SHRI KRISHNA ACADEMY

NEET,JEE & BOARD EXAM(10th,+1,+2) COACHING CENTRE

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STANDARD TEN

$\vec{\text{M}}\text{a}\vec{\text{T}}h \notin \vec{\text{M}}\text{a}\vec{\text{T}}\text{i}^2 \subset \sum$

BOOK BACK

1 MARK

QUESTION BANK

2019 - 2020

DEPARTMENT OF MATHEMATICS

1.RELATIONS AND FUNCTIONS

1. If $n(A\times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is
   (1) 1 (2) 2 (3) 3 (4) 6
2. $A = \{a, b, p\}$, $B = \{2,3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C)\times B]$ is
   (1) 8 (2) 20 (3) 12 (4) 16
3. 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.
   (1) $(A\times C)\subset(B\times D)$ (2) $(B\times D)\subset(A\times C)$
   (3) $(A\times B)\subset(A\times D)$ (4) $(D\times A)\subset(B\times A)$
4. 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
   (1) 3 (2) 2 (3) 4 (4) 8
5. The range of the relation $R = \{(x, x^2) \mid x$ is a prime number less than 13$\}$ is
   (1) {2,3,5,7} (2) {2,3,5,7,11} (3) {4,9,25,49,121} (4) {1,4,9,25,49,121}
6. If the ordered pairs $(a+2, 4)$ and $(5, 2a+b)$ are equal then (a,b) is
   (1) (2, –2) (2) (5,1) (3) (2,3) (4) (3, –2)
7. 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
   (1) m^n (2) n^m (3) $2^{mn}-1$ (4) 2^{mn}
8. If {(a, 8), (6, b) represents an identity function, then the value of a and b are respectively
   (1) (8,6) (2) (8,8) (3) (6,8) (4) (6,6)
9. 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
   (1) Many-one function (2) Identity function
   (3) One-to-one function (4) Into function
10. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$ then $f \circ g$ is
    (1) $\frac{3}{2x^2}$ (2) $\frac{2}{3x^2}$ (3) $\frac{2}{9x^2}$ (4) $\frac{1}{6x^2}$
11. If $f : A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
    (1) 7 (2) 49 (3) 1 (4) 14
12. 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
    (1) {0,2,3,4,5} (2) {–4,1,0,2,7} (3) {1,2,3,4,5} (4) {0,1,2}
13. Let $f(x) = \sqrt{1+x^2}$ then
    (1) $f(xy) = f(x).f(y)$ (2) $f(xy) \geq f(x).f(y)$ (3) $f(xy) \leq f(x).f(y)$ (4) None of these
14. 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
    (1) (–1,2) (2) (2, –1) (3) (–1, –2) (4) (1,2)

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

(1) linear (2) cubic (3) reciprocal (4) quadratic

2.NUMBERS AND SEQUENCES

1. 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.

(1) $1 < r < b$ (2) $0 < r < b$ (3) $0 \le r < b$ (4) $0 < r \le b$

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

(1) 0, 1, 8 (2) 1, 4, 8 (3) 0, 1, 3 (4) 1, 3, 5

3. If the HCF of 65 and 117 is expressible in the form of $65m–117$, then the value of m is

(1) 4 (2) 2 (3) 1 (4) 3

4. The sum of the exponents of the prime factors in the prime factorization of 1729 is

(1) 1 (2) 2 (3) 3 (4) 4

5. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

(1) 2025 (2) 5220 (3) 5025 (4) 2520

6. $7^{4k} \equiv$ _____ (mod 100)

(1) 1 (2) 2 (3) 3 (4) 4

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

(1)3 (2)5 (3)8 (4)11

8. 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.

(1) 4551 (2) 10091 (3) 7881 (4) 13531

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

(1) 0 (2) 6 (3) 7 (4) 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

(1) 16 m (2) 62 m (3) 31 m (4) $\frac{31}{2}$ m

11. 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?

(1) 6 (2) 7 (3) 8 (4) 9

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

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

(3) B is larger than A by 1 (4) A is larger than B by 1

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

(1) $\frac{1}{24}$ (2) $\frac{1}{27}$ (3) $\frac{2}{3}$ (4) $\frac{1}{81}$

14. If the sequence $t_1, t_2, t_3 \ldots\ldots$ are in A.P. then the sequence $t_6, t_{12}, t_{18} \ldots\ldots$ is
    (1) a Geometric Progression
    (2) an Arithmetic Progression
    (3) neither an Arithmetic Progression nor a Geometric progression
    (4) a constant sequence

15. The value of $(1^3+2^3+3^3+.....+15^3)-(1+2+3+.....+15)$ is
    (1) 14400 (2) 14200 (3) 14280 (4) 14520

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3. ALGEBRA

1. A system of three linear equations in three variables is inconsistent if their planes
    (1) intersect only at a point (2) intersect in a line
    (3) coincides with each other (4) do not intersect

2. The solution of the system $x+y-3x=-6$, $-7y+7z=7$, $3z=9$ is
    (1) $x=1,\ y=2,\ z=3$ (2) $x=-1,\ y=2,\ z=3$
    (3) $x=-1,\ y=-2,\ z=3$ (4) $x=1,\ y=2,\ z=-3$

3. If $(x-6)$ is the HCF of $x^2-2x-24$ and x^2-kx-6 then the value of k is
    (1) 3 (2) 5 (3) 6 (4) 8

4. $\dfrac{3y-3}{y} \div \dfrac{7y-7}{3y^2}$ is
    (1) $\dfrac{9y}{7}$ (2) $\dfrac{9y^3}{(21y-21)}$ (3) $\dfrac{21y^2-42y+21}{3y^3}$ (4) $\dfrac{7(y^2-2y+1)}{y^2}$

5. $y^2+\dfrac{1}{y^2}$ is not equal to
    (1) $\dfrac{y^4+1}{y^2}$ (2) $\left(y+\dfrac{1}{y}\right)^2$ (3) $\left(y-\dfrac{1}{y}\right)^2+2$ (4) $\left(y+\dfrac{1}{y}\right)^2-2$

6. $\dfrac{x}{x^2-25}-\dfrac{8}{x^2+6x+5}$ gives
    (1) $\dfrac{x^2-7x+40}{(x-5)(x+5)}$ (2) $\dfrac{x^2+7x+40}{(x-5)(x+5)(x+1)}$
    (3) $\dfrac{x^2-7x+40}{(x^2-25)(x+1)}$ (4) $\dfrac{x^2+10}{(x^2-25)(x+1)}$

7. The square root of $\dfrac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to
    (1) $\dfrac{16}{5}\left|\dfrac{x^2z^4}{y^2}\right|$ (2) $16\left|\dfrac{y^2}{x^2z^4}\right|$ (3) $\dfrac{16}{5}\left|\dfrac{y}{xz^2}\right|$ (4) $\dfrac{16}{5}\left|\dfrac{xz^2}{y}\right|$

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

(1) $4x^2$ (2) $16x^2$ (3) $8x^2$ (4) $-8x^2$

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

(1) -1 (2) 2 (3) $-1, 2$ (4) None of these

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

(1) 100,120 (2) 10,12 (3) -120 ,100 (4) 12,10

11. 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 _____

(1) A.P (2) G.P (3) Both A.P and G.P (4) none of these

12. Graph of a linear polynomial is a

(1) straight line (2) circle (3) parabola (4) hyperbola

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

(1) 0 (2) 1 (3) 0 or 1 (4) 2

14. 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

(1) 2x3 (2) 3x2 (3) 3x4 (4) 4x3

15. If A is a 2x3 matrix and B is a 3x4 matrix, how many columns does AB have

(1) 3 (2) 4 (3) 2 (4) 5

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

(1) diagonal matrix (2) rectangular matrix

(3) square matrix (4) identity matrix

17. Transpose of a column matrix is

(1) unit matrix (2) diagonal matrix

(3) column matrix (4) row matrix

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

(1) $\begin{pmatrix}-2&-2\\2&-1\end{pmatrix}$ (2) $\begin{pmatrix}2&2\\2&-1\end{pmatrix}$ (3) $\begin{pmatrix}1&2\\2&2\end{pmatrix}$ (4) $\begin{pmatrix}2&1\\2&2\end{pmatrix}$

19. 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

(1) (i) and (ii) only (2) (ii) and (iii) only

(3) (ii) and (iv) only (4) all of these

20. If $A=\begin{pmatrix}1 & 2 & 3\\ 3 & 2 & 1\end{pmatrix}, B=\begin{pmatrix}1 & 0\\ 2 & -1\\ 0 & 2\end{pmatrix}$ and $C=\begin{pmatrix}0 & 1\\ -2 & 5\end{pmatrix}$. 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) $(AB)C=\begin{pmatrix}-8 & 20\\ -8 & 13\end{pmatrix}$

(1) (i) and (ii) only (2) (ii) and (iii) only

(3) (iii) and (iv) only (4) all of these

4.GEOMETRY

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

(1) $\angle B=\angle E$ (2) $\angle A=\angle D$ (3) $\angle B=\angle D$ (4) $\angle A=\angle F$

