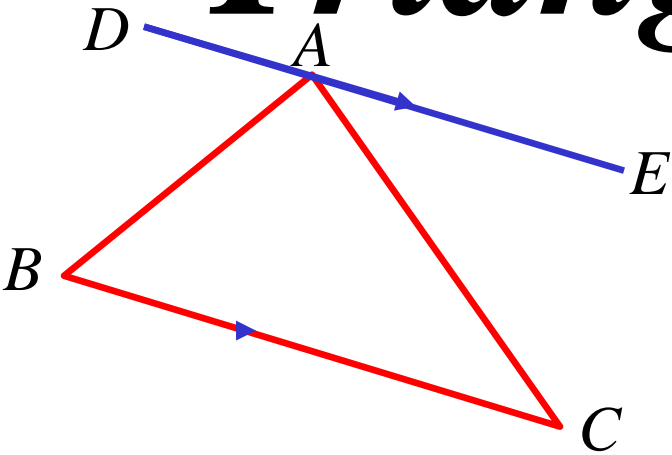


# Triangle Theorems



The angle sum of any triangle is  $180^\circ$

$$\angle A + \angle B + \angle C = 180 \quad (\angle \text{sum } \triangle ABC = 180^\circ)$$

**Proof:**

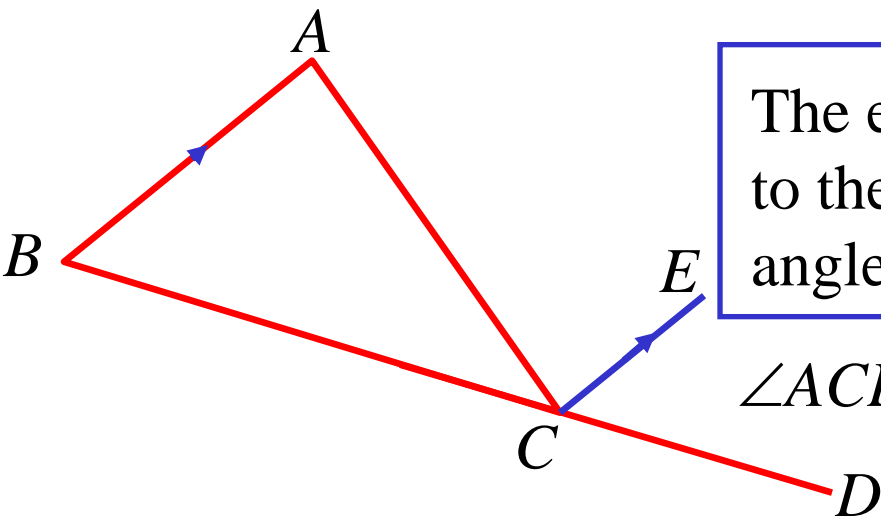
Construct  $DE \parallel BC$  passing through  $A$

$$\angle DAB = \angle ABC \quad (\text{alternate } \angle \text{'s } =, DE \parallel BC)$$

$$\angle EAC = \angle ACB \quad (\text{alternate } \angle \text{'s } =, DE \parallel BC)$$

$$\angle DAB + \angle BAC + \angle CAE = 180 \quad (\text{straight } \angle DAE = 180^\circ)$$

$$\therefore \underline{\angle ABC + \angle BAC + \angle ACB = 180^\circ}$$



The exterior angle of any triangle is equal to the sum of the two opposite interior angles

$$\angle ACD = \angle A + \angle B \quad (\text{exterior } \angle, \Delta CAB)$$

***Proof:***

Construct  $CE \parallel BA$

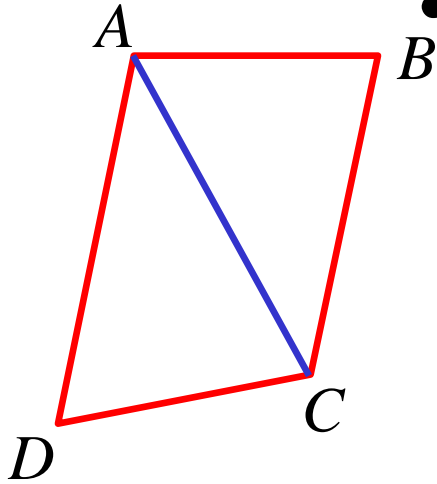
$$\angle ABC = \angle ECD \quad (\text{corresponding } \angle\text{'s } =, CE \parallel BA)$$

