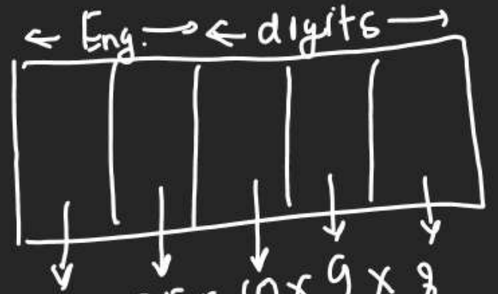
Nishant Jindal

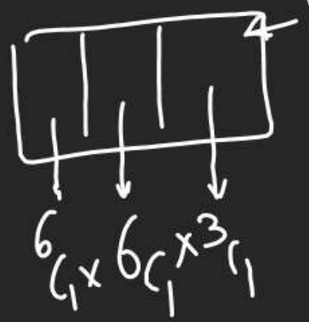
Q How many Car No plates for a car can be made if each plate contains 2 different english alphabet followed by 3 different digits.



N.o.W. $= 26 \times 25 \times 10 \times 9 \times 8$

468000

Q How many 3 digit even No. can be formed from digits 1, 2, 3, 4, 5, 6 if digits can be Repeated?



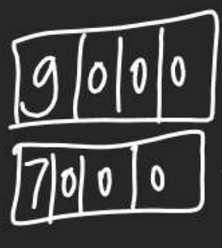
Ondi place पर Even No रहेगा। option 2, 4, 6

$^6C_1 \times {}^6C_1 \times {}^3C_1$

$6 \times 6 \times 3$

$= 108$

03



Q No of Natural No. less than 7000 which can be formed by using digits 0, 1, 3, 7, 9 (R.A.) = ?

< 7000 Required

Single Digit

Double Digit

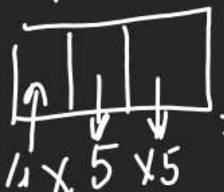
4

$2 \times 5 \times 5 \times 5 = 250$

1)  $= 4$

2)  $+$

$4 \times 5 = 20$

3)  $+$

$= 100$

$4 \times 5 \times 5$

$+ \quad 374$

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Q Find No of 3 Diget No. Containing atleast one 7.

- atleast one 7 → 2 Bar 7 Aye, 3 Bar 7 Aye } दोनों
- → Km Se Km ek bar 7 ज़रूर Aye.

Alleastone = total - None 7

$= \boxed{9 \times 10 \times 10} - \boxed{8 \times 9 \times 9}$

(first digit: 0 ✗; second box: 0 ✗, 7 ✗ | 7 ✗ | 7 ✗)

$= 900 - 648 = 252$

Q Find No of 3 digit No. in which 100^{th} place is greater than other two.

Starting 1 से	1	0	0	→ 1 No Psbl
" 2 से	2	0, 0, 1, 1	0, 1, 0, 1	→ 4 No Psbl
" 3 से	3	0, 0, 1, 1, 2, 0, 2, 1, 2	0, 1, 0, 1, 0, 2, 1, 2, 2	→ 9 No psbl

$total = 1 + 2^2 + 3^2 + 4^2 + \dots 9^2$

$= \frac{9 (9+1)(2 \times 9 + 1)}{6} = 15 \times 19$

$= 285$

Notes + Problem Set = Enough.

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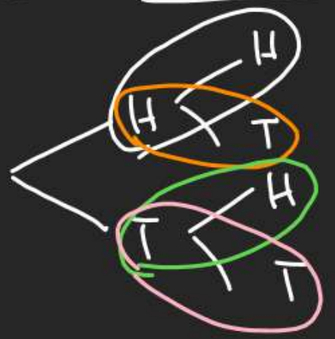
Coin tossing / Dice Rolling

1) 1 Coin tossed then Psbl No of Outcomes = 2 (H, T)

2) 2 Coins ——— ——— = 4 = 2^2



= {HH, HT, TH, TT}

(3) 3 Coins tossed then total No of outcomes = $2^3 = 8$

= {HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}

(4) n Coins are tossed then total No of outcomes = 2^n.

(5) 1 dice Rolled then 6 outcomes

= {1, 2, 3, 4, 5, 6}

(6) 2 dices Rolled then 6^2 outcomes = 36 out.

(1,1) (1,2) (1,3) (1,4), (1,5) (1,6)
(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)
(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)
(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)
(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)
(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)

} 36

(7) 3 dices Rolled then total No of outcomes = 6^3.

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Q If 4 dices are Rolled then

1) total No of Outcome.

