

MATHEMATIC ANSWERS

Level Two

Geometry # 2

Task One

1. Circumference of a circle = $\pi 2r$
 \Rightarrow Let: r_1 = radius of the first circle
 r_2 = radius the second circle
 c = the length of the bridge
 \Rightarrow Breaking down the roading into $\frac{1}{4}$ circles and using the above formula adding together gives:
 $\Rightarrow \frac{1}{4}\pi 2r_1 + \frac{1}{4}\pi 2r_2 + c + \frac{1}{4}\pi 2r_2 + \frac{1}{4}\pi 2r_1$
 $\Rightarrow \frac{1}{2}\pi 2r_1 + \frac{1}{2}\pi 2r_2 + c$
 $\Rightarrow \pi r_1 + \pi r_2 + c$
2. Arc of first circle and last circle: $\Rightarrow \frac{1}{4}\pi 2r_1 \Rightarrow 30\pi$
Arc of second and third circle: $\Rightarrow \frac{1}{4}\pi 2r_2 \Rightarrow 15\pi$
Bridge CD \Rightarrow given $\Rightarrow 50m$
3. Total length is $\Rightarrow 60\pi + 30\pi + 50$
 $\Rightarrow 90\pi + 50$
 $\Rightarrow 332.7m$ long
4. $332.7m \times 18m \times \150 per $m^2 = \$898,290$.
5. $\$6000 \times 24 \times 50 = \7.2 (million)

Task Two

1. $\theta = 61^\circ$ radius = 34m
 $\Rightarrow \theta = \frac{61 \cdot \pi}{180} = 1.0647$ (radians)
 $\Rightarrow S = R\theta = 34 \times 1.0647$
 $\Rightarrow = 36.198m$
2. $\alpha = 30^\circ 30' 00''$ (or 30.5°) since $\theta = 2\alpha$ or $\alpha = \theta/2$ $\lambda = 59^\circ 30'$ (or 59.5°)
(More likely to get reasoning based on the isosceles triangle, and that tangents meet radii at 90°).
3. $\frac{1}{2}R^2\theta$ $\theta = 1.0647$ (radians from Q.1), $R = 34$
 $\Rightarrow \frac{1}{2} \times (34)^2 \times 1.0647$
 $\Rightarrow = 615.4m^2$