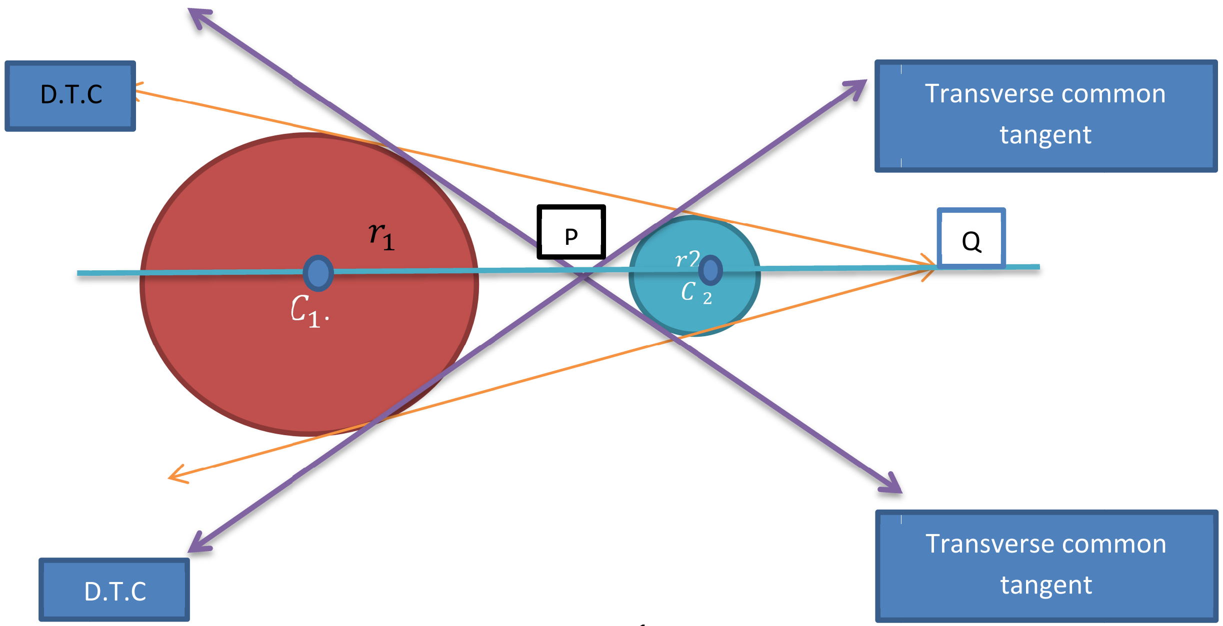
Let $S = 0, S^1 = 0$ be two circles with

centres C_1, C_2 and

radii r_1, r_2 respectively.



i) If $C_1C_2 > r_1 + r_2$ then
each circle lies completely
outside the other circle.
No. of common tangents = 4

The point of intersection of transverse common tangents of $S = 0, S^1 = 0$ is called internal centre of similitude P. P divides in the ratio $r_1 : r_2$. (m: n)

