

ANALYTICAL GEOMETRY

28 JULY 2014



Lesson Description

In this lesson we:

- Discuss the following aspects of Analytical Geometry:
 - Distance formula
 - Midpoint theorem
 - Gradient of a line



Summary

The Distance Formula

$$AB = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$$

The Midpoint Formula

$$M\left(\frac{x_A + x_B}{2}; \frac{y_A + y_B}{2}\right)$$

Gradient of a Line

$$M_{AB} = \frac{y_B - y_A}{x_B - x_A}$$

- For horizontal lines the gradient is equal to 0.
- For vertical lines the gradient is undefined.
- Gradients of parallel lines

Two lines that run parallel to each other are always the same distance apart and have equal gradients.

- Gradients of perpendicular lines

If two lines intersect perpendicularly, then the product of their gradients is equal to -1.



Test Yourself

Question 1

Two towns are located at T(9; 6) and S(-10; -6). What are the co-ordinates of M, which is halfway between T and S.

- A) (1; -2)
- B) (0; -0.5)
- C) (-2; 1)
- D) (-0.5; 0)

Question 2

True or false: the following three points are collinear points: X(2; 4), Y(0; 2) and Z(-4; -2).

Question 3

The distance between A(-1; 3) and B(5; -6) correct to one decimal place is:

- A) 0.5
- B) 10.8
- C) 4.2
- D) 6.3

Question 4

M(0; 2) is the midpoint of the line segment joining A(x; y) and B(8; -4). Find the co-ordinates of A:

- A) (8;-8)
- B) (-8;8)
- C) (4;-1)
- D) (-1;4)

Question 5

True or false: the point H(-3; 3) lies on the line $2y - 3x = 1$



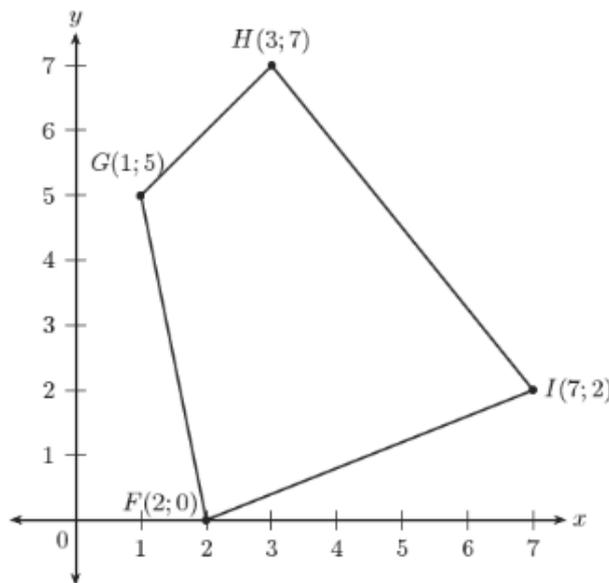
Improve your Skills

Question 1

The line joining C(-2; 4) and D(x; y) has the mid-point M(1;-3). Find point D.

Question 2

In the diagram below, the vertices of the quadrilateral are F(2; 0), G(1; 5),H(3; 7) and I(7; 2)



- a) Calculate the lengths of the sides of FGHI
- b) Are the opposite sides of FGHI parallel?
- c) Do the diagonals of FGHI bisect each other?
- d) State what type of quadrilateral FGHI is. Give reasons for your answer.

Question 3

A is the point $(-6; 1)$ and B is the point $(0; 3)$

- a) Determine the equation of line AB
- b) Find the equation of line CD perpendicular to AB and passing through the point $(-3;6)$