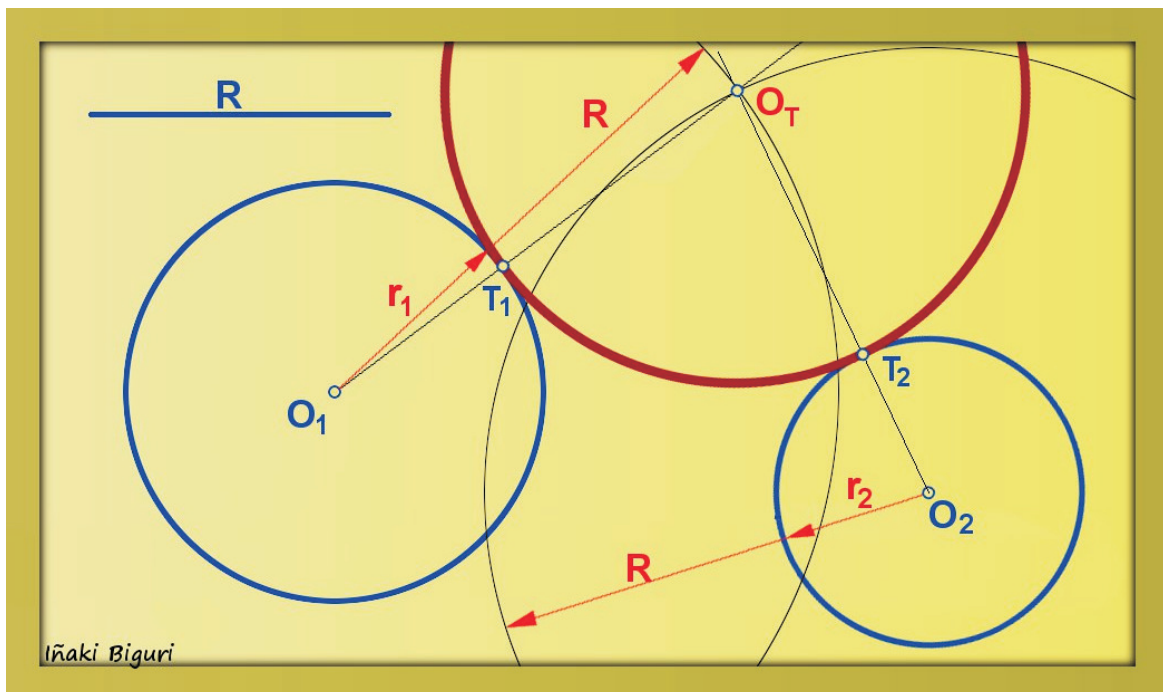


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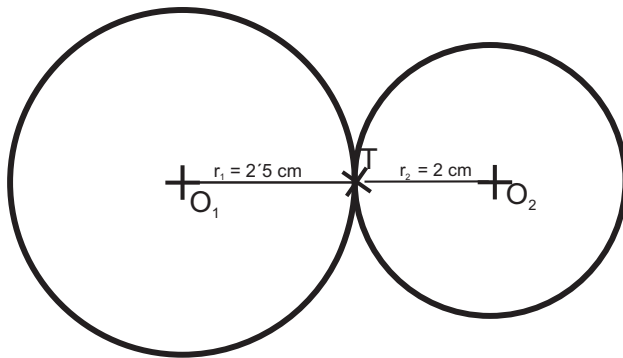
TANGENCIES AND LINKS



3rd Compulsory Secondary Education
Teacher: Maria Jose Relaño Cotta

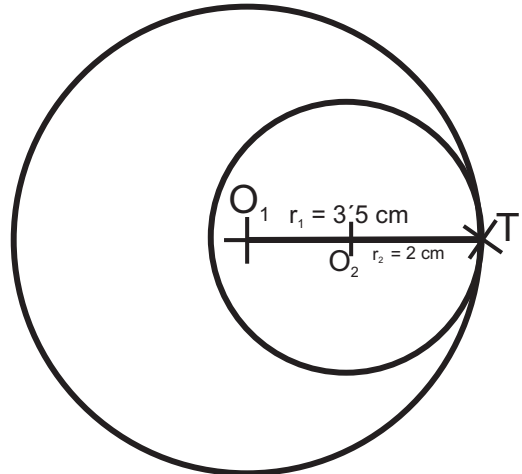
Tangency exercises \ Sheet 1

a.1. Draw a pair of outer tangent circumferences, which radius are $r_1 = 2.5$ cm And $r_2 = 2$ cm.



