

MASSACHUSETTS MATHEMATICS LEAGUE

OCTOBER 2003

ROUND 2: PYTHAGOREAN RELATIONS

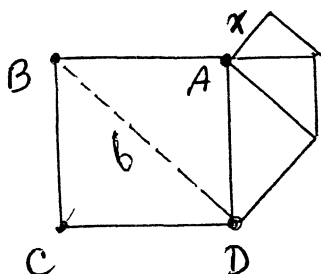
ANSWERS

A) \_\_\_\_\_

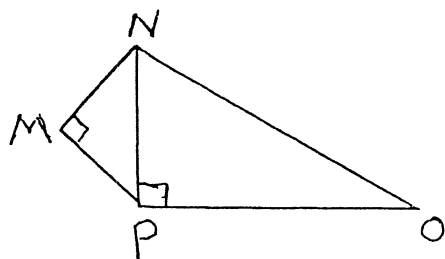
B) \_\_\_\_\_

C) \_\_\_\_\_

A) The diagonal of square ABCD is 6, and three 45-45-90 triangles adjoin it on the right in succession. The length of the leg labeled  $x$  is the reduced fraction  $a/b$ . Find the value of  $a+b$ .



B) In NOPM,  $MN = MP = 7$ ,  $\angle NMP = \angle NPO = 90^\circ$ , and  $\angle O = 30^\circ$ . Calculate PO in simplified radical form.



C) In tetrahedron A-BCD,  $\overline{AD} \perp \text{plane } BCD$ ,  $AB = 10$ ,  $BD = 8$ ,  $\angle CAD = \angle DCA$ , and  $\angle BDC = 60^\circ$ . Calculate BC in simplified radical form.

