Angles and Polygons

MA 341 – Topics in Geometry
Lecture 06

UK

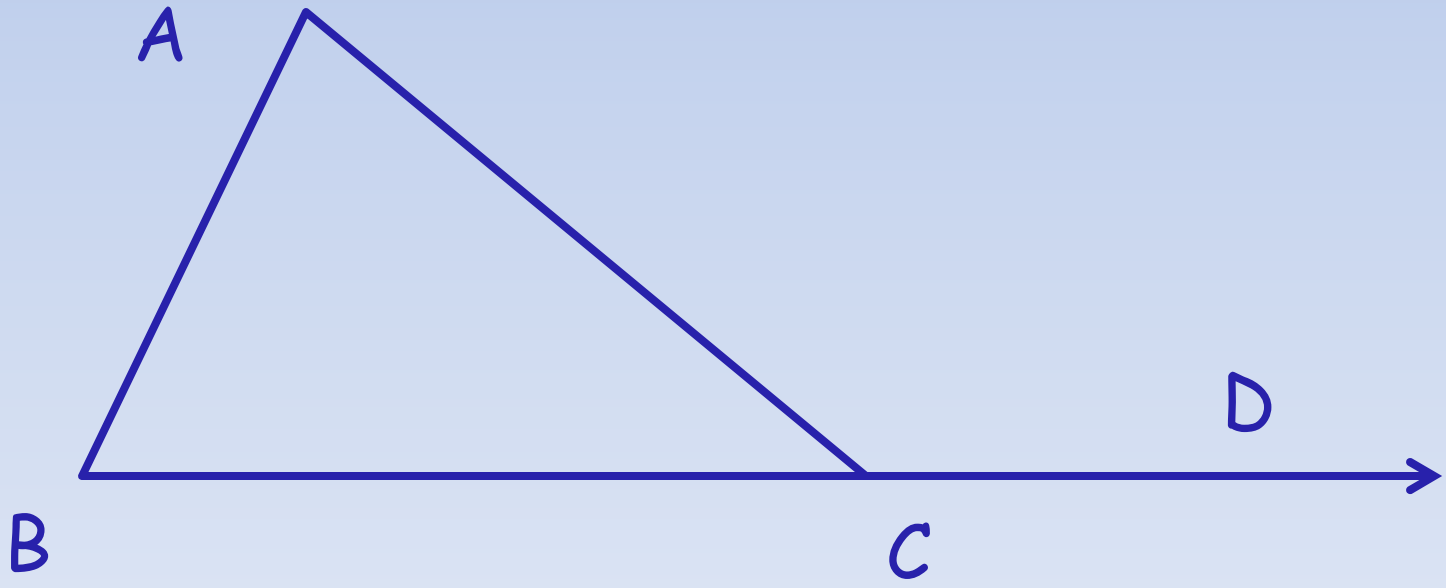
Theorem

The sum of the interior angles in a triangle is 180°.

Proof:

