S1 Topic 14

Introduction to Coordinates

Level: Key Stage 3

Dimension: Measures, Shape and Space
Module: Learning Geometry through an Analytic approach
Unit: Introduction to Coordinates

Student ability: Average

Content Objectives:

After completing the activity, students should have consolidated their understanding of ordered pairs and rectangular coordinate systems.

Language Objectives:

After completing the activity, students should be able to

- Understand and use the English terms related to rectangular coordinate systems (e.g., *rectangular coordinate system, axes, x-axis, y-axis, horizontal, vertical, perpendicular, intersection, origin, projection, number lines, coordinates, x-coordinate, y-coordinate, position*);
- understand the English expressions for explaining how a rectangular coordinate system is constructed, e.g.,

- *In rectangular coordinate system, two axes are used. The two axes are perpendicular to each other. Their intersection is called the origin. The horizontal axis is called the x-axis, and the vertical one called the y-axis. Each axis is a number line. A number line is a line marked with numbers in regular intervals as in a ruler. On the x-axis, points to the right are positive, and to the left are negative. For the y-axis, points above the origin is positive, below are negative.*
- *A pair of numbers, written in the form {a, b}, represents a point in the rectangular coordinate system. The pair of numbers comes from projections of the point on the horizontal and vertical number lines.*
- *The order of numbers in an ordered pair is important, for example (3, 5) and (5, 3) represent different positions.*

- *The x-coordinate (the number at the projection on the horizontal number line) is written first followed by the y-coordinate (the number at the projection on the vertical number line). They are put inside a pair of brackets and separated by a comma.*

●follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite knowledge: nil

Time: 2 lessons (80 minutes)

Procedure:

1. The teacher should ask students whether they have been to the cinema before, and select a student who has. The teacher should invite the student to locate the seat he or she sat in, by reference to the seating plan of a cinema shown in Activity 1A.
2. The teacher should then show the seating plan in Activity 1B to the class and asks students to answer the questions by locating the seats by column and row.
3. The students then study the information and answer the questions in Activity 2A. The teacher may allow the students to form groups of 2 to 4 for discussion.
4. The teacher should then discuss the answers in Activity 2A with the students.
5. The teacher should introduce the key terms by discussing part B of Activity 2 with the students, making sure that the students know the pronunciation and meaning of the terms.
6. Students then complete part C of Activity 2 as classwork.

Explanatory Notes for Teachers:

1. Instead of introducing the terms and definitions to the students at the beginning, this activity allows the students to investigate the rectangular coordinates system first.
2. This may avoid students being deterred by a large number of terms in English at the beginning.
3. The terms and definitions are taught after the students have grasped the concept of rectangular coordinate systems.