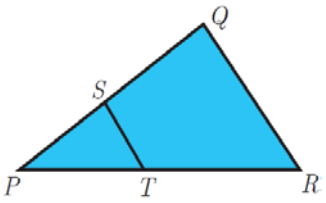
2. In ΔLMN, $\angle L=60°, \angle M=50°$. If $\Delta LMN \sim \Delta PQR$ then the value of $\angle R$ is

(1) 40° (2) 70° (3) 30° (4) 110°

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

(1) 2.5 cm (2) 5 cm (3) 10 cm (4) $5\sqrt{2}$ cm

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



(1) 25 : 4 (2) 25 : 7

(3) 25 : 11 (4) 25 : 13

5. 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

(1) $6\frac{2}{3}$ cm (2) $\frac{10\sqrt{6}}{3}$ cm (3) $66\frac{2}{3}$ cm (4) 15 cm

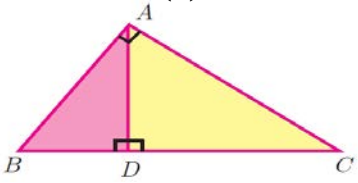
6. If in ΔABC , DE$\parallel$BC , AB = 3.6 cm, .AC = 2.4cm and .AD = 2.1 cm then the length of AE is

(1) 1.4 cm (2) 1.8 cm (3) 1.2 cm (4) 1.05 cm

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

(1) 6 cm (2) 4 cm (3) 3 cm (4) 8 cm

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



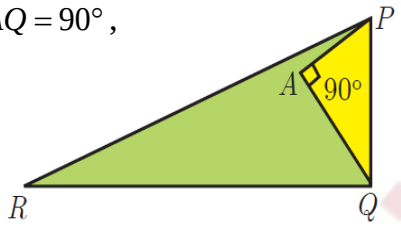
(1) BD.CD=BC^2 (2) AB.AC=BC^2

(3) BD.CD=AD^2 (4) AB.AC=AD^2

9. 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?

(1) 13 m (2) 14 m (3) 15 m (4) 12.8 m

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



(1) 80° (2) 85°

(3) 75° (4) 90°

11. A tangent is perpendicular to the radius at the

(1) centre (2) point of contact (3) infinity (4) chord

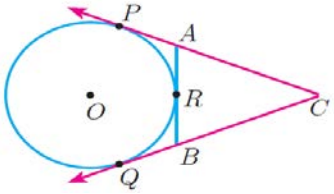
12. How many tangents can be drawn to the circle from an exterior point?

(1) one (2) two (3) infinite (4) zero

13. 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

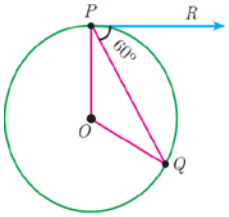
(1) 100° (2) 110° (3) 120° (4) 130°

14. 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



(1) 6 cm (2) 5 cm (3) 8 cm (4) 4 cm

15. In figure if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is



(1) 120° (2) 100°

(3) 110° (4) 90°

5. COORDINATE GEOMETRY

1. The area of triangle formed by the points (–5,0) , (0,–5) and (5,0) is

(1) 0 sq.units (2) 25 sq.units (3) 5 sq.units (4) none of these

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

(1) $x = 10$ (2) $y = 10$ (3) $x = 0$ (4) $y = 0$

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

(1) parallel to X axis (2) parallel to Y axis

(3) passing through the origin (4) passing through the point (0,11)

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

(1) 3 (2) 6 (3) 9 (4) 12

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

(1) (5,3) (2) (2,4) (3) (3,5) (4) (4,4)

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

(1) 1 (2) 4 (3) –5 (4) 2

7. The slope of the line which is perpendicular to line joining the points (0,0) and (–8,8) is

(1) –1 (2) 1 (3) $\frac{1}{3}$ (4) –8

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

(1) $\sqrt{3}$ (2) $-\sqrt{3}$ (3) $\frac{1}{\sqrt{3}}$ (4) 0

9. If A is a point on the Y axis whose ordinate is 8 and B is a point on the X axis whose abscissae is 5 then the equation of the line AB is

(1) $8x+5y = 40$ (2) $8x–5y = 40$ (3) $x = 8$ (4) $y = 5$

10. The equation of a line passing through the origin and perpendicular to the line $7x–3y+4=0$ is

(1) $7x–3y+ 4=0$ (2) $3x–7y+4=0$ (3) $3x+7y = 0$ (4) $7x–3y = 0$

11. 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 ?

(1) l_1 and l_2 are perpendicular (2) l_1 and l_4 are parallel

(3) l_2 and l_4 are perpendicular (4) l_2 and l_3 are parallel

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

(1)The slope is 0.5 and the y intercept is 2.6 (2)The slope is 5 and the y intercept is 1.6

(3)The slope is 0.5 and the y intercept is 1.6 (4)The slope is 5 and the y intercept is 2.6

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

(1)Two sides are parallel. (2)Two parallel and two non-parallel sides.

(3)Opposite sides are parallel. (4)All sides are of equal length.

14. When proving that a quadrilateral is a parallelogram by using slopes you must find

(1)The slopes of two sides (2)The slopes of two pair of opposite sides

(3)The lengths of all sides (4)Both the lengths and slopes of two sides

15. (2, 1) is the point of intersection of two lines.

(1) $x–y–3=0$; $3x–y–7=0$ (2) $x+y =3$; $3x+y=7$

(3) $3x+y=3$; $x+y=7$ (4) $x+3y–3=0$; $x–y–7=0$

6.TRIGNOMETRY

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

   (1) $\tan^2\theta$ (2) 1 (3) $\cot^2\theta$ (4) 0

2. $\tan\theta\cos ec^2\theta-\tan\theta$ is equal to

   (1) $\sec\theta$ (2) $\cot^2\theta$ (3) $\sin\theta$ (4) $\cot\theta$

3. If $(\sin\alpha+\cos ec\alpha)^2+(\cos\alpha+\sec\alpha)^2=k+\tan^2\alpha+\cot^2\alpha$, then the value of k is equal to

   (1) 9 (2) 7 (3) 5 (4) 3

4. If $\sin\theta+\cos\theta=a$ and $\sec\theta+\operatorname{cosec}\theta=b$, then the value of $b(a^2-1)$ is equal to

   (1) $2a$ (2) $3a$ (3) 0 (4) $2ab$

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

   (1) 25 (2) $\frac{1}{25}$ (3) 5 (4) 1

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

   (1) $-\frac{3}{2}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $-\frac{2}{3}$

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

   (1) $\frac{y^2}{b^2}-\frac{x^2}{a^2}=1$ (2) $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ (3) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (4) $\frac{x^2}{a^2}-\frac{y^2}{b^2}=0$

8. $(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)$ is equal to

   (1) 0 (2) 1 (3) 2 (4) –1

9. $a\cot\theta+b\operatorname{cosec}\theta=p$ and $b\cot\theta+a\operatorname{cosec}=q$ then p^2-q^2 is equal to

   (1) a^2-b^2 (2) b^2-a^2 (3) a^2+b^2 (4) $b-a$

10. 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

    (1) 45° (2) 30° (3) 90° (4) 60°

11. 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

    (1) $\sqrt{3}\,b$ (2) $\frac{b}{3}$ (3) $\frac{b}{2}$ (4) $\frac{b}{\sqrt{3}}$

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

    (1) 41.92 m (2) 43.92 m (3) 43 m (4) 45.6 m

13. 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 multistoried building and the distance between two buildings (in metres) is

(1) $20,10\sqrt{3}$ (2) $30, 5\sqrt{3}$ (3) 20, 10 (4) $30, 10\sqrt{3}$

14. 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

(1) $\sqrt{2}\,x$ (2) $\frac{x}{2\sqrt{2}}$ (3) $\frac{x}{\sqrt{2}}$ (4) $2x$

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

(1) $\frac{h(1+tan\beta)}{1-\tan\beta}$ (2) $\frac{h(1-tan\beta)}{1+\tan\beta}$ (3) $h\tan(45°-\beta)$ (4) none of these

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7. MENSURATION

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is

(1) 60π cm^2 (2) 68π cm^2 (3) c) 120π cm^2 (4) 136π cm^2

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

(1) $4\pi r^2$ sq. units (2) $6\pi r^2$ sq. units (3) $3\pi r^2$ sq. units (4) $8\,\pi r^2$ sq. units

3. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be

(1) 12 cm (2) 10 cm (3) 13 cm (4) 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

(1) 1:2 (2) 1:4 (3) 1:6 (4) 1:8

5. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is

(1) $\frac{9\pi h^2}{8}$ sq.units (2) $24\pi h^2$ sq.units (3) $\frac{8\pi h^2}{9}$ sq.units (4) $\frac{56\pi h^2}{9}$ sq.units

