LONDON SCHOOL

10TH

MATHS

ONE WORDS

1. RELATIONS AND FUNCTIONS

1. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is

   (a) linear (b) cubic (c) reciprocal (d) quadratic

2. $A = \{a, b, p\}, B = \{2,3\}, C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is:

   (a) 8 (b) 20 (c) 12 (d) 16

3. The range of the relation $R = \{(x, x^2) | x$ is a prime number less than $13\}$ is

   (a) $\{2,3,5,7\}$ (b) $\{2,3,5,7,11\}$

   (c) $\{4,9,25,49,121\}$ (d) $\{1,4,9,25,49,121\}$

4. If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively

   (a) (8,6) (b) (8,8) (c) (6,8) (d) (6,6)

5. Let f and g be two functions given by $f = \{(0,1), (2,0), (3,-4), (4,2), (5,7)\}$, $g = \{(0,2), (1,0), (2,4), (-4,2), (7,0)\}$ then the range of $f \circ g$ is

   (a) $\{0,2,3,4,5\}$ (b) $\{-4,1,0,2,7\}$ (c) $\{1,2,3,4,5\}$ (d) $\{0,1,2\}$

6. If $g = \{(1,1), (2,3), (3,5), (4,7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are

   (a) $(-1,2)$ (b) $(2,-1)$ (c) $(-1,-2)$ (d) (1,2)

7. If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is:

   (a) 1 (b) 2 (c) 3 (d) 6

8. If $A = \{1,2\}, B = \{1,2,3,4\}, C = \{5,6\}$ and $D = \{5,6,7,8\}$ then state which of the following statement is true.

   (a) $(A \times C) \subset (B \times D)$ (b) $(B \times D) \subset (A \times C)$

   (c) $(A \times B) \subset (A \times D)$ (d) $(D \times A) \subset (B \times A)$

9. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of elements in B is

(a) 3 (b) 2 (c) 4 (d) 8

10. If the ordered pairs $(a + 2,4)$ and $(5,2a + b)$ are equal then (a, b) is

(a) $(2, -2)$ (b) $(5,1)$ (c) $(2,3)$ (d) $(3, -2)$

11. Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is

(a) m^n (b) n^m (c) $2^{mn} - 1$ (d) 2^{mn}

12. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then $f \circ g$ is :

(a) $\frac{3}{2x^2}$ (b) $\frac{2}{3x^2}$ (c) $\frac{2}{9x^2}$ (d) $\frac{1}{6x^2}$

13. Let $f(x) = \sqrt{1 + x^2}$ then:

(a) $f(xy) = f(x).f(y)$ (b) $f(xy) \geq f(x).f(y)$

(c) $f(xy) \leq f(x).f(y)$ (d) None of these

14. Let $A = \{1,2,3,4\}$ and $B = \{4,8,9,10\}$. A function $f: A \to B$ given by $f = \{(1,4), (2,8), (3,9), (4,10)\}$ is a

(a) Many-one function (b) Identity function

(c) One-to-one function (d) Into function

15. If $f: A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to:

(a) 7 (b) 49 (c) 1 (d) 14

2. NUMBERS AND SEQUENCES

1. If the sequence $t_1, t_2, t_3, \ldots$ are in A.P. then the sequence $t_6, t_{12}, t_{18}, \ldots$ is

(a) a Geometric Progression (b) an Arithmetic Progression

(c) neither an Arithmetic Progression nor a Geometric Progression

(d) a constant sequence

2. The least number that is divisible by all the numbers from 1 to 10 is:

(a) 2025 (b) 5220 (c) 5025 (d) 2520

3. $7^{4k} \equiv$ ____ $(mod\ 100)$:

(a) 1 (b) 2 (c) 3 (d) 4

4. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$, then F_5 is:

