Topics in Algebra, Tigonometry and Pre-Calculus
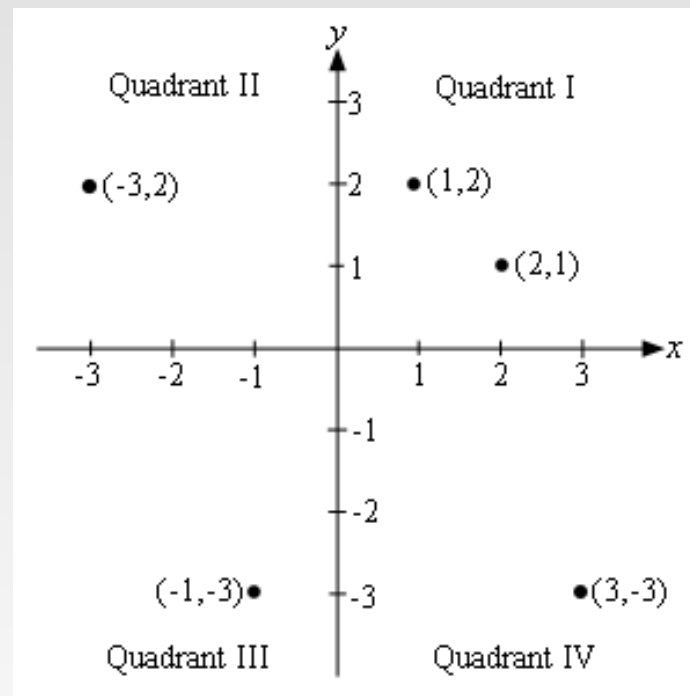
- The Cartesian co-ordinate system

Topics in Algebra, Tigonometry and Pre-Calculus

- The Cartesian co-ordinate system
    - Co-ordinates;
    - Distance between points;
    - Mid-point of line segment;

The Cartesian co-ordinate system

- Standard x and y-axis

The Cartesian co-ordinate system

- Quadrants:
  - They go anti-clockwise starting from the quadrant where both x and y are positive.
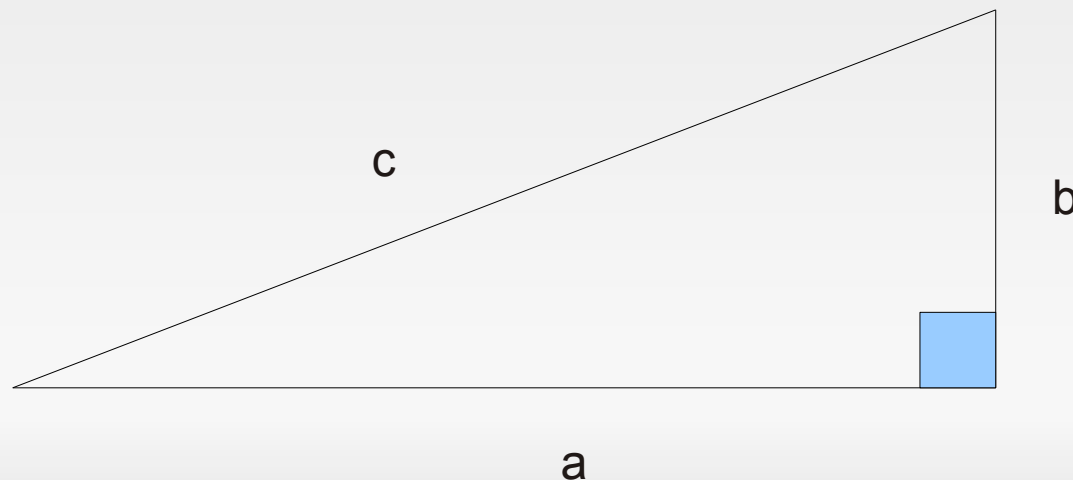
The Cartesian co-ordinate system

- Quadrants:

    - They go anti-clockwise starting from the quadrant where both x and y are positive.

    - They have an important role to play with Trigonomoetic functions. Discuss in later unit.

