

MATHEMATICS

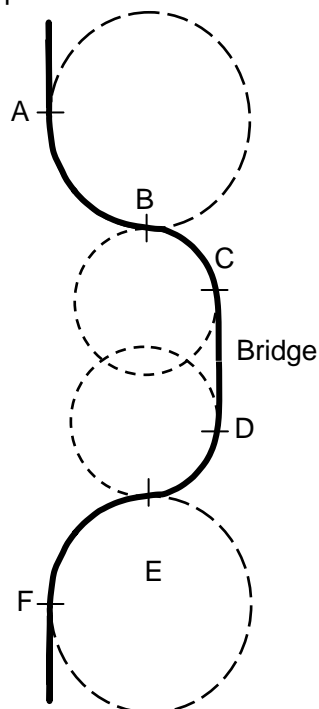
Level Two

Geometry # 2

Task One:

During a flash flood the bridge connecting two towns is destroyed leaving the ground unstable. A new bridge is to be located 50m downstream. Circular curves are needed to connect the new bridge to the old road.

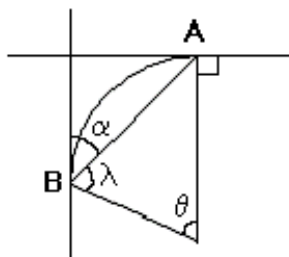
The radius of both the first and last curve is 60m and the two curves either side of the bridge are 30m in radius. The Bridge is 50m in length. The bridge connects into the circles at the tangent points. The first circle meets the second curve at their common tangent points.



- 1) Derive a formula to work out the length of road between points A and F.
- 2) How long is the road in each part of the circle?
- 3) What is the total length of the road?
- 4) If the cost of roading per square metre is \$150 and the width of the road is 18m. How much will the new road cost?
- 5) If the bridge is 24m wide and it costs \$6000 per m^2 to build, what is the total cost of the bridge?

Task Two

Part of the new road is shown below and is being correctly set out by surveyors. Using the following information, given in the diagram below, answer the questions:



- 1) If $\theta = 61^\circ$ and the radius is 34m Calculate the Curved length of AB
- 2) Calculate α and λ . Explain your reasoning.
- 3) If the formula for sector area = $\frac{1}{2}R^2\theta$ (θ in radians), calculate this.