(a) 3 (b) 5 (c) 8 (d) 11

5. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are

(a) $0, 1, 8$ (b) $1, 4, 8$ (c) $0, 1, 3$ (d) $1, 3, 5$

6. The value of $(1^3 + 2^3 + 3^3 + \ldots\ldots + 15^3) - (1 + 2 + 3 + \ldots\ldots + 15)$ is:

(a) 14400 (b) 14200 (c) 14280 (d) 14520

7. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is (a) 4 (b) 2 (c) 1 (d) 3

8. The sum of the exponents of the prime factors in the prime factorization of 1729 is: (a) 1 (b) 2 (c) 3 (d) 4

9. If 6 times of 6^{th} term of an A.P. is equal to 7 times the 7^{th} term, then the 13^{th} term of the A.P. is

(a) 0 (b) 6 (c) 7 (d) 13

10. An A.P. consists of 31 terms. If its 16^{th} term is m, then the sum of all the terms of this A.P. is

(a) $16\,m$ (b) $62\,m$ (c) $31\,m$ (d) $\frac{31}{2}m$

11. Euclid's division lemma states that for positive integers $a$and b, there exist unique integers $q$and $r$such that $a = bq + r$, where r must satisfy.

(a) $1 < r < b$ (b) $0 < r < b$ (c) $0 \leq r < b$ (d) $0 < r \leq b$

12. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120?

(a) 6 (b) 7 (c) 8 (d) 9

13 The first term of an arithmetic progression is unity and the common difference is 4. which of the following will be a term of this A.P.

(a) 4551 (b) 10091 (c) 7881 (d) 13531

14. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots\ldots$is

(a) $\frac{1}{24}$ (b) $\frac{1}{27}$ (c) $\frac{2}{3}$ (d) $\frac{1}{81}$

15. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \ldots + 2^0$ which of the following is true?

(a) B is 2^{64} more than A (b) A and B are equal

(c) B is larger than $A$by 1 (d) A is larger than B by 1

3. ALGEBRA

1. If $(x-6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is:

(a) 3 (b) 5 (c) 6 (d) 8

2. For the given matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{pmatrix}$ the order of the matrix A^T is:

(a) 2×3 (b) 3×2 (c) 3×4 (d) 4×3

3. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are :

(a) 100,120 (b) 10,12 (c) -120 ,100 (d) 12,10

4. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is :

(a) $\frac{9y}{7}$ (b) $\frac{9y^3}{21y-21}$ (c) $\frac{21y^2-42y+21}{3y^3}$ (d) $\frac{7(y^2-2y+1)}{y^2}$

5. $y^2+\frac{1}{y^2}$ is not equal to:

$(a)\ \frac{y^4+1}{y^2}$ $(b)\ \left(y+\frac{1}{y}\right)^2$ $(c)\ \left(y-\frac{1}{y}\right)^2+2$ $(d)\ \left(y+\frac{1}{y}\right)^2-2$

6. A system of three linear equations in three variables is inconsistent if their planes (a) intersect only at a point (b) intersect in a line (c) coincides with each other (d) do not intersect

7. If $A=\begin{pmatrix}1 & 2 & 3\\ 3 & 2 & 1\end{pmatrix}, B=\begin{pmatrix}1 & 0\\ 2 & -1\\ 0 & 2\end{pmatrix}$. Which of the following statements are correct? $(i)\ AB+C=\begin{pmatrix}5 & 5\\ 5 & 5\end{pmatrix}$ $(ii)\ BC=\begin{pmatrix}0 & 1\\ 2 & -3\\ -4 & 10\end{pmatrix}$

$(iii)\ BA+C=\begin{pmatrix}2 & 5\\ 3 & 0\end{pmatrix}$ $(iv)\ (AB)C=\begin{pmatrix}-8 & 20\\ -8 & 13\end{pmatrix}$

(a) $(i)$and(ii) only (b) (ii) and (iii) only

(c) $(iii)$and(iv) only (d) all of these

8. $\frac{x}{x^2-25}-\frac{8}{x^2+6x+5}$ gives:

$(a)\ \frac{x^2-7x+40}{(x-5)(x+5)}$ $(b)\ \frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$ $(c)\ \frac{x^2-7x+40}{(x^2-25)(x+1)}$ $(d)\ \frac{x^2+10}{(x^2-25)(x+1)}$

