

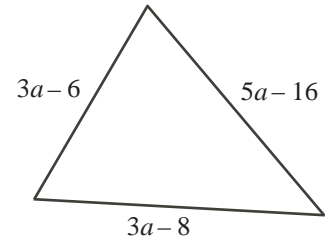


Intermediate Math Circles

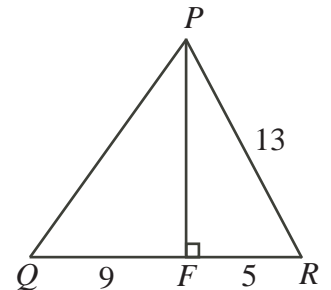
Wednesday 17 October 2018

Problem Set 2

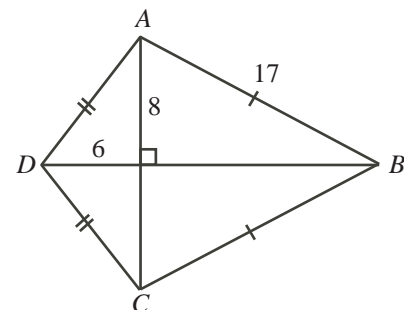
1. Determine the number of different values of a for which the given triangle is isosceles.



2. In triangle PQR , F is the point on QR so that PF is perpendicular to QR . If $PR = 13$, $RF = 5$, and $FQ = 9$, what is the perimeter of $\triangle PQR$?



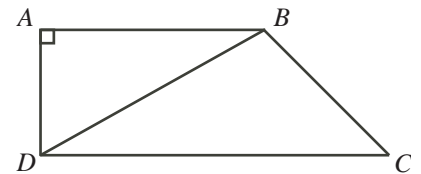
3. Calculate the area of figure $ABCD$.





4. If a 3 m stake casts a shadow 7 m long, what is the height of a tree that casts a shadow 63 m long?

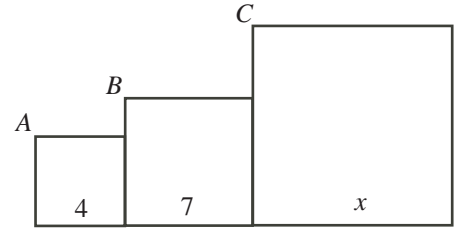
5. In the diagram, $AB = 4$, $DC = 6$, and AB is parallel to DC . If $\angle C = 45^\circ$, determine the length of BD .



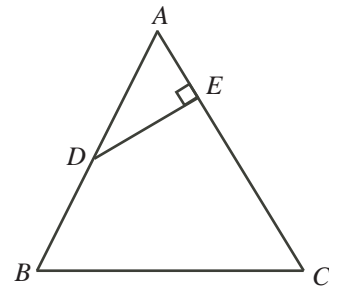
6. $\triangle ABC$ is similar to $\triangle XYZ$. If $AB = 4$, $YZ = 9$, and $BC = XY = p$, determine the value of p .



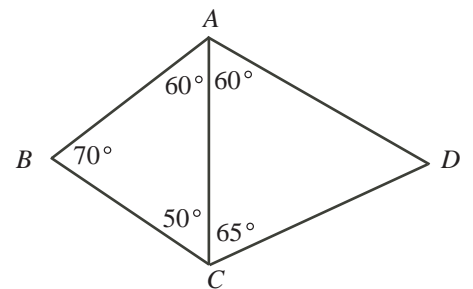
7. In the adjacent squares shown, the vertices A , B and C lie in a straight line. What is the value of x ?



8. In the diagram, $AD = BD = 5$, $EC = 8$ and $AE = 4$. Determine the length of BC .



9. In the diagram, which side is the longest: AB , BC , AC , CD , or AD ?





10. A *scalene* triangle is a triangle whose side lengths are all different. Determine the side lengths of all possible scalene triangles with integer side lengths and perimeter less than 13.
11. A triangle can be formed having side lengths 4, 5 and 8. It is impossible however, to construct a triangle with side lengths 4, 5 and 10. Using the side lengths 2, 3, 5, 7 and 11, how many different triangles *with exactly two equal sides* can be formed?
12. A triangle can be formed having side lengths 4, 5 and 8. It is impossible however, to construct a triangle with side lengths 4, 5 and 10. Ron has eight sticks, each having an integer length. He observes that he cannot form a triangle using any three of these sticks as side lengths. What is the shortest possible length of the longest of the eight sticks?

Answers

1. 2 2. 42 3. 168 4. 27 m 5. $\sqrt{20} = 2\sqrt{5}$ 6. $p = 6$ 7. $\frac{49}{4}$
8. $2\sqrt{13}$ 9. AD 10. (2, 3, 4), (2, 4, 5), (3, 4, 5) 11. 14 12. 21