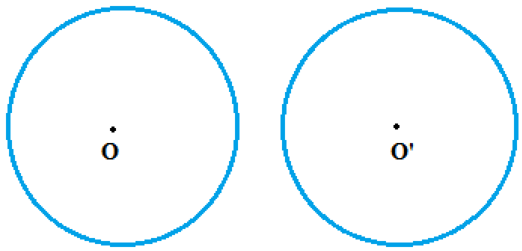
Circle: Exercise 10.3

Q.1 Draw different pairs of circles. How many points does each pair have in common? What is the maximum number of common points?

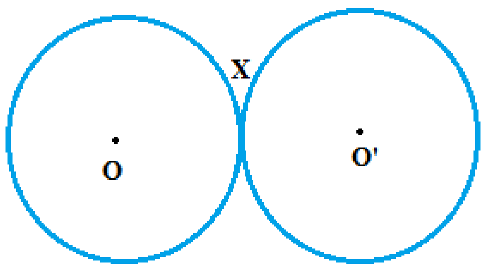
Sol. Drawing a different pairs of circles.

(i)



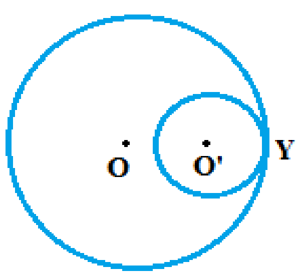
In both circles, no pint is common.

(ii)



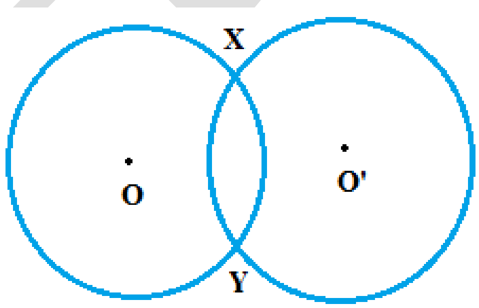
In both the circles, one point x is common.

(iii)



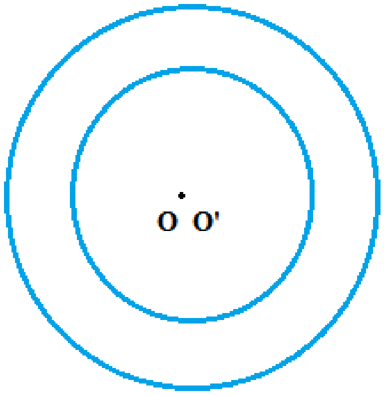
In both the circles, one point Y is common.

(iv)



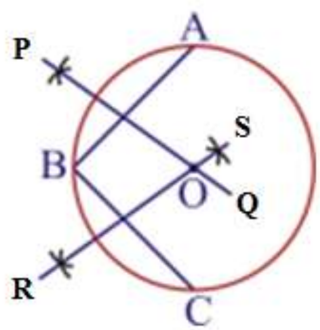
In both the circles, two points X and Y are common.

(v)



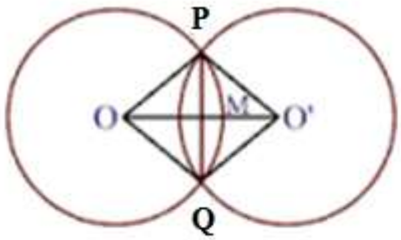
In both the circles, No point is common.
So, we find that they have maximum two points in common.

Q.2 Suppose you are given a circle. Give a construction to find its centre.
Sol. Given: We have given a circle.
Since, as we know that bisector of any chord of circle will pass through the center of the circle. If we draw the angle bisectors of any two chord of the circle, then both the bisectors will give the center of circle.
Steps of Construction:



1. Firstly, take three points A, B and C on the circumference of the circle.
2. Now, join AB and BC to obtain two chords.
3. Draw PQ and RS, the perpendicular bisectors of chords AB and BC respectively with help of compass and ruler, which intersect each other at O.
Thus, this point O is the centre of the circle.

Q.3 If two circles intersect at two points, prove that their centres lie on the perpendicular bisector of the common chord.
***Sol.* Given:** Let two circles, with centres O and O' intersect, at two points P and Q so that PQ is the common chord of the two circles and OO' is the line segment which intersects PQ at M.
To prove: OO' is the perpendicular bisector of PQ.
Construction: Draw the line segments OP, OQ, O'P and O'Q.



Proof: Firstly, in ΔOPO' and ΔOQO',
OP = OQ (Since, radii of the same circle with centre O)

$O'P = O'Q$ (Since, radii of the same circle with centre O')
and $OO' = OO'$ (Common side)
So, from SSS criterion of congruence,
Thus, $\Delta OPO' \cong \Delta OQO'$
$\Rightarrow \angle POO' = \angle QOO'$
$\Rightarrow \angle POM = \angle QOM$ ... (i) (From, C.P.C.T) (Since $\angle POO' = \angle POM$ and $\angle QOM = \angle QOO'$)
Now, in ΔPOM and ΔQOM,
$OP = OQ$ (Since, radii of the same circle with centre O)
$\angle POM = \angle QOM$ (From eq. (i))
and $OM = OM$ (Common side)
So, from SAS criterion of congruence,
Thus, $\Delta POM \cong \Delta QOM$
$\Rightarrow PM = QM$ and $\angle PMO = \angle QMO$ (From C.P.C.T)
But $\angle PMO + \angle QMO = 180^\circ$ (Linear pair angles)
So, $2\angle PMO = 180^\circ$
$\Rightarrow \angle PMO = 90^\circ$
Therefore, $PM = QM$ and $\angle PMO = \angle QMO = 90^\circ$
Thus, OO' is the perpendicular bisector of PQ.
Hence Proved.