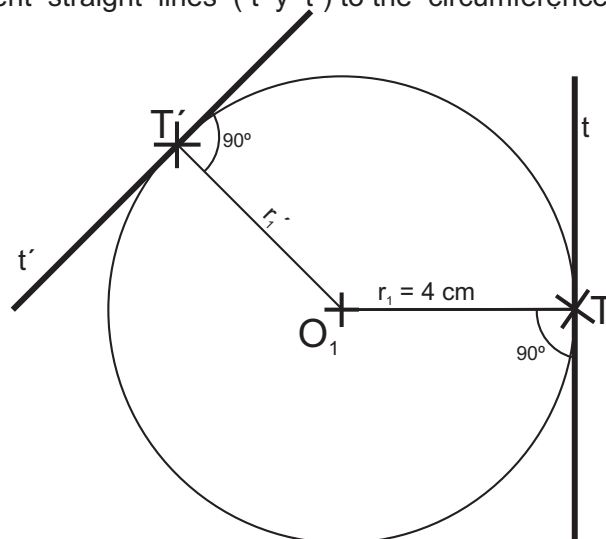
1. Trace O_1 ($r_1 = 2.5$ cm) ; trace a radius r_1
2. Name the tangency point T .
3. Prolong the 2 centimetre radius to mark the second centre.
4. Go over the two circumferences.

a.2. Draw a pair of inner tangent circumferences, which radius are $r_1 = 2.5$ cm And $r_2 = 2$ cm.



1. Trace O_1 ($r_1 = 2.5$ cm) ; trace a radius r_1
2. Name the tangency point T .
3. Measure the 2 centimetre radius from point T on radius OT to mark the second centre.
4. Go over the two circumferences.

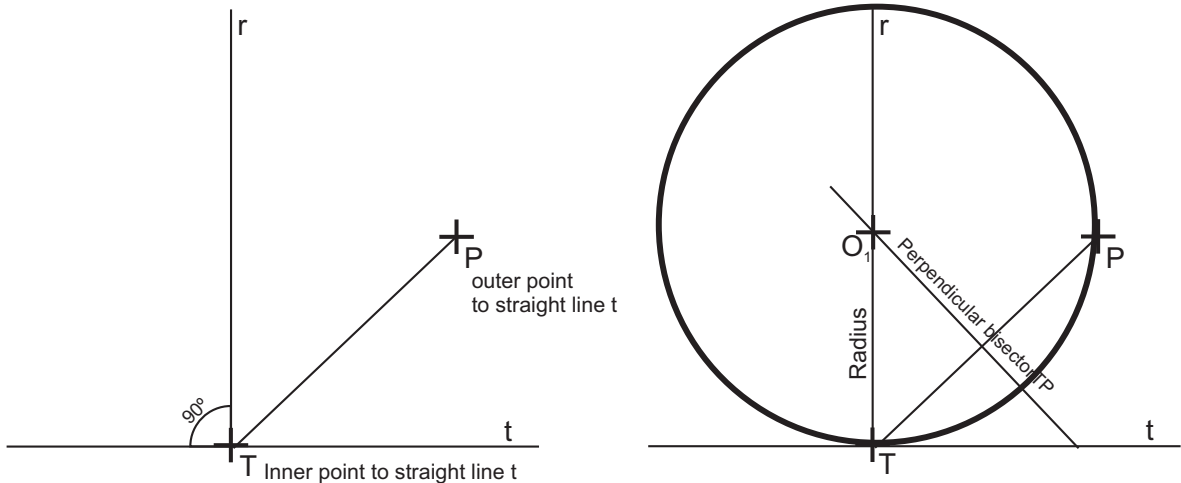
b. Trace two tangent straight lines (t y t') to the circumference O_1



1. Trace O_1 ($r_1 = 4$ cm) ; trace a radius r_1 (any one).
2. Name the point T (tangency point).
3. By point T , trace the tangent straight line (to radius O_1T) . Go over the straight line t.
4. Trace a second radius r' : trace the tangent straight line t' by T' radio O_1T' . Go over t' .

