Chapter 6

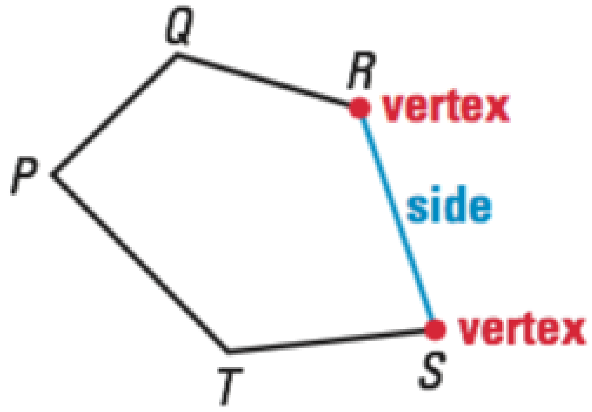
Quadrilaterals

Section 1
Polygons

GOAL 1: Describing Polygons

A __polygon__ is a plane figure that meets the following conditions.

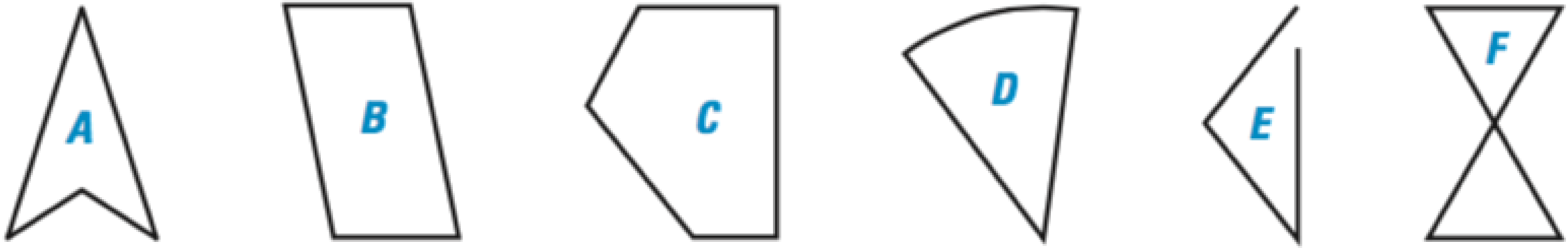
1) It is formed by three or more segments called ___sides___, such that no two sides with a common endpoint are collinear.
2) Each side intersects exactly two other sides, one at each endpoint.



Each endpoint of a side is a __vertex__ of the polygon. The plural of vertex is vertices. You can name a polygon by listing its vertices consecutively. For instance, PQRST and QPTSR are two correct names for the polygon to the right.

Example 1: Identifying Polygons

State whether the figure is a polygon. If not, explain why.



A – yes, formed by straight lines

B – yes, formed by straight lines

C – yes, formed by straight lines

D – no, has curves

E – no, has an opening/not a closed figure

F – no, has intersecting lines

Polygons are named by the number of sides they have.

