

Circle

Submission deadline: October 28th 2023

In a right triangle, c is the length of hypotenuse, a and b are the lengths of the two other sides. If d is the diameter of the inscribed circle, express $a + b$ in terms of c and d .

The problem was solved by

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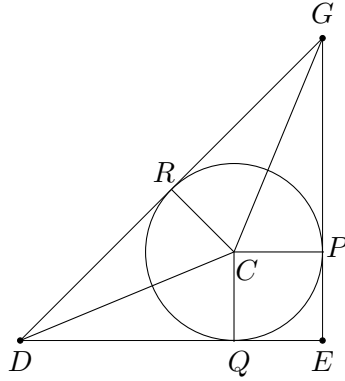
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Discussion:



Let $a = |GE|$ and $b = |DE|$.

The two right triangles GCR and GCP are congruent, hence $|GR| = |GP|$. Moreover, the right triangles CRD and CQD are congruent, thus, $|DR| = |DQ|$. It is easy to see that the quadrilateral $CPEQ$ is a square, hence $|QE| = |PE| = d/2$.

Thus, we get that $|GR| + |DR| + \frac{d}{2} + \frac{d}{2} = |GP| + |PE| + |DQ| + |QE|$. Therefore,

$$c + d = a + b$$