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# MATHEMATICS

## WORKSHEETS AND ASSIGNMENTS

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# Contents

# 1 Recurring Deposits

1. Kiran deposited Rs. 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at the rate of 11% per annum, find the amount she gets on maturity.

2. Mohan deposited Rs. 80 per month in a cumulative deposit account for 6 years. Find the amount payable to him on maturity, it the rate of interest is 6% per annum.

3. Mr. R. K. Nair gets Rs. 6455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly installment.

4. Ahmed has a recurring deposit account in a bank He deposits Rs. 2500 per month for 2 years. If he gets Rs. 66250 at the time of maturity, find: i) interest paid by the bank ii) rate of interest.

5. Punnet has a recurring deposit account in Bank of Baroda and deposits Rs.140 per month for 4 years. If he gets Rs.8,092 on maturity, find the rate of interest given by the bank.

6. Amit deposited 150 per month in a bank for 8 month under the recurring deposit scheme. What will be the maturity value of his deposits, if the rate of interest is 8% per annum and interest is calculated at the end of every month?

7. Mr. Gupta opened a recurring deposit account in a bank. He deposited Rs. 2,500 per month for two years. At the time of maturity, he got Rs.67,500. Find:

(i)The total interest earned by Mr. Gupta

· (ii) The rate of interest per annum.

8. Bitto deposits a certain sum of money in a recurring deposit account of a Bank. If the rate of interest of 8% per annum and Mr. Bitto gets Rs.8,008 from the bank after 3 years, find the value of his monthly installment.

9. Shahrukh opened a recurring deposit account in a bank and deposited 800 per month for 1 ½ years. If he received Rs.15,084 at the time of maturity. Find the interest rate per annum.

10. David opened a recurring deposit account in a bank and deposited Rs.300per month for two years. If he received Rs.7,725 at the time of maturity, find the rate of interest per annum.

# 2 Shares And Dividends

1. A man invests Rs. 8,800 in buying shares of a company of face value of Rs. 100 each at a premium of 10%. If he ears Rs. 1,200 at the end of the year as dividend. Find; i) The number of shares he has in the company. ii) The dividend percent per share.

2. A man invests Rs. 1680 in buying shares of nominal value Rs. 24 and selling at 12% premium. The dividend on the shares is 15% per annum. Calculate: i) The number of shares he buys; ii) The dividend he receives.

3. By investing Rs. 7500 in a company paying 10% dividend, an annual income of Rs. 500 is received. What price is paid for each of Rs.100 shares?

4. A man invests Rs. 20,020 in buying shares of N.V. Rs. 26 at 10% premium. The dividend on the shares is 15% per annum. Calculate: i) The number of shares he buys; ii) The dividend he receives annually; iii) The rate of interest he gets on his money.

5. A man invested Rs. 45,000 in 15% Rs.100 shares quoted at Rs. 125, when the M.V. of these shares rose to Rs. 140, he sold some shares, just enough to raise Rs. 8400. calculate: i) The number of shares he still holds; ii) The dividend due to him on these remaining shares.

6. Vivek invests Rs. 4,500 in 8%, Rs.10 shares at Rs. 15. He sells the shares when the price rises to Rs. 30, and invests the proceeds in 12% Rs. 100 shares at Rs. 125. Calculate; i) The sale proceeds ii) The number of Rs. 125 shares he buys; iii) The change in his annual income from dividend.

7. Mr. Parekh invested Rs. 52,000 on Rs. 100 shares at a discount of Rs. 20 paying 8% dividend. At the end of one year he sells the shares at a premium of Rs. 20; find: i) The annual dividend; ii) The profit earned including his dividend.

8. Salman buys 50 shares of face value Rs. 100 available at Rs. 132. i) What is his investment? ii) If the dividend is 7.5%, what will be his annual income? iii) If he wants to increase his annual income by Rs. 150, how many extra shares should he buy?

9. Salman invests a sum of money in Rs. 50 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is Rs. 600, Calculate; i) The number of shares he bought; ii) His total investment; ii) The rate of return on his investment.

10. A person invested of his saving in 20% Rs. 50 shares quoted at Rs. 60 and the remainder of the savings in 10% Rs. 100 shares quoted at Rs. 110. if his total income from these investments is Rs. 9,200; find: i) His total savings ii) The number of Rs. 50 shares; ii) The number of Rs. 100 shares.

# 3 Linear Inequations

1. Solve the following inequation and graph the solution on a number line

$2x - 5 \leq 5x + 4 < 11$, where $x \in I$.

2. Given that $x \in I$, solve the inequation and graph it on a number line:

$3 \geq \frac{x-4}{2} + \frac{x}{3} \geq 2$.

3. Find the range of the set $A \cap B$ and represent it on a number line:

$A = \{x : 11x - 5 > 7x + 3, x \in R\}$, $B = \{x : 18x - 9 \geq 15 + 12x, x \in R\}$.

4. Solve the given inequation and graph it on a number line:

$2y - 3 < y + 1 \leq 4y + 7, y \in R$.

5. Solve the given inequation and graph it on a number line:

$-3 < -\frac{1}{2} - \frac{2x}{3} \leq \frac{5}{6}, x \in R$.

6. Solve the given inequation and graph it on a number line:

$4x - 19 < \frac{3x}{5} - 2 \leq -\frac{2}{5} + x, x \in R$.

7. Solve the given inequation and graph it on a number line:

$-\frac{x}{3} \leq \frac{x}{2} - 1\frac{1}{3} < \frac{1}{6}. x \in R$.

8. Find the value of $x$ which satisfies the inequation:

$-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2, x \in W$.

9. Solve the inequation given that $x \in N$:

$3 - 2x \geq x - 12$

10. Solve the inequation:

$12 + 1\frac{5}{6}x \leq 5 + 3x$ and $x \in R$.

# 4 Quadratic Equations

1. Solve the following quadratic equation for x and give your answer correct to two decimal places:
$x^2 - 3x - 9 = 0$

2. Solve $(7x + 1)/(7x + 5) = (3x + 1)/(5x + 1)$.

3. Solve the quadratic equation: $21x^2 - 8x - 4 = 0$

4. Solve the equation: $\sqrt{(3x^2 - 2)} = 2x - 1$.

5. Solve the quadratic equation: $\sqrt{3}\, x^2 + 10x - 8\sqrt{3} = 0$.

6. A train covers a distance of 600 km at x km/hr. Had the speed been (x + 20) km/hr, the time taken to cover the distance would have been reduced by 5 hours. Write down an equation in x and solve it to evaluate x.

7. In an auditorium, seats were arranged in rows and columns. The number of rows was equal to the number of seats in each row. When the number of rows was doubled and the number of seats in each row was reduced by 10, the total number of seats increased by 300. Find:
   (i) The number of rows in the original arrangement.
   (ii) The number of seats in the auditorium after re-arrangement.

8. A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

9. Five years ago, a woman's age was the square of her son's age. Ten years later her age will be twice that of her son's age. Find:
   (i) The age of the son five years ago.
   (ii) The present age of the woman.

10. Find the value of 'z', if the following equation has equal roots: $(z - 2)x^2 - (5 + z)x + 16 = 0$

11. The difference of two positive integers is 3 and the sum of their squares is 117; find the numbers.

12. The product of two consecutive positive odd integers is 2499. Find the bigger integer.

13. The product of two positive consecutive even integer is 168. Assuming the smaller integer to be x, frame an equation for the statement and find the numbers.

14. For every litre of petrol, one car travels x km and another car travels 5 km more than the first. If the first car uses 4 litres more than the second car in converting 400 km, frame an equation for the statement to find x. What is the value of x?

15. The product of two consecutive integers is 3906. Find the integers.

16. 6. Divide 51 into two parts whose product is 608.