6^4

(2) If No dice exhibit "5" then total No of outcomes?

5 वाले side छोड़ दो

$= 5^4$

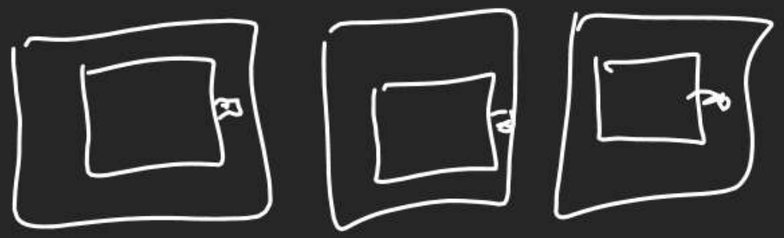
(3) No of ways in which atleast one dice exhibit 5.

Atleast one = Total - None

= Total outcomes - No 5 diff ent.

$= 1296 - 625 = 671$

Q I HMW 5 letters Can be mailed if 3 diffrent Boxes are avaliable.



1st letter के 4 Optⁿ = 3

2nd ——— = 3

3rd ——— = 3

4th ——— = 3

5th = 3

$3 \times 3 \times 3 \times 3 \times 3 = 3^5$

Q 5 Person in a Lift Wants to go at any floor of 8 Storey Building find No of optim. avaliable to them.

1st man has 8 optⁿ

2nd man has 8 optⁿ.

3rd ——— 8

4th ——— 8

5th ——— 8

$8 \times 8 \times 8 \times 8 \times 8 = 8^5$

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Q Find No of ways in which

n distinct Balls can be put

into 3 boxes.

$${}^{3}C_1 \times {}^{3}C_1 \times {}^{3}C_1 \times {}^{3}C_1 \times \cdots {}^{3}C_1$$

$$= 3 \times 3 \times 3 \times 3 \cdots 3$$

$\leftarrow$ n Balls $\rightarrow$

$$= 3^n \text{ options}$$

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CIRCLE

30. The equation to the chord of the circle $x^2 + y^2 = 16$ which is bisected at $(2, -1)$ is-

(A) $2x + y = 16$

(B) $2x - y = 16$

(C) $x + 2y = 5$

(D) $2x - y = 5$

$T = S_1$

Nishant Jindal

CIRCLE

32. Tangents are drawn from $(4,4)$ to the circle $x^2+y^2-2x-2y-7=0$ to meet the circle at A and B. The length of the chord AB is

(A) $2\sqrt{3}$
(B) $3\sqrt{2}$
(C) $2\sqrt{6}$
(D) $6\sqrt{2}$

$16+16-8-8-7>0$

outside

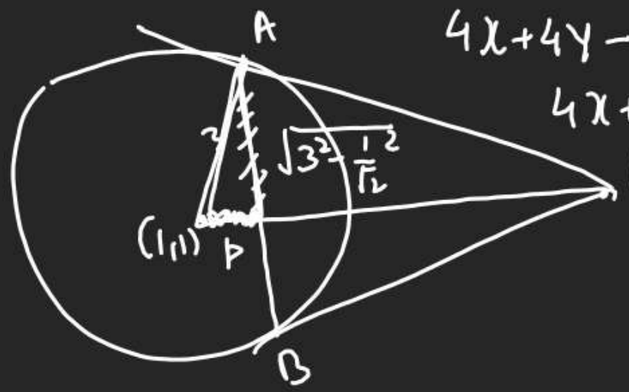
Chord AB ⊥ OC

$4x+4y-(x+4)-(y+4)-7=0$

$4x+4y-x-y-15=0$

$3x+3y-15=0$

$x+y-5=0$



$Rad = \sqrt{1^2+1^2+7} = 3$

$p = \frac{|1+1-5|}{\sqrt{1^2+1^2}} = \frac{3}{\sqrt{2}}$

$\sqrt{9-\frac{9}{2}} = \frac{3}{\sqrt{2}}$

$AB = 2\times\frac{3}{\sqrt{2}} = 3\sqrt{2}$

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CIRCLE

34. The equation of pair of tangents drawn from the point $(0, 1)$ to the circle $x^2 + y^2 - 2x + 4y = 0$ is-

(A) $4x^2 - 4y^2 + 6xy + 6x + 8y - 4 = 0$

(B) $4x^2 - 4y^2 + 6xy - 6x + 8y - 4 = 0$

(C) $x^2 - y^2 + 3xy - 3x + 2y - 1 = 0$

(D) $x^2 - y^2 + 6xy - 6x + 8y - 4 = 0$

$SS_1 = T^2$

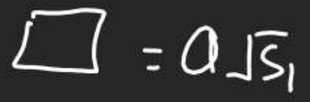
$(x^2+y^2-2x+4y)(0+1-0+4) = (x\cdot 0 + y\cdot 1 - (x+0) + 2(y+1))^2$

Solve.