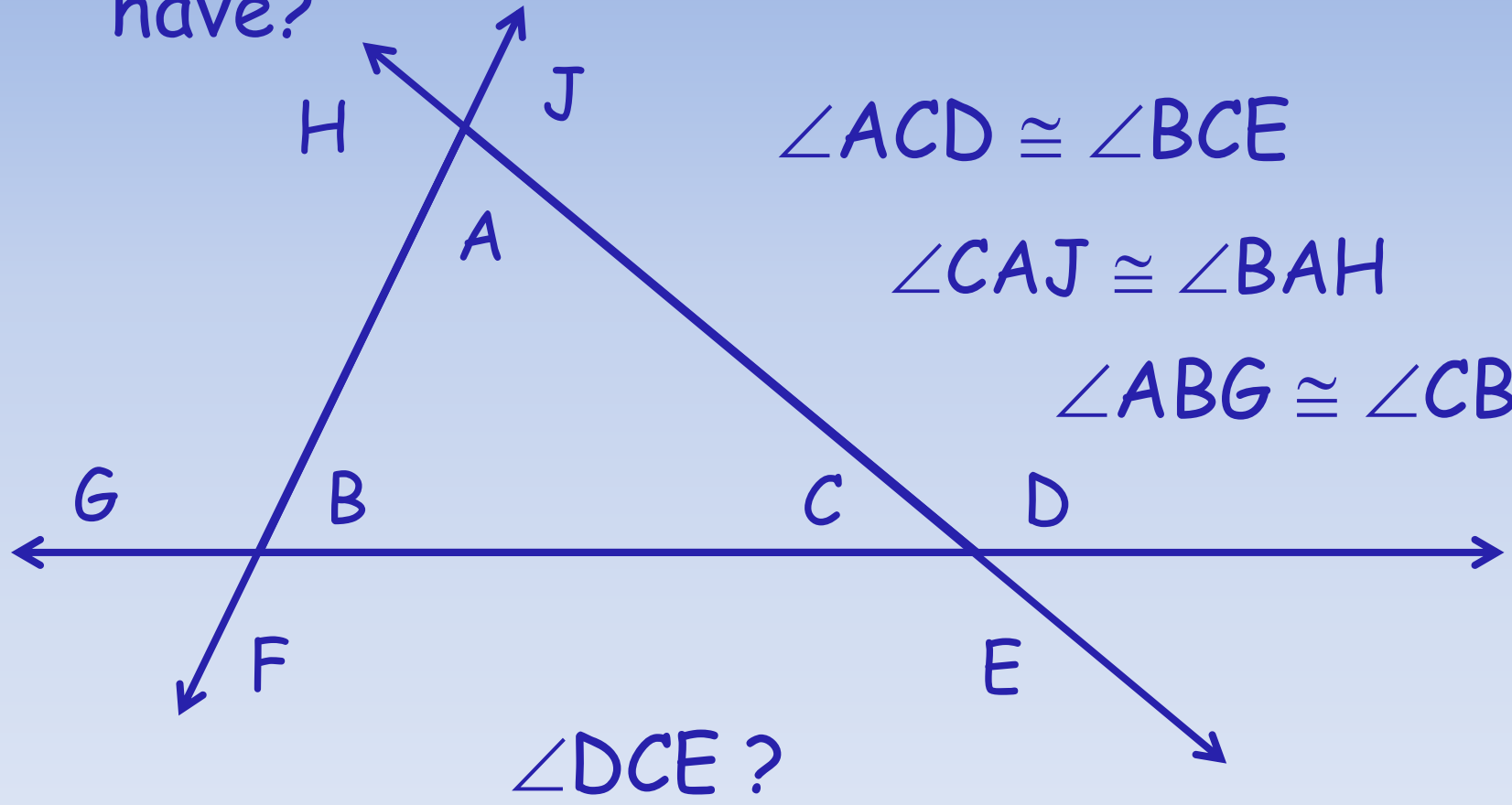
Exterior Angles

In triangle ΔABC extend BC to a point D on the line. Then $\angle ACD$ is called an exterior angle of the triangle.



Exterior Angles

How many exterior angles does a triangle have?



