**TALENT DEVELOPMENT CENTRE**
**INDIAN INSTITUTE OF SCIENCE, KUDAPURA**
**Challakere, Chitradurga District, Karnataka-577536**

## MATHS ASSIGNMENT: 02

1. Find the distance between the following pair of points:
   a) (2,3) and (5,7); b) (4,−7) and (−1,5); c) (a,0) and (0,b); ( d) (−cos $\theta$, sin$\theta$) and ( cos $\theta$, − sin$\theta$)
2. Find the value of x if the distance between the points (x, 2) and (3, 4) is 8.
3. Prove that the points (2,4), (2,6) and (2 + √3, 5) are the vertices of an equilateral triangle.
4. Mention the necessary and sufficient condition for a quadrilateral to be
   (i) parallelogram (ii) rectangle (iii) rhombus (iv) square
5. Prove that the points (-2,-1), (1,0), (4,3) and (1,2) are the vertices of a parallelogram.
6. Prove that (2,−2), (8,4), (5,7) and (−1,1) are the vertices of a rectangle.
7. Find the point which divides the line segment joining the points (1,3) and (2,7) in the ratio 3 : 4, internally.
8. Find the point which divides the line segment joining the points (−1,2) and (4,−5) in the ratio 2 : 3,
   (i) internally, (ii) externally.
9. Find the slope of the line joining the points (3,2) and (1,5).
10. Show that the lines 3x + 2y − 5 = 0 and 2x − 3y + 1 = 0 are perpendicular to each other.
11. Show that the line joining the points (3,1) and (5,4) is parallel to the line join of (2,0) and (4,3).
12. A line makes an angle of 60◦ with x-axis. Find its slope.
13. Find the ratio in which the line segment joining the points (3,2) and (4,−5) is divided by the x axis.
14. The line passing through the points (3,4) and (−1,2) is perpendicular to the line joining (3,2) and (5,m). Find m.
15. Find the equation of the line making an angle of 30◦ with x-axis and having y-intercept 3.
16. Find the slope and y-intercept of the line 3x − 2y + 5 = 0.
17. Three consecutive vertices of a parallelogram are A(1,2), B(2,3) and C(8,5). Find the fourth vertex.
18. Find the co-ordinates of the centre passing through A(4,6), B( 0,4) and C(6,2).Also, find the radius of the circle
19. Find the relation between x and y if point P(x, y) lies on the perpendicular bisector of the line joining the points (7,1) and (3,5).
20. Find the value of ' k' if point P( 0,2) is equidistant from ( 3,k) and (k,5)
21. Find the ratio in which the line $x - y - 2 = 0$ divides the line segment joining the points A(3, -1) and B( 8,9). Also find the co-ordinates of the point of division
22. Using co-ordinate geometry, prove that the line segment joining the midpoint of any two sides of a triangle is parallel and half of the third side.

23. Using Euclid's algorithm, find the HCF of 640 and 1160.

24. A rectangular hall is 18m72cm long and 13m20cm broad. If square tiles of the same size are to be used for paving the hall, find the least number of such tiles required.

25. The decimal point of a number is shifted one place to the left and the resulting number is added to $\left({}^{3}/_{5}\right)$th of the original number. The result is 1406.3. What is the original number?

26. Prove that a 6-digit number of the form $\overline{ababab}$ cannot have a prime factor of more than 2 digits.

27. Suppose $\frac{p}{q}$ is a positive rational in its lowest form ,Prove that $\frac{1}{q} + \frac{1}{p+q}$ is also in its lowest form.

28. Check whether $48^n$ end with zero, where n is any natural number.

29. Prove that $\sqrt{5}$ is an irrational number and hence prove that $6 + \sqrt{5}$ is irrational.

30. Use Euclid's division lemma to show that cube of any positive integer is either of the form 9m, 9m + 1 or 9m − 1 for some integer m.

31. Suppose a is a positive integer such that 2a + 1 and 3a + 1 are both perfect squares. Prove that 5a + 3 is a composite number.

32. Show that one and only one out of $n, n+2, n+4$ is divisible by 3, where n is any positive integer.

33 If n is an odd integer, then Show that $n^2 - 1$ is divisible by 8.

34.(a) Find the LCM and HCF of the pair of integers 198 and 144 and verify that LCM x HCF = Product of the numbers.

(b) Find the LCM and HCF of the integers 30, 72 and 432 and show that LCM x HCF ≠ Product of the numbers.

35. Let, n denote the number of integers k such that $0 < k \leq 10{,}000$ and which are divisible by each of the numbers 1,2,3,4,5,6,7,8,9 and 10. Find n.

36. If a and b are two odd positive integers such that a > b, then prove that one of the two numbers $\frac{a+b}{2}$ & $\frac{a-b}{2}$ is odd and the other is even.

37. If d is the HCF of 56 and 72, find x, y satisfying d = 56x + 72y. Also show that x and y are not unique.

38. If the HCF of 657 and 963 is expressible in the form of 657n + 963 x (-15), find n

39 The length of the edge of a cube is an integer. Consider one-third of the volume, one-half of the area of a face and one-sixth of the edge length. Prove that the sum of these numbers is an integer.

40. Prove that the magic sum of a 3 × 3 magic square is 3 times the central number.

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