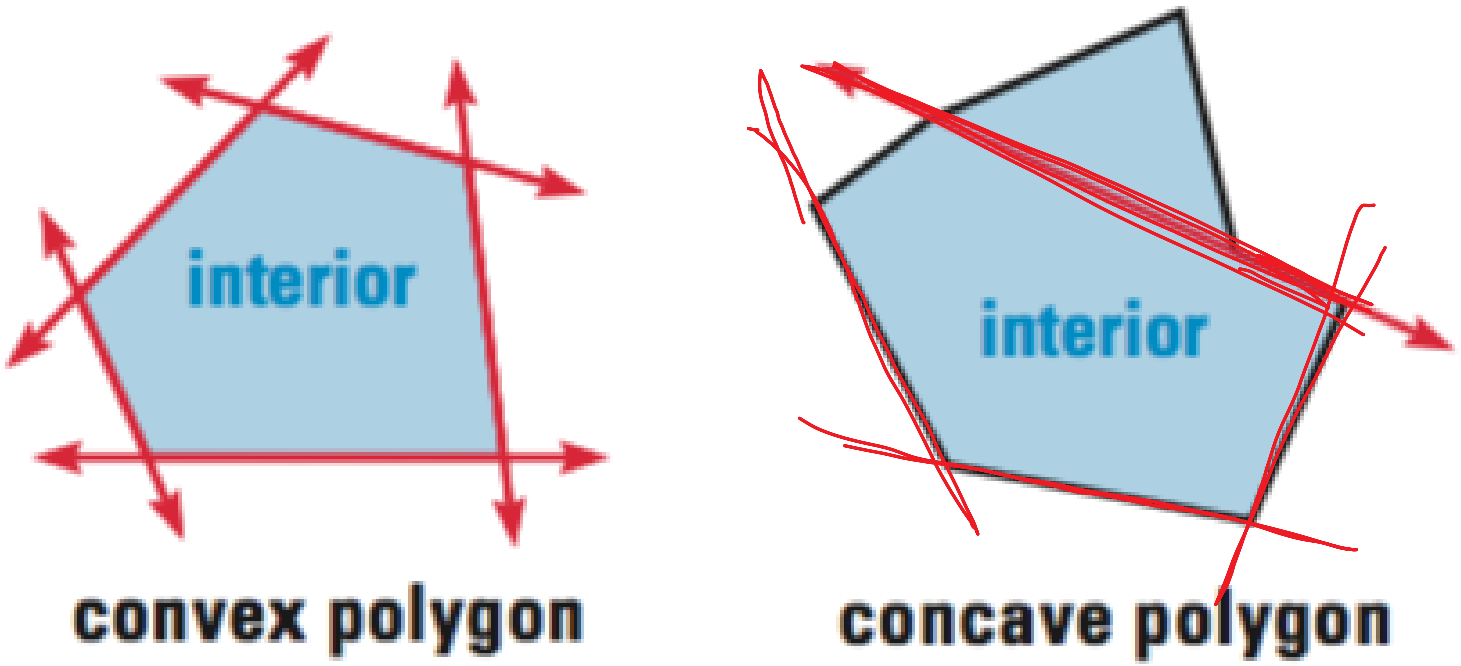
*TPP

Number of sides	Type of polygon
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon

Number of sides	Type of polygon
8	Octagon
9	Nonagon
10	Decagon
12	Dodecagon
n	n-gon

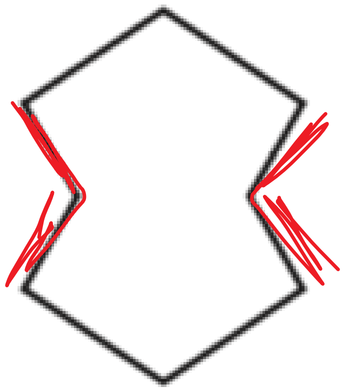
A polygon is ____convex____ if no line that contains a side of the polygon contains a point in the interior of the polygon.

A polygon that is not convex is called ____not convex______ or _____concave_____.



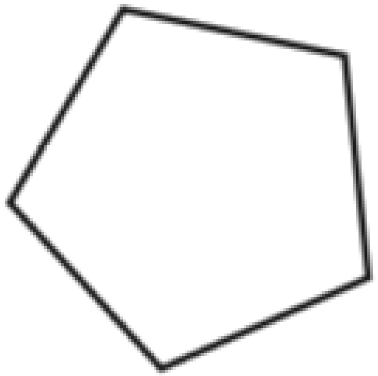
Example 2: Identify the polygon and state whether it is convex or concave.

a.



concave

b.



convex

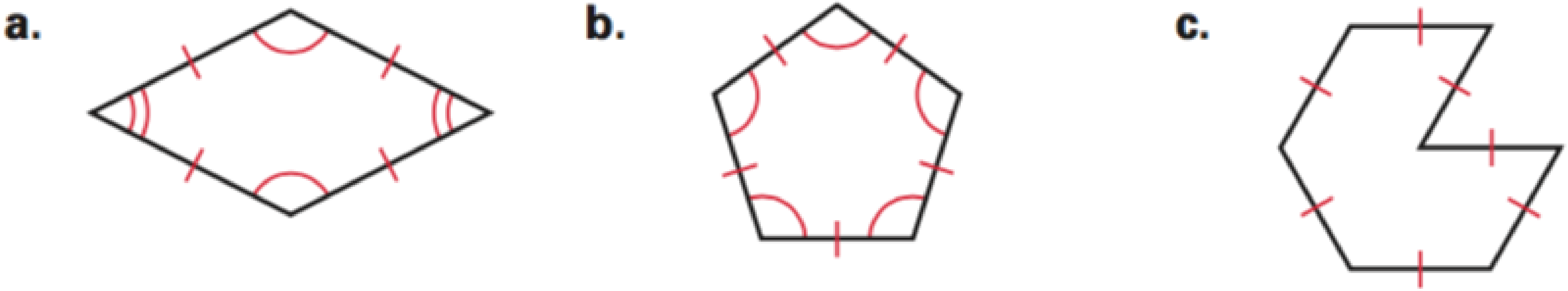
A polygon is ___equilateral___ if all of its sides are congruent.