17. At a party, each member gives a gift to the rest. There were 132 gifts given at the party. Find the number of members.

18. A two-digit number is made of two consecutive digits such that the sum of their squares is 4 less than the number. Find the two-digit number.

19. 780 students stand in rows and columns. Each row has equal number of students and each column has equal number of students. If the number of students in each row is 4 more than the number of rows, find the number of students in each row.

20. Find the percent age of a man if his age 40 years hence will become equal to the square of what his age was 32 years ago.

21. Two pipes together can fill a cistern in 11 1/9 minutes. If operated separately, time taken by the first pipe to fill the cistern is 5 minutes more than that by the second. Find the time required individually for each of the pipes to fill the cistern.

22. Mrs Tendon has two sons, one being exactly one year older than the other. At percentage, her age is equal to the sum of the squares of the ages of her sons. If 4 years hence her age becomes five times the age of the elder son then find the percent ages of her sons.

23. In a triangle the measure of the greatest angle is square of the measure of the smallest angle, and the other angle is double of the smallest angle. Find the greatest angle of the triangle.

24. The lengths (in cm) of parallel sides of a trapezium are 2x and 4x 3x - 1, and the distance between the parallel sides is x + 1. If the area of the trapezium be 28 cm^2, find the smaller of the two parallel sides.

25. Area and perimeter of a rectangular field are 2000 sq.m. and 180 m respectively. Find its length and breadth.

26. The base of a triangle exceeds twice its altitude by 1 8m. If the area of the triangle be 360 sq. m., what is its altitude?

27. Five times of a positive integer is less than twice its square by 3. Find the integer.

28. Smith and Johnson together can do a piece of work in 4 days. If they had to work separately, the time taken by Johnson to do the work would be more than that of Smith by 6 days. In how many days can Smith alone do the work?

29. A shopkeeper buys a certain number of books for $720. If the cost per book was $5 less, the number of books that could be bought for $ 720 would be 2 more. Taking the original cost of each book to be $x, write an equation in x and solve it.

30. Find the value of 'p', if the following quadratic equation has equal roots: $4x^2 - (p - 2)x + 1 = 0$

# 5 Ratio And Proportions

1. If $x, y \text{ and } z$ are in continued proportion, prove that:

$$\frac{(x+y)^2}{(y+z)^2} = \frac{x}{y}$$

2. Given $x = \frac{\sqrt{a^2+b^2}+\sqrt{a^2-b^2}}{\sqrt{a^2+b^2}-\sqrt{a^2-b^2}}$. Use componendo and dividendo to prove that: $x^2 = \frac{2a^2x}{x^2+1}$

3. If $\frac{x^2+y^2}{x^2-y^2} = 2\frac{1}{8}$, find:

i) $\frac{x}{y}$

ii) $\frac{x^3+y^3}{x^3-y^3}$

4. Using componendo and dividendo, find the value of $x$: $\frac{\sqrt{3x+4}+\sqrt{3x-5}}{\sqrt{3x+4}-\sqrt{3x-5}} = 9$

5. If $x = \frac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$, using properties of proportion show that: $x^2 - 2ax + 1$

6. Given, $\frac{a}{b} = \frac{c}{d}$

prove that: $\frac{3a-5b}{3a+5b} = \frac{3c-5d}{3c+5d}$

7. If $x = \frac{\sqrt{a+3b}+\sqrt{a-3b}}{\sqrt{a+3b}-\sqrt{a-3b}}$, prove that: $3bx^2 - 2ax + 3b = 0$

8. Using the properties of proportion, solve for $x$ Given: $\frac{(x^4+1)}{2x^2} = \frac{17}{8}$

9: What least number must be added to each of the numbers $6, 15, 20, \text{ and } 43$ to make them proportional.

10. The monthly pocket money of Ravi and Sanjeev are in the ratio of 5:7 Their expenditures are in the ratio of 3:5. If each saves Rs. 80 per month, find their monthly pocket money.

11.. If $a : b = 5 : 3$, find $(5a + 8b) : (6a - 7b)$

12. If x : y = 9:10, find the value of (5x + 3y) : (5x – 3y).

14: What number should be subtracted from each of the numbers $23, 30, 57 and 78$ ; so that the ratios are in proportion.

15: $6$ is the mean proportion between two numbers $x$ and $y$ and $48$ is the third proportion to $x$ and $y$. Find the numbers.

16. If (4a + 9b) : (4c + 9d) = (4a – 9b) : (4c – 9d) , show that a : b = c : d.

17. If the mean proportional of a and c is b then prove that a, c, $a^2 + b^2$ and $b^2 + c^2$ are proportional.

18. If b is the mean proportional of a and c, prove that the mean proportional of $a^2 + b^2$ and $b^2 + c^2$ is ab + bc.

19. Find the fourth proportional of the following sets numbers.

(i) $a^2b, b^2c, c^2a$ (ii) $m - n, m^2 - n^2, m^2 - mn + n^2$

20. (i) If m, 10, n, 40 are in continued proportion hen find the positive values of m and n.

(ii) If 4, 16, m, n are in continued proportion then find m and n.

# 6 Remainder Theorem And Factor Theorem

1. Use the Remainder Theorem, find the remainder when $4x^3 - 3x^2 + 2x - 4$ is divided by $x + 1$.

2. If $p(y) = y^3 + y^2 - 2y + 1$, using Remainder Theorem, find the remainder, when $p(y)$ is divided by $(y - 3)$, find the value of $p(a)$.

3. Find the remainder (without division) when
   (a) $x^2 - 2x + 4$ is divided by $x - 1$
   (b) $2x^3 - 3x^2 + 7x - 8$ is divided by $x - 1$

4. Use the Remainder Theorem, find the remainder when $x^4 - 3x^2 + 4x - 12$ is divided by $x - 3$.

5. Find the remainder (without division) when
   (a) $x^3 + 4x + 2$ is divisible by $x + 2$
   (b) $4x^3 - 3x^2 + 5x + 4$ is divided by $2x + 1$
   (c) $4x^3 + 5x^2 + 6x - 7$ is divided by $2x - 1$

6. What number should be added to $x^2 + 5$ so that the resulting polynomial leaves the remainder 3 when divided by $x + 3$?

7. Use the Remainder Theorem, find the remainder when $4x^3 - 3x^2 + 2x - 4$ is divided by $x + 1$.

8. What number should be subtracted from $3x^2 + 5x$ so that the resulting polynomial leaves the remainder 1 when divided by $2x + 5$?

9. Use the Remainder Theorem, find the remainder when $x^6 + 3x^2 + 10$ is divided by $x - 2$.

10. Find a if the remainder is a when $x^3 + 3x^2 - ax + 3$ is divided by $x - 2$.

11. If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by $(x - 3)$, find the value of a.

12. Find the value of k if the remainder is -3 when $kx^3 + 8x^2 - 4x + 10$ is divided by $x + 1$.

13. If both $ax^3 + 2x^2 - 3$ and $x^2 - ax + 4$ leave the same remainder when divided by $x - 2$, find a.

14. Find the remainder (without division) when $8x^2 + 5x + 1$ is divisible by $x - 10$

15. Find the remainder when $x^3 - ax^2 + 6x - a$ is divisible by $x - a$.

16. Find the remainder (without division) when $x^2 + 7x - 11$ is divisible by $3x - 2$

17. Check whether $7 + 3x$ is a factor of $3x^3 + 7x$.

18. Find the remainder (without division) when $4x^3 - 3x^2 + 2x - 4$ is divisible by $x + 2$

19. Check whether the polynomial: $f(x) = 4x^3 + 4x^2 - x - 1$ is a multiple of $2x + 1$.

20. Prove that $x + 5$ is a factor of $2x^2 + 7x - 15$.

# 7 MATRICES

1. If $A = \begin{bmatrix} 3 & 5 \\ 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$, is the product of $AB$ possible.