The Cartesian co-ordinate system

- Distance between points:

  - Pythagoras' Theorem

  - Let a, b, c be the lengths of the sides of a right-angled triangle such that c is the longest length. Then:
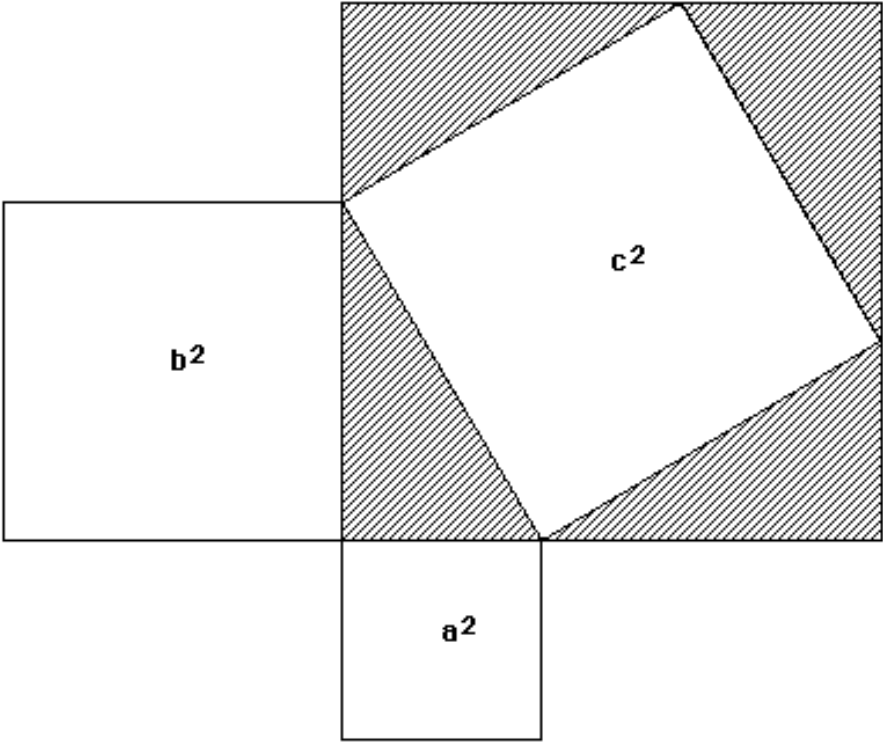
$$c^2 = a^2 + b^2$$

The Cartesian co-ordinate system

- Link to picture

The Cartesian co-ordinate system

- YouTube: Easy proof!

- Example:

  - What is the distance between the points (-2,4) and (1,8) ?
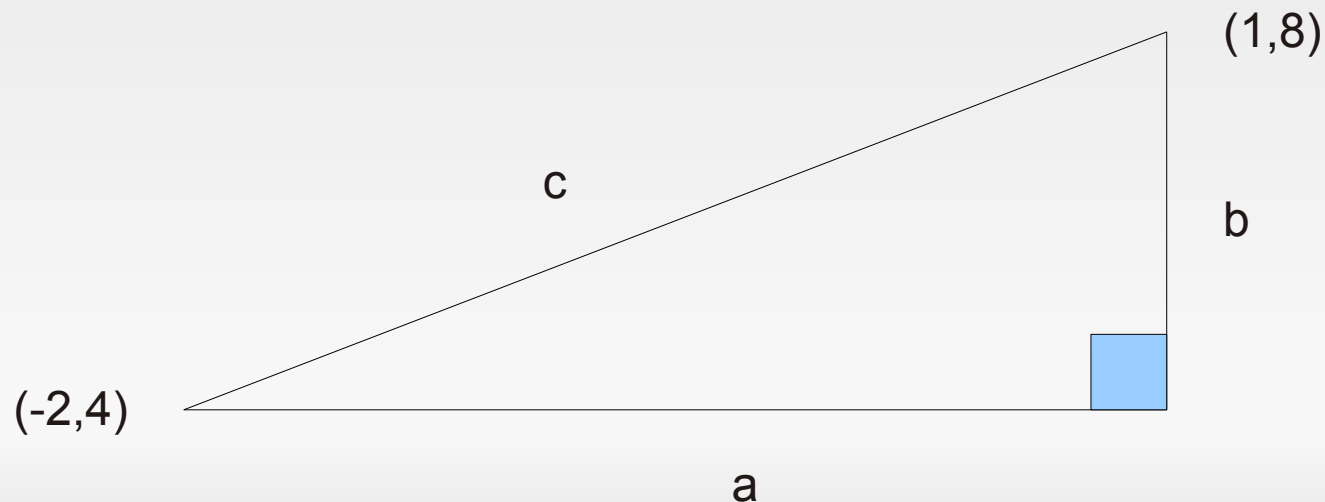
The Cartesian co-ordinate system

