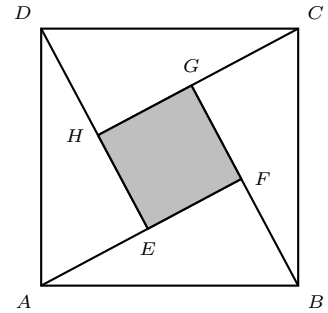# BRITISH COLUMBIA COLLEGES

Junior High School Mathematics Contest, 2005

Final Round, Part B

Friday May 6, 2005

1. In the diagram, $ABCD$ is a square with side length 17 and the four triangles ABF, DAE, BCG, and CDH are congruent right triangles. Further, $\overline{FB} = 8$. Find the area of the shaded quadrilateral $EFGH$.

2. A party went to a restaurant for dinner. At the end of the meal they decided to split the bill evenly among them. If each contributed \$16 they found that they were \$4 short, while if each put in \$19 they had enough to pay the bill, 15% for the tip and \$2 left over. How much was the bill and how many were in the party?

3. Find the number of solutions in integers (x, y) of the equation

$$x^2 y^3 = 6^{12}$$

4. Nellie is 5 km south of a stream that flows due east. She is 8 km west and 6 km north of her cabin. She wishes to water her horse at the stream and then return to her cabin. What is the shortest distance that Nellie must travel?

5. In the diagram triangle ABC is a 30°-60°-90° triangle with the right angle at vertex C, the 30° angle at vertex B, and side AB having length 20. Segment ED is perpendicular to side AC and D bisects AC. Segment EC is parallel to AB. Segment EF is perpendicular to ED and F is on the extension of AB.
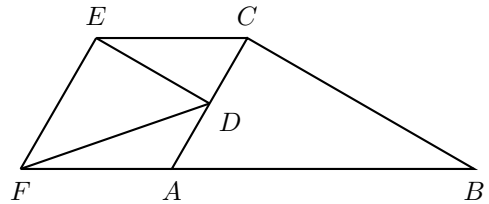
   (a) Find the length of segment ED.

   (b) Find the length of segment DF