2. Given $\begin{bmatrix} 2 & 1 \\ -3 & 4 \end{bmatrix} . X = \begin{bmatrix} 7 \\ 6 \end{bmatrix}$, find: i) the order of matrix $X$ ii) the matrix $X$ [2012]

3. If $M = \begin{bmatrix} 2 & 1 \\ 1 & -2 \end{bmatrix}$, find $M^2$, $M^3$ *and* $M^5$

4. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, and $B = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ find: i) $A(BA)$ ii) $(AB)B$.

5. If $M = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ and I is the unit matrix of the same order as that of M; show that:

$M^2 = 2M + 3I$

6. Given $A = \begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and ; $C = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$. Find $X$ such that $A + X = 2B + C$

7. Find the value of $x$ given that $A^2 = B$, $A = \begin{bmatrix} 2 & 12 \\ 0 & 1 \end{bmatrix}$, and $B = \begin{bmatrix} 4 & x \\ 0 & 1 \end{bmatrix}$

8. If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$ and $I$ matrix of the same order and $A^t$ is the transpose of the matrix, find $A^t.B + BI$.

9. Given $A = \begin{bmatrix} 2 & -6 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 2 \\ 4 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & 0 \\ 0 & 2 \end{bmatrix}$; Find the matrix $X$ such that $A + 2X = 2B + C$.

10. Let $A = \begin{bmatrix} 4 & -2 \\ 6 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 \\ 1 & -1 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & 3 \\ 1 & -1 \end{bmatrix}$. Find $A^2 - A + BC$

# 8 Section Formula

1. Find the point which lies on the perpendicular bisector of the line segment joining the points A(-2,-5) and B(2,5).

2. If P(x, 6) is the mid-point of the line segment joining A(6, 5) and B(4, y), find y.

3. Determine the vertex which contains a right angle in ΔABC, where A(4, -2), B(7, 9) and C(7,-2)

4. Find the distance of the point (2,3) from x- axis.

5. Find the coordinates of the centroid of a triangle, whose vertices are A($2\sqrt{5}$, $\sqrt{2}$), B($5\sqrt{5}$, $\sqrt{8}$) and C($\sqrt{125}$, $-2\sqrt{2}$).

6. The area of a triangle is 5 square units. Two of its vertices are (2, 1) and (3, -2). The third vertex is (x, y) where y = x + 3. Find the coordinates of the third vertex.

7. Show that points (a, b + c), (b, c + a) and (c, a + b) are collinear.

8. If two adjacent vertices of a parallelogram are (8, 2) and (-5, 10) and the diagonals intersect at the point (3, 5), find the other vertices of the parallelogram.

9. Find the value(s) of p for which the points (3p + 1, p), (p + 2, p – 5) and (p + 1, -p) are collinear.

10. Point A lies on the line segment PQ joining P(6, -6) and Q(-4, -1) in such a way that / = 2/5. If point P also lies on the line 3x + k(y + 1) = 0, find the value of k.

11. The coordinates of the midpoint of the line segment AB are (1, -2). The coordinate of A are (-3, 2). Find the coordinate of B.

12. Find the ratio in which the line segment PQ, where P (-5, 2) and Q (2, 3), is divided by the y-axis.

13. Find the ratio in which the point X (-6, h) divides the join of P (-4, 4) and Q (6, -1) and here hence find the value of h.

14. Find the ratio in which the line segment PQ, where P (4, -2) and Q (1, 3), is divided by the x-axis.

15. Find the coordinates of points of trisection of the line segment joining the point (6, -9) and the origin.

16. If X, Y and Z divides the line segment PQ in four equal parts such that PX = XY = YZ = ZQ, and the coordinates of P and Q are (1, 6) and (3, -4) respectively then find the coordinates of X, Y and Z.

17. In what ratio is the line segment joining X (0, 3) and Y (4, -1) divided by the x-axis. Write the coordinates of the point where XY intersects the x-axis.

18. If the point (p, q) is the middle point of the line segment joining the points P (7, -4) and Q (-1, 2) then find p and q.

19. Let M (-3, 5) be the middle point of the line segment XY whose one end has the coordinates (0, 0). Find the coordinates of the other end.

20. In what ratio is the line segment joining X (2, -3) and Y (5, 6) divides by the x-axis? Also, find the coordinates of the point of division.

# 9 REFLECTION

1. Find the coordinates of the image of the points (5, - 3) under (i) reflection in the x- axis (ii) reflection in the y- axis and (iii) reflection in the origin.

2. A point P (3, - 2) is reflected in the origin as P`. Point Q (- 7, 1) is reflected in the x- axis as Q`. Write down the co-ordinates of P` and Q` calculate the distance P`Q`.

3. The image of a point P under reflection in the x- axis is (- 3, 2). Write down the co-ordinates of P.

4. A triangle ABC where A (- 2, 3), B (4, - 4) C (6, - 7) is reflected in the x- axis onto triangle $A^{I}\ B^{I}\ C^{I}$ and then triangle $A^{I}\ B^{I}\ C^{I}$ is reflected in the origin onto $A^{II}\ B^{II}\ C^{II}$.

Write down the co-ordinates of (i) A`, B` C` & (ii) A'' B'' C''.

5. Point A (x, 5) is reflected in the origin and its image is (2, y). Write down the values of x and y.

6. i. The point P (2, 3) is reflected in the origin to P` (x, y). Write down the values of x and y.

ii. The point (4, 1) and (- 2, 4) are reflected in the line y = 3. Find the coordinates of their images.

7. i. A triangle ABC where A (1, 2), B (4, 8) and C (6, 8) is reflected through origin to triangle $A_1\ B_1\ C_1$. Triangle $A_1\ B_1\ C_1$ is then reflected in the x - axis to triangle $A_2$, $B_2$, $C_2$. Write down the coordinates of $A_2$, $B_2$, $C_2$. Write down a single transformation.

ii. The reflection of A (2, 3) in the line y = x produced A` (3, 2). Write down the co-ordinates of the reflection of each of the points in the line y = x (i) (4, 1) (ii) (- 2, - 3).

8. A (5, 4) is reflected in the x-axis to a point A`.

1. Write down the coordinates of A`.
2. What type of triangle is the figure OAA`, where O is the origin? Give reason. Draw a diagram to represent it
3. State, with reason, whether the triangle OAA` has any line of symmetry.
4. Find the coordinates of A'', the reflection of A in the y-axis followed by the reflection in the origin.
5. Compare the coordinates of A` and A.

9. i. The image of the point A (1, 5) when reflected in a line PQ is A` (7, 5). Write down the equation of the line PQ.

ii. The point A (a, b) is first reflected in the y-axis and then reflected in the origin to a point A` (- 3, 4). Write the value of a and b.

10. i. Point A (5, 0) on reflection is mapped as A` (- 5, 0). Write the equation of the mediator.

ii. Point P (3, -4) on reflection is mapped as P` (3, 4) Write the equation of the mediator.

# 10 Straight Lines

1. Determine the equation of a straight line whose inclination is 60° and which passes through the point (3, 4).

2. Find the equation of the straight line whose slope is 3 and passes through the point (-1, 2)

3. Find the equation of the straight line whose slope is -2 and passes through the point (3, 0)

4. Find the equation of the straight line whose inclination is 45° and passes through the point (4, -1)

5. A straight line passes through the point (- 1, 4) and makes an angle 60° with the positive direction of the x-axis. Find the equation of the straight line.