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

(1) 5600π cm^3 (2) 11200π cm^3 (3) 56π cm^3 (4) 3600πcm^3

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is
   (1) made 6 times (2) made 18 times (3) made 12 times (4) unchanged
8. The total surface area of a hemi-sphere is how much times the square of its radius.
   (1) π (2) 4π (3) 3π (4) 2π
9. 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
   (1) $3x$ cm (2) x cm (3) $4x$ cm (4) $2x$ cm
10. 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
    (1) $3328\pi cm^3$ (2) 3228π cm^3 (3) 3240π cm^3 (4) 3340π cm^3
11. A shuttle cock used for playing badminton has the shape of the combination of
    (1) a cylinder and a sphere (2) a hemisphere and a cone
    (3) a sphere and a cone (4) frustum of a cone and a hemisphere
12. 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
    (1) 2:1 (2) 1:2 (3) 4:1 (4) 1:4
13. 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
    (1) $\frac{4}{3}\pi$ (2) $\frac{10}{3}\pi$ (3) 5π (4) $\frac{20}{3}\pi$
14. 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. $h_2 : h_1 = 1:2$ then $r_2 : r_1$ is
    (1) 1:3 (2) 1:2 (3) 2:1 (4) 3:1
15. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
    (1)1:2:3 (2) 2:1:3 (3) 1:3:2 (4) 3:1:2

8.STATISTICS AND PROBABILITY

1. Which of the following is not a measure of dispersion?
   (1) Range (2) Standard deviation
   (3) Arithmetic mean (4) Variance

2. The range of the data 8, 8, 8, 8, 8. ….. 8 is
   (1) 0 (2) 1 (3) 8 (4) 3
3. The sum of all deviations of the data from its mean is
   (1) Always positive (2) always negative (3) zero (4) non-zero integer
4. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is
   (1) 40000 (2) 160900 (3) 160000 (4) 30000
5. Variance of first 20 natural numbers is
   (1) 32.25 (2) 44.25 (3) 33.25 (4) 30
6. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
   (1) 3 (2) 15 (3) 5 (4) 225
7. If the standard deviation of x, y, z is p then the standard deviation of $3x+5, 3y+5, 3z+5$ is
   (1) $3p+5$ (2) $3p$ (3) $p+5$ (4) $9p+15$.
8. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is
   (1) 3.5 (2) 3 (3) 4.5 (4) 2.5
9. Which of the following is incorrect?
   (1) $P(A)>1$ (2) $0 \leq P(A) \leq 1$ (3) $P(\emptyset) = 0$ (4) $P(A)+P(\bar{A})=1$
10. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is
    (1) $\frac{q}{p+q+r}$ (2) $\frac{p}{p+q+r}$ (3) $\frac{p+q}{p+q+r}$ (4) $\frac{p+r}{p+q+r}$
11. 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
    (1) $\frac{3}{10}$ (2) $\frac{7}{10}$ (3) $\frac{3}{9}$ (4) $\frac{7}{9}$
12. 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
    (1) 2 (2) 1 (3) 3 (4) 1.5
13. 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
    (1) 5 (2) 10 (3) 15 (4) 20
14. If a letter is chosen at random from the English alphabets {a,b,…..,z}, then the probability that the letter chosen precedes x
    (1) $\frac{12}{13}$ (2) $\frac{1}{13}$ (3) $\frac{23}{26}$ (4) $\frac{3}{26}$
15. 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?
    (1) $\frac{1}{5}$ (2) $\frac{3}{10}$ (3) $\frac{2}{3}$ (4) $\frac{4}{5}$

ANSWER KEY

CHAPTER – 1 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(3)	(3)	(1)	(2)	(3)	(4)	(3)	(1)	(3)	(3)	(1)	(4)	(3)	(2)	(4)

CHAPTER – 2 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(3)	(1)	(2)	(3)	(4)	(1)	(4)	(3)	(1)	(3)	(3)	(4)	(2)	(2)	(3)

CHAPTER – 3 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(4)	(1)	(2)	(1)	(2)	(3)	(4)	(2)	(3)	(3)	(2)	(1)	(2)	(4)	(2)	(2)	(4)	(2)	(2)	(1)

CHAPTER – 4 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(3)	(2)	(4)	(1)	(4)	(1)	(2)	(3)	(1)	(4)	(2)	(2)	(2)	(4)	(1)

CHAPTER – 5 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(2)	(1)	(2)	(3)	(3)	(4)	(2)	(2)	(1)	(3)	(3)	(1)	(2)	(1)	(2)

CHAPTER – 6 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(2)	(4)	(2)	(1)	(2)	(2)	(1)	(3)	(2)	(4)	(2)	(2)	(4)	(2)	(1)

CHAPTER – 7 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(4)	(1)	(1)	(2)	(3)	(2)	(2)	(3)	(3)	(1)	(4)	(1)	(1)	(2)	(4)

CHAPTER – 8 :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(3)	(1)	(3)	(2)	(3)	(4)	(2)	(1)	(1)	(2)	(2)	(2)	(3)	(3)	(4)

SHRI KRISHNA ACADEMY

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STANDARD TEN

$$\vec{M}\vec{a}\vec{T}h \notin \vec{M}\vec{a}\vec{T}i^2 \subset \sum$$

BOOK BACK

QUESTION BANK

{CHAPTER 1 – 8}

2019 - 2020

QUESTION BANK SAMPLES

1.RELATIONS AND FUNCTIONS

Example 1.1

If $A = \{1,3,5\}$ and $B = \{2,3\}$ then (i) find $A\times B$ and $B\times A$. (ii) Is $A\times B = B\times A$? If not why? (iii) Show that $n(A\times B) = n(B\times A) = n(A)\times n(B)$

Example 1.2

If $A\times B = \{(3,2), (3,4), (5,2), (5,4)\}$ then find A and B.

Example 1.3

Let $A = \{x \in N \mid 1 < x < 4\}$, $B = \{x \in W \mid 0 \le x < 2\}$ and $C = \{x \in N \mid x < 3\}$.

Then verify that (i) $A\times(B\cup C) = (A\times B)\cup(A\times C)$ (ii) $A\times(B\cap C) = (A\times B)\cap(A\times C)$

Exercise 1.1

16. Find A×B, A×A and B×A (i) $A = \{2,-2,3\}$ and $B = \{1,-4\}$ (ii) A=B={p,q}
    (iii) A={m,n}; B=ϕ
17. Let $A = \{1,2,3\}$ and B={x|x is a prime number less than 10}. Find $A\times B$ and $B\times A$.
18. If $B\times A = \{(-2,3),(-2,4),(0,3),(0,4),(3,3),(3,4)\}$, find A and B.
19. If A={5,6} , $B = \{4,5,6\}$, $C = \{5,6,7\}$, Show that $A\times A = (B\times B)\cap(C\times C)$
20. Given A={1,2,3}, $B = \{2,3,5\}$, $C = \{3,4\}$ and $D = \{1,3,5\}$, check if
    $(A\cap C)\times(B\cap D) = (A\times B)\cap(C\times D)$ is true?
21. Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid 1 < x \le 4\}$ and $C = \{3,5\}$. Verify that
    (i) $A\times(B\cup C) = (A\times B)\cup(A\times C)$ (ii) $A\times(B\cap C) = (A\times B)\cap(A\times C)$
    (iii) $(A\cup B)\times C = (A\times C)\cup(B\times C)$
22. Let A = The set of all natural numbers less than 8, B = The set of all prime numbers less than 8, C = The set of even prime number. Verify that
    (i) $(A\cap B)\times C = (A\times C)\cap(B\times C)$ (ii) $A\times(B-C) = (A\times B)-(A\times C)$

Example 1.4

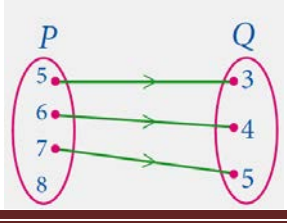
Let $A = \{3,4,7,8\}$ and $B = \{1,7,10\}$. Which of the following sets are relations from A to B?

(i) $R_1 = \{(3,7), (4,7), (7,10), (8,1)\}$ (ii) $R_2 = \{(3,1), (4,12)\}$

(iii) $R_3 = \{(3,7), (4,10), (7,7), (7,8), (8,11), (8,7), (8,10)\}$

Example 1.5

The arrow diagram shows a relationship between the sets P and Q. Write the relation in (i) Set builder form (ii) Roster form



(iii) What is the domain and range of R.

Exercise 1.2

1. Let A ={1,2,3,7} and B ={3,0,–1,7},which of the following are relation from A to B?
   (i) R_1 = {(2,1), (7,1)} (ii) R_2= {(–1,1)} (iii) R_3 = {(2,–1), (7,7), (1,3)}
   (iv) R_4= {(7,–1), (0,3), (3,3), (0,7)}
2. Let A={1,2,3,4,...,45} and R be the relation defined as "is square of " on A. Write R as a subset of A×A . Also, find the domain and range of R.
3. A Relation R is given by the set $\{(x, y) / y = x + 3, x \in \{0,1,2,3,4,5\}\}$. Determine its domain and range.
4. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible. (i) $\{(x,y) | x = 2y, x \in \{2,3,4,5\}, y \in \{1,2,3,4\}$
   (ii) $\{(x,y) | y = x+3$, x, y are natural numbers $< 10\}$
5. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide ₹ 10,000, ₹ 25,000, ₹ 50,000 and ₹ 1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. If A_1, A_2, A_3, A_4 and A_5 were Assistants; C_1, C_2, C_3, C_4 were Clerks; M_1, M_2, M_3 were managers and E_1, E_2 were Executive officers and if the relation R is defined by xRy, where x is the salary given to person y, express the relation R through an ordered pair and an arrow diagram.

Example 1.6

Let X={1,2,3,4} and Y={2,4,6,8,10} and R = {(1,2),(2,4),(3,6),(4,8)}. Show that R is a function and find its domain, co-domain and range?

