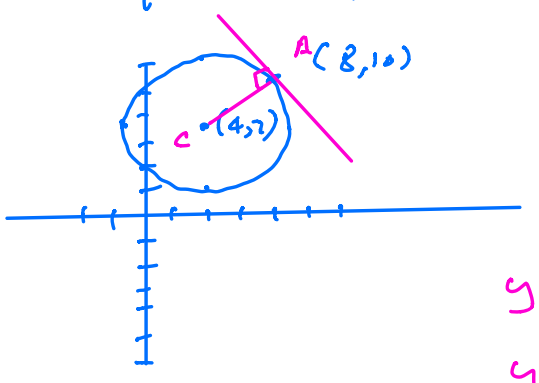
Finding Eqn of Tangent to Circle at a Given Point

Ex

Circle $(x-4)^2 + (y-7)^2 = 5^2$

Find eqn of tangent at $A(8, 10)$



grad AC $= \frac{10-7}{8-4} = \frac{3}{4}$

grad of tgt $= -\frac{4}{3}$

$y - y_1 = m(x - x_1)$

$y - 10 = -\frac{4}{3}(x - 8)$

$3y - 30 = -4x + 32$

$4x + 3y - 62 = 0$

Exercise 6E

5) $x^2 + 18x + y^2 - 2y + 29 = 0$

a) Verify $P(-7,-6)$ on circle

$(-7)^2 + 18(-7) + (-6)^2 - 2(-6) + 29$

$= 49 - 126 + 36 + 12 + 29$

$= +126 - 126 = 0$ ✓ $\therefore$ on circle

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b) $(x+9)^2 - 81 + (y-1)^2 - 1 + 29 = 0$

$(x+9)^2 + (y-1)^2 = 53$

centre $A(-9, 1)$

$$\text{grad } AP = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - -6}{-9 - -7} = \frac{1+6}{-9+7} = \frac{7}{-2}$$

$$= -\frac{7}{2}$$

$\therefore$ grad of tgt at $P = +\frac{2}{7}$

$$y - y_1 = m(x - x_1)$$

$$y - -6 = \frac{2}{7}(x - -7)$$

$$y + 6 = \frac{2}{7}(x + 7)$$

$$y + 6 = \frac{2}{7}x + 2$$

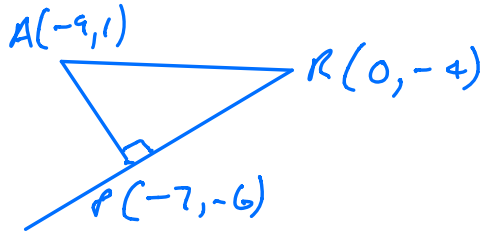
$$y = \frac{2}{7}x - 4$$

c) On y-axis $x = 0$

$$y = \frac{2}{7}(0) - 4 = -4$$

$\therefore R(0, -4)$

d)



$$AP = \sqrt{(-7 - -9)^2 + (-6-1)^2}$$

$$= \sqrt{4 + 49}$$

$$= \sqrt{53}$$

$$\text{Area} = \frac{1}{2} \times AP \times PR$$

$PR = \sqrt{(0--7)^2 + (-4--6)^2}$

$= \sqrt{49+4}$

$= \sqrt{53}$

Area of $\triangle APR$

$= \frac{1}{2} \times \sqrt{53} \times \sqrt{53}$

$= \frac{53}{2}$ units^2

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10) a) $M = \left(\frac{2+10}{2}, \frac{3+1}{2}\right) = (6, 2)$

b) $CR = CS$

$\sqrt{(a-2)^2 + (-2-3)^2} = \sqrt{(a-10)^2 + (-2-1)^2}$

$(a-2)^2 + 25 = (a-10)^2 + 9$

$\cancel{a^2} - 4a + 4 + 25 = \cancel{a^2} - 20a + 100 + 9$

$29 - 104 = -16a$

$-80 = -16a$

$\frac{-80}{-16} = a$

$\underline{a = 5}$

$CR = \sqrt{9+25} = \sqrt{34}$

Circle $(x-5)^2 + (y+2)^2 = 34$