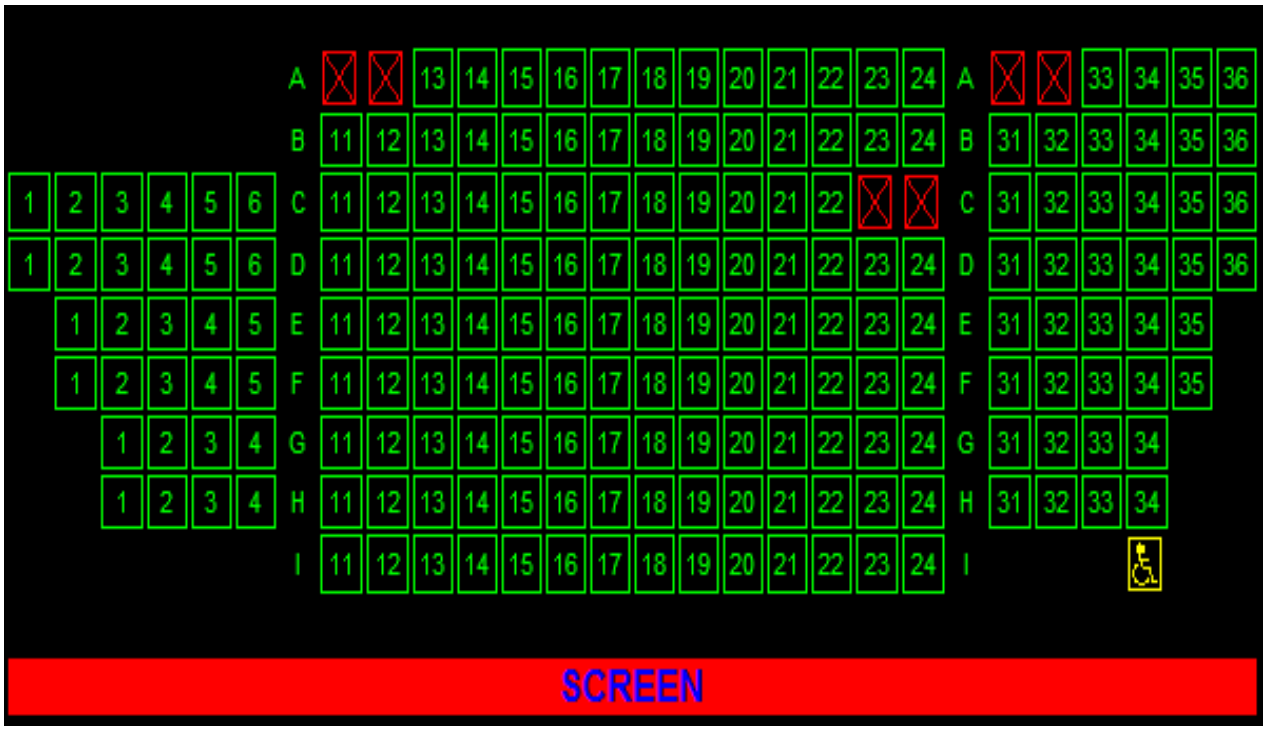
Name: _____ Class: _____ ( )

Title: Introduction to Coordinates

Activity 1A:

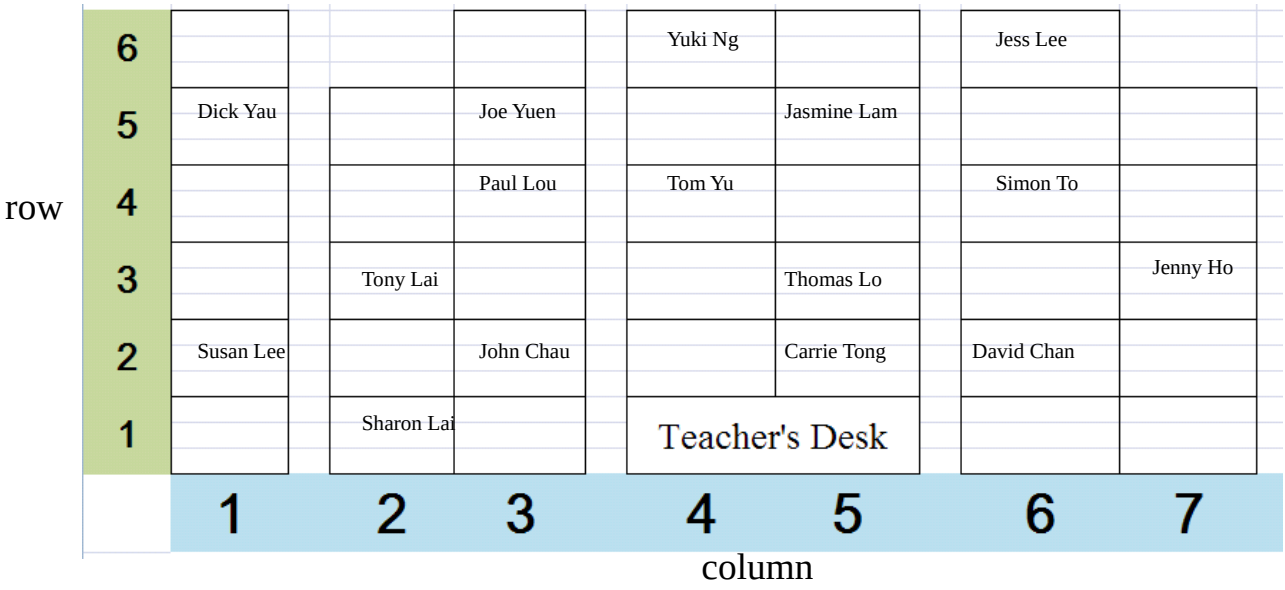
Visit the cinema

Have you visited a cinema before? Locate the seats for which the tickets have already been sold. How do you locate those seats?