$\angle ACD \cong \angle BCE$

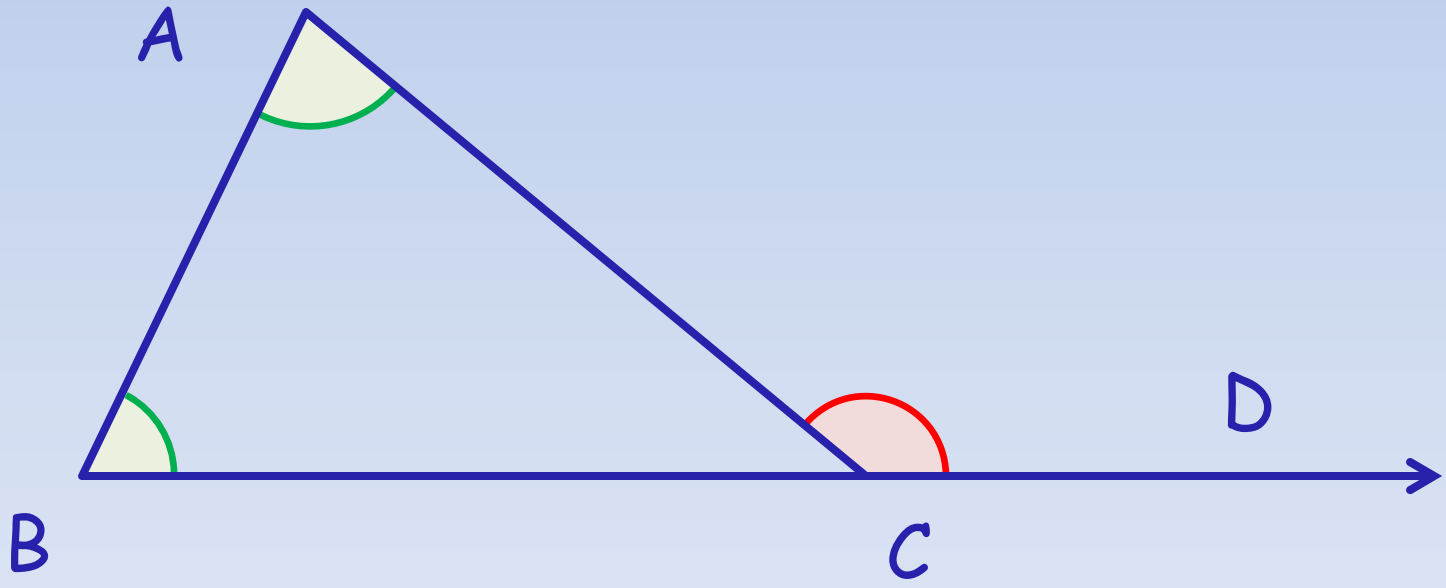
$\angle CAJ \cong \angle BAH$

$\angle ABG \cong \angle CBF$

$\angle DCE$?

Exterior Angle

$\angle ACD$ is an exterior angle and $\angle A$ and $\angle B$ are called <u>remote interior angles</u>.



Theorem

An exterior angle of a triangle equals the sum of the two remote interior angles.

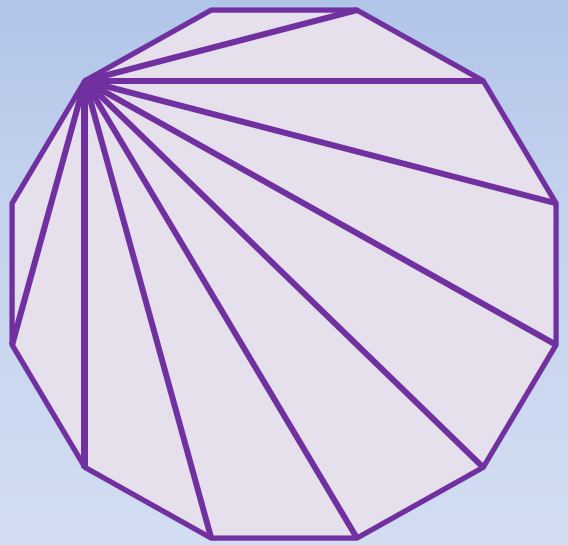
Proof:

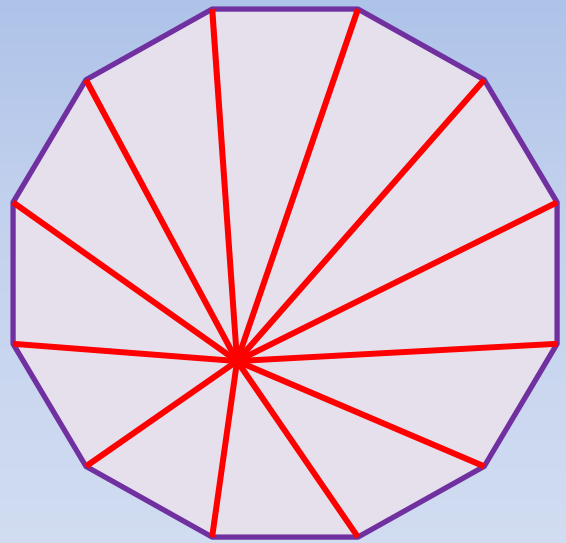
Question

What is the sum of the exterior angles in a triangle, one at each vertex? Why?

