

NYC Math Team – practice 1.16.15  
Problems donated by David Hankin.

- I1. If  $(319, b, 481)$  is a Pythagorean triple, with  $b < 481$ , find  $b$ .
- I2. The hypotenuse of a right triangle is 11 and its area is 21. Find its perimeter.

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- I3. On the coordinate plane:  $A(12, 20)$ ,  $B(57, 100)$ ,  $C(-30, -63)$ . Find the coordinates of the intersection of the medians of  $\triangle ABC$ .
- I4. A class with 11 girls and  $n$  boys visited a library. Each child checked out the same number of books. Together they checked out  $n^2 + 9n - 2$  books from the library. How many boys are there in the class?

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- I5. In  $\triangle ABC$ ,  $P$  is on  $\overline{AB}$ , and  $AP : PB = 1 : 3$ . Find the ratio into which the line through  $P$  and the centroid of  $\triangle ABC$  divides  $\overline{BC}$ .
- I6. The angle bisectors of the acute angles of a  $3 - 4 - 5$  right triangle split the triangle into four regions. Compute the area of the region that is a quadrilateral.

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- I7. In  $\triangle ABC$ ,  $M$  is on  $\overline{AB}$ ,  $AM : MB = 3 : 4$ ,  $N$  is on  $\overline{AC}$ ,  $AN : NC = 2 : 3$ , and  $\overline{BN}$  intersects  $\overline{CM}$  at  $P$ . Compute  $CP : PM$ .
- I8.  $P(x)$  is a monic polynomial (its leading coefficient is 1) which satisfies the identity:  
 $(x - 6) \cdot P(x) = x \cdot P(x - 1)$ . Find  $P(-1)$ .