

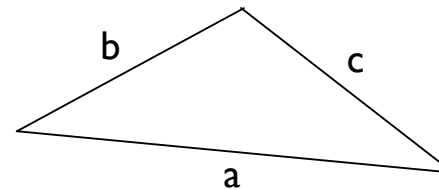
## Heron's formula

Heron's formula for calculating the area of any triangle is:

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

where:

$$s = \frac{1}{2}(a + b + c)$$

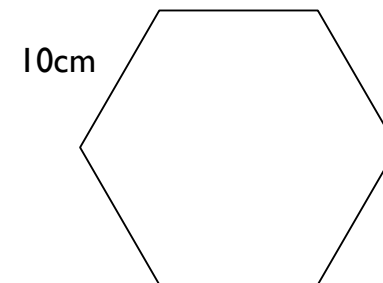


## Practice

1. Calculate the area of an equilateral triangle with sides 5cm.
2. Calculate the area of an isosceles triangle with sides 7cm, 7cm and 4cm.
3. Calculate the area of a scalene triangle with sides 3cm, 4cm and 5cm.

## Challenge

Calculate the area of a regular hexagon with sides 10cm.



## Answers

$$\begin{aligned}
 1. \quad s &= \frac{1}{2}(5+5+5) \\
 &= 7.5 \\
 A &= \sqrt{7.5(7.5-5)(7.5-5)(7.5-5)} \\
 &= \sqrt{7.5 \times 2.5^3} \\
 &= 10.8253\dots \\
 &= 10.8\text{cm}^2
 \end{aligned}$$

$$\begin{aligned}
 2. \quad s &= \frac{1}{2}(7+7+4) \\
 &= 9 \\
 A &= \sqrt{9(9-7)(9-7)(9-4)} \\
 &= \sqrt{9 \times 2^2 \times 5} \\
 &= 13.4164\dots \\
 &= 13.4\text{cm}^2
 \end{aligned}$$

$$\begin{aligned}
 3. \quad s &= \frac{1}{2}(3+4+5) \\
 &= 6 \\
 A &= \sqrt{6(6-3)(6-4)(6-5)} \\
 &= \sqrt{6 \times 3 \times 2 \times 1} \\
 &= 6\text{cm}^2
 \end{aligned}$$

## Challenge

The hexagon is made up of 6 equilateral triangles with sides 10cm.

$$\begin{aligned}
 \text{For one triangle: } s &= \frac{1}{2}(10+10+10) = 15 \\
 A &= \sqrt{15(15-10)(15-10)(15-10)} \\
 &= \sqrt{15 \times 5^3} \\
 &= 43.3012\dots
 \end{aligned}$$

$$\begin{aligned}
 \text{For the hexagon: } A &= 6 \times 43.3012\dots \\
 &= 259.8076\dots \\
 &= 260\text{cm}^2
 \end{aligned}$$