

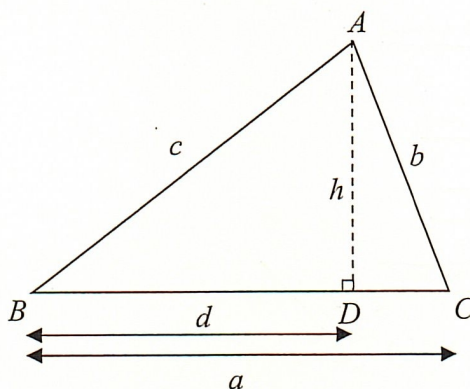


Name: _____ () Class: _____ Date: _____

MA304.3.X1 – Heron's Formula

In this worksheet we will explore the Heron's Formula which is used to calculate the area of a triangle given only the lengths of the 3 sides.

S1. Suppose we have a triangle $\triangle ABC$ such that the lengths of the sides are given by a , b and c as shown below.



Let D be the foot of perpendicular from A to the line BC , such that $AD = h$ (height of the triangle with BC as the base). Let $BD = d$.

- (a) By considering the two right-angle triangles $\triangle ABD$ and $\triangle ACD$, use Pythagoras' Theorem to express d in terms of a , b and c only.

(b) Hence show that $h^2 = \frac{(a+c-b)(a+b+c)(b+c-a)(a+b-c)}{4a^2}$.

(c) By letting $s = \frac{a+b+c}{2}$, show that A , the area of the triangle $\triangle ABC$, is given by

$$A = \sqrt{s(s-a)(s-b)(s-c)}.$$

S2. Find the area of the triangle whose sides are 6 cm, 10 cm and 12 cm.

S3. Find a triangle (Heronian triangle) whose sides are of integer-valued lengths, and whose area is 36 cm^2 . Is it the only one?