Example 1.7

A relation 'f' is defined by $f(x) = x^2 - 2$, where $x \in \{-2, -1, 0, 3\}$ (i) List the elements of f (ii) Is f a function?

Example 1.8

If X = {–5,1,3,4} and Y = {a,b,c}, then which of the following relations are functions from X to Y ? (i) R_1 = {(–5,a), (1,a), (3,b)} (ii) R_2 = {(–5,b), (1,b), (3,a),(4,c)}
(iii) R_3 = {(–5,a), (1,a), (3,b),(4,c),(1,b)}

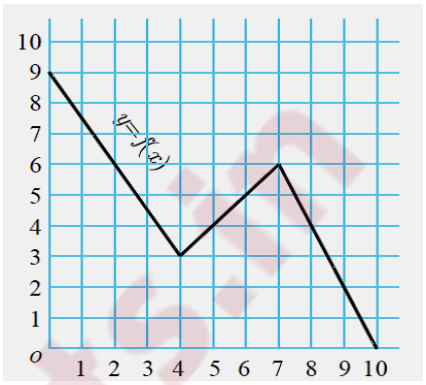
Example 1.9

Given $f(x) = 2x - x^2$, find (i) $f(1)$ (ii) $f(x+1)$ (iii) $f(x) + f(1)$

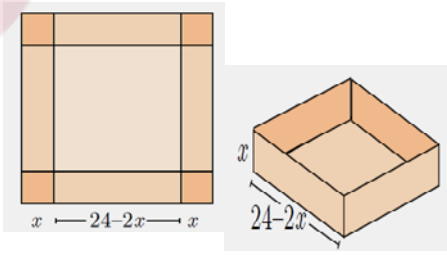
Exercise 1.3

1. Let $f = \{(x, y) | x, y \in N$ and $y = 2x\}$ be a relation on N. Find the domain, co-domain and range. Is this relation a function?

2. Let X = {3, 4, 6, 8}. Determine whether the relation $R = \{(x, f(x)) \mid x \in X, f(x) = x^2 + 1\}$ is a function from X to N?
3. Given the function $f : x \to x^2 - 5x + 6$, evaluate (i) $f(-1)$ (ii) $f(2a)$ (iii) $f(2)$ (iv) $f(x-1)$.
4. A graph representing the function $f(x)$ is given in Figure it is clear that $f(9) = 2$.



   (i) Find the following values of the function
   (a) $f(0)$ (b) $f(7)$ (c) $f(2)$ (d) $f(10)$
   (ii) For what value of x is $f(x) = 1$?
   (iii) Describe the following (i) Domain (ii) Range.
   (iv) What is the image of 6 under f?
5. Let $f(x) = 2x+5$. If $x \neq 0$ then find $\dfrac{f(x+2) - f(2)}{x}$.
6. A function f is defined by $f(x) = 2x - 3$ (i) find $\dfrac{f(0) + f(1)}{2}$.
   (ii) find x such that $f(x) = 0$. (iii) find x such that $f(x) = x$.
   (iv) find x such that $f(x) = f(1-x)$.
7. An open box is to be made from a square piece of material, 24 cm on a side, by cutting equal squares from the corners and turning up the sides as shown in Figure Express the volume V of the box as a function of x.



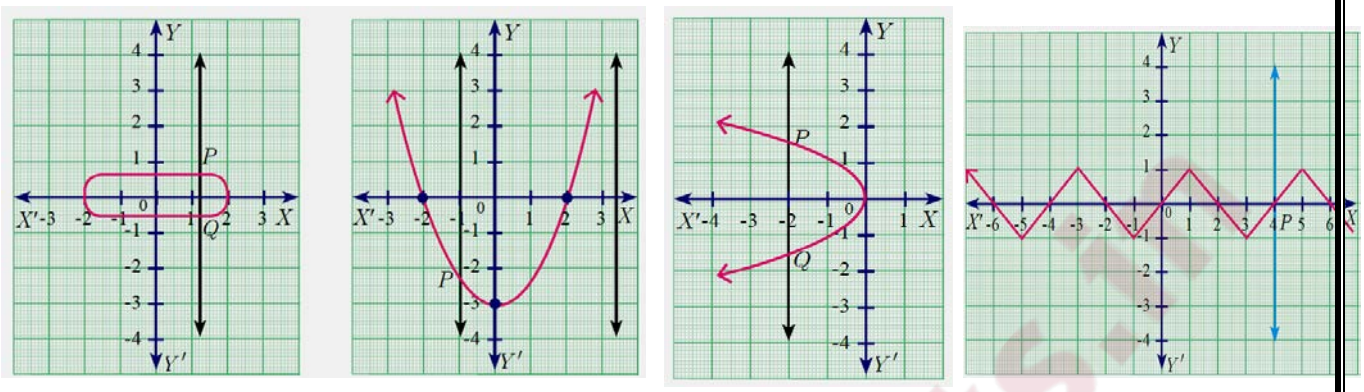
8. A function f is defined by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$.
9. A plane is flying at a speed of 500 km per hour. Express the distance d travelled by the plane as function of time t in hours.
10. The data in the adjacent table depicts the length of a woman's forehand and her corresponding height. Based on this data, a student finds a relationship between the height (y) and the forehand length (x) as $y = a\,x$+b, where a, b are constants.

Length 'x' of forehand (in cm)	Height 'y' (in inches)
45.5	65.5
35	56
45	65
50	69.5
55	74

   (i) Check if this relation is a function.
   (ii) Find a and b.
   (iii) Find the height of a woman whose forehand length is 40 cm.
   (iv) Find the length of forehand of a woman if her height is 53.3 inches.

Example 1.10

Using vertical line test, determine which of the following curves (Fig.(a), (b), (c),(d)) represent a function?



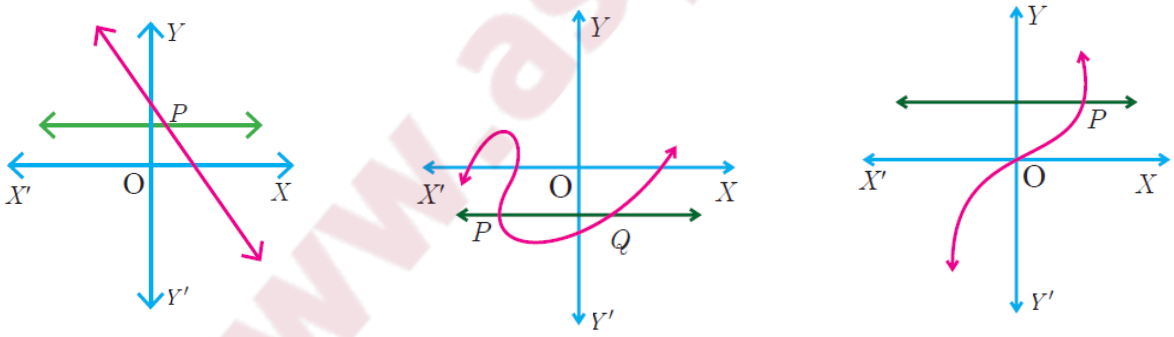
(a) **(b)** **(c)** **(d)**

Example 1.11

Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets. Let $f : A \to B$ be a function given by $f(x) = 3x-1$. Represent this function (i) by arrow diagram (ii) in a table form (iii) as a set of ordered pairs (iv) in a graphical form

Example 1.12

Using horizontal line test (Fig.(a), (b), (c)), determine which of the following functions are one – one.



(a) **(b)** **(c)**

Example 1.13

Let $A = \{1,2,3\}$, $B = \{4,5,6,7\}$ and $f = \{(1,4),(2,5),(3,6)\}$ be a function from A to B. Show that f is one – one but not onto function.

Example 1.14

If $A = \{-2,-1,0,1,2\}$ and $f : A \to B$ is an onto function defined by $f(x) = x^2 + x + 1$ then find B.

Example 1.15

Let f be a function $f : N \to N$ be defined by $f(x) = 3x+2$, $x \in N$

(i) Find the images of 1, 2, 3

(ii) Find the pre-images of 29, 53 (iii) Identify the type of function

Example 1.16

Forensic scientists can determine the height (in cms) of a person based on the length of their thigh bone. They usually do so using the function $h(b) = 2.47b + 54.10$, where b is the length of the thigh bone.

(i) Check if the function h is one – one

(ii) Also find the height of a person if the length of his thigh bone is 50 cms.

(iii) Find the length of the thigh bone if the height of a person is 147. 96 cms.

Example 1.17

Let f be a function from R to R defined by $f(x) = 3x - 5$. Find the values of a and b given that

$(a, 4)$ and $(1, b)$ belong to f.

Example 1.18

The distance S (in kms) travelled by a particle in time 't' hours is given by $S(t) = \frac{t^2 + t}{2}$.

Find the distance travelled by the particle after (i) three and half hours. (ii) eight hours and fifteen minutes.