9. Find the matrix X if $2X+\begin{pmatrix}1 & 3\\ 5 & 7\end{pmatrix}=\begin{pmatrix}5 & 7\\ 9 & 5\end{pmatrix}$

$(a)\ \begin{pmatrix}-2 & -2\\ 2 & -1\end{pmatrix}$ $(b)\ \begin{pmatrix}2 & 2\\ 2 & -1\end{pmatrix}$ $(c)\ \begin{pmatrix}1 & 2\\ 2 & 2\end{pmatrix}$ $(d)\ \begin{pmatrix}2 & 1\\ 2 & 2\end{pmatrix}$

10. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to :

$(a)\ \frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ $(b)\ 16\left|\frac{y^2}{x^2z^4}\right|$ $(c)\ \frac{16}{5}\left|\frac{y}{xz^2}\right|$ $(d)\ \frac{16}{5}\left|\frac{xz^2}{y}\right|$

11. Which of the following should be added to make x^4+64 a perfect square :

$(a)\ 4x^2$ $(b)\ 16x^2$ $(c)\ 8x^2$ $(d)\ -8x^2$

12. The solution of $(2x-1)^2 = 9$ is equal to:

$(a)\ -1$ $(b)\ 2$ $(c)\ -1, 2$ (d) None of these

13. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$ then q, p, r are in ___

$(a)\ A.P$ $(b)\ G.P$ (c) Both $A.P$ and $G.P$ (d) none of these

14. The solution of the system $x + y - 3x = 6, -7y + 7z = 7,\ 3z = 9$ is

$(a)\ x = 1, y = 2, z = 3$ $(b)\ x = -1, y = 2, z = 3$

$(c)\ x = -1, y = -2, z = 3$ $(d)\ x = 1, y = 2, z = -3$

15. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have: $(a)\ 3$ $(b)\ 4$ $(c)\ 2$ $(d)\ 5$

16. If number of columns and rows are not equal in a matrix then it is said to be a

(a) diagonal matrix (b) rectangular matrix

(c) square matrix (d) identity matrix

17. Transpose of a column matrix is:

(a) unit matrix (b) diagonal matrix (c) column matrix (d) row matrix

18. Which of the following can be calculated from the given matrices

$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}, B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$, $(i)\ A^2\ (ii)\ B^2\ (iii)\ AB\ (iv)\ BA$

$(a)\ (i)$and(ii) only $(b)\ (ii)$ and (iii) only

$(c)\ (ii)$and(iv) only (d) all of these

19. Graph of a linear polynomial is a :

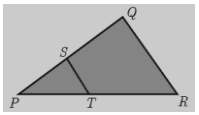
(a) straight line (b) circle (c) parabola (d) hyperbola

20. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is

$(a)\ 0$ $(b)\ 1$ $(c)\ 0\ or\ 1$ $(d)\ 2$

4. GEOMETRY

1. In a given figure $ST \parallel QR, PS = 2\ cm$ and $SQ = 3\ cm$. Then the ratio of the area of to the area of is



$(a)\ 25:4$ $(b)25:7$ $(c)25:11$ $(d)25:13$

2. The perimeters of two similar triangles ΔABC and ΔPQR are $36\ cm$ and $24\ cm$ respectively. If $PQ = 10\ cm$, then the length of AB is :

$(a)\ 6\frac{2}{3}cm$ $(b)\ \frac{10\sqrt{6}}{3}cm$ $(c)\ 66\frac{2}{3}cm$ $(d)\ 15\ cm$

3. If in $\Delta ABC, DE \parallel BC. AB = 3.6\ cm, AC = 2.4\ cm$ and $AD = 2.1\ cm$ then the length of AE is

$(a)\ 1.4\ cm$ $(b)\ 1.8\ cm$ $(c)\ 1.2\ cm$ $(d)\ 1.05\ cm$

4. If in triangles ABC and $EDF, \frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, when

(a) $\angle B = \angle E$ $(b)\ \angle A = \angle D$ $(c)\ \angle B = \angle D$ $(d)\ \angle A = \angle F$

