information
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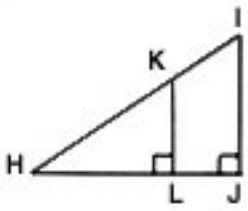
careers
sample questions
GO FIGURE 2000 Math Challenge
math geniuses in history

8. As clearly as you can, justify your answers for problem 7.

PROBLEMS 9, 10, 11 and 12 ARE OPTIONAL FOR STUDENTS IN GRADES 7, 8, 9.

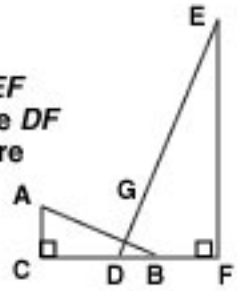
9. (a) Find the two numbers x that satisfy $(x - 50)^2 = 9$
   (b) Find the four numbers u that satisfy the equation $(u^2 - 17)^2 = 64$.

10. The point K is on the hypotenuse HI of the right triangle HIJ and L is on side HJ. Both angle HJI and angle HLK are right angles. The lengths of segments HL, LJ and HK are 112, 56, and 130 units, respectively. Find the lengths of segments KL and KI.



11. As in the figure, right triangles ABC and DEF overlap so that D is on side CB, B is on side DF and the hypotenuses meet at G. Lengths are as follows:

segments	AB	AC	CD	DB	BF	EF
length	13	5	8	4	6	24



(a) Find the area of ΔDBG.

(b) Find the length of segment AE.

12. There are 3 cars available to transport 3 girls and 5 boys on a field trip. Each car can hold up to 3 children. There are

$$3 \cdot \binom{8}{2} \cdot \binom{6}{3} \cdot \binom{3}{3} = 3 \left(\frac{8 \cdot 7}{2} \right) \cdot \left(\frac{6 \cdot 5 \cdot 4}{2 \cdot 3} \right) \cdot 1 = 1680$$

ways to assign the children to cars, since there are 3 choices for the car to hold only 2 children, $\binom{8}{2}$ ways to pick these 2 children, $\binom{6}{3}$ ways to assign 3 other children to another car, and $\binom{3}{3} = 1$ way to complete the assignment. How many of the 1680 ways assign 2 or 3 girls to one of the cars?

[The symbol $\binom{n}{k}$ stands for the number of distinct subsets with exactly k elements that can be chosen from a set of n elements. Also, $\binom{n}{0} = 1 = \binom{n}{n}$ and

$$\binom{n}{r} = \frac{n(n-1)(n-2)\ldots(n-r+1)}{1 \cdot 2 \cdot 3 \ldots r} \quad \text{for } r = 1, 2, \ldots, n-1.]$$

answers