



MATHS

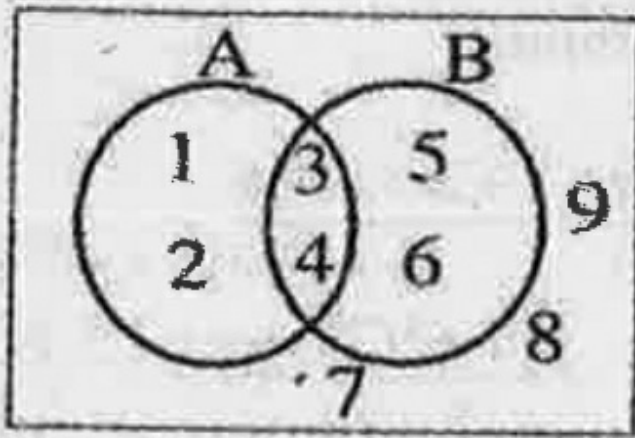
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MODEL PAPER 18

Example

1. Consider the Venn diagram given below:

Write A' , B' , $(A \cap B)'$



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2. For any triangle ABC, prove that

$$\sin\left(\frac{B - C}{2}\right) = \frac{b - c}{a} \cos\left(\frac{A}{2}\right)$$

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3. Consider the complex number $z = 3 + 4i$. Write the conjugate of z .

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4. Consider the complex number $z = 3 + 4i$. Verify that $z\bar{z} = |z|^2$

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5. Solve the inequality $-5 \leq \left(\frac{5 - 3x}{2} \right) \leq 8$.

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6. $-5 \leq \left(\frac{5 - 3x}{2} \right) \leq 8$. Represent the solution on a number line.



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7. 4 cards are drawn from a well shuffled pack of 52 cards. In how many ways can this be done?



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8. 4 cards are drawn from a well shuffled pack of 52 cards. In how many ways can this be done if all 4 cards are of the same colour?



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9. Consider the equation of the ellipse

$$9x^2 + 4y^2 = 36. \text{ Find foci.}$$



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10. Consider the equation of the ellipse

$$9x^2 + 4y^2 = 36. \text{ Find Eccentricity.}$$



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11. Consider the equation of the ellipse

$9x^2 + 4y^2 = 36$. find Length of latus rectum.



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12. Evaluate $\lim_{x \rightarrow -4} \frac{2x + 8}{x^2 + x - 12}$.



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13. Consider the statement

$$P(n): \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

.Show that P(1) is true.



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14. Consider the statement

$$P(n): \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

.Prove that $P(n)$ is true for all $n \in \mathbb{N}$ using the principle of mathematical induction.



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15. Consider the complex number $z = \frac{1 + 3i}{1 - 2i}$. Write

z in the form $a + ib$



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16. Consider the complex number $z = \frac{1 + 3i}{1 - 2i}$. Write z in polar form.

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17. Solve the following inequalities graphically

$$x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$$

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18. How many 3 letter words with or without meaning can be formed using 26 letters in English alphabet, if no letter is repeated?

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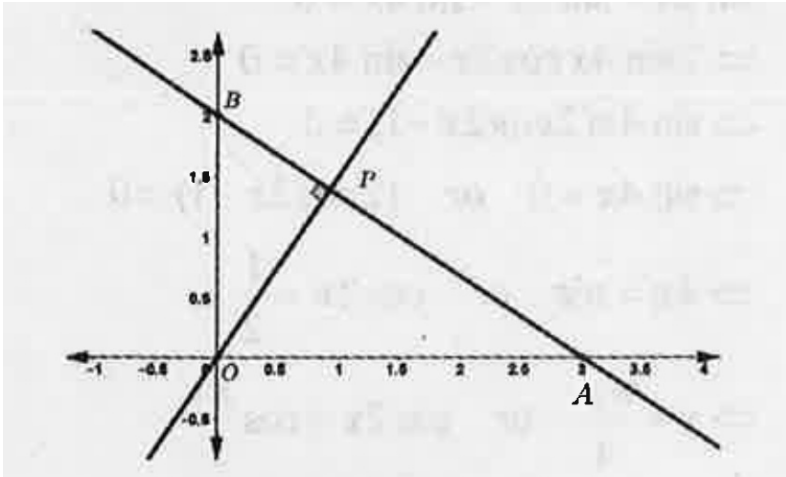
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19. Find the number of permutation of letters of the word MATHEMATICS.

