

IM2 Problem Set 1.7 - Geometric Figures on a Coordinate Grid

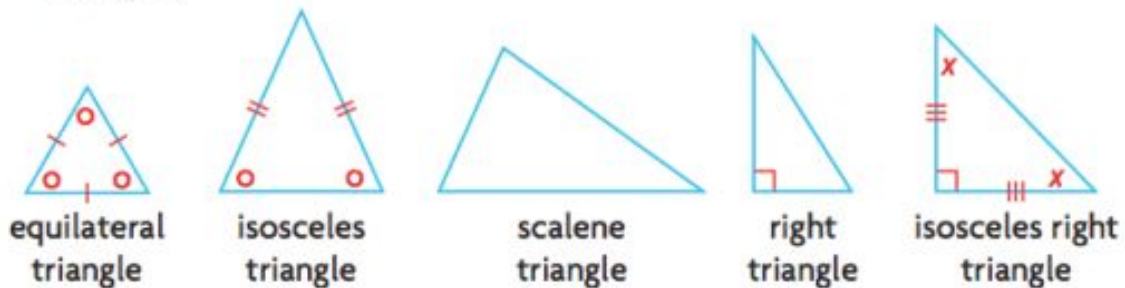
BIG PICTURE of this UNIT:	<ul style="list-style-type: none">• mastery with linear algebraic skills to be used in our work with coordinate geometry (midpoint, length, slope)• understanding various geometric properties of quadrilaterals, triangles & circles• how do you really “prove” that something is “true”?• introduction to working with 3D shapes
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Part 1 - Concepts Review

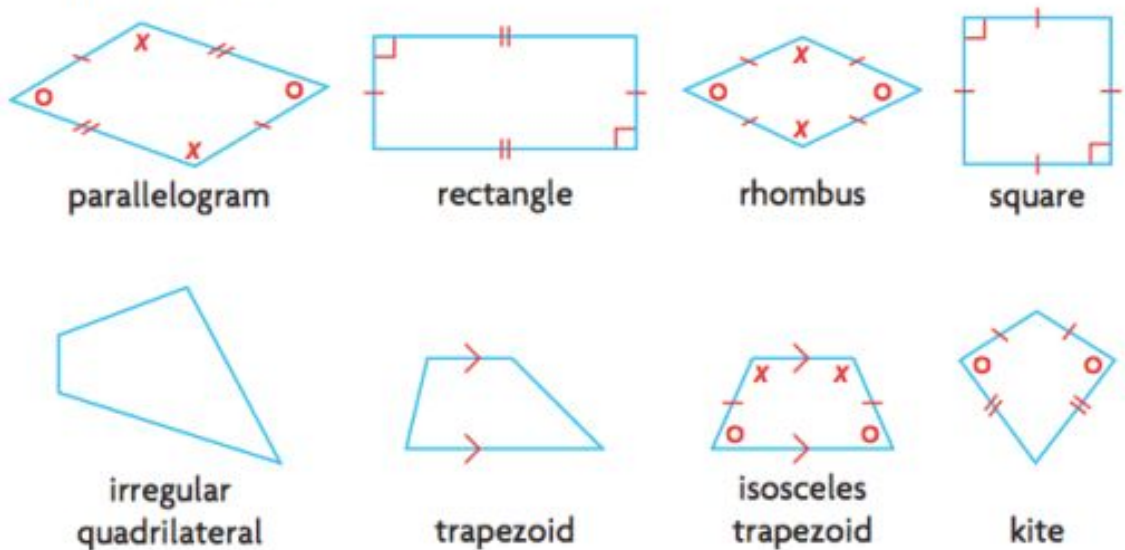
What you need to know about triangles and quadrilaterals.....

- Triangles and quadrilaterals can be classified by the relationships between their sides and their interior angles.

Triangles



Quadrilaterals



Part 2 - Skills Review

1. The following points are vertices of triangles. Use **analytical geometry** to classify the triangle as scalene, isosceles or equilateral. **Verify** with Geogebra.
 - a. $A(30,30)$; $B(-41,11)$, $C(11,-41)$
 - b. $A(-1,5)$, $B(8,-2)$, $C(-5,-1)$
 - c. $A(3,-1)$; $B(7,1)$; $C(3,4)$
 - d. $A(1,5)$, $(8,1)$, $C(-3,-2)$

2. The following points are vertices of quadrilaterals. Use **analytical geometry** to classify the type of quadrilateral. Make sure you have provided “sufficient” evidence to justify your classification. **Verify** with Geogebra.
 - a. $A(-3,4)$; $B(6,10)$, $C(10,4)$; $D(1,-2)$
 - b. $A(2,6)$; $B(8,10)$, $C(18,6)$; $D(6,-2)$
 - c. $A(-4,6)$; $B(-7,4)$, $C(-6,-4)$; $D(-2,3)$

3. How can you use the distance formula to decide whether the points $P(-2,-3)$, $Q(4,1)$ and $R(2,4)$ do OR do not form a right triangle? Use your answer to show that PQR is a right triangle. Verify using Geogebra.

CHALLENGE Q:

- a. Now, on Geogebra, construct this triangle
 - b. Then, use the “circle tool” to construct a circle using these three points.
 - c. Determine the center of the circle.
 - d. Hence, what is true about the hypotenuse of this right triangle in relation to the circle?
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4. The quadrilateral $EFGH$ is defined by the four vertices $E(-2,3)$, $F(2,1)$, $G(0,-3)$ and $H(-4,-1)$. Use analytical geometry to show that the diagonals of $EFGH$ are perpendicular to each other. What type of quadrilateral could $EFGH$ be, given that the diagonals are perpendicular to each other? Verify with Geogebra.

Part 3 – Skills PRACTICE/Applications & GEOMETRY Contexts

1. A surveyor is marking the corners of a building lot. The corners have coordinates A(-5,4), B(4,9), C(9,0) and D(0,-5).
 - a. What shape is this building lot?
 - b. Find the perimeter of this building lot if one unit on the grid is 12 m.
 - c. Find the area of this building lot if one unit on the grid is 12 m.

2. The vertices of DEF are at D(-3,-4), E(-2,4) and F(5,-5).
 - a. Show that DEF is isosceles
 - b. Determine the length of median from vertex D.
 - c. Show that this median is perpendicular to EF.

3. What type of a quadrilateral is ABCD if the vertices are A(-2,3), B(-2,-2), C(2,1) and D(2,6)?

4. Use the points A(2,4), B(-3,3), C(-2,-5) and D(4,-1) to show that the midpoints of the sides when joined together to make a second quadrilateral will actually form a parallelogram.

5. Points P(4,12), Q(9,14) and R(13,4) are three vertices of a rectangle. Determine the coordinates of the fourth vertex, S.