6. Find the equation of the line

   (i) passing through (1, 3) and making an intercept 5 on the y-axis

   (ii) passing through (4, -2) and making an intercept -3 on the y-axis

7. Find the equation of the line which is inclined at 135° with the negative direction of the x-axis and passes through the point (1, 2)

8. Prove that the line lines x - 2 = 0, x + 1 = 0, y = 0 & y - 3 = 0 form a square. Find the equations of its diagonals.

9. Find the equation of the straight line parallel to the y-axis and passes through the point (1, 3).

10. A straight line passes through the point (2, 3) and is such that the sum of its intercepts on the coordinate axes is 10. Find the equation of the straight line.

11. Find the equation, of the straight line whose inclination is $60^0$ and which passes through the mid-point of the line-segment joining the points (3, - 4) and (7, 8).

12. Find the equation of the line

   (i) whose slope is 2 and which cuts off an intercept 2 on the y-axis

   (ii) whose inclination is 45° and which cuts off an intercept -1 on the y-axis.

13. Find the equation of the line

   (i) passing through (-2, 5) and cutting the y-axis at A on the positive side of the y-axis such that OA = 4, O being the origin

   (ii) passing through (1, -2) and cutting the y-axis at B on the negative side of the y-axis such that OB = 4, O being the origin

14. Find the equation of the line parallel to the x-axis at a distance

   (i) 8 on the positive side of the y-axis (ii) 5 on the negative side of the y-axis

15. A and B are two points on the x-axis. A is on the positive side of the x-axis at a distance 5 and B is on the negative side at a distance 3 from the origin O. P is the midpoint of AB. Find the equation of the line PC which cuts an intercept 2 on the y-axis. Also, find the slope of PC.

16. Find the slope and the y-intercept of the line whose equation is

   (i) $y = x + 3$ (ii) $3y = \sqrt{3}x - 1$ (iii) $11x - 5y + 2 = 0$ (iv) $2y = 3(x + 1)$

17. Find the point midway between the point (-1, 3) and the point intersection of the lines 4x + y - 10= 0 and 2x + 3y - 8 = 0.

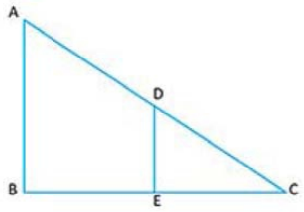
18. Find the equation of the straight line which cuts off an intercept (- 4) from the x-axis and passes through the point (2, - 1).

19. If the slope of the line joining the points (2k, - 2) and (1, - k) be (- 2), find k.

20. Find the co-ordinates of the point on the line 7x - 6y = 20 for which the ordinate is double the abscissa.

# 11 SIMILARITY

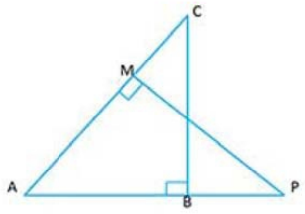
1. In the given figure, $AB$ and $DE$ are perpendicular to $BC$.



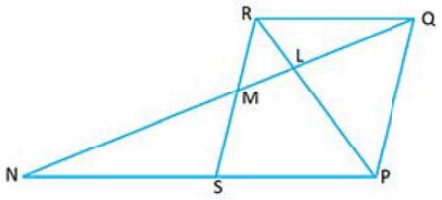

If $AB = 9\ cm, DE = 3\ cm\ and\ AC = 24cm$, calculate $AD$.

2. In the given figure, $\triangle ABC$ and $\triangle AMP$ are right angled at $B$ and $M$ respectively. Given $AC = 10\ cm, AP = 15\ cm$ and $PM = 12\ cm$.

(i) Prove $\triangle ABC \sim \triangle AMP$ (ii) Find $AB$ and $AC$.



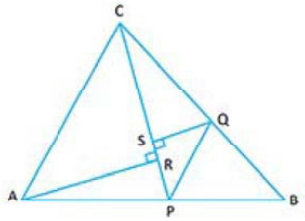

3. In the figure, $PQRS$ is a parallelogram with $PQ = 16\ cm$ and $QR = 10\ cm$. $L$ is a point on $PR$ such that $RL : LP = 2 : 3$. $QL$ produced meets $RS$ at $M$ and $PS$ produced at $N$. Find the lengths of $PN$ and $RM$.



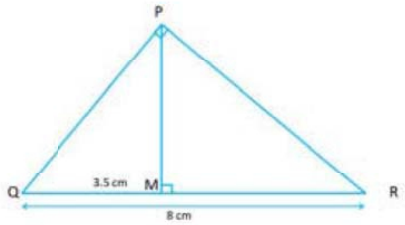

4. In the figure given below, $P$ is a point on $AB$ such that $AP : PB = 4 : 3$. $PQ \parallel AC$.

(i) Calculate the ratio $PQ : AC$, giving reasons for your answer.

(ii) In $\triangle ARC, \angle ARC = 90^o$ and in $\triangle PQS, \angle PSQ = 90^o$. Given $QS = 6\ cm$, calculate length of $AR$.



5. In the right angled $\triangle QPR$, $PM$ is the altitude. Given that $QR = 8cm$ and $MQ = 3.5cm$, calculate the value of $PR$.



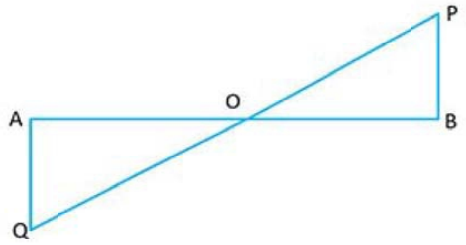

6. In the given figure $DE \parallel BC$.

(i) Prove that $\triangle ADE$ and $\triangle ABC$ are similar.

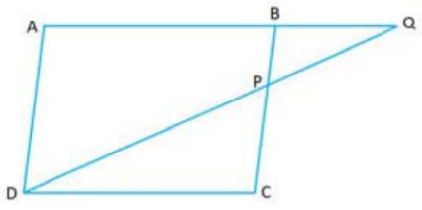
(ii) Given that $AD = \frac{1}{2}BD$, calculate $DE$, if $BC = 4.5\ cm$. Also find:

$\frac{Ar.(\triangle ADE)}{Ar.(\triangle ABC)}$ , $\frac{Ar.(\triangle ADE)}{Ar.(trapezium\ BCED)}$.

7: In the figure given below, $PB$ and $QA$ are perpendiculars to the line segment $AB$. If $PO = 6\ cm, QO = 9\ cm$ and area of $\triangle POB = 120\ cm^2$, find the area of $\triangle QOA$.




8. In the figure given below, $ABCD$ is a parallelogram. $P$ is a point on $BC$ su that $BP : PC = 1 : 2$. $DP$ produced meets $AB$ produced at $Q$. Given the area of $\triangle CPQ = 20\ cm^2$.




Calculate:

(i) area of $\triangle CDP$

(ii) area of parallelogram $ABCD$.

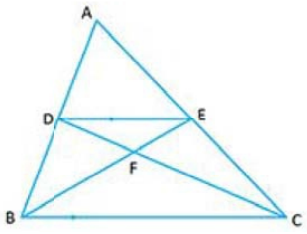
9. A model of a ship is made to scale of $1 : 200$.

(i) The length of the model is $4\ m$; calculate the length of the ship.

(ii) The area of the deck of the ship is $160000\ m^2$; find the area of the deck of the model.

(iii) The volume of the model is $200\ liters$; calculate the volume of the ship in $m^3$.

10. In the figure given below $ABC$ is a triangle. $DE$ is parallel to $BC$ and $\frac{AD}{DB} = \frac{3}{2}$.




(i) Determine the ratios $\frac{AD}{AB}$ $and$ $\frac{DE}{BC}$

(ii) Prove that $\triangle DEF$ is similar to $\triangle CBF$. Hence , find $\frac{EF}{FB}$.

# 12 CONSTRUCTIONS

1. Use ruler and compass only in this question.
   (i) Draw a circle, with centre O and radius 4 cm.
   (ii) Mark a point P such that OP = 7 cm. Construct the two tangents to the circle from P. Measure and record the length of one of the tangents.