CIRCLE

35. From the point $P(16, 7)$ tangents PQ and PR are drawn to the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. If C be the centre of the circle then area of the quadriteral PQCR is-

(A) 450 sq. units
(B) 15 sq. units
(C) 50 sq. units
(D) 75 sq. units



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CIRCLE

36. Equation of the circle touching the circle $x^2 + y^2 - 15x + 5y = 0$ at the point $(1, 2)$ and passing through the point $(0, 2)$ is

(A) $13x^2 + 13y^2 - 13x - 61y + 70 = 0$

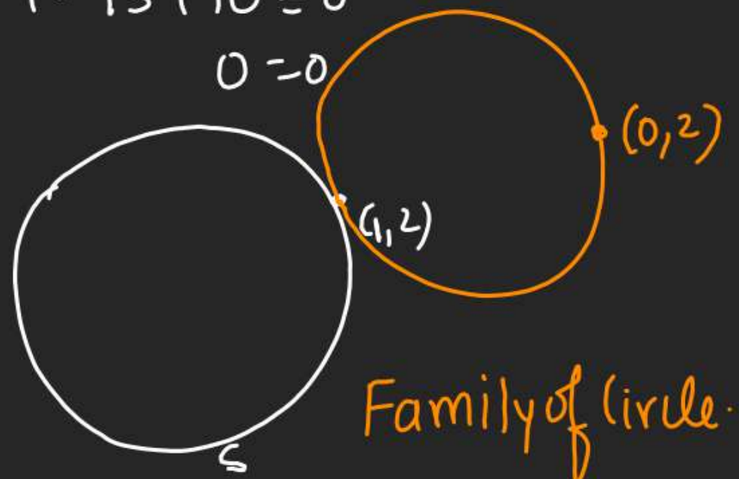
(B) $x^2 + y^2 + 2x = 0$

(C) $13x^2 + 13y^2 - 13x - 61y + 9 = 0$

(D) none of these

$1^2 + 4 - 15 + 10 = 0$

$0 = 0$



Family of circle.

$S_1 + \lambda S_2 = 0$

$(x^2+y^2-15x+5y) + \lambda\{(x-1)^2+(y-2)^2\} = 0$

$(4 + 10) + \lambda(1 + 0) = 0$

$\lambda = -14$

$(x^2+y^2-15x+5y) - 14\{x^2+y^2-2x-4y+5\} = 0$

Nishant Jindal

CIRCLE

37. The number of common tangents of the circles $x^2 + y^2 - 2x - 1 = 0$ and $x^2 + y^2 - 2y - 7 = 0$

(A) 1
(B) 3
(C) 2
(D) 4

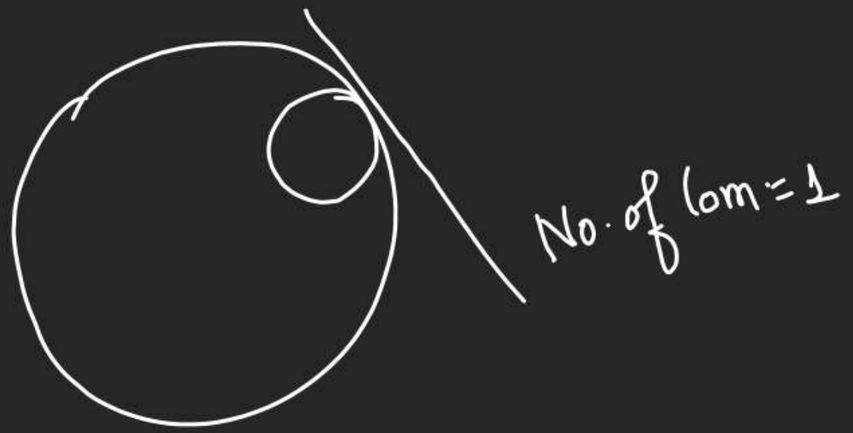
$C_1(1,0)$, $r = \sqrt{1+0+1} = \sqrt{2}$

