

Maximum areas Problem

1. Triangles of many different shapes can be created using two sides of length 5 and 6. Which of these has the greatest area?
2. Parallelograms of many different shapes can be created using side lengths of 10, 12, 10, and 12. Which has the greatest area?

Hints

If you have geometry software available, try creating the conditions given and adjusting angles.

Answers

1. The right triangle with legs 5 and 6
2. The rectangle

Solutions

1. Consider the side of length 6 as the base. The corresponding altitude can't be greater than the length of each of the other sides. So the most it could be is 5, giving a right triangle with legs 5 and 6. The area would be $\frac{1}{2}(5)(6)$.
2. Cut the parallelogram into two triangles, along one of the diagonals. Find the maximum for each triangle, as above. Each would be a right triangle with sides 10 and 12. Put them back together, and you have a rectangle. The maximum area is 120.