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20. Consider the given below. $A(3, 0)$ and $B(0, 2)$ are two points on axes. The line is perpendicular to AB .

Find the coordinate of the point P.



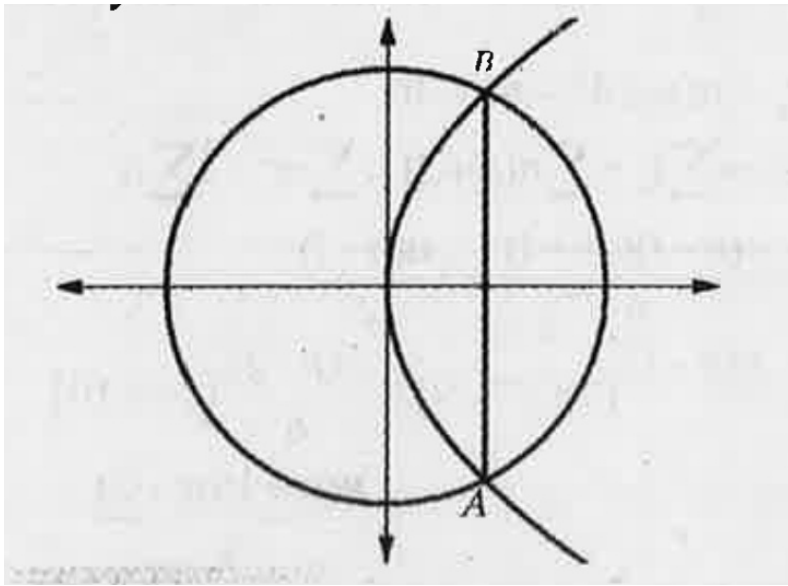
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21. Equation of the parabola given in the figure is

$$y^2 = 8x$$

Find the focus and length of latus rectum of the

parabola.



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22. Let L be the line $x - 2y + 3 = 0$. Find the equation of the L_1 which is parallel to L and passing through $(1, -2)$.



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23. Let L be the line $x - 2y + 3 = 0$. The equation of line L_1 is parallel to L and passing through $(1, -2)$. Find the distance between L and L_1 .



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24. Consider a point $A (3, 2, -1)$ in space. Write the octant in which A belongs to.



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25. Consider a point A (3,2,-1) in space.If B (1,2,3) is another point in space, find the distance between A and B.



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26. Write the contrapositive of the statement.p: If a triangle is equilateral, then it is isosceles.



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27. Verify by method of contradiction:

' $\sqrt{3}$ is irrational.



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28. If $A = \{a, b\}$ write $A \times A \times A$.



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29. If $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$. Write R in roster form.



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30. Find the domain and range of the real function

$$f(x) = 2 + \sqrt{x - 1}$$



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31. The minute hand of a watch is 3cm long. How far does its tip move in 40 minutes?(use $\pi = 3.14$)



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32. Solve $\sin 2x - \sin 4x + \sin 6x = 0$



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33. Find the sum of all 3 digit numbers which are multiple of 5.



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34. How many terms of GP $3, 3^2, 3^3, \dots$ are needed to give the sum 120?



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35. Find the sum of the first n terms of the series whose n th term is $n(n + 3)$.



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36. Expand using binomial theorem, $\left(\frac{x}{3} + \frac{1}{x}\right)^5$.



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37. Find $(a + b)^4 - (a - b)^4$.



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38. evaluate

$$(\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4$$



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39. Find the derivative of $y = \frac{1}{x}$ from the first principle.

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40. Differentiate $f(x) = \frac{\cos x}{1 + \sin x}$ with respect to x .

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41. Calculate the mean deviation about median for the following data:

Class	0-10	10 - 20	20 - 30	30- 40	40 - 50	50 - 60
Freq- uency	6	7	15	16	4	2



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42. Consider a bag containing 3 red balls and 2 black balls which are identical. 2 balls are drawn simultaneously at random from the bag. Write the sample space of the random experiment.



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43. Consider a bag containing 3 red balls and 2 black balls which are identical. 2 balls are drawn simultaneously at random from the bag.

Write the event.

A : Both balls are red.

B : One is red and one is black.



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44. Consider a bag containing 3 red balls and 2 black balls which are identical. 2 balls are drawn simultaneously at random from the bag.

A: Both the balls are red

B: One ball is red and another one is black

Show that A and B are mutually exclusive.



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