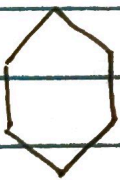


Section 11-2 Curves, Polygons, + Symmetry

Let's explore some definitions that lead to the defn of a polygon.

1. A curve is formed by connecting points in a single, continuous motion.
2. A simple curve does not cross itself.
3. A closed curve is a curve that is drawn by starting and stopping at the same point.
4. A polygon is a simple, closed curve that is made up entirely of line segments.
5. A point where 2 sides of a polygon meet is called a vertex.
6. A convex curve is a simple, closed curve such that any line segment connecting any 2 points in the interior of the curve is completely contained in the interior.
7. A curve that is not convex is concave.

ex | Classify the following as simple, closed, polygon, or none.

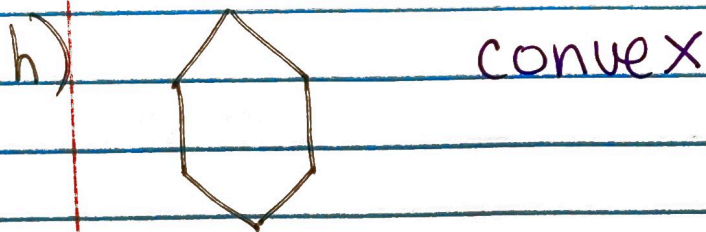
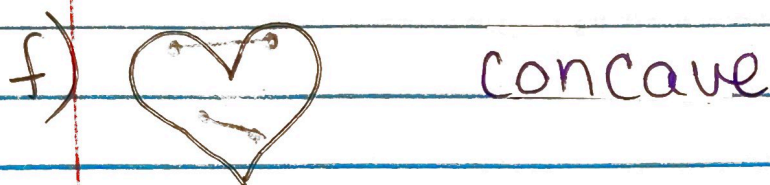
- a)  simple, not closed, not polygon
- b)  not simple, closed, not polygon
- c)  simple, not closed, not polygon
- d)  simple, closed, polygon
- e)  not simple, not closed, not polygon
- f)  simple, closed, not polygon (not line segs)
- g)  simple, closed, not polygon
- h)  simple, closed, polygon
- i)  simple, not closed, not polygon

simple - doesn't cross itself

closed - starts & ends at same point

polygon - simple, closed, & only line segments

ex 2 Go back to ex 1 and label any of the simple + closed curves as either convex or concave.



Polygons are classified according to their number of sides.

<u>Polygon</u>	<u>#sides</u>
Triangle	3
Quadrilateral	4
Pentagon	5
Hexagon	6
Heptagon	7
Octagon	8
Nonagon	9
Decagon	10
Hendecagon	11 (not used much)
Dodecagon	12
:	:
n-gon	n

A polygon is regular if all of the sides are congruent and all of the angles are congruent.

Congruent line segments have the same length and congruent angles have the same measure.

Two shapes are congruent if they have the same shape and size.

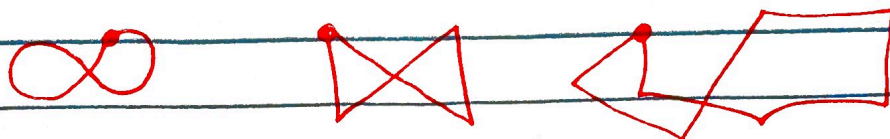
We use the symbol $\cong$ to represent congruence.

- A regular triangle is more commonly called an equilateral triangle.
- A regular quadrilateral is more commonly called a square.

* Look at separate paper for triangle & quadrilateral definitions and hierarchy.

ex 3 Draw the following, if possible.