Activity 1B:

The classroom seating plan



Use the information in the above seating plan to answer the following questions.

1. Who is sitting in column 3, row 4? _____.

2. Who is sitting in column 6, row 2? _____.

3. Who is sitting in column 4, row 6? _____.

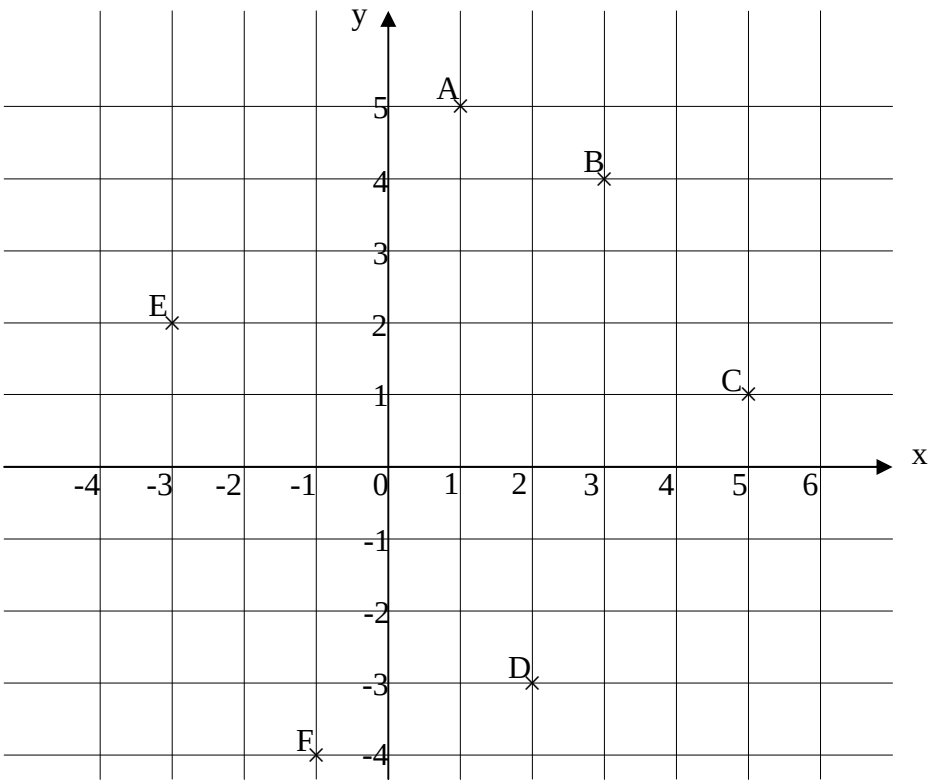
4. Jenny Ho is sitting in _____.

5. Dick Yau is sitting in _____.

6. Sharon Lai is sitting in _____.

Activity 2:

In mathematics, we represent the position of a point in the following way.



Point A is represented by (1, 5)
Point B is represented by (3, 4)
Point C is represented by (5, 1)
Point D is represented by (2, -3)
Point E is represented by (-3, 2)
Point F is represented by (-1, -4)

A. Study the above diagram and answer the following questions.

1. How many numbers are used to represent each point?

_____

2. Where do the numbers come from?

_____

3. Is the order of the numbers important? Why?

_____

4. How many number lines are used as reference lines?

_____

5. How are the number lines positioned?

_____

6. Describe the format for writing the numbers.

_____

_____

_____

7. Mark the points represented by (2, 5), (-2, -3) an (3, -2) on the diagram.

B. Listen to the teacher's explanation and complete the following.

1. This system of representing the position of a point is called _____

_____.

2. The horizontal number line is the _____, labelled with an x.
3. The vertical number line is the _____, labelled with a y.
4. The intersecting point of the x-axis and y-axis is the _____.
5. If a line perpendicular to the x-axis is drawn through a point, the number at the position where it cuts the x-axis is the_____ of the point.
6. If a line perpendicular to the y-axis is drawn through a point, the number at the position where it cuts the y-axis is the_____ of the point.
7. A pair of numbers whose order is important is called an _____.
8. The ordered pair (_____,_____) are the _____ of the point.