$$P=\left[\frac{mx_2+nx_1}{m+n},\frac{my_2+ny_1}{m+n}\right]$$

Equation of T.C.T is

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

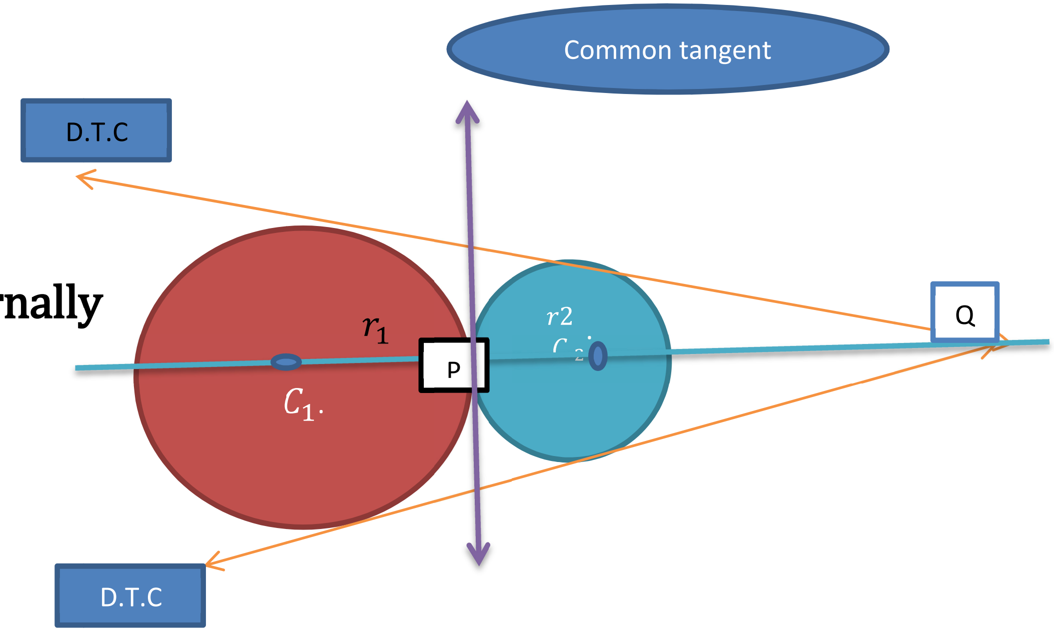
The point of intersection of Direct common tangents of $S = 0, S^1 = 0$ is called External centre of similitude Q. Q divides in the ratio $r_1 : -r_2$. (-m: n)

$$Q=\left[\frac{mx_2-nx_1}{m-n},\frac{my_2-ny_1}{m-n}\right]$$

Equation of D.C.T is $(y - y_1) = m(x - x_1)$

ii) If $C_1C_2 = r_1 + r_2$ then

Circles touch each other externally



No. of common tangents = 3

P divides in the ratio $r_1 : r_2$. (m: n)

$$P=\left[\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right]$$

Common tangents is $S - S' = 0$

The point of intersection of Direct common tangents of $S = 0, S^1 = 0$ is called External centre of similitude Q. Q divides in the ratio $r_1 : -r_2$. (-m: n)

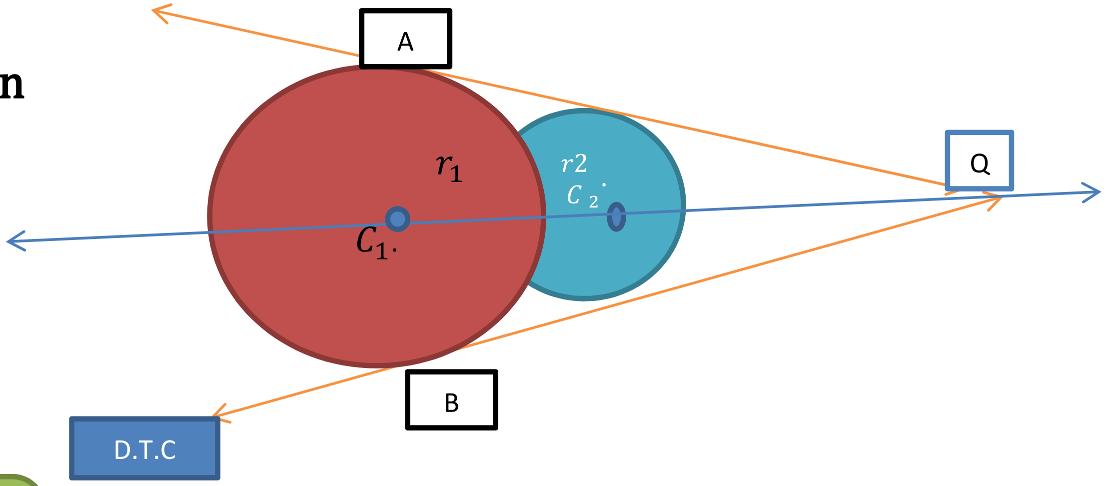
$$Q=\left[\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right]$$

Equation of Direct common tangents is

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

iii) If If $|r_1 - r_2| < (C_1C_2) < r_1 + r_2$ then

Circles intersect each other at two points at A and B.