2. Construct an angle PQR = 45º. Mark a point Son QR such that QS = 4.5 cm. Construct a circle to touch PQ at Q and also to pass through S.

3. Construct a Δ ABC, in which AC = 5 cm, NC = 7 cm and AB = 6 cm.
   (i) Mark D, the midpoint of AB.
   (ii) Construct the circle which touches BC at C and passes through D.

4. i. Using ruler and compass only, construct a Δ ABC such that AB = 5 cm, ∠ABC = 75º and the radius of the circum-circle of triangle ABC 3.5 cm.
ii. On the same figure, construct a circle touching AB at its middle point, and also touching the side AC.

5. Only ruler and compass may be used in this question,
   (i) Construct Δ ABC, such that AB = AC = 7 cm, BC = 5 cm.
   (ii) Draw AX, the perpendicular bisector of side BC.
   (iii) Draw a circle with centre A and radius 3 cm cutting AX at Y.
   (iv) Construct another circle to touch the circle with centre A externally at Y and passing through B and C.

6. Ruler and compass only may be used in this question. All construction lines and arcs must be clearly shown, and be of sufficient length and clarity to permit assessment.
   (i) Construct Δ ABC, in which AB = 9 cm, BC = 10 cm and ∠ABC = 45º.
   (ii) Draw a circle, with centre A and radius 2.5 cm. Let it meet AB at D.
   (iii) Construct a circle to touch the circle with centre A externally at D and also to touch the line BC.

7. Using ruler and compass only, construct
   (i) A triangle ABC in which AB = 9 cm, BC = 10 cm and ∠ABC = 45º.
   (ii) construct a circle of radius 2 cm to touch the arms of ∠ACB in (i) above.

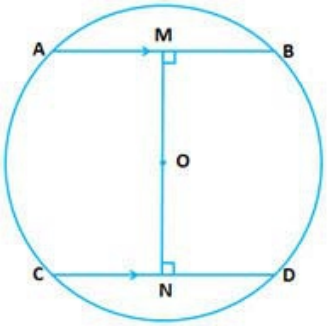
8. Use a ruler and a pair of compasses to construct a Δ ABC in which BC = 4.2 cm, ∠ABC = 60 º and AB = 5 cm. Construct a circle of radius 2 cm to touch both the arms of ∠ABC of Δ ABC.

9. Using a ruler, construct a triangle ABC with BC = 6.4 cm, CA = 5.8 cm and ∠ABC = 60 º. Draw its in-circle. Measure and record the radius of the in-circle.

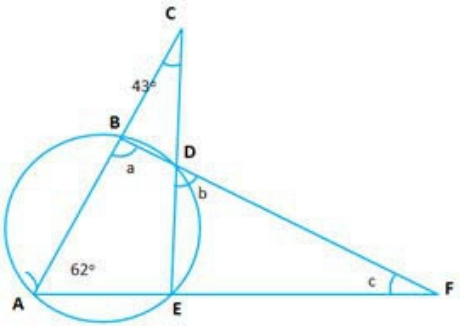
10. Use ruler and compass only in this question.
   (i) Draw a circle, with centre O and radius 3 cm.
   (ii) Mark a point P such that OP = 6 cm. Construct the two tangents to the circle from P. Measure and record the length of one of the tangents.

# 13 CIRCLES

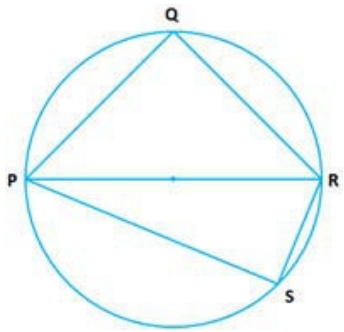
1. In the figure, given below, $AB$ and $CD$ are two parallel chords and $O$ is the center. If the radius of the circle is $15\ cm$, find the distance $MN$ between the two chords of lengths $24\ cm$ and $18\ cm$ respectively.



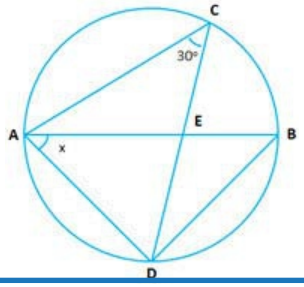

2. In the given figure $\angle ACE = 43^o$ and $\angle CAF = 62^o$; find the values of $a, b$ and $c$.




3. In the following figure shows a circle with $PR$ as its diameter.
If $PQ = 7\ cm$ and $QR = 3RS = 6cm$, find the perimeter of the cyclic quadrilateral $PQRS$




4. In the given circle with diameter $AB$, find the value of $x$.

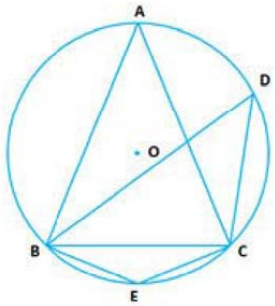


5. In the given diagram, $\angle DBC = 58^o$, $BD$ is a diameter of the circle. Calculate:

(i) $\angle BDC$

(ii) $BEC$

(iii) $\angle BAC$



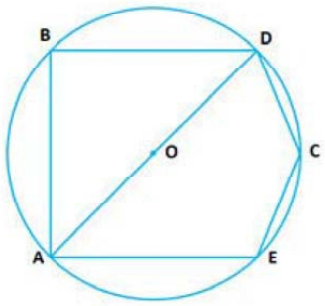

6. In the given diagram, $BD$ is the side of a regular hexagon, $DC$ is the side of a regular pentagon and $AD$ is a diameter. Calculate:

(i) $\angle ADC$

(ii) $\angle BDA$

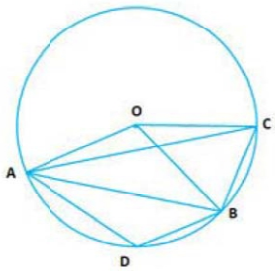
(iii) $\angle ABC$

(iv) $\angle AEC$

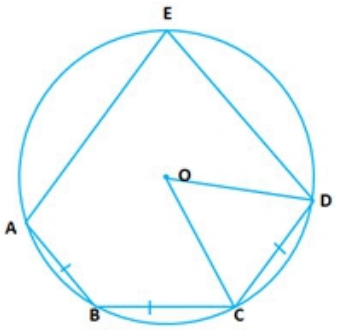



7. In the diagram, $O$ is the center of the circle and the length of $\widehat{AB} = 2 \times \widehat{BC}$.
If $\angle AOB = 108^o$ find: (i) $\angle CAB$

(ii) $\angle ADB$



8. In the given diagram, $AB = BC = CD$and $\angle ABC = 132^o$. Find:

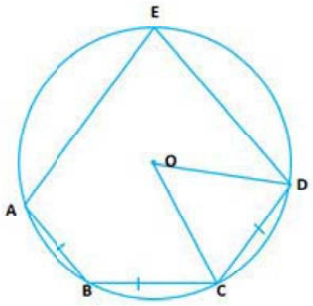



(i) $\angle AEB$

(ii) $\angle AED$

(iii) $\angle COD$

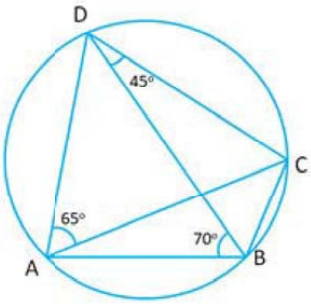
9. In a regular pentagon $ABCDE$ inscribed in a circle, find the ratio of the $\angle EDA : \angle ADC$



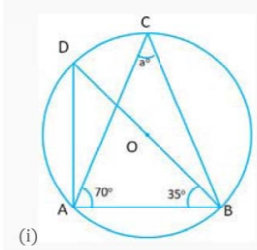

10. In the given figure, $\angle BAD = 65^o, \angle ABD = 70^o$ and $\angle BDC = 45^o$.

(i) Prove that $AC$ is a diameter of the circle.

