to both ends of the magnet

Ans. (D)

73. Suppose you have a 9 cm long magnetized iron strip and you cut it into three parts of 2 cm, 3 cm and 4 cm length. On testing each part, you will observe that—

- (A) 2 cm long part behaves as north pole and 4 cm long part behaves as south pole
(B) only 3 cm long part behaves like a magnet
(C) all parts behave as a magnet
(D) 3 cm long part loses its magnetization and other two parts behave like a complete magnet

Ans. (C)

74. The dimensions of a room are 5 m × 4 m × 3 m. If the density of air at normal atmospheric pressure is 1.293 kg/m³, the mass of air present in the room is nearly—

- (A) 39 kg (B) 78 kg
(C) 156 kg (D) 230 kg

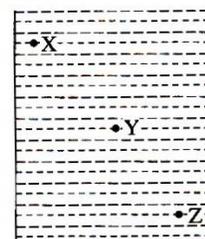
Ans. (B)

75. The unit of pressure is—

- (A) Joule (B) Newton
(C) Pascal (D) Watt

Ans. (C)

76. In the following figure, a container filled with a liquid is shown—



Select the correct statement about pressure of the liquid from the following—

- (A) Pressure at X = Pressure at Y = Pressure at Z

- (B) Pressure at X < Pressure at Y < Pressure at Z
 (C) Pressure at X < Pressure at Y > Pressure at Z
 (D) Pressure at X > Pressure at Y > Pressure at Z

Ans. (B)

77. The filaments of electric bulbs are made up of—

- (A) aluminium (B) copper
 (C) nichrome (D) tungsten

Ans. (D)

78. The frequency of alternating current (AC) used in our houses/schools/offices is—

- (A) 100 hertz (B) 60 hertz
 (C) 50 hertz (D) 40 hertz

Ans. (C)

79. The most important safety method used for protecting domestic circuits/appliances from short circuiting or overloading is the use of—

- (A) electric meter of ISI mark
 (B) voltage stabilizer
 (C) earth wire/earthing
 (D) fuse of proper rating

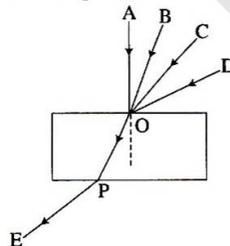
Ans. (D)

80. The part of human eye which controls the amount of light entering into the eye is called—

- (A) cornea (B) eye lens
 (C) iris (D) retina

Ans. (C)

81. In the following ray diagram, four light rays AO, BO, CO and DO are shown incident on a glass slab at the point O—

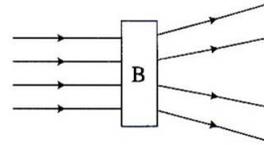


Which of these rays will travel along OPE ?

- (A) AO (B) BO
 (C) CO (D) DO

Ans. (C)

82. A parallel beam of light is incident on one face of a transparent box B in which an optical device is enclosed. The light emerges out of the other face of the box as shown below—



Which of the following could be inside the box ?

- (A) Convex lens (B) Concave lens
 (C) Glass slab (D) Glass prism

Ans. (B)

83. An object is placed at a distance of 2.5 m in front of a plane mirror. The distance between the object and the image formed by the mirror is—

- (A) 10 m (B) 7.5 m
 (C) 5 m (D) 4 m

Ans. (C)

84. The theory of evolution of species by natural selection was given by—

- (A) Mendel (B) Lamarck
 (C) Morgan (D) Darwin

Ans. (D)

85. In our country, large patches of forests are being cleared for the cultivation of crops. The environmental impact of such a practice may lead to—

- (A) soil erosion
 (B) soil pollution
 (C) soil conservation
 (D) soil fertility

Ans. (A)

86. The process of loosening and turning of soil is called—

- (A) ploughing (B) irrigation
 (C) harvesting (D) sowing

Ans. (A)

87. Consider the following statements about fertilizers—

- I. They are environment-friendly.
 II. They increase the yield.

- III. They are generally used in large quantity.
IV. Their excessive use disturbs the balance of nutrients in the soil.

The correct statements are—

- (A) I and II only (B) III and IV only
(C) I and III only (D) II and IV only

Ans. (D)

88. Which one of the following forms of energy leads to least environmental pollution in the process of harnessing and utilization ?
(A) Nuclear energy

- (B) Solar energy
(C) Geothermal energy
(D) Thermal energy

Ans. (B)

89. Which of the following is a pair of inexhaustible natural resources ?

- (A) Soil and coal
(B) Water and petroleum
(C) Wildlife and minerals
(D) Air and sunlight

Ans. (D)