- a) a closed curve that is not simple



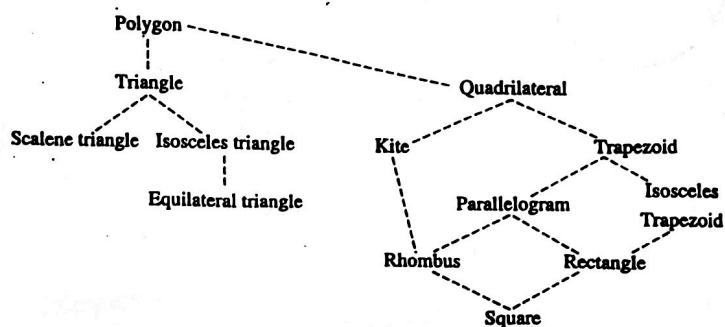
- b) a polygon with an obtuse angle.



A triangle containing one right angle is a right triangle.



Definition	Illustration	Example
A triangle in which all the angles are acute is an acute triangle.		
A triangle containing one obtuse angle is an obtuse triangle.		
A triangle with no congruent sides is a scalene triangle.		
A triangle with at least two congruent sides is an isosceles triangle.		
A triangle with three congruent sides is an equilateral triangle.		
A trapezoid is a quadrilateral with at least one pair of parallel sides.		
A kite is a quadrilateral with at least two distinct pairs of consecutive congruent sides.		
An isosceles trapezoid is a trapezoid with one pair of congruent base angles. (Equivalently, an isosceles trapezoid is a trapezoid with two congruent nonadjacent sides.)		
A parallelogram is a quadrilateral in which each pair of opposite sides is parallel.		
A rectangle is a parallelogram with a right angle. (Equivalently, a rectangle is a quadrilateral with four right angles.)		
A rhombus is a parallelogram with all sides congruent. (Equivalently, a rhombus is a quadrilateral with all sides congruent.)		
A square is a rectangle with all sides congruent. (Equivalently, a square is a quadrilateral with four right angles and four congruent sides.)		



c) a right, equilateral triangle

not possible ↗ you can't have a triangle w/ 3 right angles

d) a polygon that is not simple

not possible a polygon must be simple

e) a right, scalene triangle



f) a curve that is neither simple nor closed

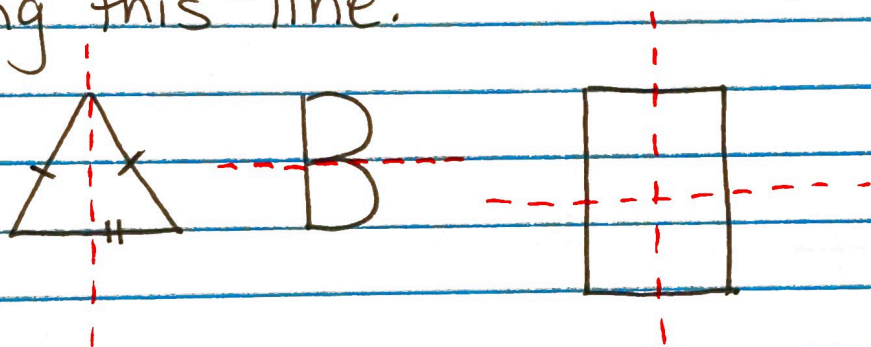


ex 4 True or False

- a) Every square is a rectangle. True
- b) Every rectangle is a square. False
- c) Every equilateral triangle is isosceles. True
- d) Every kite is a parallelogram. False
- e) Every parallelogram is a kite. False

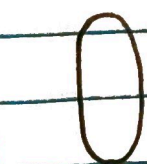
Symmetry is usually thought of as something being a mirror image of itself. Another common technique to show symmetry is paper folding.

A geometric figure has a line of symmetry if the 2 sides of the image match up perfectly when the image is folded along this line.

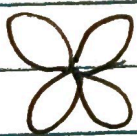


* This figure has 2 lines of symmetry.

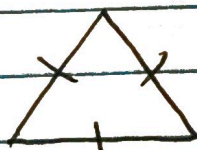
Figures can also have rotational symmetry if they can be rotated at an angle between 0° and 360° and the rotation match the original figure.



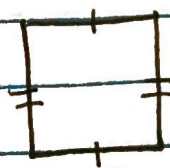
180°
rot. sym.



90°
rot. sym.



120°
rot. sym.



180°
rot. sym.

end
11-2