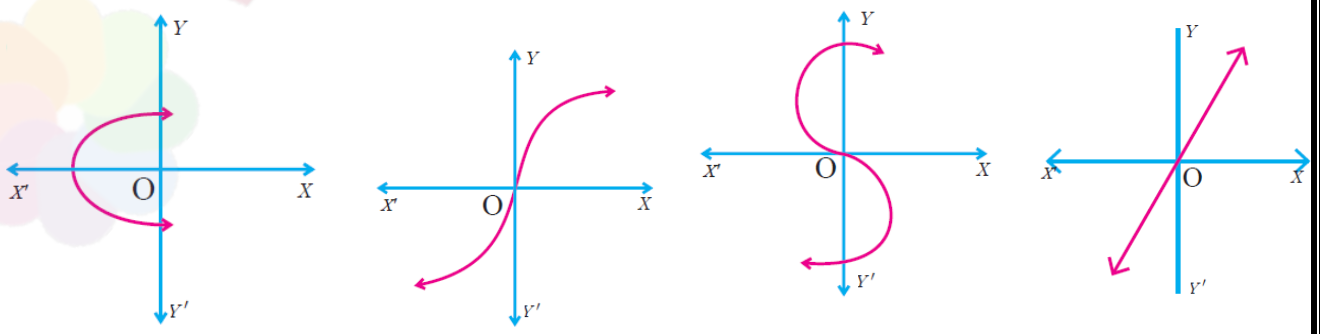
Example 1.19

If the function $f : R \to R$ is defined by $f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \le x < 3 \\ 3x - 2, & x \ge 3 \end{cases}$ then find the values of (i) f(4) (ii) f(-2) (iii) f (4) + 2 f(1) (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

Exercise 1.4

1. Determine whether the graph given below represent functions. Give reason for your answers concerning each graph.

(i) **(ii)** **(iii)** **(iv)**



2. Let f : A $\to$ Bbe a function defined by $f(x)=\frac{x}{2}-1$ where A={2,4,6,10,12}, B={0,1,2,4,5,9}. Represent f by (i) set of ordered pairs; (ii) a table; (iii) an arrow diagram; (iv) a graph
3. Represent the function f ={(1,2),(2,2),(3,2),(4,3),(5,4)} through (i) an arrow diagram (ii) a table form (iii) a graph
4. Show that the function $f : N \to N$ defined by $f(x) = 2x-1$ is one-one but not onto.
5. Show that the function $f : N \to N$ defined by $f(m) = m^2 + m + 3$ is one-one function.
6. Let A= {1,2,3,4} and B=N. Let $f : A \to B$ be defined by $f(x) = x^3$ then, (i) find the range of f (ii) identify the type of function
7. In each of the following cases state whether the function is bijective or not. Justify your answer. (i) $f : R \to R$ defined by $f(x) = 2x+1$ (ii) $f : R \to R$ defined by $f(x) = 3-4x^2$
8. Let $A = \{-1,1\}$ and $B = \{0,2\}$. If the function $f : A \to B$ defined by $f(x) = a\,x+b$ is an onto function? Find a and b.
9. If the function f is defined by $f(x)=\begin{cases} x+2, & \text{if } x>1 \\ 2, & \text{if } -1\le x\le 1 \\ x-1, & \text{if } -3<x<-1 \end{cases}$; find the values of
   (i) f(3) (ii) f(0) (iii) f (−1.5) (iv) f(2)+f(−2).
10. A function f : [−5,9] $\to$ R is defined as follows : $f(x)=\begin{cases} 6x+1, & \text{if } -5\le x<2 \\ 5x^2-1, & \text{if } 2\le x<6 \\ 3x-4, & \text{if } 6\le x\le 9 \end{cases}$
    Find (i) f(−3)+f(2) (ii) f(7) − f(1) (iii) 2f(4)+f(8) (iv) $\frac{2f(-2)-f(6)}{f(4)+f(-2)}$
11. The distance S an object travels under the influence of gravity in time t seconds is given by $S(t)=\frac{1}{2}gt^2+at+b$ where, (g is the acceleration due to gravity), a, b are constants. Check if the function $S(t)$ is one-one.
12. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by t(C) = F where $F=\frac{9}{5}C+32$. Find, (i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$
    (iv) the value of C when t(C)= 212
    (v) the temperature when the Celsius value is equal to the Farenheit value.

Example 1.20

Find $f\circ g$ and $g\circ f$ when $f(x)=2x+1$ and $g(x)=x^2-2$

Example 1.21

Represent the function $f(x)=\sqrt{2x^2-5x+3}$ as a composition of two functions.

Example 1.22

If $f(x)=3x-2$, $g(x)=2x+k$ and if $f\circ g = g\circ f$, then find the value of k.

Example 1.23

Find k if $f\circ f(k) = 5$ where $f(k)=2k-1$.

Example 1.24

If $f(x)=2x+3$, $g(x)=1-2x$ and $h(x)=3x$. Prove that $f\circ(g\circ h)=(f\circ g)\circ h$

Example 1.25

Find x if $gff(x) = fgg(x)$, given $f(x)=3x+1$ and $g(x)=x+3$.

Exercise 1.5

1. Using the functions f and g given below, find $f\circ g$ and $g\circ f$. Check whether $f\circ g = g\circ f$.

(i) $f(x)=x-6,\ g(x)=x^2$ (ii) $f(x)=\frac{2}{x},\ g(x)=2x^2-1$ (iii) $f(x)=\frac{x+6}{3},\ g(x)=3-x$

(iv) $f(x)=3+x,\ g(x)=x-4$ (v) $f(x)=4x^2-1,\ g(x)=1+x$

2. Find the value of k, such that $f\circ g = g\circ f$

(i) $f(x)=3x+2,\ g(x)=6x-k$ (ii) $f(x)=2x-k,\ g(x)=4x+5$

3. If $f(x)=2x-1,\ g(x)=\frac{x+1}{2}$, show that $f\circ g = g\circ f = x$

4. (i) If $f(x)=x^2-1,\ g(x)=x-2$ find a, if $g\circ f(a) = 1$.

(ii) Find k, if $f(k)=2k-1$ and $f\circ f(k) = 5$.

5. Let $A,B,C\subseteq N$ and a function $f:A\to B$ be defined by $f(x)=2x+1$ and $g:B\to C$ be defined by $g(x)=2x^2$. Find the range of $f\circ g$ and $g\circ f$.

6. Let $f(x)=x^2-1$. Find (i) $f\circ f$ (ii) $f\circ f\circ f$

7. If $f:R\to R$ and $g:R\to R$ are defined by $f(x)=x^5$ and $g(x)=x^4$ then check if f, g are one-one and $f\circ g$ is one-one?

8. Consider the functions $f(x)$, $g(x)$, $h(x)$ as given below. Show that $(f\circ g)\circ h = f\circ(g\circ h)$ in each case. (i) $f(x)=x-1,\ g(x)=3x+1$ and $h(x)=x^2$

(ii) $f(x)=x^2,\ g(x)=2x$ and $h(x)=x+4$ (iii) $f(x)=x-4,\ g(x)=x^2$ and $h(x)=3x-5$

9. Let $f=\{(-1,3),(0,-1),(2,-9)\}$ be a linear function from Z into Z. Find $f(x)$.

10. In electrical circuit theory, a circuit $C(t)$ is called a linear circuit if it satisfies the superposition principle given by $C(at_1+bt_2)=aC(t_1)+bC(t_2)$, where a, b are constants. Show that the circuit $C(t) = 3t$ is linear.

2.NUMBERS AND SEQUENCES

Example:2.1

We have 34 cakes. Each box can hold 5 cakes only. How many boxes we need to pack and how many cakes are unpacked?

Example:2.2

Find the quotient and remainder when a is divided by b in the following cases

(i)$a = -12$, $b = 5$ (ii)$a = 17$, $b = -3$ (iii)$a = -19$, $b = -4$

Example:2.3

Show that the square of an odd integer is of the form $4q + 1$, for some integer q.

Example:2.4

If the Highest Common Factor of 210 and 55 is expressible in the form $55x - 325$, find x.

Example:2.5

Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.

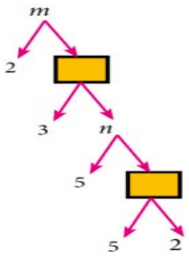
Example:2.6

Find the HCF of 396, 504, 636.

Exercise 2.1

1. Find all positive integers, when divided by 3 leaves remainder 2.
2. A man has 532 flower pots. He wants to arrange them in rows such that each row contains 21 flower pots. Find the number of completed rows and how many flower pots are left over.
3. Prove that the product of two consecutive positive integers is divisible by 2.
4. When the positive integers a, b and c are divided by 13, the respective remainders are 9,7 and 10. Show that $a+b+c$ is divisible by 13.
5. Prove that square of any integer leaves the remainder either 0 or 1 when divided by 4.
6. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of
   (i) 340 and 412 (ii) 867 and 255 (iii)10224 and 9648 (iv) 84, 90 and 120
7. Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case.
8. If d is the Highest Common Factor of 32 and 60, find x and y satisfying $d = 32x + 60y$.
9. A positive integer when divided by 88 gives the remainder 61. What will be the remainder when the same number is divided by 11?

10. Prove that two consecutive positive integers are always coprime.



Example:2.7

In the given factor tree, find the numbers *m* and *n*.

3. ALGEBRA

Example 3.1

The father's age is six times his son's age. Six years hence the age of father will be four times his son's age. Find the present ages (in years) of the son and father.