- The distance c is calculated as follows using Pythagoras' theorem:

$$c^2 = ((-2) - 1)^2 + (4 - 8)^2$$

$$c^2 = 25$$

$$c = 5$$

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- Question:

  - What are the distances between each of the following pairs of points

    - a) (4,3) and (-1,9)?
    - b) (-11,-11) and (-3, -5)?
    - c) (6,5) and (15,17)?

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- Answers:
  - a) 13.
  - b) 10.
  - c) 15.
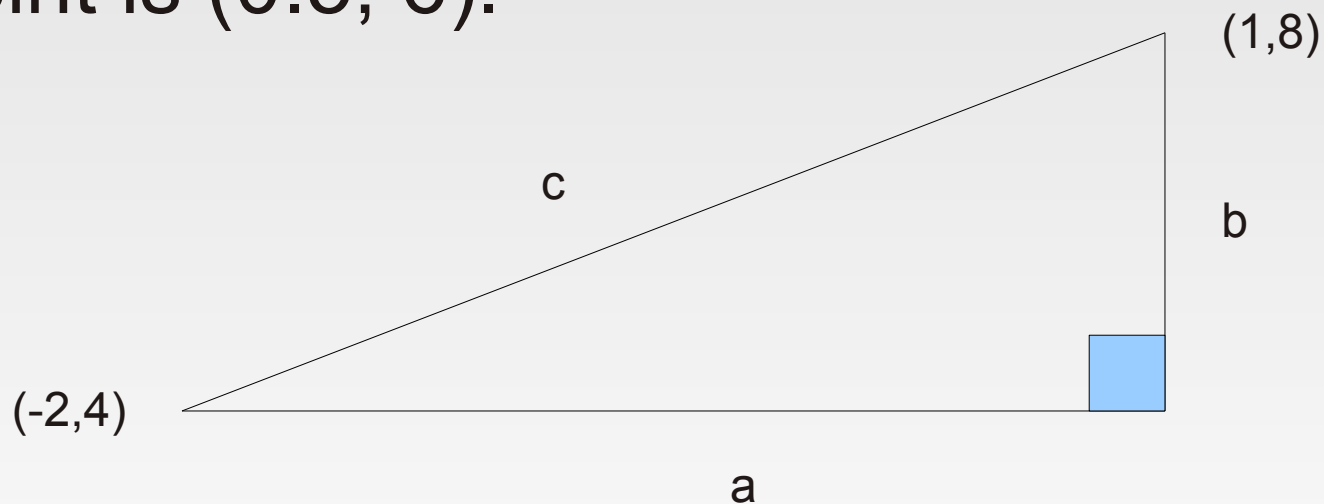
The Cartesian co-ordinate system

- The mid-point of two points:

The Cartesian co-ordinate system

- The mid-point of two points:

  - Starting at one of the points, the mid-point is clearly halfway up (or down) and halfway along.

  - Example: What point is halfway between (1,8) and (-2,4)?

- Answer: We compute the triangle has sides a=3, b=4 and c=5.

- We find that a/3=1.5 and b/2=2, and so the midpoint is (0.5, 6).

(1,8)

c

b

(-2,4)

a

The Cartesian co-ordinate system

- Question:
  - What are the mid-points between each of the following pairs of points
    - a) (4,3) and (-1,9)?
    - b) (-11,-11) and (-3,-5)?
    - c) (6,5) and (15,17)?

The Cartesian co-ordinate system

- Answers:
  - a) (1.5, -3)
  - b) (-7, -8)
  - c) (10.5,11)