$$\angle BAC = \angle ACE \quad (\text{alternate } \angle\text{'s } =, CE \parallel BA)$$

$$\angle ACD = \angle ACE + \angle ECD \quad (\text{common } \angle)$$

$$\therefore \underline{\angle ACD = \angle ABC + \angle BAC}$$

# Polygon Theorems



The angle sum of any quadrilateral is  $360^\circ$

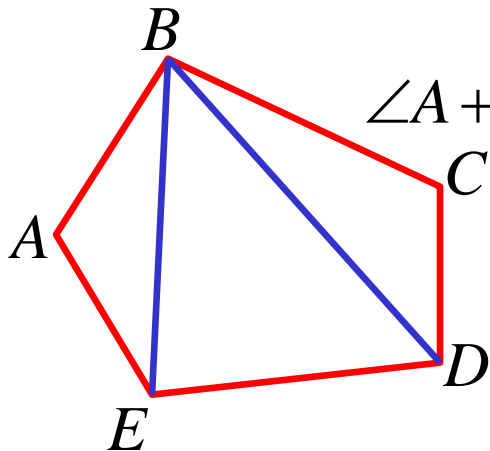
$$\angle A + \angle B + \angle C + \angle D = 360^\circ \quad (\angle \text{sum } ABCD = 360^\circ)$$

**Proof:**  $\angle \text{sum } \triangle ABC = 180^\circ$  (+)

$$\underline{\angle \text{sum } \triangle ADC = 180^\circ}$$

$$\angle \text{sum } ABCD = 360^\circ$$

The angle sum of any pentagon is  $540^\circ$



$$\angle A + \angle B + \angle C + \angle D + \angle E = 540^\circ \quad (\angle \text{sum } ABCDE = 540^\circ)$$

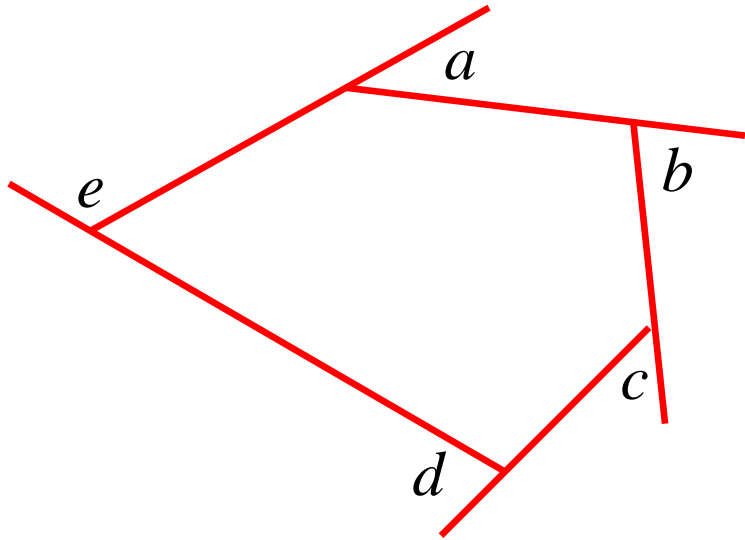
**Proof:**  $\angle \text{sum } \triangle ABE = 180^\circ$  (+)

$$\angle \text{sum } \triangle BED = 180^\circ$$

$$\underline{\angle \text{sum } \triangle BDC = 180^\circ}$$

$$\angle \text{sum } ABCDE = 540^\circ$$

The angle sum of any polygon is  $180(n-2)^\circ$ ,  
where  $n$  is the number of sides



The exterior angle sum of  
any polygon is  $360^\circ$

$$a + b + c + d + e = 360^\circ$$

(exterior  $\angle$  sum =  $360^\circ$ )

**Exercise 8B; 1dg, 2c, 3dh, 5ace, 6ab (iii), 7b, 8bfh, 9ad, 10dh,  
11ad, 12c, 16, 18, 20**