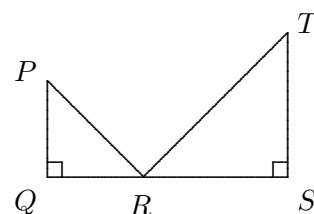


THE TWENTIETH W.J. BLUNDON MATHEMATICS CONTEST*

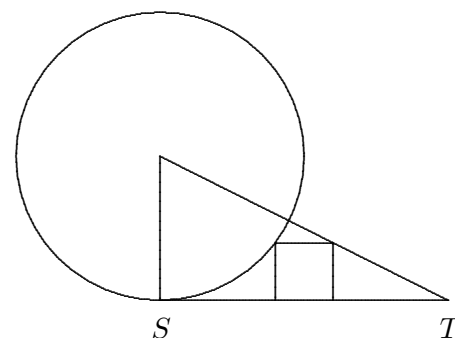
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Memorial University of Newfoundland

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1. Solve: $\log_2(9 - 2^x) = 3 - x$.
2. Show that $(\sqrt{5} + 2)^{\frac{1}{3}} - (\sqrt{5} - 2)^{\frac{1}{3}}$ is rational, and find its value.
3. If $a^3 + b^3 = 4$ and $ab = \frac{2}{3}$, where a and b are real, find $a + b$.
4. Find x , y and z such that when any one is added to the product of the other two, the result is 2.
5. If a , b and c are the three zeros of $P(x) = x^3 - x^2 + x - 2$, find $a + b + c$ and $a^2 + b^2 + c^2$.
6. If $\sin x + \cos x = \sqrt{\frac{2 + \sqrt{3}}{2}}$, with $0 < x < \frac{\pi}{2}$, find x .
7. Prove that two consecutive odd positive integers cannot have a common factor other than 1.
8. Triangle ABC has vertices $A(3, 1)$, $B(5, 7)$ and $C(1, y)$. Find all y so that angle C is a right angle.
9. In the diagram to the right, $PQ = 8$, $TS = 12$ and $QS = 20$. Find QR so that $\angle PRT$ is a right angle.



10. A square of side 2 is placed with one side on a tangent to a circle of radius 5 so that the square lies outside the circle, and one vertex of the square lies on the circle. A line is drawn from the centre of the circle through the vertex of the square that is not on the tangent and not on the circle. This line cuts the tangent at a point T . If the tangent meets the circle at S , find the length of the line segment TS .



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