$C_2(0,1)$ $r_2 = \sqrt{0+1+7} = 2\sqrt{2}$

$C_1C_2 = \sqrt{1+1} = \sqrt{2}$

$|r_2 - r_1| = |2\sqrt{2} - \sqrt{2}| = \sqrt{2}$

$C_1C_2 = |r_2 - r_1|$



CIRCLE

38. If the circle $x^2 + y^2 = 9$ touches the circle $x^2 + y^2 + 6y + c = 0$, then c is equal to

(A) -27
(B) 36
(C) -36
(D) 27

$C_1 = (0,0)$ | $C_2(0,-3)$ $\longrightarrow$ $C_1C_2 = \sqrt{0+(3)^2} = 3$

$r_1 = 3$ | $r_2 = \sqrt{0+9-c} = \sqrt{9-c}$

$$\left|\sqrt{9-c} - 3\right| = 3$$

$\sqrt{9-c} - 3 = 3$ | $\sqrt{9-c} - 3 = -3$

$\sqrt{9-c} = 6$ | $c = 3$

$9 - c = 36$ | x

$c = -27$

(A)

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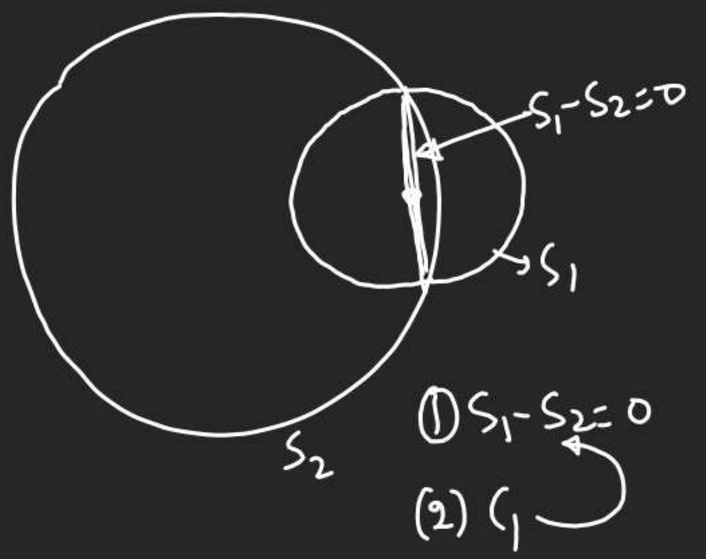
CIRCLE

39. If the circumference of the circle $x^2 + y^2 + 8x + 8y - b = 0$ is bisected by the circle $x^2 + y^2 - 2x + 4y + a = 0$, then $a + b =$

(A) 50
(B) 56
(C) -56
(D) -34

Done



CIRCLE

(1,0)

40. The distance of the centre of the circle $x^2 + y^2 = 2x$ from the common chord of the circles $x^2 + y^2 + 5x - 8y + 1 = 0$ and $x^2 + y^2 - 3x + 7y - 25 = 0$ is

(A) 1
(B) 3
(C) 2
(D) $\frac{1}{3}$

Com. Chord

$S_1 - S_2 = 0$

$5x + 3x - 8y - 7y + 1 + 25 = 0$

$8x - 15y + 26 = 0$

$p = \frac{|8 + 0 + 26|}{\sqrt{64 + 225}} = \frac{34}{17} = 2$

CIRCLE

41. The equation of three circles are given $x^2 + y^2 = 1$, $x^2 + y^2 - 8x + 15 = 0, x^2 + y^2 + 10y + 24 = 0$. Determine the coordinates of the point P such that the tangents drawn from it to the circles are equal in length.

(A) $(2, -5/2)$
(B) $(-2, -5/2)$
(C) $(2, 5/2)$
(D) $(3, -5/3)$

R.O. माँग रहा हूँ

$S_1 - S_2 = 0$ (A), $S_2 - S_3 = 0$ (B)

(A) & (B) Solve

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CIRCLE

42. The locus of the centers of the circles which cut the circles $x^2 + y^2 + 4x - 6y + 9 = 0$ and $x^2 + y^2 - 5x + 4y - 2 = 0$ orthogonally is

(A) $9x + 10y - 7 = 0$

(B) $x - y + 2 = 0$

(C) $9x - 10y + 11 = 0$

(D) $9x + 10y + 7 = 0$

$(g_1, f_1) = (2, -3)$, $(g_2, f_2) = \left(-\frac{5}{2}, 2\right)$

$S \rightarrow x^2 + y^2 + 2gx + 2fy + 1 = 0$ is Circle.

Intersecting Orthogonally Both.