Example 3.2

Solve $2x-3y=6, x+y=1$

Example 3.3

Solve the following system of linear equations in three variables

$3x-2y+z=2, 2x+3y-z=5, x+y+z=6$

Example 3.4

In an interschool atheletic meet, with 24 individual events, securing a total of 56 points, a first place secures 5 points, a second place secures 3 points, and a third place secures 1 point. Having as many third place finishers as first and second place finishers, find how many athletes finished in each place.

Example 3.5

Solve $x+2y-z=5;\ x-y+z=-2;\ -5x-4y+z=-11$

Example 3.6

Solve $3x+y-3z=1;\ -2x-y+2z=1;\ -x-y+z=2$

Example 3.7

Solve $\frac{x}{2}-1=\frac{y}{6}+1=\frac{z}{7}+2;\ \frac{y}{3}+\frac{z}{2}=13$

Example 3.8

Solve : $\frac{1}{2x}+\frac{1}{4y}-\frac{1}{3z}=\frac{1}{4};\ \frac{1}{x}=\frac{1}{3y};\ \frac{1}{x}-\frac{1}{5y}+\frac{4}{z}=2\frac{2}{15}$

Example 3.9

The sum of thrice the first number, second number and twice the third number is 5. If thrice the second number is subtracted from the sum of first number and thrice the third we get 2. If the third number is subtracted from the sum of twice the first, thrice the second, we get 1. Find the numbers.

Exercise 3.1

1. Solve the following system of linear equations in three variables :

   (i) $x+y+z=5;\ 2x-y+z=9;\ x-2y+3z=16$

   (ii) $\frac{1}{x}-\frac{2}{y}+4=0;\ \frac{1}{y}-\frac{1}{z}+1=0;\ \frac{2}{z}+\frac{3}{x}=14$

   (iii) $x+20=\frac{3y}{2}+10=2z+5=110-(y+z)$

2. Discuss the nature of solutions of the following system of equations

   (i) $x+2y-z=6;\ -3x-2y+5z=-12;\ x-2z=3$

   (ii) $2y+z=3(-x+1);\ -x+3y-z=-4;\ 3x+2y+z=-\frac{1}{2}$

   (iii) $\frac{y+z}{4}=\frac{z+x}{3}=\frac{x+y}{2};\ x+y+z=27$

3. Vani, her father and her grand father have an average age of 53. One-half of her grand father's age plus one-third of her father's age plus one fourth of Vani's age is 65. Four years ago if Vani's grandfather was four times as old as Vani then how old are they all now ?
4. The sum of the digits of a three-digit number is 11. If the digits are reversed, the new number is 46 more than five times the former number. If the hundreds digit plus twice the tens digit is equal to the units digit, then find the original three digit number ?
5. There are 12 pieces of five, ten and twenty rupee currencies whose total value is ₹ 105. When first 2 sorts are interchanged in their numbers its value will be increased by ₹ 20. Find the number of currencies in each sort.

Exercise 3.15

1. Graph the following quadratic equations and state their nature of solutions.

   (i) $x^2-9x+20=0$ (ii) $x^2-4x+4=0$ (iii) $x^2+x+7=0$

   (iv) $x^2-9=0$ (v) $x^2-6x+9=0$ (vi) $(2x-3)(x+2)=0$

2. Draw the graph of $y=x^2-4$ and hence solve $x^2-x-12=0$
3. Draw the graph of $y=x^2+x$ and hence solve $x^2+1=0$
4. Draw the graph of $y=x^2+3x+2$ and use it to solve $x^2+2x+1=0$
5. Draw the graph of $y=x^2+3x-4$ and hence use it to solve $x^2+3x-4=0$
6. Draw the graph of $y=x^2-5x-6$ and hence solve $x^2-5x-14=0$
7. Draw the graph of $y=2x^2-3x-5$ and hence solve $2x^2-4x-6=0$
8. Draw the graph of $y=(x-1)(x+3)$ and hence solve $x^2-x-6=0$

MATRICES

Example 3.53

Consider the following information regarding the number of men and women workers in three factories I, II and III.

Factory	Men	Women
I	23	18
II	47	36
III	15	16

Represent the above information in the form of a matrix. What does the entry in the second row and first column represent?

Example 3.54

If a matrix has 16 elements, what are the possible orders it can have?

Example 3.55

Construct a 3x3 matrix whose elements are $a_{ij} = i^2 j^2$

Example 3.56

Find the value of a, b, c, d from the equation $\begin{pmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{pmatrix} = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$

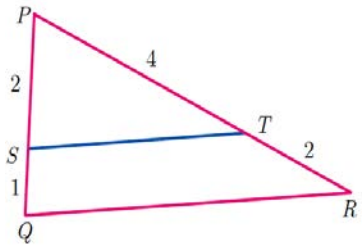
Exercise 3.16

1. In the matrix $A = \begin{pmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \frac{\sqrt{3}}{2} & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{pmatrix}$, write (i) The number of elements (ii) The order of the matrix (iii) Write the elements a_{22}, a_{23}, a_{24}, a_{34}, a_{43}, a_{44}.
2. If a matrix has 18 elements, what are the possible orders it can have? What if it has 6 elements?
3. Construct a3x3 matrix whose elements are given by (i) $a_{ij} = |i - 2j|$ (ii) $a_{ij} = \frac{(i+j)^3}{3}$
4. If $A = \begin{pmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{pmatrix}$ then find the transpose of A.
5. If $A = \begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ then find the transpose of $-A$.
6. If $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ then verify $(A^T)^T = A$.

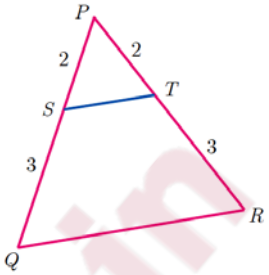
4.GEOMETRY

Example:4.1

Show that ΔPST ~ ΔPQR (i)



(ii)

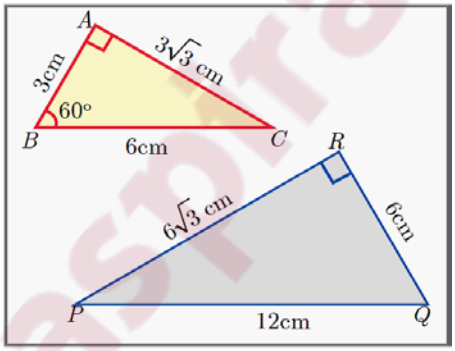


Example:4.2

Is ΔABC ~ ΔPQR ?

Example:4.3

Observe Figure and find ∠P

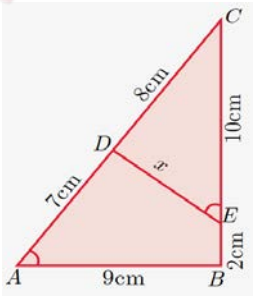


Example:4.4

A boy of height 90cm is walking away from the base of a lamp post at a speed of 1.2m/sec. If the lamppost is 3.6m above the ground, find the length of his shadow cast after 4 seconds.

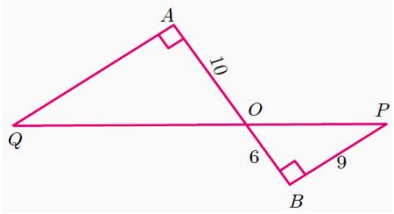
Example:4.5

In Figure ∠A = ∠CED
prove that ΔCAB ~ΔCED .
Also find the value of x.



Example:4.6

In Fig , *QA* and *PB* are perpendiculars to *AB*.
If *AO* = 10 cm, *BO*= 6 cm and *PB*= 9 cm. Find *AQ*.



Example:4.7

The perimeters of two similar triangles *ABC* and *PQR* are respectively 36 cm and 24 cm. If *PQ* = 10 cm, find *AB*.

Example:4.8

If ΔABC is similar to ΔDEF such that BC = 3 cm, EF = 4 cm and area of ΔABC = 54 cm^2. Find the area of ΔDEF.

Example:4.9

Two poles of height '*a*' metres and '*b*' metres are '*p*' metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres

Example:4.10

Construct a triangle similar to a given triangle *PQR* with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle *PQR* (scale factor $\frac{3}{5} < 1$)

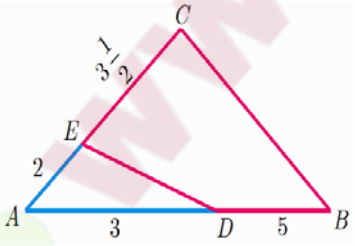
Example:4.11

Construct a triangle similar to a given triangle *PQR* with its sides equal to $\frac{7}{4}$ of the corresponding sides of the triangle *PQR* (scale factor $\frac{7}{4} > 1$)

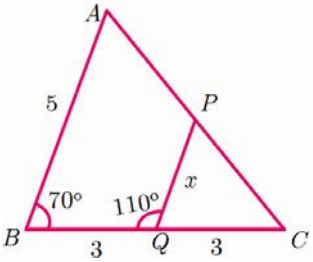
Exercise 4.1

1. Check whether the which triangles are similar and find the value of *x*.

(i)



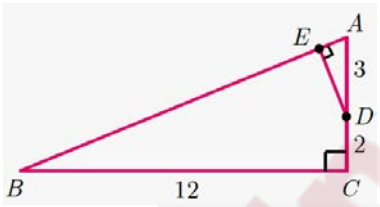
(ii)



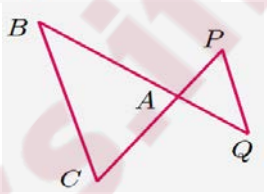
2. A girl looks the reflection of the top of the lamp post on the mirror which is 66 m away from the foot of the lamppost. The girl whose height is 12.5 m is standing 2.5 m away from the mirror. Assuming the mirror is placed on the ground facing the sky and the girl, mirror and the lamppost are in a same line, find the height of the lamp post.
3. A vertical stick of length 6 m casts a shadow 400 cm long on the ground and at the same time a tower casts a shadow 28 m long. Using similarity, find the height of the tower.