No. of common tangents = 2

Equation of Direct common tangents is

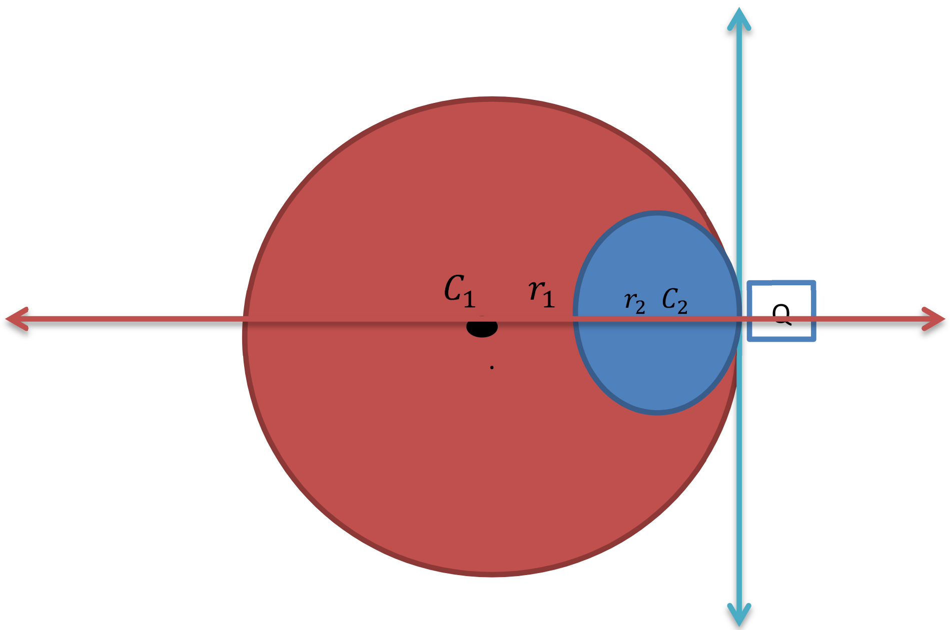
$$(y - y_1) = m(x - x_1)$$

The point of intersection of Direct common tangents of $S = 0, S^1 = 0$ is called External centre of similitude Q. Q divides in the ratio $r_1 : -r_2$. $(-m : n)$

$$Q = \left[\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right]$$

iv) If If $|r_1 - r_2| = r_1 + r_2$ then

Circles touch each other internally.

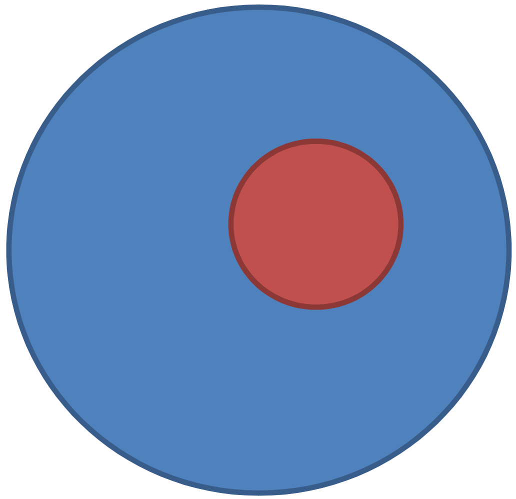


No. of common tangents = 1

Common tangents is $S - S' = 0$

The point of intersection of Direct common tangents of $S = 0, S^1 = 0$ is called External centre of similitude Q. Q divides in the ratio $r_1 : -r_2$. (-m: n)

$$Q = \left[\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right]$$



v) If $C_1C_2 < |r_1 - r_2|$ then one circle lies completely inside the other circle.

No. of common tangents = 0.