$2g(2) + 2f(-3) = c + g \rightarrow A$

$2g\left(-\frac{5}{2}\right) + 2f(2) = c - 2 \rightarrow B$

Solve get a Eqn in (g, f) Eliminite "c"

$g \rightarrow -x$

$f \rightarrow -y$

CIRCLE

43. Two given circles $x^2 + y^2 + ax + by + c = 0$ and $x^2 + y^2 + dx + ey + f = 0$ will intersect each other orthogonally, only when-

(A) $ad + be = c + f$

(B) $a + b + c = d + e + f$

(C) $ad + be = 2c + 2f$

(D) $2ad + 2be = c + f$

$(g_1, f_1) = \left(\frac{a}{2}, \frac{b}{2}\right)$

$(g_2, f_2) = \left(\frac{d}{2}, \frac{e}{2}\right)$

$2g_1g_2 + 2f_1f_2 = c_1 + c_2$

CIRCLE

44. If the circles of same radius a and centres at $(2,3)$ and $(5,6)$ cut orthogonally, then a is equal to-

(A) 6
(B) 4
(C) 3
(D) 10

$S_1 : (x-2)^2+(y-3)^2 = a^2$

$S_2 : (x-5)^2+(y-6)^2 = a^2$

$x^2+y^2-4x-6y+13-a^2=0 \rightarrow (-2,-3)$

$x^2+y^2-10x-12y+61-a^2=0 \rightarrow (-5,-6)$

$2g_1g_2+2f_1f_2 = c_1+c_2 \rightarrow a^2$

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CIRCLE

48. $(6,0), (0,6)$ **and** $(7,7)$ **are the vertices of a triangle. The circle inscribed in the triangle has the equation**

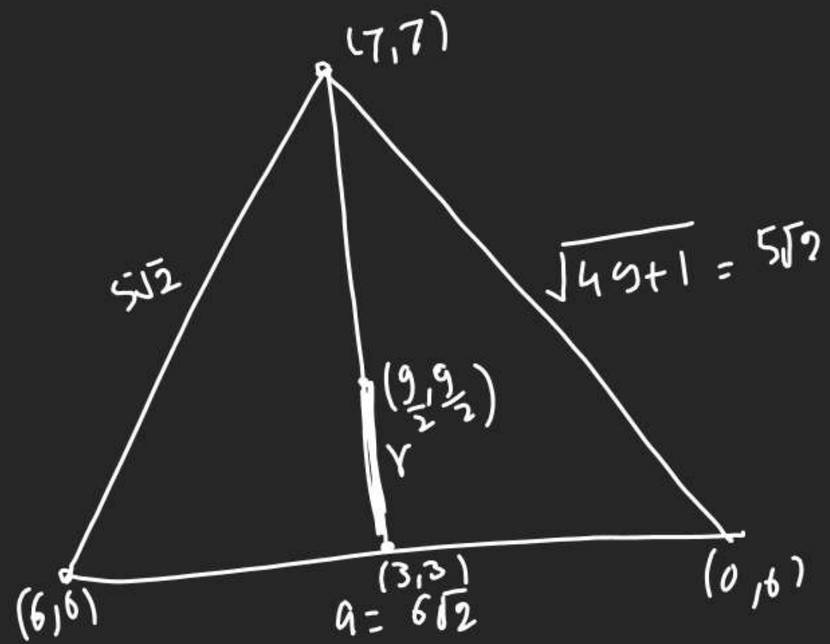
(A) $x^2 + y^2 - 9x + 9y + 36 = 0$

(B) $x^2 + y^2 - 9x - 9y + 36 = 0$

(C) $x^2 + y^2 + 9x - 9y + 36 = 0$

(D) $x^2 + y^2 - 9x - 9y - 36 = 0$

Incentre → Inradius → Incircle



$$I = \frac{6\sqrt{2}\cdot 7 + 6\sqrt{2}\times 6 + 5\sqrt{2}\times 0}{6\sqrt{2}+5\sqrt{2}+5\sqrt{2}}$$

$$, \frac{6\sqrt{2}\times 7 + 5\sqrt{2}\times 0 + 5\sqrt{2}\times 6}{5\sqrt{2}+6\sqrt{2}+6\sqrt{2}}$$

$$= \left(\frac{\frac{189}{16\sqrt{2}}}{\frac{16\sqrt{2}}{2}}, \frac{72\sqrt{2}}{16\sqrt{2}}\right) = \left(\frac{9}{2}, \frac{9}{2}\right)$$

$$\left(x-\frac{9}{2}\right)^2 + \left(y-\frac{9}{2}\right)^2 = (r)^2$$