A polygon is ___equiangular___ if all of its interior angles are congruent.

A polygon is ___regular___ if it is BOTH equilateral and equiangular.

Example 3: Identifying Regular Polygons

Decide whether the polygon is regular.



A – no, not equiangular

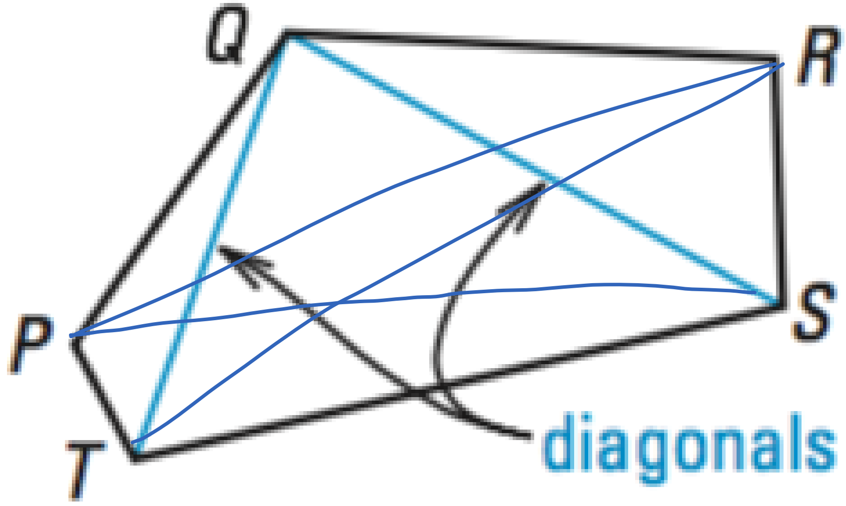
B – yes, both equilateral and equiangular