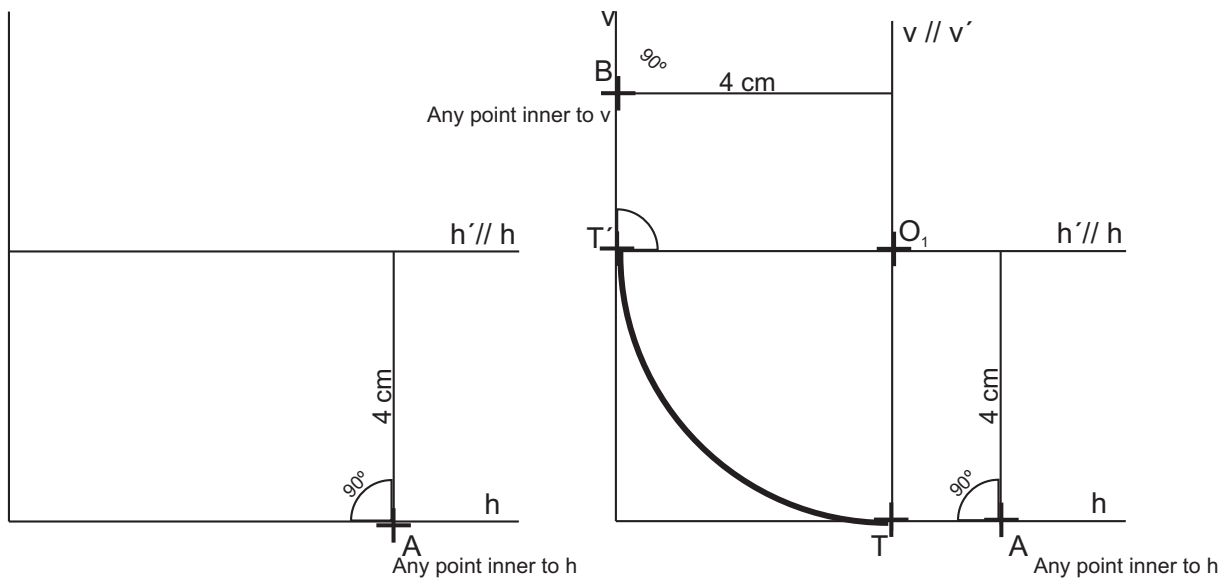
Tangency exercises \ Sheet 2

- a. Draw the circumference O_1 tangent to the straight line t by point T which contains the point P .



1. Draw the straight line t , mark the point T , anyone which belongs to t , and the point P , anyone outer to line t .
2. Trace the straight line r to line t by point T .
3. Join points T and P .
4. Trace the perpendicular bisector of segment TP ; it cuts the line r by the centre O_1 .
5. Draw the solution circumference, with centre = O_1 and radius = O_1T .

