Translations. Other Homework problems

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My geometry teacher was sometimes acute, and sometimes obtuse, but always, he was right.

Finish the problems from the class handout.

Competition practice

Exercise 1. 1985 AJHSME, Problem 12. A square and a triangle have equal perimeters. The length of the three sides of the triangle are 6.2 cm, 8.3 cm and 9.5 cm. What is the area of the square?

Exercise 2. 2002 AMC 10A, Problem 18. A $3 \times 3 \times 3$ cube is formed by gluing together 27 standard cubical dice. (On a standard die, the sum of the numbers on any pair of opposite faces is 7.) What is the smallest possible sum of all the numbers showing on the surface of the $3 \times 3 \times 3$ cube?

Exercise 3. 2005 AMC 10A, Problem 4. A rectangle with a diagonal of length x is twice as long as it is wide. What is the area of the rectangle?

Challenge Problems

Exercise 4. Where should we build a bridge through the river defined by two parallel lines L_1 and L_2, so that the road between two houses A and B on different sides of the river is minimal? (The bridge is perpendicular to lines L_1 and L_2) (see figure)
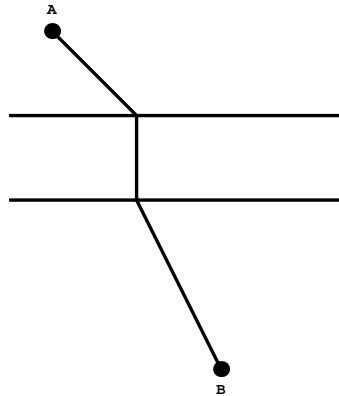
Exercise 5. Suppose you have a calculator that can perform arithmetic operations $(+, -, *, /)$ and it has two special buttons: one button allows to calculate the absolute value of a number and and the other allows to calculate the maximum of two numbers.

1. The absolute-value-of-a-number button got broken. How can you calculate the absolute value of a number without it?

2. The next time the absolute-value button got repared but the maximum button got broken, and by your luck you need to calculate the maximum of two numbers. How can you do that?

Exercise 6. A rectangular sheet of paper is folded so that two diagonally opposite corners come together. If the crease formed is the same length as the longer side of the sheet, what is the ratio of the longer side of the sheet to the shorter side?

Exercise 7. A man is trapped in a room. The room has only two possible exits: two doors. Through the first door there is a room constructed from magnifying glass. The blazing hot sun instantly fries anything or anyone that enters. Through the second door there is a fire-breathing dragon. How does the man escape?