4. Two triangles QPR and QSR, right angled at P and S respectively are drawn on the same base QR and on the same side of QR. If PR and SQ intersect at T, prove that PT × TR = ST × TQ.

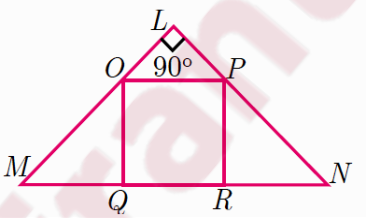
5. In the adjacent figure, ΔABC is right angled at C and DE ⊥ AB. Prove that ΔABC ~ ΔADE and hence find the lengths of AE and DE



6. In the adjacent figure, ΔACB~ΔAPQ . If *BC* = 8 cm, PQ = 4 cm, BA = 6.5 cm and AP = 2.8 cm, find CA and AQ.

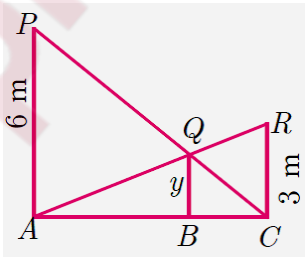


7. If figure OPRQ is a square and ∠ MLN = 90° .
   Prove that (i) ΔLOP ~ ΔQMO
   (ii) ΔLOP ~ ΔRPN
   (iii) ΔQMO ~ ΔRPN
   (iv) $QR^2 = MQ \times RN$



8. If ΔABC ~ ΔDEF such that area of ΔABC is $9cm^2$ and the area of ΔDEF is $16cm^2$ and BC = 2.1 cm. Find the length of EF.

9. Two vertical poles of heights 6 m and 3 m are erected above a horizontal ground AC. Find the value of y.



10. Construct a triangle similar to a given triangle *PQR* with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle *PQR* (scale factor $\frac{2}{3}$).

11. Construct a triangle similar to a given triangle *LMN* with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle *LMN* (scale factor $\frac{4}{5}$).

12. Construct a triangle similar to a given triangle *ABC* with its sides equal to $\frac{6}{4}$ of the corresponding sides of the triangle *ABC* (scale factor $\frac{6}{4}$).

13. Construct a triangle similar to a given triangle *PQR* with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle *PQR* (scale factor $\frac{7}{3}$).

5. COORDINATE GEOMETRY

Example 5.1

Find the area of the triangle whose vertices are (−3,5) , (5, 6) and (5,−2)

Example 5.2

Show that the points $P(-1.5,3)$, $Q(6,-2)$, $R(-3,4)$ are collinear.

Example 5.3

If the area of the triangle formed by the vertices A(−1,2), B(k,−2) , and C(7,4) (taken in order) is 22 sq. units, find the value of k.

Example 5.4

If the points $P(-1, -4)$, $Q(b,c)$, and $R(5, -1)$ are collinear and if $2b+c = 4$, then find the values of b and c.

Example 5.5

The floor of a hall is covered with identical tiles which are in the shapes of triangles. One such triangle has the vertices at (−3,2) , (−1, −1) and (1,2). If the floor of the hall is completely covered by 110 tiles, find the area of the floor.

Example 5.6

Find the area of the quadrilateral formed by the points (8,6) , (5,11) , (−5,12) and (−4,3).

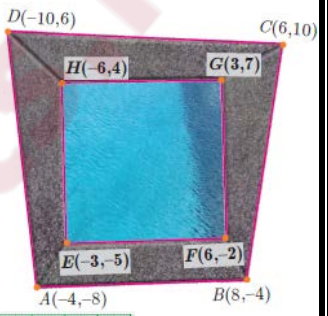
Example 5.7

The given diagram shows a plan for constructing a new parking lot at a campus. It is estimated that such construction would cost `1300 per square feet. What will be the total cost for making the parking lot?

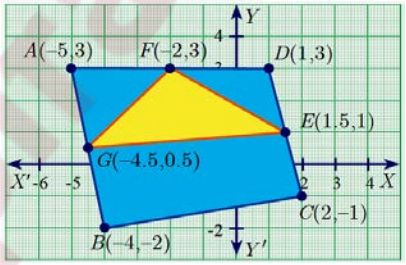
Exercise 5.1

1. Find the area of the triangle formed by the points
   (i) (1, −1) , (−4,6) and (−3, −5). (ii) (−10, −4) , (−8, −1) and (−3, −5).
2. Determine whether the sets of points are collinear?
   (i) $(-\frac{1}{2}, 3)$, (−5,6) and (−8, 8). (ii) (a, b+c) , (b, c+a) and (c, a+b).
3. Vertices of given triangles are taken in order and their areas are provided aside. In each case, find the value of 'p '.
   (i) Vertices : (0,0) , (p,8) and (6, 2) Area : 20 sq.units
   (ii) Vertices : (p,p) , (5,6) and (5, −2) Area : 32 sq.units
4. In each of the following, find the value of 'a' for which the given points are collinear.
   (i) (2,3) , (4,a) and(6, −3) (ii) (a, 2−2a) , (−a+1, 2a) and (−4−a, 6−2a)

5. Find the area of the quadrilateral whose vertices are at
   (i) (−9, −2) , (−8−4), (2,2) and (1, −3). (ii) (−9,0) , (−8,6)(−1, −2) and (−6, −3).
6. Find the value of k, if the area of a quadrilateral is 28 sq.units, whose vertices are (−4, −2) , (−3,k), (3, −2) and (2,3).
7. If the points A(−3,9), B(a, b) , and C(4, −5) are collinear and if $a+b = 1$, then find a and b.
8. Let P(11, 7), Q(13.5, 4) , and R(9.5, 4) be the mid- points of the sides AB, BC and AC respectively of ΔABC . Find the coordina tes of the vertices A, B and C. Hence find the area of ΔABC and compare this with area of ΔPQR .
9. In the figure, the quadrilateral swimming pool shown is surrounded by concrete patio. Find the area of the patio. A triangular shaped glass with vertices at A(−5, −4), B(1, 6) , and C(7, −4) has to be painted. If one bucket of paint covers 6 square feets, how many buckets of paint will be required to paint the whole glass, if only one coat of paint is applied.



10. In the figure, find the area of (i) triangle AGF
    (ii) triangle FED (iii) quadrilateral BCEG.



6.TRIGNOMETRY

Example:6.1

Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$

Example:6.2

Prove that $\dfrac{\sin A}{1+\cos A} = \dfrac{1-\cos A}{\sin A}$

Example:6.3

Prove that $1 + \dfrac{\cot^2\theta}{1+\operatorname{cosec}\theta} = \operatorname{cosec}\theta$

Example:6.4

Prove that $\sec\theta - \cos\theta = \tan\theta \sin\theta$

Example:6.5

Prove that $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

Example:6.6

Prove that $\frac{\sec\theta}{\sin\theta}-\frac{\sin\theta}{\cos\theta}=\cot\theta$

Example:6.7

Prove that $\sin^2 A\cos^2 B+\cos^2 A\sin^2 B+\cos^2 A\cos^2 B+\sin^2 A\sin^2 B=1$

Example:6.8

If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$, then prove that $\cos\theta-\sin\theta=\sqrt{2}\sin\theta$

Example:6.9

Prove that $(\cos ec\theta-\sin\theta)(\sec\theta-\cos\theta)(\tan\theta+\cot\theta)=1$

Example:6.10

Prove that $\frac{\sin A}{1+\cos A}+\frac{\sin A}{1-\cos A}=2\cos ecA$

Example:6.11

If $\cos ec\theta+\cot\theta=P$, then prove that $\cos\theta=\frac{P^2-1}{P^2+1}$

Example:6.12

Prove that $\tan^2 A-\tan^2 B=\frac{\sin^2 A-\sin^2 B}{\cos^2 A\cos^2 B}$

Example:6.13

Prove that $\left(\frac{\cos^3 A-\sin^3 A}{\cos A-\sin A}\right)-\left(\frac{\cos^3 A+\sin^3 A}{\cos A+\sin A}\right)=2\sin A\cos A$

Example:6.14

Prove that $\frac{\sin A}{\sec A+\tan A-1}+\frac{\cos A}{\cos ecA+\cot A-1}=1$

Example:6.15

Show that $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right)=\left(\frac{1-\tan A}{1-cotA}\right)^2$

Example:6.16

Prove that $\frac{(1+\cot A+\tan A)(\sin A-\cos A)}{\sec^3 A-\cos ec^3 A}=\sin^2 A\cos^2 A$