C – no, not equiangular

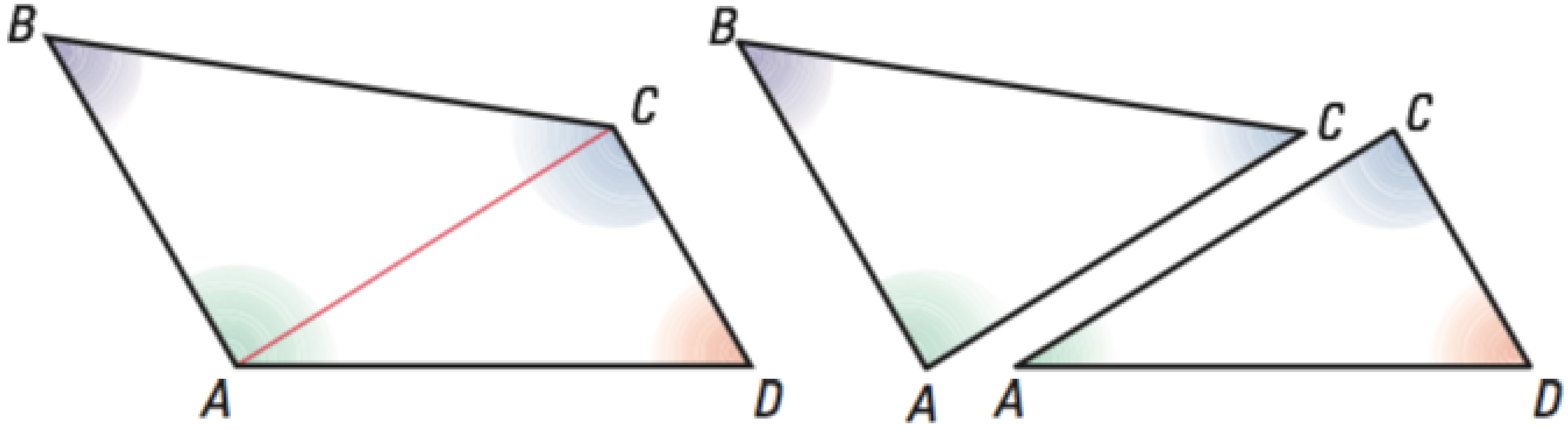
**concave figures will NOT be regular

GOAL 2: Interior Angles of Quadrilaterals

A ____diagonal____ of a polygon is a segment that joins two nonconsecutive vertices. Polygon PQRST has 2 diagonals from point Q, QT and QS.



Like triangles, quadrilaterals have both interior and exterior angles. If you draw a diagonal in a quadrilateral, you divide it into two triangles, each of which has interior angles with measures that add up to 180°. So you can conclude that the sum of the measures of the interior angles of a quadrilateral is 2(180°), or 360°.

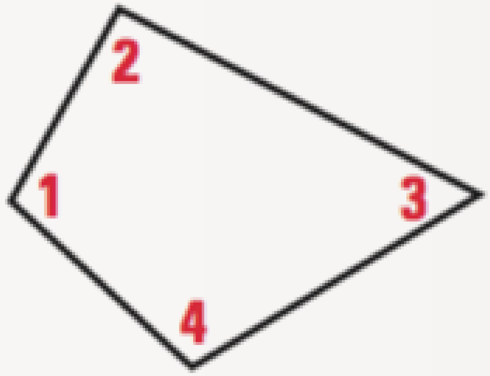


THEOREM

THEOREM 6.1 ***Interior Angles of a Quadrilateral***

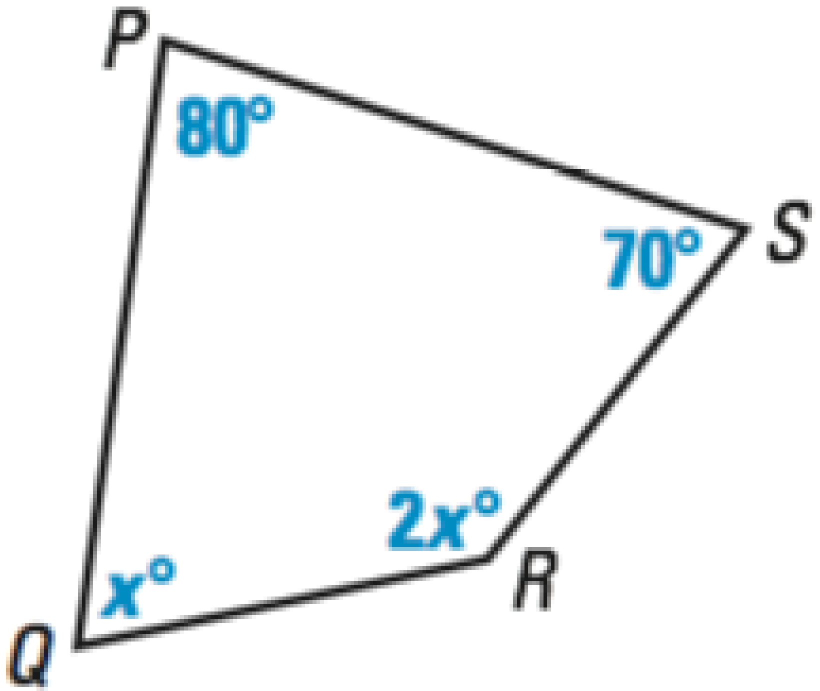
The sum of the measures of the interior angles of a quadrilateral is 360°.

$$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360^\circ$$



Example 4: Interior Angles of a Quadrilateral

Find m<Q and m<R.



$x + 2x + 70 + 80 = 360$

$3x + 150 = 360$

$3x = 210$

$x = 70$

m<Q → x → 70*

m<R → 2x → 2(70) → 140*

EXIT SLIP

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