20 / 12 / 16

Circles - Lesson 3

Intersections of Circles

LI

- Determine whether or not 2 circles intersect.
- If circles intersect, determine in how many places they meet.

SC

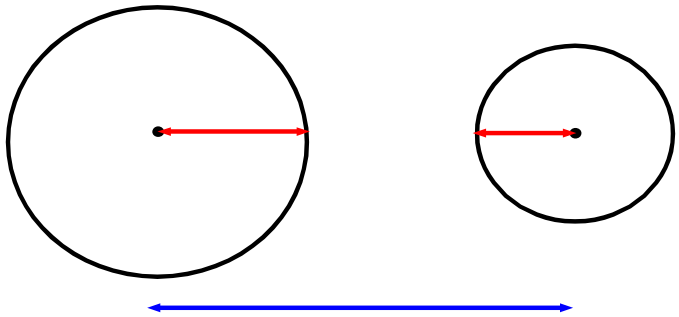
- Equation of a circle.
- Distance formula.

Jan 10-12:11

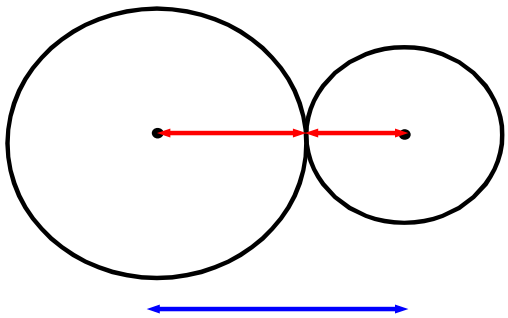
Circles Meeting Circles

d = distance between centres

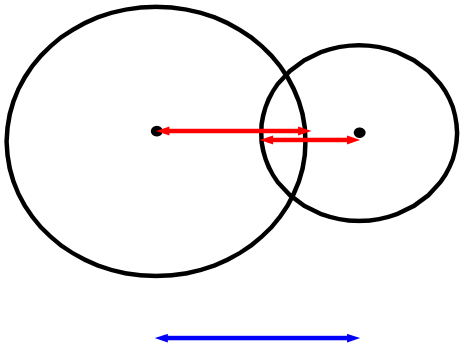
r_1, r_2 = radii of the 2 circles



$d > r_1 + r_2$: Circles do not meet



$d = r_1 + r_2$: Circles meet once (tangency)



$d < r_1 + r_2$: Circles meet twice

Example

Determine whether or not the circles $x^2 + y^2 + 2x + 4y + 4 = 0$ and $(x - 3)^2 + (y - 3)^2 = 36$ intersect; if they intersect, state how many points of intersection there are.

We first find the centres and radii of both circles.

$$x^2 + y^2 + 2x + 4y + 4 = 0$$

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

$$2g = 2 \Rightarrow g = 1$$

$$2f = 4 \Rightarrow f = 2$$

$$c = 4$$

Centre : $(-g, -f) = \underline{(-2, -1)}$

Radius : $\sqrt{g^2 + f^2 - c}$

$$= \sqrt{1^2 + 2^2 - 4}$$

$$\underline{r_1 = 1}$$

$$(x - 3)^2 + (y - 3)^2 = 36$$

Centre : $\underline{(3, 3)}$

Radius : $\underline{r_2 = 6}$

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

$$d = \sqrt{5^2 + 4^2}$$

$$\underline{d = \sqrt{41} \approx 6.4}$$

$$r_1 + r_2 = 1 + 6$$

$$\underline{r_1 + r_2 = 7}$$

As $d < r_1 + r_2$, the circles meet in two places.

Dec 15-10:30

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Oct 29-09:14