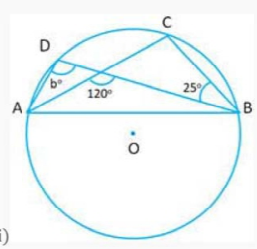
(ii) find $\angle ACB$



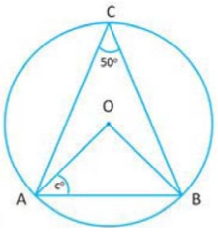

11. In each of the following figures, $O$ is the center of the circle. Find the values of $a, b, c$ and $d$.



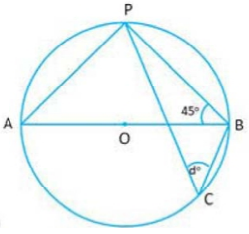

(i)




(ii)

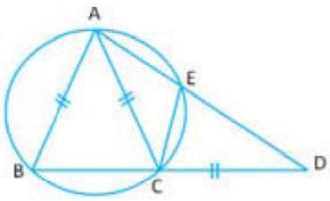



(iii)

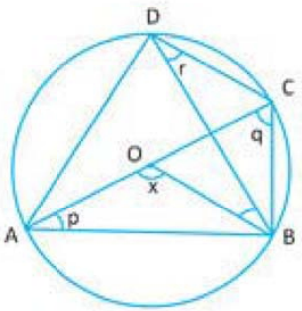



(iv)

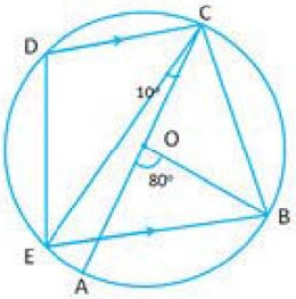
12. In the given figure $AB = AC = CD$ and $\angle ADC = 38^o$, calculate (i) $\angle ABC$ (ii) $\angle BEC$



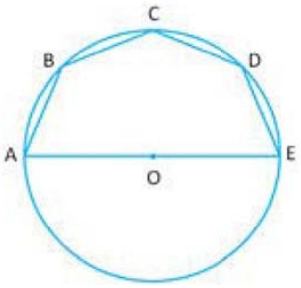

13. In the given figure $AC$ is the diameter of the circle with center $O$. Chord $BD \perp AC$. Write down the angles $p, q$ and $r$ in terms of $x$.



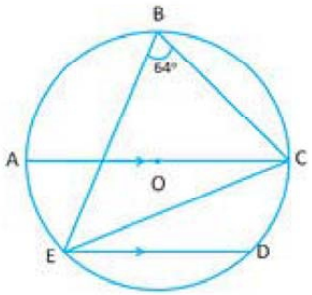

14. In the given figure $AC$ is the diameter of the circle with center $O$. CD is parallel to BE. $\angle AOB = 80^o$ and $\angle ACE = 110^o$. Calculate (i) $\angle BEC$ (ii) $\angle BCD$ (iii) $\angle CED$



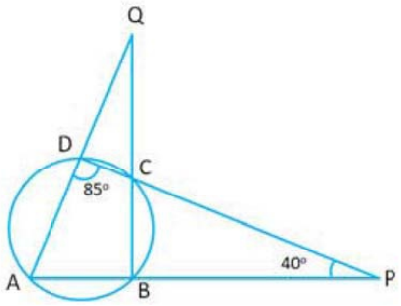

15. In the given figure, $AE$ is the diameter of the circle. Write down the numerical value of $\angle ABC + \angle CDE$. Give reasons for your answer.



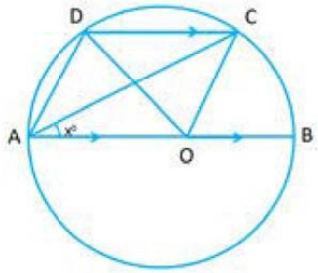
16. In the given figure $AOC$ is the diameter and $AC \parallel ED$. If $\angle CBE = 64^o$, ca



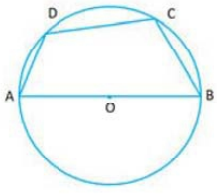

17. Use the given figure below to find (i) $\angle BAD$ (ii) $\angle DQB$



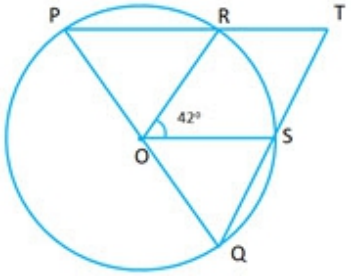

18. In the given figure $AOB$ is the diameter and $DC \parallel AB$. If $\angle CAB = x^o$, find in terms of $x$, the values of: (i) $\angle COB$ (ii) $\angle DOC$ (iii) $\angle DAC$ (iv) $\angle ADC$




19. In the figure $AB$ is the diameter of the circle with center $O$. $\angle BCD = 130^o$. Find (i) $\angle DAB$ (ii) $\angle DBA$




20. In the given figure $PQ$ is the diameter of the circle whose center is $O$. Given $\angle ROS = 42^o$, calculate $\angle RTS$.



# 14 Surface Areas And Volumes

1. The volume of a conical tent is $1232\ m^3$ and the area of the base floor is $154\ m^2$. Calculate the: (i) radius of the floor (ii) height of the tent (iii) length of the canvas required to cover this conical tent if its width is $2\ m$.

2. A solid sphere of radius $15\ cm$ is melted and recast into solid right circular cones of radius $2.5$ and height $8\ cm$. Calculate the number of cones recast.

3. A hollow sphere of internal and external diameters $4\ cm$ and $8\ cm$respectively is melted into a cone of base diameter $8\ cm$. Find the height of the cone.

4. A hemispherical bowl of diameter $7.2\ cm$ is filled completely with chocolate sauce. This sauce is poured into an inverted cone of radius $4.8\ cm$. Find the height of the cone if it is completely filled.

5. A solid cone of radius $5\ cm$ and height $8\ cm$ is melted and made into small spheres of radius $0.5\ cm$. Find the number of spheres formed.

6. The total area of a solid metallic sphere is $1256\ cm^2$. It is melted and recast into solid right circular cones of radius $2.5\ cm$ and height $8\ cm$. Calculate: (i) the radius of the solid sphere, (ii) the number of cones recast.

7. A hollow sphere of internal and external $6\ cm$ and $8\ cm$ respectively is melted and recast into small cones of base radius $2\ cm$ and height $8\ cm$. Find the number of cones.

8. The surface area of a solid metallic sphere is $2464\ cm^2$. It is melted and recast into solid right circular cones of radius $3.5\ cm$ and height $7\ cm$. Calculate: (i) the radius of the sphere (ii) the number of cones recast. (Take $\pi = \frac{22}{7}$)

9: A vessel in the form of an inverted cone, is filled with water to the brim. Its height is $20\ cm$ and diameter is $16.8\ cm$. Two equal solid cone are dropped in it so that they are fully submerged. As a result, one third of the water in original cone overflows. What is the volume of each of the solid cones submerged?

10: A metallic sphere of radius $10.5\ cm$ is melted and then recast into small cones each of radius $3.5\ cm$ and height $3\ cm$. Find the number of cones thus formed.

