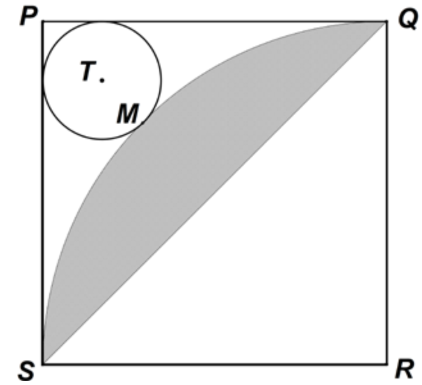

Team Round - continued

E) The shaded region plus the region bounded by ΔSQR is a quarter circle with area $\frac{\pi(6)^2}{4} = 9\pi$. Thus, the area of the shaded region is $9\pi - \frac{1}{2}\cdot 6\cdot 6 = 9(\pi - 2)$.
Draw diagonal $\overline{PR}$, intersecting $\overline{SQ}$ at point O.
$PR = 6\sqrt{2} \Rightarrow PO = 3\sqrt{2}$.
Since points T and M lie on $\overline{PR}$, $PT + TM + MO = 3\sqrt{2}$ (***).
If r denotes the radius of circle T, $PT = r\sqrt{2}$ (since P, T and the points of tangency on the square form a small square with side r). Therefore, (***) is equivalent to:
$r\sqrt{2} + r + \left(6 - 3\sqrt{2}\right) = 3\sqrt{2}$ $(MO = RM - RO)$
$\Leftrightarrow r\left(\sqrt{2}+1\right) = 6\left(\sqrt{2}-1\right)$
$\Leftrightarrow r = \frac{6\left(\sqrt{2}-1\right)}{\sqrt{2}+1} = 6\left(\sqrt{2}-1\right)^2 = 6\left(3-2\sqrt{2}\right)$

Finally, the required ratio is $\frac{\pi r^2}{9(\pi-2)} = \frac{\pi\cdot 36\cdot\left(3-2\sqrt{2}\right)^2}{9(\pi-2)} = \frac{\pi\left(68-48\sqrt{2}\right)}{\pi-2}$ and
$(A, B) = \underline{\left(\mathbf{68-48\sqrt{2},\ 2}\right)}$ or $\underline{\left(\mathbf{4\left(17-12\sqrt{2}\right),\ 2}\right)}$

$4\left(\sqrt{2}-1\right)^4$ is **not** an acceptable as the computed value of A.