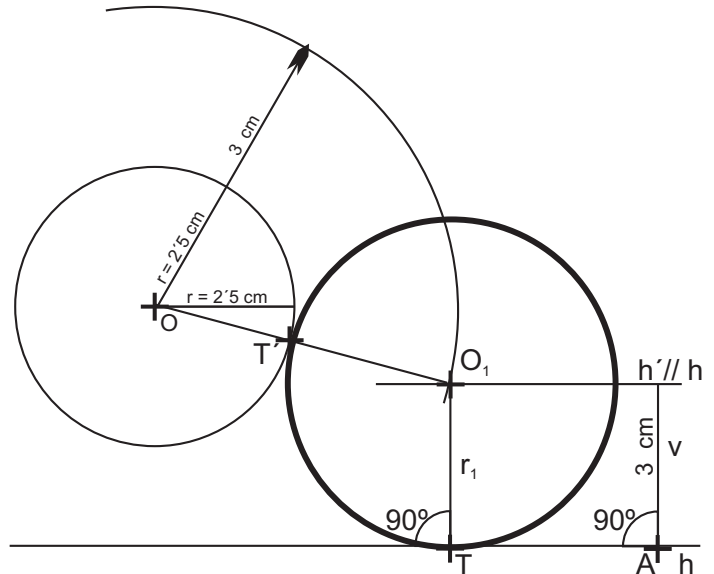
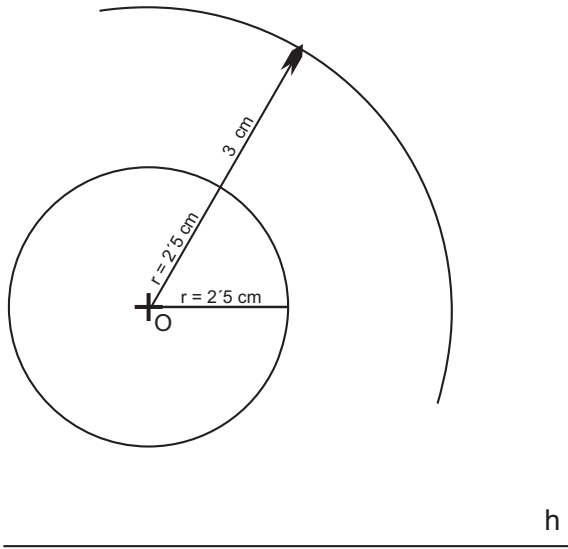
- b. Draw the tangent arc to two perpendicular straight line, which radius is 4 centimetre.



1. Trace two straight lines; a horizontal one H and a vertical one v .
2. Trace a parallel one to h at a 4 centimetre distance.
3. Trace a parallel one to v at a 4 centimetre distance.
4. The intersection point between both parallels is the centre O .
5. Determine the tangency points.
6. Trace the circumference arc TT' , which centre = O_1 and radius = O_1T .

Tangency exercises \ Sheet 3

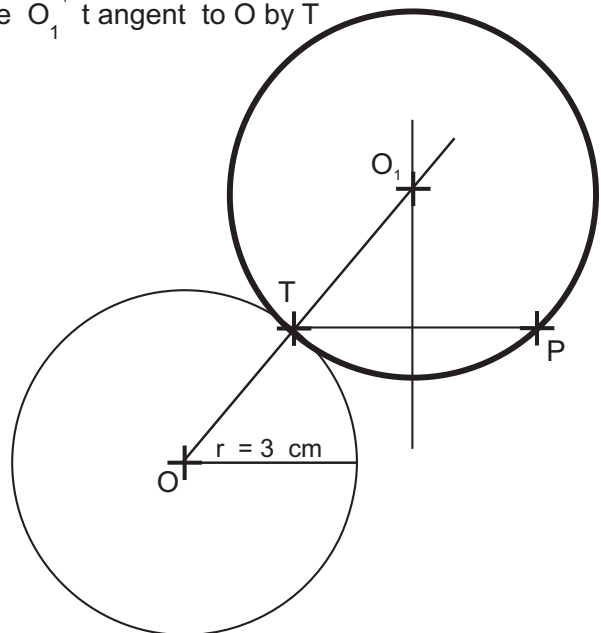
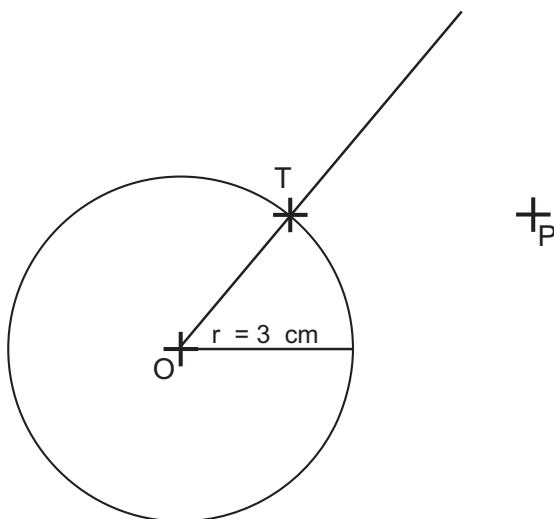
a. Place the circumference O (radius = 2'5 cm) and the horizontal straight line h,
Trace the circumference O₁ (radius = 3 cm)



