# Bergen County Mathematics League

Good Luck To You


Good Luck To All

**Contest #5 (No Calculators)** **2017-2018**

**Part I** *Time Limit: 12 minutes* On contest #6, **any S.A.T. calculator** will be allowed.

5-1. How many triples of consecutive positive integers, each less than 100, have the property that the square of the middle number is 1 more than the product of the other two?

5-2. What are all values of $x$ which satisfy $\sqrt{\frac{6x+6}{4x-1}} + 2\sqrt{\frac{4x-1}{6x+6}} = 3 + \frac{2}{3}$?

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**Part II** *Time Limit: 12 minutes*

5-3. On hypotenuse $\overline{AB}$ of right $\triangle ABC$, $D$ is the point for which $CB = BD$. If $m\angle B = 40$, what is $m\angle ACD$?

5-4. What are all three values of $x$ which satisfy $\log_{10}x + \log_{10}(x^2+11) = \log_{10}6 + \log_{10}(x^2+1)$?

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**Part III** *Time Limit: 12 minutes*

5-5. What is the exact numerical value of $\frac{\sin 25° + \sin 35°}{\cos 25° + \cos 35°}$?

5-6. For what ordered pair $(A,B)$ will the four-digit numeral $3AB8$ be a multiple of 99, where $A$ and $B$ are the respective hundreds' and tens' digits of $3AB8$?

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**Answers**

5-1. 97

5-2. 1/2, -29/19

5-3. 20 or 20°

5-4. 1, 2, 3

5-5. $\sqrt{3}/3$ or $\sqrt{\frac{1}{3}}$

5-6. (1,6)