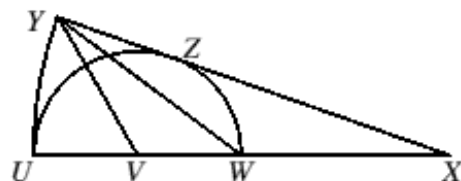22. A semicircle of radius r is drawn with centre V and diameter UW. The line UW is then extended to the point X, such that UW and WX are of equal length. An arc of the circle with centre X and radius $4r$ is then drawn so that the line XY is a tangent to the

semicircle at Z, as shown. What, in terms of r, is the area of triangle YVW?

A $\dfrac{4r^2}{9}$ B $\dfrac{2r^2}{3}$ C r^2 D $\dfrac{4r^2}{3}$ E $2r^2$

22. **B** Let the perpendicular from Y meet UV at T and let $\angle ZXV = \alpha$. Note that $\angle VZX = 90°$ as a tangent to a circle is perpendicular to the radius at the point of contact. Therefore $\sin \alpha = \frac{r}{3r} = \frac{1}{3}$. Consider triangle YTX: $\sin \alpha = \frac{YT}{YX}$. So $YT = YX \sin \alpha = \frac{4r}{3}$. So the area of triangle $YVW = \frac{1}{2} \times VW \times YT = \frac{1}{2} \times r \times \frac{4r}{3} = \frac{2r^2}{3}$.