1. Draw the circumference O (cto = any point ; radius = 2'5 cm)
2. Trace horizontal straight line h.
3. Trace the arc (cto = O ; radio = 5'5 cm)

4. Trace parallel straight line to h at a 3 centimetre distance.
5. Name O₁ (intersection point between the arc and line h')
6. Determine T and T': trace O₁; go over the solution circumference.

b. Place the circumference O (radius r = 3 cm), point P, outer to the circumference, and point T, inner to the circumference, draw the circumference O₁ t tangent to O by T which contains to P.

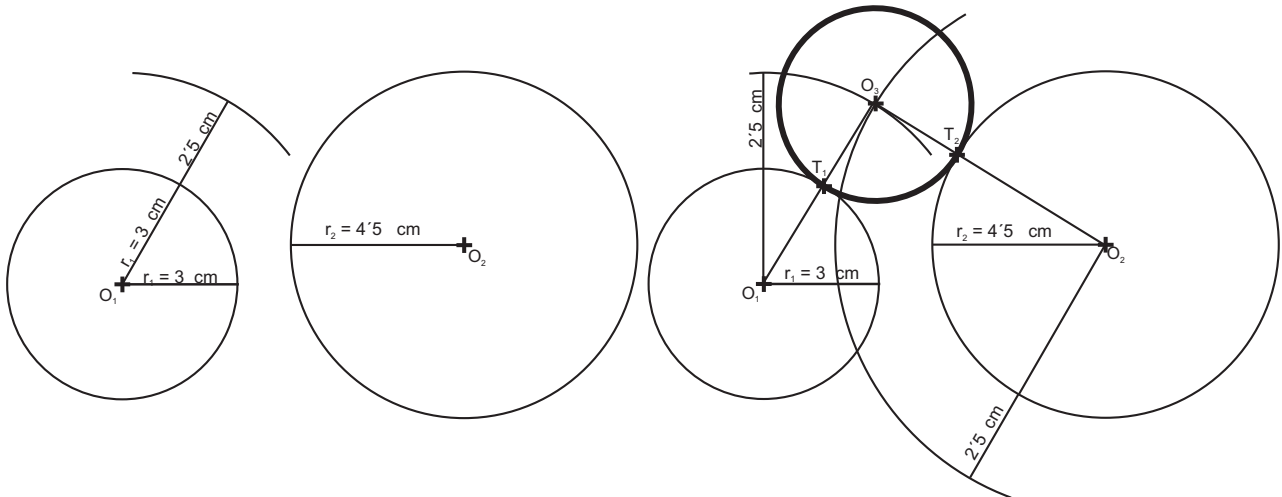


1. Trace the circumference O (radius = 3 cm) ; T is any inner point of the circumference.
2. Mark the point P (anyone outer to the circumference)
3. Trace the radius OT ; prolong it.

4. Trace the perpendicular bisector of the segment TP.
5. The perpendicular bisector cuts to radius OT in the centre O₁
6. Trace the circumference O₁ ; go over it.