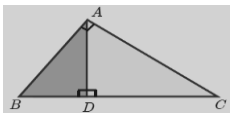
5. In $\Delta LMN, L = 60°, \angle M = 50°$. If $\Delta LMN \sim \Delta PQR$ then the value of ΔR is:

$(a)\ 40°$ $(b)\ 70°$ $(c)\ 30°$ $(d)\ 110°$

6. In a$\Delta ABC, AD$ is the bisector of $\angle BAC$. If $AB = 8\ cm, BD = 6\ cm$ and $DC = 3\ cm$. The length of the side AC is

$(a)\ 6\ cm$ $(b)\ 4\ cm$ $(c)\ 3\ cm$ $(d)\ 8\ cm$

7. In the adjacent figure $\angle BAC = 90°$ and $AD \perp BC$ then



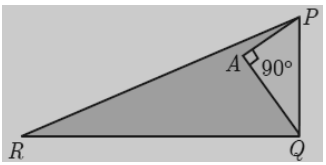
$(a)\ BD. CD = BC^2$ $(b)\ AB. AC = BC^2$

$(c)\ BD. CD = AD^2$ $(d)\ AB. AC = AD^2$

8. Two poles of heights $6\ m$ and $11\ m$ stand vertically on a plane ground. If the distance between their feet is $12\ m$, what is the distance between their tops?

$(a)\ 13\ m$ $(b)\ 14\ m$ $(c)\ 15\ m$ $(d)\ 12.8\ m$

9. In the given figure, $PR = 26\ cm, QR = 24\ cm,$ $\angle PAQ = 90°, PA = 6\ cm$ and $QA = 8\ cm$. Find $\angle PQR$.

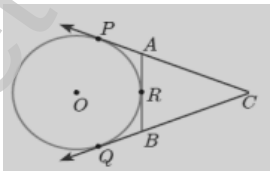


$(a)\ 80°$ $(b)\ 85°$ $(c)\ 75°$ $(d)\ 90°$

10. The two tangents from an external points P to a circle with centre at $O$are PA and PB. If $\angle APB = 70°$ then the value of $\angle AOB$ is :

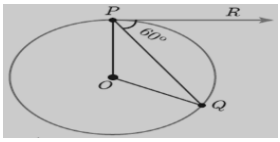
$(a)\ 100°$ $(b)\ 110°$ $(c)\ 120°$ $(d)\ 130°$

11. In figure $CP$and $CQ$are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If $CP = 11\ cm$ and $BC = 7\ cm$, then the length of BR is



$(a)\ 6\ cm$ $(b)\ 5\ cm$ $(c)\ 8\ cm$ $(d)\ 4\ cm$

12. In figure if PR is tangent to the circle at $P$and $O$is the centre of the circle, then is



$(a)\ 120°$ $(b)\ 100°$ $(c)\ 110°$ $(d)\ 90°$

13. A tangent is perpendicular to the radius at the

(a) centre (b) point of contact (c) infinity (d) chord

14. How many tangents can be drawn to the circle from an exterior point?

(a) one (b) two (c) infinite (d) zero

15. If ΔABC is an isosceles triangle with $\angle C = 90°$and $AC = 5\ cm$, then AB is

$(a)\ 2.5\ cm$ $(b)\ 5\ cm$ $(c)\ 10\ cm$ $(d)\ 5\sqrt{2}\ cm$

5. COORDINATE GEOMETRY

1. A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the Yaxis. The path travelled by the man is

$(a)\ x = 10$ $(b)\ y = 10$ $(c)\ x = 0$ $(d)\ y = 0$

2. If $(5,7),(3,p)$ and $(6,6)$ are collinear, then the value of p is

$(a)\ 3$ $(b)\ 6$ $(c)\ 9$ $(d)\ 12$

3. The slope of the line which is perpendicular to line joining the points $(0,0)$ and $(-8,8)$ is: $(a)\ -1$ $(b)\ 1$ $(c)\ \frac{1}{3}$ $(d)\ -8$

4. $(2,1)$ is the point of intersection of two lines.