C. In the following diagram, draw the x-axis and y-axis.

1. Mark the points P, Q, R, S and T.

   The coordinates of P are (2, 4)

   The coordinates of Q are (-1, 1)

   R is 3 units below Q.

   The coordinates of S are (2, -3)

   T is the point where PS cut the x-axis.

2. What are the coordinates of points R and T?

3. Mark the point Z (1.5, 2) on the diagram.

Suggested answers:

Activity 1A:

Locate with row and seat no., A11, A12, A31, A32, C23 and C24

Activity 1B:

1. Paul Lou 2. David Chan 3. Yuki Ng 4. column 7 and row 3

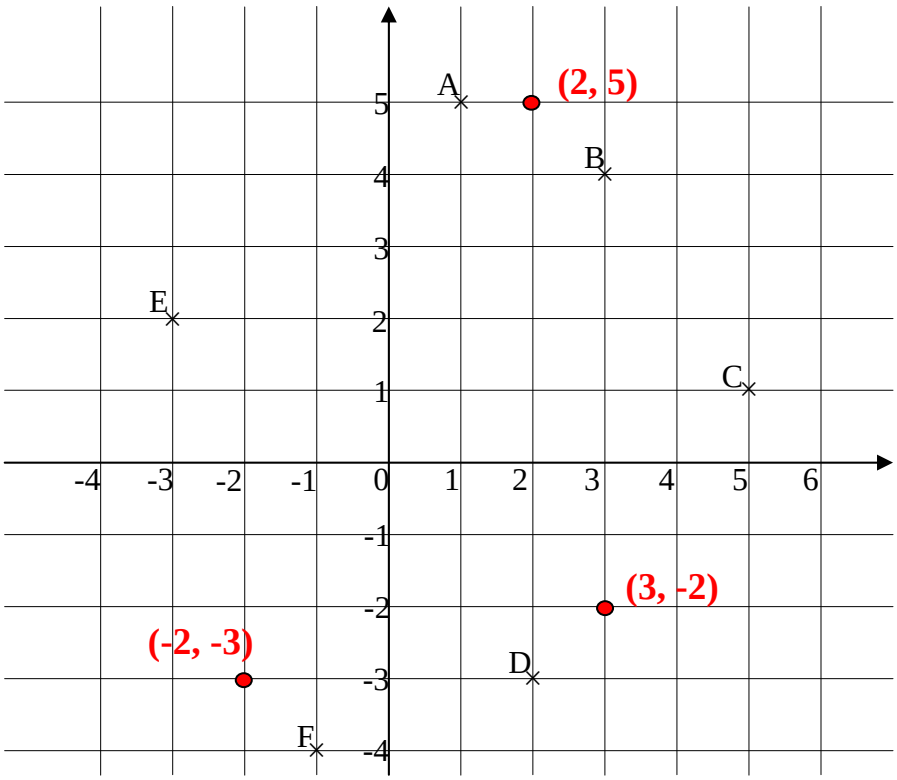
5. column 1 and row 5 6. column 2 and row 1

Activity 2:

A.

1. two numbers
2. projections of the point on the horizontal and vertical number lines
3. The order of numbers is important, for example (3, 5) and (5, 3) represent different positions
4. 2 number lines
5. They are perpendicular to each other and intersect at the origin.
6. The number at the projection on the horizontal number line is written first followed by the number at the projection on the vertical number line. They are put inside a pair of brackets and separated by a comma.

7.



B.

1. the rectangular coordinate system 2. x-axis 3. y-axis 4. origin

5. x-coordinate 6. y-coordinate 7. ordered pair

8. (x-coordinate, y-coordinate), coordinates

C.

2. The coordinates of R are (-1, -2) and coordinates of T are (2, 0).

1. & 3.