Tangency exercises \ Sheet 4

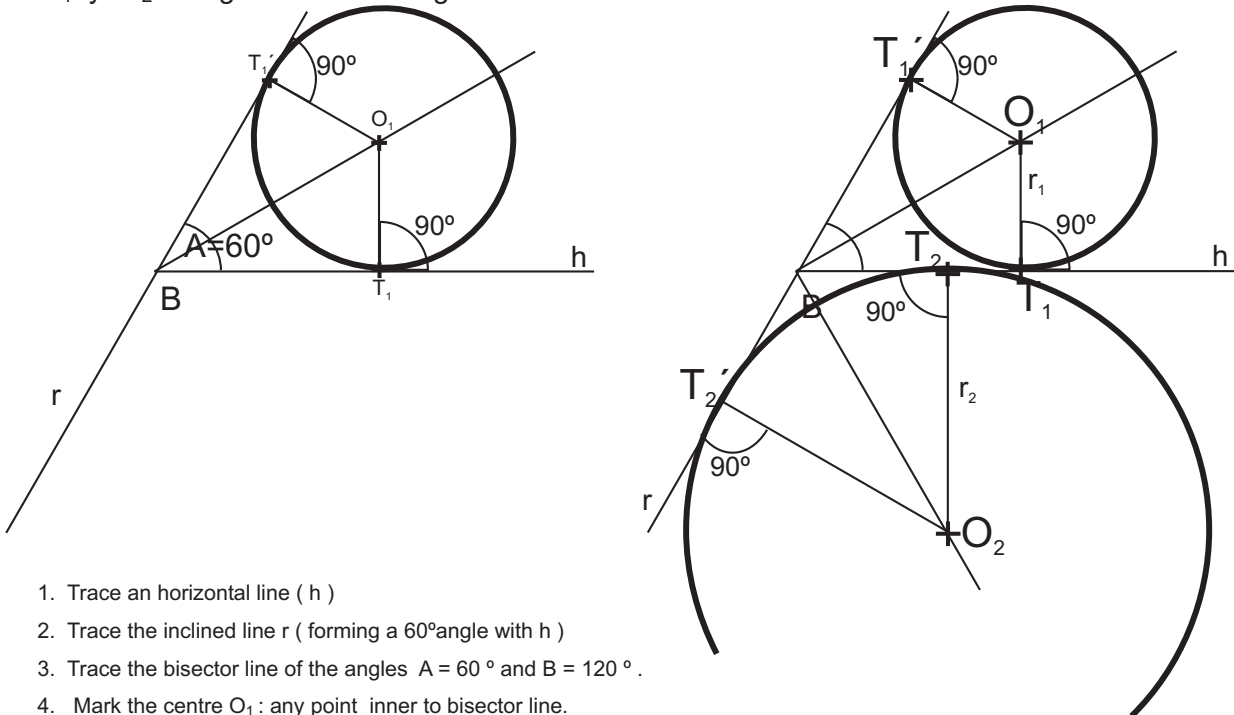
a. Place O_1 ($r_1 = 3$ cm) and O_2 ($r_2 = 4.5$ cm); draw O_3 ($r_3 = 2.5$ cm)
Tangent to O_1 And O_2



1. Trace O_1 (cto = any point ; $r_1 = 3$ cm)
1. Trace O_2 (cto = any point ; $r_1 = 4,5$ cm)
3. Prolong the radius r_1 ; add up to 2.5 cm.
4. Trace the arc with centre = O_1 radius = $r_1 + 2.5 = 5.5$ cm.

5. Prolong any radius r_2 ; add up to 2.5 cm
6. Trace the arc with centre = O_2
And radius $r_2 = 4,5 + 2.5 = 7$ cm
7. The intersection point of the two arcs is O_3 ; hallar T_1 y T_2
8. Trace the circumference O_3 ; go over it.

b. Place two straight lines h and r which cut each other with a 60 degree angle; draw circumferences O_1 y O_2 Tangent to both straight lines.



1. Trace an horizontal line (h)
2. Trace the inclined line r (forming a 60° angle with h)
3. Trace the bisector line of the angles $A = 60^\circ$ and $B = 120^\circ$.
4. Mark the centre O_1 : any point inner to bisector line.
5. Determine the tangency points.
6. Trace the bisector line of the angle $B = 120^\circ$.

7. Mark O_2 , any point of the bisector line. Determine T_2 y T_2'
8. Trace O_2 with centre = O_2 y radius = O_2T_2