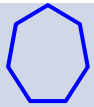
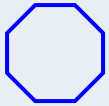
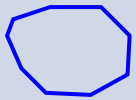
Proof:

Convex Polygons

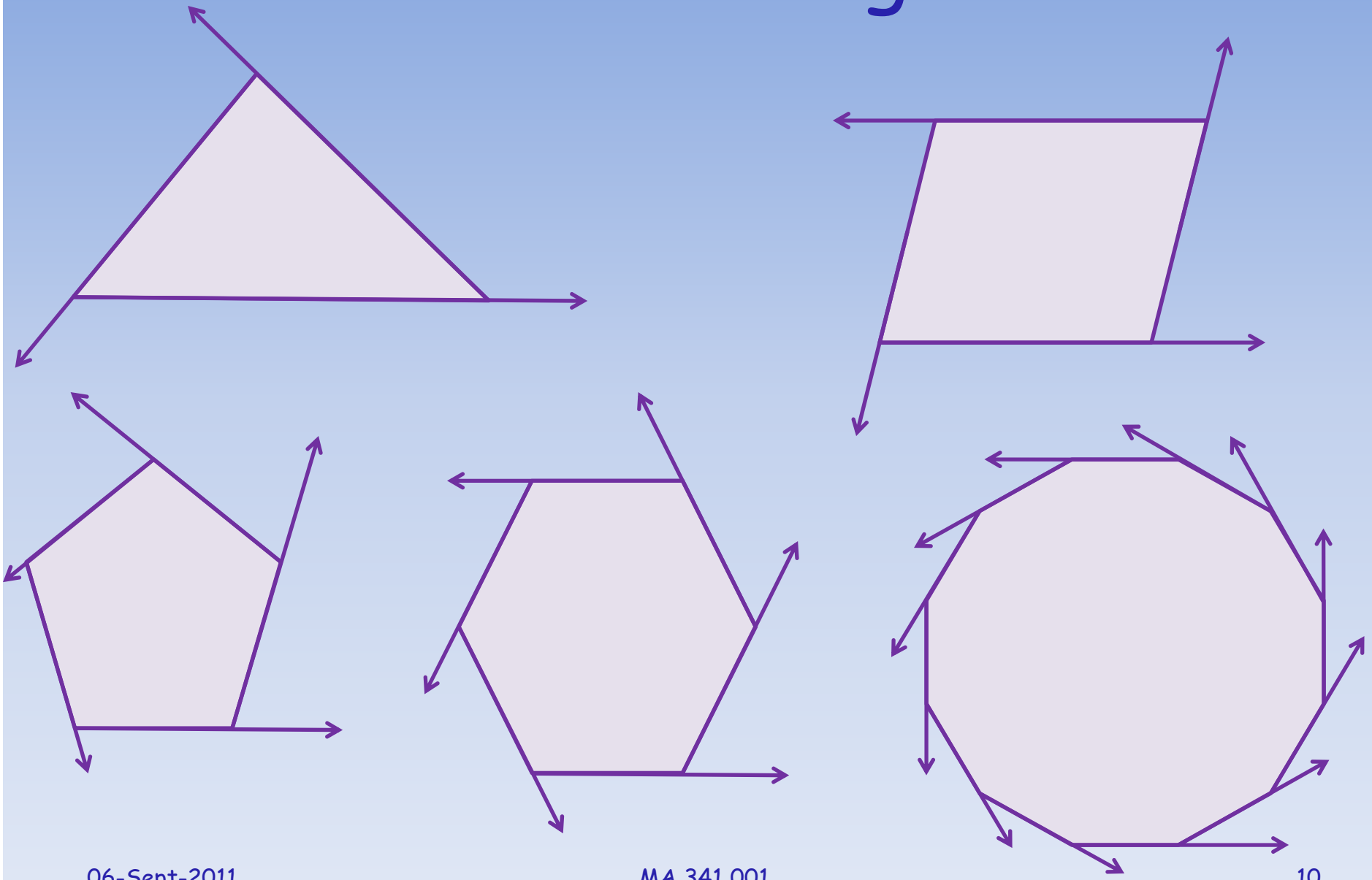




Sums of Interior Angles

Figure	Sides	Vertices	Sum
	3	3	180
	4	4	
	5	5	
	6	6	
	7	7	
	8	8	
	9	9	

Exterior Angles



Convex Polygons

What is the sum of the exterior angles of a convex polygon?

Is this true for non-convex polygons?

Non-convex Polygons