# 15 Trigonometric Ratios And Identities

1. Prove: $(\sec A - 1)/(\sec A + 1) = (1 - \cos A)(1 + \cos A)$
2. Prove: $1/(\sin\theta + \cos\theta) + 1/(\sin\theta - \cos\theta) = 2\sin\theta/(1 - 2\cos^2\theta)$
3. Prove: $\cot^2 A - \cos^2 A = \cot^2 A \cos 2A$
4. Prove: $\sqrt{(1 + \sin\theta)}/\sqrt{(1 - \sin\theta)} = \sec\theta + \tan\theta$
5. Prove: $(1 - \sin\theta)/(1 + \sin\theta) = (\sec\theta - \tan\theta)^2$
6. Prove: $\sin A/(1 + \cos A) + (1 + \cos A)/\sin A = 2\operatorname{cosec} A$
7. Prove: $\cos A/(1 - \tan A) + \sin A/(1 - \cot A)$
8. Prove: $1 - \cos^2\theta/(1 + \sin\theta) = \sin\theta$
9. Prove: $\sqrt{(1 - \cos A)}/\sqrt{(1 + \cos A)} = \sin A/(1 + \cos A)$
10. Prove: $\sin\theta \tan\theta /(1 - \cos\theta) = 1 + \sec\theta$
11. Prove: $(1 + \tan A)^2 + (1 - \tan A)^2 = 2 \sec^2 A$
12. Prove: $(\tan\theta + \sec\theta - 1)/(\tan\theta - \sec\theta + 1) = (1 + \sin\theta)/\cos\theta$
13. Prove: $(1 - \sin A)/(1 + \sin A) = (\sec A - \tan A)^2$
14. Prove: $\sqrt{\{(\sec\theta - 1)/(\sec\theta + 1)\}} = \operatorname{cosec}\theta - \cot\theta.$
15. Prove: $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$
16. Prove: $\cos\theta/(1 - \tan\theta) + \sin\theta/(1 - \cot\theta) = \sin\theta + \cos\theta$
17. Prove: $\cot\theta + \tan\theta = \sec\theta\operatorname{csc}\theta$
18. Prove: $(1 - \cos\theta)(1 + \cos\theta)(1 + \cot^2\theta) = 1$
19. Prove: $\tan\theta\sin\theta + \cos\theta = \sec\theta$
20. Prove: $\sec\theta\sqrt{(1 - \sin^2\theta)} = 1$

# 16 Heights And Distances

1. The height of a tree is $\sqrt{3}$ times the length of its shadow. Find the angle of elevation of the sun.

2. The angle of elevation of the top of a tower, from a point on the ground and at a distance of $160\ m$ from its foot, is found to be $60^o$.Find the height of the tower.

3. A ladder is placed along a wall such that its upper end is resting against a vertical wall. The foot of the ladder is $2.4\ m$ from the wall and the ladder is making an angle of $68^o$ with the ground. Find the height, up to which the ladder reaches.

4. A kite is attached to a sling. Find the length of the string, when the height of the kite is $60\ m$ and the string make an angle $30^o$ with the ground.

5. A boy, $1.6\ m$ tall, is $20\ m$ away from a tower and observes the angle of elevation of the top of the tower to be (i) $45^o$ (ii) $60^o$. Find the height of the tower in each case.

6. The upper part of a tree, broken over by the wind, makes an angle of $45^o$ with the ground; and the distance from the root to the point where the top of the tree touches the ground, is $15\ m$. What was the height of the tree before it was broken?

7. The angle of elevation of the top of an unfinished tower at a point distance $80\ m$ from its base is $30^o$. How much higher must the tower be raised so that its angle of elevation at the same point may be $60^o$?

8. At a particular time when sun's altitude is $30^o$, the length of the shadow of altitude is a vertical tower is $45\ m$. Calculate:
   (i) the height of the tower,
   (ii) the length of the shadow of the tower, when the sun's altitude is (a) same (b) $45^o$ (c) $60^o$.

9. The angle of elevation of an aeroplane from a point on the ground is $45^\circ$. After flying for 15 seconds, the elevation changes to $30^\circ$ .If the aeroplane is flying at a height of 2500 meters, find the speed of the aeroplane.

10. An aeroplane when 3000 m height passes vertically above another aeroplane at an instance when their angles of elevation, at the same observation point are $60^\circ$ and $45^\circ$ respectively. How many meters higher is the one than the other.

11. The angle of elevation of a cloud from a point 60 meters above a lake is $30^\circ$ and the angle of depression of the reflection of the cloud in the lake is $60^\circ$ . Find the height of cloud.

12. From the top of a tower 60 meters high, the angles of depression of the top and bottom of a pole are observed to be $45^\circ$ and $60^\circ$ respectively. Find the height of the pole if the Pole and tower stand on the same plane.

13. A man standing on the deck of the ship, which is 10 m above the water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30°. Calculate the distance of the hill from the ship and the height of the hill.

14. Two pillars of equal heights stand on the either side of the roadway 150 m wide. From a point on the roadway between the pillars, the angles of elevation of the top of the pillars are 60° and 30°. Find the height of pillars and the position of the point.

**15.** On a horizontal plane there is a vertical tower with a flag pole on the top of the tower. At a point 9 m away from the foot of the tower the angle elevation of the top and bottom of the flag pole are 60° and 30°. Find the heights of the tower and the flag pole mounted on it.

**16.** The angles of depression of the top and bottom of a tower, as seen from the top of a 100 m high cliff, are 30° and 60° respectively. Find the height of the tower.

**17.** A bird sitting on the top of a tree, which is 80 m high. The angle of elevation of the bird, from a point on the ground is 45°. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes 30°. Find the speed of flying of the bird.

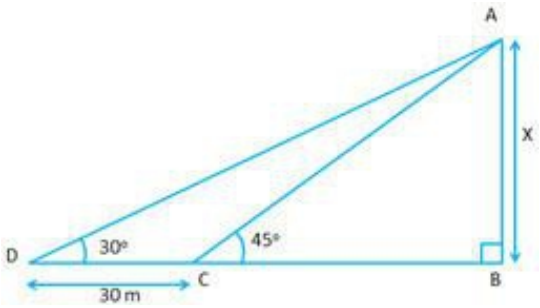
**18.** The angles of elevation and depression of the top and bottom of a light-house from the top of a building 60 m high, 30° and 60° respectively. Find

(i) the difference the heights of the light-house and the building,

(ii) distance between the light-house and the building.

**19.** From a window 60 metres high above the ground of a house in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are 60° and 45° respectively. Show that the height of the opposite house is [illegible]

**20.** In the figure, given below, it is given that AB is perpendicular to BD and is of length x meters. DC = 30 m, angle ADB = $30^0$ and angle ACB = $45^0$.




Without using tables, find x.

# 17 MEASURES OF CENTRAL TENDANCY

1. Use a graph paper for this question. The daily pocket expenses of 200 students in a school are given below;

| Pocket expenses (Rs.) | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 |
|---|---|---|---|---|---|---|---|---|
| Number of students (frequency) | 10 | 14 | 28 | 42 | 50 | 30 | 14 | 12 |

Draw a histogram representing the above distribution and estimate the mode from the graph.

2. The marks obtained by 100 students in a Mathematics test are given below;

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Students | 3 | 7 | 12 | 17 | 23 | 14 | 9 | 6 | 5 | 4 |

Draw an ogive for the distribution on a graph sheet. (Use a scale of 2 cm = 10 units on both axis)

Use the ogive to estimate the:

(i) median

(ii) lower quartile

(iii) number of students who obtained more than 85% marks in the test.

(iv) number of students who did not pass in the if the pass percentage was 35

3. The marks obtained by 30 students in a class assessment of 5 marks is given below:

| **Marks** | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **No. of Students** | 1 | 3 | 6 | 10 | 5 | 5 |

Calculate the mean, median and mode of the above distribution.