Example:6.17

If $\frac{\cos^2\theta}{\sin\theta}=p$ and $\frac{\sin^2\theta}{\cos\theta}=q$, then prove that $p^2q^2\left(p^2+q^2+3\right)=1$

Exercise 6.1

1. Prove the following identities.

(i) $\cot\theta+\tan\theta=\sec\theta\,\mathrm{cosec}\theta$ (ii) $\tan^4\theta+\tan^2\theta=\sec^4\theta-\sec^2\theta$

2. Prove the following identities

(i) $\dfrac{1-\tan^2\theta}{\cot^2\theta-1}=\tan^2\theta$ (ii) $\dfrac{\cos\theta}{1+\sin\theta}=\sec\theta-\tan\theta$

3. Prove the following identities.

(i) $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}}=\sec\theta+\tan\theta$ (ii) $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}}+\sqrt{\dfrac{1-\sin\theta}{1+\sin\theta}}=2\sec\theta$

4. Prove the following identities.

(i) $\sec^6\theta=\tan^6\theta+3\tan^2\theta\sec^2\theta+1$

(ii) $(\sin\theta+\sec\theta)^2+(\cos\theta+\mathrm{cosec}\theta)^2=1+(\sec\theta+\mathrm{cosec}\theta)^2$

5. Prove the following identities.

(i) $\sec^4\theta(1-\sin^4\theta)-2\tan^2\theta=1$ (ii) $\dfrac{\cot\theta-\cos\theta}{\cot\theta+\cos\theta}=\dfrac{\mathrm{cosec}\theta-1}{\mathrm{cosec}\theta+1}$

6. Prove the following identities.

(i) $\dfrac{\sin A-\sin B}{\cos A+\cos B}+\dfrac{\cos A-\cos B}{\sin A+\sin B}=0$ (ii) $\dfrac{\sin^3 A+\cos^3 A}{\sin A+\cos A}+\dfrac{\sin^3 A-\cos^3 A}{\sin A-\cos A}=2$

7. (i) If $\sin\theta+\cos\theta=\sqrt{3}$, then prove that $\tan\theta+\cot\theta=1$

(ii) If $\sqrt{3}\sin\theta-\cos\theta=0$, then show that $\tan 3\theta=\dfrac{3\tan\theta-\tan^3\theta}{1-3\tan^2\theta}$

8. (i) If $\dfrac{\cos\alpha}{\cos\beta}=m$ and $\dfrac{\cos\alpha}{\sin\beta}=n$, then prove that $(m^2+n^2)\cos^2\beta=n^2$

(ii) If $\cot\theta+\tan\theta=x$ and $\sec\theta-\cos\theta=y$, then prove that $(x^2y)^{\frac{2}{3}}-(xy^2)^{\frac{2}{3}}=1$

9. (i) If $\sin\theta+\cos\theta=p$ and $\sec\theta-\mathrm{cosec}\theta=q$, then prove that $q(p^2-1)=2p$

(ii) If $\sin\theta(1+\sin^2\theta)=\cos^2\theta$ then prove that $\cos^6\theta-4\cos^4\theta+8\cos^2\theta=4$

10. If $\dfrac{\cos\theta}{1+\sin\theta}=\dfrac{1}{a}$, then prove that $\dfrac{a^2-1}{a^2+1}=\sin\theta$

7. MENSURATION

Example 7.1

A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface area and the total surface area.

Example 7.2

The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . Find the diameter of the cylinder.

Example 7.3

A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level a garden. How much area will it cover in 8 revolutions?

Example 7.4

If one litre of paint covers 10 m^2, how many litres of paint is required to paint the internal and external surface areas of a cylindrical tunnel whose thickness is 2 m, internal radius is 6 m and height is 25 m.

Example 7.5

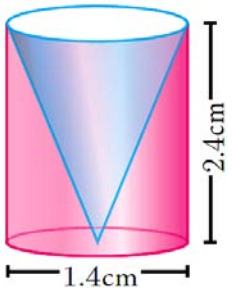
The radius of a conical tent is 7 m and the height is 24 m. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is 4 m?

Example 7.6

If the total surface area of a cone of radius 7cm is 704 cm^2, then find its slant height.

Example 7.7

From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and base is hollowed out (Figure). Find the total surface area of the remaining solid.



Example 7.8

Find the diameter of a sphere whose surface area is 154 m^2.

Example 7.9

The radius of a spherical balloon increases from 12 cm to 16 cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.

Example 7.10

If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area?

Example 7.11

The internal and external radii of a hollow hemispherical shell are 3 m and 5 m respectively. Find the T.S.A. and C.S.A. of the shell.

Example 7.12

A sphere, a cylinder and a cone are of the same radius, where as cone and cylinder are of same height. Find the ratio of their curved surface areas.

Example 7.13

The slant height of a frustum of a cone is 5 cm and the radii of its ends are 4 cm and 1 cm. Find its curved surface area.

Example 7.14

An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10 m and 4 m and whose height is 4 m. Find the curved and total surface area of the bucket.

Exercise 7.1

1. The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.
2. A solid iron cylinder has total surface area of 1848 sq.m. Its curved surface area is five – sixth of its total surface area. Find the radius and height of the iron cylinder.
3. The external radius and the length of a hollow wooden log are 16 cm and 13 cm respectively. If its thickness is 4 cm then find its T.S.A.
4. A right angled triangle PQR where $\angle Q = 90°$ is rotated about QR and PQ. If QR=16 cm and PR=20 cm, compare the curved surface areas of the right circular cones so formed by the triangle.
5. 4 persons live in a conical tent whose slant height is 19 cm. If each person require 22 cm^2 of the floor area, then find the height of the tent.
6. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720 cm^2, how many caps can be made with radius 5 cm and height 12 cm.
7. The ratio of the radii of two right circular cones of same height is 1:3. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone.
8. The radius of a sphere increases by 25%. Find the percentage increase in its surface area.
9. The internal and external diameters of a hollow hemispherical vessel are 20 cm and 28 cm respectively. Find the cost to paint the vessel all over at ₹ 0.14 per cm^2 .
10. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is ₹ 2.

8.STATISTICS AND PROBABILITY

Example 8.1

Find the range and coefficient of range of the following data: 25, 67, 48, 53, 18, 39, 44.

Example 8.2

Find the range of the following distribution.

Age (in years)	16-18	18-20	20-22	22-24	24-26	26-28
Number of students	0	4	6	8	2	2

Example 8.3

The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value.

Example 8.4

The number of televisions sold in each day of a week are $13, 8, 4, 9, 7, 12, 10$. Find its standard deviation.

Example 8.5

The amount of rainfall in a particular season for 6 days are given as 17.8 cm, 19.2 cm, 16.3 cm, 12.5 cm, 12.8 cm and 11.4 cm. Find its standard deviation.

Example 8.6

The marks scored by 10 students in a class test are 25, 29, 30, 33, 35, 37, 38, 40, 44, 48. Find the standard deviation.

Example 8.7

The amount that the children have spent for purchasing some eatables in one day trip of a school are 5, 10, 15, 20, 25, 30, 35, 40. Using step deviation method, find the standard deviation of the amount they have spent.

Exercise 8.4

1. If $P(A)=\frac{2}{3}$, $P(B)=\frac{2}{5}$, $P(A\cup B)=\frac{1}{3}$ then find $P(A\cap B)$.
2. A and B are two events such that, $P(\text{A}) = 0.42$, $P(\text{B}) = 0.48$, and $P(A\cap B)=0.16$
   Find (i) P,(not A) (ii) P,(not B) (iii) P,(A or B)
3. If A and B are two mutually exclusive events of a random experiment and P(not A) = 0.45, $P(A\cup B)=0.65$, then find $P(B)$.
4. The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(\bar{A})+P(\bar{B})$.
5. The probability of happening of an event A is 0.5 and that of B is 0.3. If A and B are mutually exclusive events, then find the probability that neither A nor B happen.
6. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

7. From a well-shuffled pack of 52 cards, a card is drawn at random. Find the probability of it being either a red king or a black queen.
8. A box contains cards numbered 3, 5, 7, 9, … 35, 37. A card is drawn at random from the box.
   Find the probability that the drawn card have either multiples of 7 or a prime number.
9. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads.
10. The probability that a person will get an electrification contract is $\frac{3}{5}$ and the probability that he will not get plumbing contract is $\frac{5}{8}$. The probability of getting atleast one contract is $\frac{5}{7}$.
    What is the probability that he will get both?
11. In a town of 8000 people, 1300 are over 50 years and 3000 are females. It is known that 30% of the females are over 50 years. What is the probability that a chosen individual from the town is either a female or over 50 years?
12. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or consecutive two heads.
13. If A, B, C are any three events such that probability of B is twice as that of probability of A and probability of C is thrice as that of probability of A and if $P(A\cap B)=\frac{1}{6}$, $P(B\cap C)=\frac{1}{4}$, $P(A\cap C)=\frac{1}{8}$, $P(A\cup B\cup C)=\frac{9}{10}$, $P(A\cap B\cap C)=\frac{1}{15}$, then find P(A) , P(B) and P(C) ?
14. In a class of 35, students are numbered from 1 to 35. The ratio of boys to girls is 4:3. The roll numbers of students begin with boys and end with girls. Find the probability that a student selected is either a boy with prime roll number or a girl with composite roll number or an even roll number.