$(a)\ x-y-3=0, 3x-y-7=0$ $(b)\ x+y=3, 3x+y=7$

$(c)\ 3x+y=3, x+y=7$ $(d)\ x+3y-3=0, x-y-7=0.$

5. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then the slope of the perpendicular bisector of PQ is

$(a)\ \sqrt{3}$ $(b)\ -\sqrt{3}$ $(c)\ \frac{1}{\sqrt{3}}$ $(d)\ 0$

6. If $A$is a point on the Yaxis whose ordinate is 8 and B is a point on the Xaxis whose abscissa is 5 then the equation of the line AB is

$(a)\ 8x+5y=40$ $(b)\ 8x-5y=40$ $(c)\ x=8$ $(d)\ y=5$

7. The equation of a line passing through the origin and perpendicular to the line $7x-3y+4=0$ is $(a)\ 7x-3y+4=0$ $(b)\ 3x-7y+4=0$

$(c)\ 3x+7y=0$ $(d)\ 7x-3y=0$

8. Consider four straight lines: $(i)\ l_1: 3y=4x+5$ $(ii)\ l_2: 4y=3x-1$

$(iii)\ l_3: 4y+3x=7$ $(iv)\ l_4: 4x+3y=2$. Which of the following statement is true? $(a)\ l_1$ and l_2 are perpendicular $(b)\ l_1$ and l_4 are parallel

$(c)\ l_2$ and l_4 are perpendicular $(d)\ l_2$ and l_3 are parallel

9. A straight line has equation $8y=4x+21$. Which of the following is true?

(a) The slope is 0.5 and the y intercept is 2.6

(b) The slope is 5 and the y intercept is 1.6

(c) The slope is 0.5 and the y intercept is 1.6

(d) The slope is 5 and the y intercept is 2.6

10. When proving that a quadrilateral is a trapezium, it is necessary to show

(a) Two sides are parallel. (b) Two parallel and two non-parallel sides.

(c) Opposite sides are parallel. (d) All sides are of equal length.

11. The straight line given by the equation $x = 11$ is:

(a) parallel to X axis (b) parallel to Y axis

(c) passing through the origin (d) passing through the point $(0,11)$

12. The point of intersection of $3x - y = 4$ and $x + y = 8$ is :

(a) $(5,3)$ (b) $(2,4)$ (c) $(3,5)$ (d) $(4,4)$

13. When proving that a quadrilateral is a parallelogram by using slopes you must find (a) The slopes of two sides (b) The slopes of two pair of opposite sides

(c) The lengths of all sides (d) Both the lengths and slopes of two sides

14. The area of triangle formed by the points $(-5,0)$, $(0,-5)$ and $(5,0)$ is

(a) 0 sq.units (b) 25 sq.units (c) 5 sq.units (d) none of these

15. The slope of the line joining $(12,3)$, $(4,a)$ is $\frac{1}{8}$. The value of 'a' is :

(a) 1 (b) 4 (c) -5 (d) 2

6. TRIGONOMETRY

1. The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are $30°$ and $60°$ respectively. The height of the multi-storeyed building and the distance between two buildings (in metres) is

(a) $20, 10\sqrt{3}$ (b) $30, 5\sqrt{3}$ (c) $20, 10$ (d) $30, 10\sqrt{3}$

2. $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ is equal to:

(a) $\sec\theta$ (b) $\cot^2\theta$ (c) $\sin\theta$ (d) $\cot\theta$

3. If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to:

$(a)\ 25$ $(b)\ \frac{1}{25}$ $(c)\ 5$ $(d)\ 1$

4. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is equal to :

$(a)\ \tan^2\theta$ $(b)\ 1$ $(c)\ \cot^2\theta$ $(d)\ 0$

5. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to:

$(a)\frac{-3}{2}$ $(b)\ \frac{3}{2}$ $(c)\ \frac{2}{3}$ $(d)\ \frac{-2}{3}$

6. If $x = a\tan\theta$ and $y = b\sec\theta$ then :

$(a)\ \frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ $(b)\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $(c)\ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $(d)\ \frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

7. If $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$, then the value of k is: $(a)\ 9$ $(b)\ 7$ $(c)\ 5$ $(d)\ 3$

8. If $\sin\theta + \cos\theta = a$ and $\sec\theta + \operatorname{cosec}\theta = b$, then the value of $b(a^2 - 1)$is equal to: $(a)\ 2a$ $(b)\ 3a$ $(c)\ 0$ $(d)\ 2ab$

9. The angle of elevation of a cloud from a point h metres above a lake is b. The angle of depression of its reflection in the lake is $45°$. The height of location of the cloud from the lake is

$(a)\ \frac{h(1+\tan\beta)}{1-\tan\beta}$ $(b)\ \frac{h(1-\tan\beta)}{1+\tan\beta}$ $(c)h\ tan(45° - \beta)$ (d) none of these

10. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$ is equal to :

$(a)\ 0$ $(b)\ 1$ $(c)\ 2$ $(d)\ -1$

11. $a\cot\theta + b\operatorname{cosec}\theta = p$ and $b\cot\theta + a\operatorname{cosec}\theta = q$ is equal to:

$(a)\ a^2 - b^2$ $(b)\ b^2 - a^2$ $(c)\ a^2 + b^2$ $(d)\ b - a$

12. A tower is 60 m height. Its shadow is x metres shorter when the sun's altitude is $45°$ than when it has been $30°$, then x is equal to

(a) 41.92 m (b) 43.92 m (c) 43 m (d) 45.6 m

13. Two persons are standing *'x'* metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is:

(a) $\sqrt{2}x$ (b) $\frac{x}{2\sqrt{2}}$ (c) $\frac{x}{\sqrt{2}}$ (d) $2x$

14. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, then the angle of elevation of the sun has measure .

(a) $45°$ (b) $30°$ (c) $90°$ (d) $60°$

15. The electric pole subtends an angle of $30°$ at a point on the same level as its foot. At a second point *'b'* metres above the first, the depression of the foot of the tower is $60°$. The height of the tower (in metres) is equal to

(a) $\sqrt{3}b$ (b) $\frac{b}{3}$ (c) $\frac{b}{2}$ (d) $\frac{b}{\sqrt{3}}$

7. MENSURATION

1. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is

(a) $2:1$ (b) $1:2$ (c) $4:1$ (d) $1:4$

2. If two solid hemispheres of same base radius r units are joined together along their bases, then curved surface area of this new solid is :

(a) $4\pi r^2$ sq. Units (b) $6\pi r^2$ sq. Units $(c)3\pi r^2$ sq. Units $(d)8\pi r^2$ sq. Units

3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be (a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

4. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is :
(a) 1:2 (b) 1:4 (c) 1:6 (d) 1:8

5. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
(a) $60\pi\ cm^2$ (b) $68\pi\ cm^2$ (c) $120\pi\ cm^2$ (d) $136\pi\ cm^2$

6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is
(a) $5600\pi\ cm^3$ (b) $11200\pi\ cm^3$ (c) $56\pi\ cm^3$ (d) $3600\pi\ cm^3$

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is
(a) made 6 times (b) made 18 times (c) made 12 times (d) unchanged

8. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is
(a) $\frac{9\pi h^2}{8}$ sq.units (b) $24\pi h^2$ sq. units (c) $\frac{8\pi h^2}{9}$ sq.units (d) $\frac{56\pi h^2}{9}$ sq.units

9. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
(a) 1:2:3 (b) 2:1:3 (c) 1:3:2 (d) 3:1:2

10. The total surface area of a hemi-sphere is how much times the square of its radius. (a) π (b) 4π (c) 3π (d) 2π

11. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is
(a) $3x\ cm$ (b) $x\ cm$ (c) $4x\ cm$ (d) $2x\ cm$

