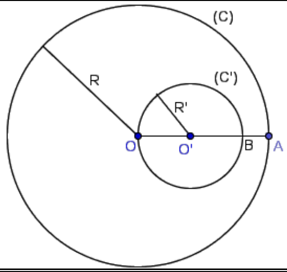
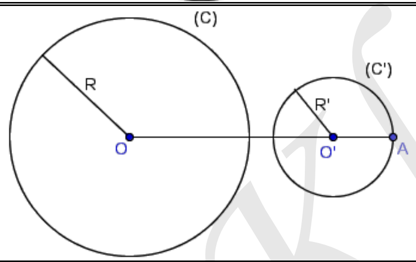
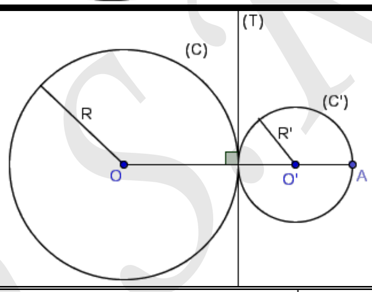
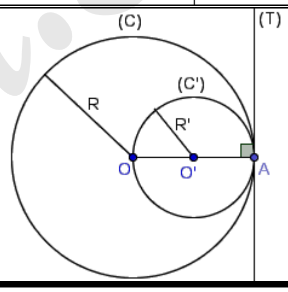
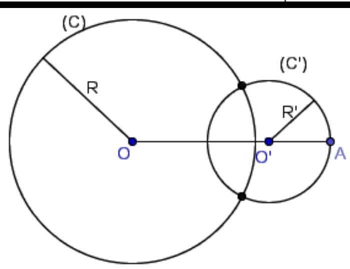
Name: . . . .

"Relative Positions Of Two Circles "

E.S-10.

Consider the two distinct circles $C(O;R) \& C'(O;R')$, where $R \& R'$ are ***positive non-zero*** numbers.

NO.	Relative Position of the two circles		Graphical representation	Mathematical relation
1.	Two Circles are ***Disjoint:***	*Internally* If		$OO' < R - R', where (R > R')$
		Externally If		$OO' > R + R'.$
2.	Two Circles are ***Tangent***:	*Externally* If		$OO' = R + R'.$
		Internally If		$OO' = R - R'.where (R > R')$
3.	Two Circles are ***Intersecting*** if			$R - R' < OO' < R + R'.(R > R')$

Summary:

	Externally	Internally
Tangent	$OO' = r + r'$	$OO' = r - r'$
Disjoint	$OO' > r + r'$	$OO' < r - r'$

If none of the above applies, then circles are secant

Application

Whenever you want to work an exercise that askes you about relative position, try this way, it works all the time.

Determine relative positions of circles $C(O, r = 3cm)$ & $n(P, r' = 5cm)$, $where\ OP = 7cm$.

To study relative positions of two circles:

Explanation	Calculation
1st: calculate the sum and the difference between the radii	$r + r' = 3 + 5 = 8cm$ $r' - r = 5 - 3 = 2cm$
2nd Find the distance between the centers	$OP = 7cm$
3rd Compare the distance between the centers to the sum and difference between the radii.	1) Is $OP = r + r'$ ($7 \neq 8$ $false$), then circles are not tangent externally. 2) Is $OP = r - r'$ ($7 \neq 2$ $false$), then circles are not tangent internally. 3) Is $OP > r + r'$ ($false$), then circles are not disjoint externally. 4) Is $OP < r - r'$ ($false$), then circles are not disjoint internally. 5) Thus, circles are secant ($r - r' < OP < r + r'$)

Ex-1: Consider the circles $\lambda(O, 5cm)$ & $\Delta(O', 3cm)$ where $OO' = \dfrac{3^3 + 243}{135} cm$

a) Prove that OO' is a natural number to be determined.

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b) Find the difference between the two radii.

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c) Draw on the adjacent grid (λ) & (Δ).

d) At how many points do (λ) & (Δ) intersect? ……………

e) Deduce the relative positions of (λ) & (Δ).

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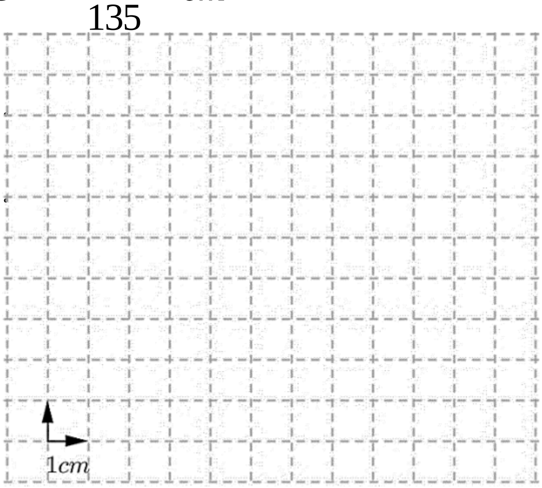

Ex-2: In the adjacent figure (C) is a circle of center O and radius $r = 5cm$.

1) Trace a circle $C'(O', r' = 3cm)$, so that $OO' = 5.6 - 2 \times 0.23 \times 10cm$

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2) Compare $r - r'$ with OO': ………………………………..

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3) Deduce the relative position of (C) & (C') ?

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