4. Calculate the mean of the following distribution using assumed mean method.

| Class Interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| Frequency | 8 | 5 | 12 | 35 | 24 | 16 |

5. The weight of 50 workers is given below:

| Weight in kg | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 | 100- |
|---|---|---|---|---|---|---|
| No. of workers | 4 | 7 | 11 | 14 | 6 | 5 |

Draw on give of the given distribution using a graph sheet. Take 2 cm =10 kg 2 cm =5 workers along the other axis. Use a graph to estimate the following:

(i) the upper and lower quartiles

(ii) if weight 95 kg and above is considering find the number of workers who

6. The number $6, 8, 10, 12, 13$ and $x$ are arranged in an ascending order. If the mean of the observations is equal to the median, find the value of $x$.

7. Calculate the mean of the distribution given below using the short cut method;

| Marks | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
|---|---|---|---|---|---|---|---|
| No. of students | 2 | 6 | 10 | 12 | 9 | 7 | 4 |

8. The median of the following observation $11, 12, 14(x-2), (x+4), (x+9), 32, 38, 47$ arranged in ascending order is $24$. Find the value of $x$ and hence find the mean.

9. Draw a histogram from the following frequency distribution and find the made from the graph:

10. Find the mean of the following distribution by step deviation method:

| Class Internal | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|---|---|---|---|---|---|---|
| Frequency | 10 | 6 | 8 | 12 | 5 | 9 |

11. The mark obtained by 120 students in a test are given below;

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| Students | 5 | 9 | 16 | 22 | 26 | 18 | 11 | 6 | 4 | 3 |

Draw an ogive for the given distribution on a graph sheet; Using suitable scale for ogive to estimate the following:

(i) The median

(ii) Number of students who obtained more than 75% marks in the test.

(iii) Number of students who did not pass the test if minimum marks required to pass is 40.

12. Marks obtained by $40$ students in a short assessment is given below, whe missing data:

| Marks | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|
| No. of Students | 6 | A | 16 | 13 | B |

If the mean of the distribution is $7.2$ find $a$ and $b$.

13. The following distribution represents the height of 160 students of a school

| Height | 140-145 | 145-150 | 150-155 | 155-160 | 160-165 | 165-170 | 170-175 | 175-180 |
|---|---|---|---|---|---|---|---|---|
| Students | 12 | 20 | 30 | 38 | 24 | 16 | 12 | 8 |

Draw a given for the given distribution taking 2 cm =5 cm of height on one axis and 2 cm=20 students on the other axis. Using the graph, determine:

(i) The medium height

(ii) The interquartile range

(iii) (iii) The number of students whose height is above 172 cm.

14. Find the mode and medium of the following frequency distribution:

| X | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|
| f | 1 | 4 | 7 | 5 | 9 | 3 |

15. A mathematics aptitude test of 50 students was recorded as follows:

| Marks | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|
| No. of students | 4 | 8 | 14 | 19 | 5 |

Draw a histogram for the above data using a graph paper and locate the mode.

16. Using step division method, calculate the mean marks of the following distribution: State the modal class:

| Class Interval | 50-55 | 55-60 | 60-65 | 65-70 | 70-75 | 75-80 | 80-85 | 85-90 |
|---|---|---|---|---|---|---|---|---|
| Frequency | 5 | 20 | 10 | 10 | 9 | 6 | 12 | 8 |

17. Marks obtained by 200 students in an examination are given below:

| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|---|---|---|---|---|---|---|---|---|
| Students | 5 | 11 | 10 | 20 | 28 | 37 | 40 | 29 |

Draw an ogive for the given distribution taking $2\ cm = 10$ marks on one axis and $2\ cm = 20$ students on the other axis. Using the graph, determine.

(i) The median marks

(ii) The number of students who failed if minimum marks required to pass is

(iii) If scoring $85$ and more marks is considered as grade one, find the numbe secured grade on in the examination.

18. The distribution given below shows the marks obtained by $25$students in an aptitude test. Find the mean, median and mode of the distribution.

| Marks obtained | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|
| No. of students | 3 | 9 | 6 | 4 | 2 | 1 |

19. The mean of the following distribution is 52 and the frequency of class interval 30-40 is $f$. Find $f$.

| Class Interval | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|---|---|---|---|---|---|---|---|
| Frequency | 5 | 3 | $f$ | 7 | 2 | 6 | 13 |

20. The monthly income of a group of 320 employees in a company is given below:

| Monthly Income | No. of Employees |
|---|---|
| 6000-7000 | 20 |
| 7000-8000 | 45 |
| 8000-9000 | 65 |
| 9000-10000 | 95 |
| 10000-11000 | 60 |
| 11000-12000 | 30 |
| 12000-13000 | 5 |

Draw an ogive of the given. distribution on a graph sheet taking $2\ cm = Rs.\ 1000$ on one axis and $2\ cm = 50\ employees$ on the other axis. From the graph determine:

(i) the median wage

(ii) the number of employees whose income is below $Rs.\ 8500$

(iii) If the salary of a senior employee is above $Rs.\ 11500$ find the number of senior employees in the company.

(iv) The upper quartile

# 18 PROBABILITY

1. In a single throw of two dice, find the probability of getting a total of at most 9.

2. A pair of dice is thrown. If the two numbers appearing on them are different, find the probability that the sum of the numbers appearing on dice is 6.

3. A bag 'A' contains 3 white and 2 black balls while the bag 'B' contains 2 white and 5 black balls. One of the bag is chosen at random and a ball is drawn from it. What is the probability that the ball is white?

4. The probability of A, B and C solving a problem are 1/3, 2/7 and 3/8 respectively. If all the three try and solve the problem simultaneously, find the probability that only one of them will solve it.

5. A and B throw two dice each. If A gets a sum of 9 on his two dice, then find the probability of B getting a higher sum.

6. Ticket numbered 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7.

7. One number is chosen at random from the number 1 to 21. Find the probability that may be a prime number.

8. In a certain city, the probability of not reading the morning newspaper by the residents is 1/2 and that of not reading the evening newspaper is 2/5. The probability of reading both the newspaper is 1/5. Find the probability that a resident reads either the morning or evening or both the papers.

9. Two horses are considered for a race. The probability of selection of the first horse is 1/4 and that of second is 1/3. What is the probability that:

(a) both of them will be selected.
(b) only one of them will be selected.
(c) none of them will be selected.

10. Bag A contains 5 white and 4 black balls and bag B contains 7 white and 6 black balls. One bag is drawn from the bag A and without noticing its colour, is put in the bag B. If a ball is drawn from bag B, find the probability that it is black in colour.

11. What is the probability that a leap year has 53 Sundays?

12. A bag has 4 red and 5 black balls, a second bag has 3 red and 7 black balls. One ball is drawn from the first bag and two from the second. Find the probability that two balls are black and one is red.

13. A card is drawn at random from a pack of 52 playing cards. What is the probability that the card drawn is neither a spade nor a queen?

14. Two dice are thrown at the same time. Find the probability of getting different numbers on both the dice.

15. Cards bearing numbers 1, 3, 5, ..., 35 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card hearing:

(i) a prime number less than 15.

(ii) a number divisible by 3 and 5.(4 Mark)

16. Red kings, queens and jacks are removed from a deck of 52 playing cards and then well-shuffled. A card is drawn from the shuffled cards. Find the probability of getting

(i) King

(ii) a red card

(iii) a spade

17. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:

(i) A king of red suit.

(ii) A queen of black suit.

(iii) A jack hearts.

(iv) A red face card

18. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.

19. An unbiased die is thrown once, find the probability of getting:

(i) a number greater than 4.

(ii) a multiple of 3.

20. Two different coins are tossed randomly. Find the probability of:

(i) getting two heads

(ii) getting two tails

(iii) getting one tail

(iv) getting no head

(v) getting no tail

(vi) getting at least 1 head

(vii) getting at least 1 tail

(viii) getting at the most 1 tail

(ix) getting 1 head and 1 tail

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