12. A frustum of a right circular cone is of height $16cm$ with radii of its ends as $8cm$ and $20cm$.Then, the volume of the frustum is

$(a)\ 3328\pi\ cm^3$ $(b)\ 3228\pi\ cm^3$ $(c)\ 3240\pi\ cm^3$ $(d)\ 3340\pi\ cm^3$

13. A shuttle cock used for playing badminton has the shape of the combination of: (a) a cylinder and a sphere (b) a hemisphere and a cone (c) a sphere and a cone (d) frustum of a cone and a hemisphere

14. The volume $(in\ cm^3)$ of the greatest sphere that can be cut off from a cylindrical log of wood of base radius $1\ cm$ and height $5\ cm$ is

$(a)\ \frac{4}{3}\pi$ $(b)\ \frac{10}{3}\pi$ $(c)\ 5\pi$ $(d)\ \frac{20}{3}\pi$

15. The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_1 : h_2 = 1:2$ then $r_1 : r_2$ is

$(a)\ 1:3$ $(b)\ 1:2$ $(c)\ 2:1$ $(d)\ 3:1$

8. STATISTICS AND PROBABILITY

1. A purse contains 10 notes of ₹ 2000, 15 notes of ₹ 500, and 25 notes of ₹ 200. One note is drawn at random. What is the probability that the note is either a ₹ 500 note or ₹ 200 note?

$(a)\ \frac{1}{5}$ $(b)\ \frac{3}{10}$ $(c)\ \frac{2}{3}$ $(d)\ \frac{4}{5}$

2. The sum of all deviations of the data from its mean is:

(a) Always positive (b) always negative (c) zero (d) non-zero integer

3. Variance of first 20 natural numbers is:

$(a)\ 32.25$ $(b)\ 44.25$ $(c)\ 33.25$ $(d)\ 30$

4. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is $(a)\ 3$ $(b)\ 15$ $(c)\ 5$ $(d)\ 225$

5. If the standard deviation of x, y, z is p then the standard deviation of $3x + 5, 3y + 5, 3z + 5$ is

$(a)\ 3p + 5$ $(b)\ 3p$ $(c)\ p + 5$ $(d)\ 9p + 15$

6. Which of the following is not a measure of dispersion?

(a) Range (b) Standard deviation (c) Arithmetic mean (d) Variance

7. The range of the data $8, 8, 8, 8, 8, \ldots\ldots, 8$ is :

$(a)\ 0$ $(b)\ 1$ $(c)\ 8$ $(d)\ 3$

8. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is

$(a)\ \frac{q}{p+q+r}$ $(b)\ \frac{p}{p+q+r}$ $(c)\ \frac{p+q}{p+q+r}$ $(d)\ \frac{p+r}{p+q+r}$

9. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is

$(a)\ 40000$ $(b)\ 160900$ $(c)\ 160000$ $(d)\ 30000$

10. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is :

$(a)\ \frac{3}{10}$ $(b)\ \frac{7}{10}$ $(c)\ \frac{3}{9}$ $(d)\ \frac{7}{9}$

11. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is

$(a)\ 2$ $(b)\ 1$ $(c)\ 3$ $(d)\ 1.5$

12. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is $\frac{1}{9}$, then the number of tickets bought by Kamalam is: $(a)\ 5$ $(b)\ 10$ $(c)\ 15$ $(d)\ 20$

13. Which of the following is incorrect?

$(a)\ P(A) > 1$ $(b)\ 0 \leq P(A) \leq 1$ $(c)\ P(\emptyset) = 0$ $(d)\ P(A) + P(\bar{A}) = 1$

14. If a letter is chosen at random from the English alphabets $\{a, b, \ldots, z\}$, then the probability that the letter chosen precedes :

$(a)\ \frac{12}{13}$ $(b)\ \frac{1}{13}$ $(c)\ \frac{23}{26}$ $(d)\ \frac{3}{26}$

15. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is

$(a)\ 3.5$ $(b)\ 3$ $(c)\ 4.5$ $(d)\ 2.5$