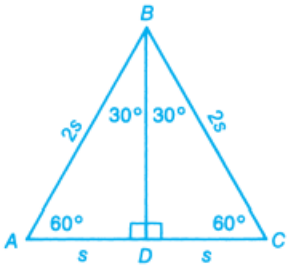
# MATH 6: SPECIAL TRIANGLES AND POLYGONS

## 1. 30 − 60 − 90 Triangle




Triangle $\triangle ABC$ is an equilateral triangle. Let's assume the sides of this equilateral triangle are $2s$. Then $AD = \frac{1}{2}(AC) = \frac{1}{2}(2s) = s$.
The length of BD can be found using the Pythagorean Theorem in triangle $\triangle ABD$:
$(BD)^2 + (AD)^2 = (AB)^2$
$(BD)^2 + s^2 = (2s)^2$
$BD^2 + s^2 = 4s^2$
$BD = \sqrt{3s^2} = s\sqrt{3}$

## 2. Polygons

The total sum of the angles of a polygon is dependent on the number of sides. The sum of the exterior angles of a polygon is always 360 and does not depend on the number of sides of the polygon.

**Theorem: The sum of the measures of the interior angles of a polygon having n sides is** $180(n-2)$.

**Theorem: The sum of the measures of the exterior angles of a polygon add up to** 360.

A polygon is regular if all its sides are congruent. All its angles will also be congruent, we also call these angles equi-angular. Once you know the sum of all its angles, can you calculate the angle of a regular polygon?

### Homework

1. What is the area of an equilateral triangle of side length 2?
2. Find the sum of the the internal angles of an octagon (8-sided polygon).
3. What is the measure of an internal angle and that of an external angle of a regular decagon (10-sided polygon).
4. Each interior angle of a regular polygon is 168. Find the number of sides.
5. If a polygon has n sides, how many diagonals can be drawn?
6. The sum of digits of a two-digit number is 8. The ratio of this two-digit number and the one's digit of the number is 7. Find the two-digit number. (We can represent any 2-digit number as $10a + b$ where a and b are the digits of that number).
7. Sketch the graph $y = \frac{1}{3}x - 1$
8. Determine the equation of the line that goes through points $(4, -2)$ and $(-2, 4)$. Sketch the graph.