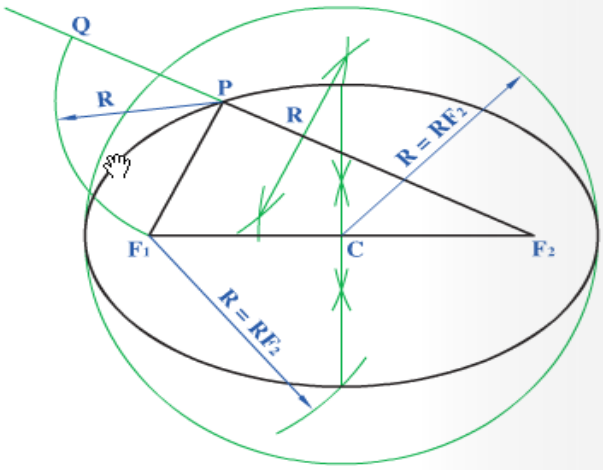
Example

In the triangle PF_1F_2, P is a point on an ellipse and F_1 and F_2 are the focal points. Construct the ellipse.

1. Bisect F_1F_2 to locate the centre C of the ellipse.
2. Extend F_2P. With centre P and radius PF_1, draw an arc to locate Q. $PF_1 + PF_2$ = major axis = F_2Q.
3. Bisect F_2Q to locate R. RF_2 = half the major axis.
4. Draw the major auxiliary circle of radius RF_2 about C.
5. With centre F_1 and radius RF_2 (half the major axis), swing an arc to locate one end of the minor axis. Construct the ellipse using any of the methods.

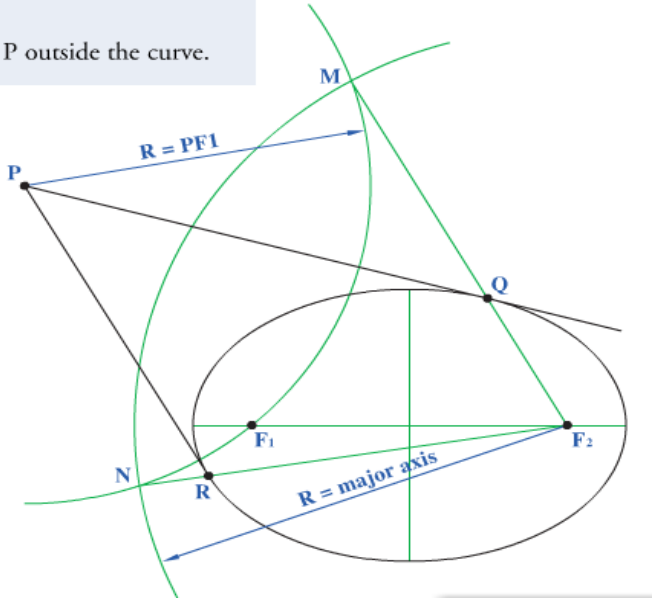


Tangents to an Ellipse from a Point Outside

Example 1

Construct a **tangent** to an ellipse from a point P outside the curve.

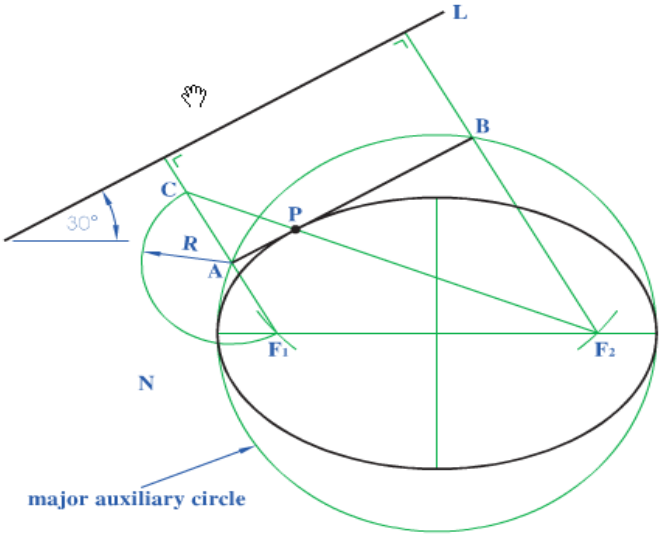
1. Determine the focal points. With P as centre and radius PF_1, draw an arc as shown.
2. With F_2 as centre and the length of the major axis as radius, draw an arc to intersect the first arc at M and N.
3. Join M to F_2 to intersect the ellipse at Q. PQ is the required tangent and Q is the point of contact.
4. Join N to F_2 to intersect the ellipse at R. PR is a second tangent that can be drawn to the curve from P and R is the point of contact.



Example 2

Construct a **tangent** to an ellipse that makes an angle of 30° with the major axis.

1. Determine the focal points.
2. Draw the major auxiliary circle.
3. Draw line L at 30° to the major axis.
4. Draw lines from F_1 and F_2 perpendicular to the line L to locate points A and B on the major auxiliary circle. AB is the required tangent.
5. With A as centre and radius AF_1 draw a semicircle to locate C. Join CF_2 to locate P on the tangent. This is the required point of contact.



Perpendiculars from the focal points to a tangent meet the tangent on the major auxiliary circle.

The **point of contact** must be located each time a tangent is drawn to an ellipse.

Answer Worksheet 21C