# Worksheet - Coordinates and translation

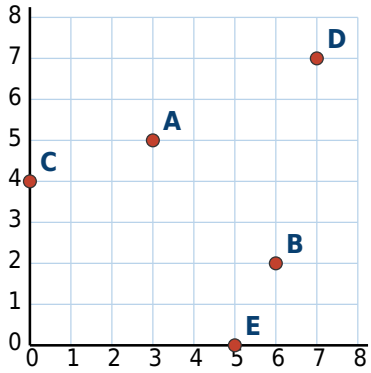
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Show your working.

## Question 1

**Question 1 – Reading coordinates** *(Section A · Practice)*

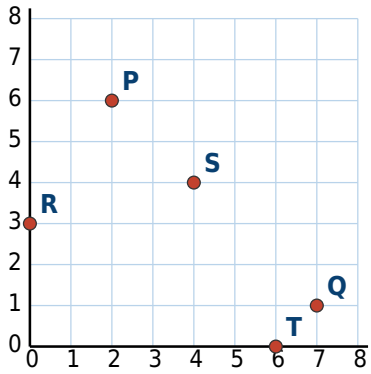
Write the coordinates of each of the points A to E.




## Question 2

**Question 2 – Plotting points** *(Section A · Practice)*

Plot these points on a grid: P (2, 6), Q (7, 1), R (0, 3), S (4, 4) and T (6, 0). Then answer the questions.




a. Which points are on one of the axes?
b. Which point is furthest to the right?
c. Which point is highest?
d. Which two points have the same y-coordinate? Is there a pair with the same x-coordinate?

## Question 3

**Question 3 – Missing corner of a rectangle** *(Section A · Practice)*

Three corners of each rectangle are given. Find the fourth corner.

a. (1, 1), (5, 1), (5, 3)
b. (2, 2), (2, 6), (7, 6)
c. (0, 4), (4, 4), (4, 0)
d. (3, 2), (3, 5), (8, 2)

## Question 4

**Question 4 – Lengths of sides** *(Section A · Practice)*

Use the coordinates to find the length of each line.

a. From (1, 2) to (6, 2)
b. From (3, 1) to (3, 7)
c. From (0, 5) to (9, 5)
d. The rectangle with corners (2, 1), (8, 1), (8, 4) and (2, 4): find its perimeter and area.

## Question 5

**Question 5 – Translating points** *(Section A · Practice)*

Translate each point by the movement given. Write the new coordinates.

a. (3, 4) moves 2 right and 1 up
b. (5, 2) moves 3 left and 4 up
c. (6, 7) moves 5 down
d. (1, 1) moves 6 right and 6 up

## Question 6

**Question 6 – Describing translations** *(Section A · Practice)*

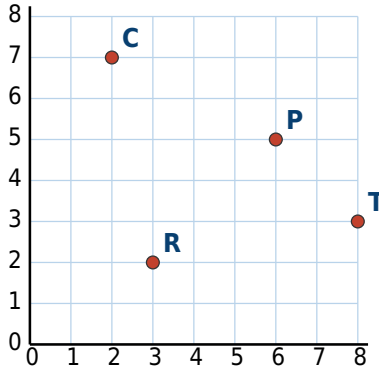
Describe the translation that moves A to B in each part.

a. A (2, 3) to B (7, 5)
b. A (6, 6) to B (2, 2)
c. A (1, 7) to B (1, 3)
d. A (8, 1) to B (3, 4)

## Question 7

**Question 7 – The treasure map** *(Section B · Real-life practice)*

A pirate map uses a grid. The start is at the origin (0, 0), the old ship. Each square is 10 paces. The map shows a rock at (3, 2), a palm tree at (6, 5), a cave at (2, 7) and the treasure at (8, 3).

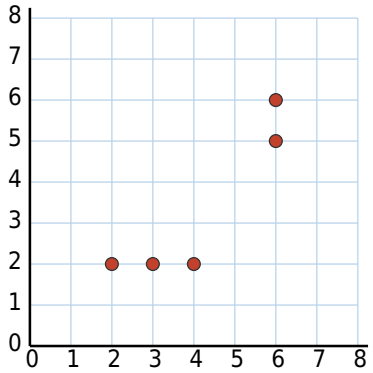



a. Which place is the closest to the old ship along the horizontal axis (the smallest x)?
b. The pirate walks from the rock to the treasure. How many squares across and how many up? How many paces is the walk?
c. The pirate walks from the palm tree to the cave. Describe the walk.
d. The pirate buries a chest at (4, 6). Is it closer to the palm tree or the cave?

## Question 8

**Question 8 – Battleships** *(Section B · Real-life practice)*

Amir and Beth play a game on a grid. Amir's ships are at these coordinates: (2, 2), (3, 2), (4, 2) for the big ship and (6, 5), (6, 6) for the small ship.

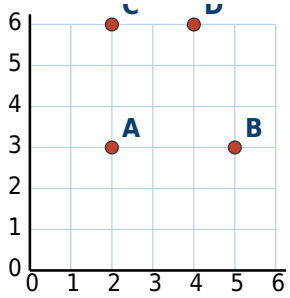



a. Beth calls (3, 2). Is it a hit? Which ship is hit?
b. She calls (2, 3). Is it a hit?
c. Describe the position of the small ship. Is it horizontal or vertical?
d. Beth wants to sink the big ship. Which coordinates must she call?

## Question 9

**Question 9 – The classroom seating plan** *(Section B · Real-life practice)*

Mr Green draws a seating plan of his class as a grid. A desk is named by its coordinates: x is the column from the left and y is the row from the front. Ali sits at (2, 3), Bea at (5, 3), Cal at (2, 6) and Dee at (4, 6).




a. Who sits in the same row as Ali?
b. Who sits in the same column as Ali?
c. Eva sits at the fourth corner of the rectangle formed by Ali, Bea and Cal. Where does she sit?
d. Mr Green asks Ali to move 3 columns to the right and 2 rows back. Where does Ali sit now?

## Question 10

**Question 10 – Robot instructions** *(Section B · Real-life practice)*

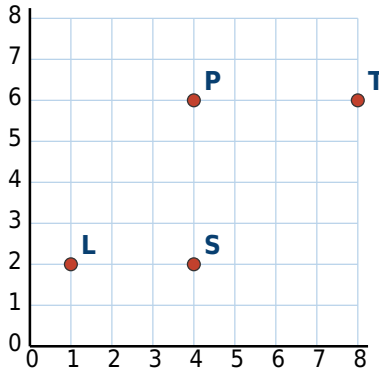
A toy robot moves on a grid. It starts at (1, 1). Each instruction moves it by a number of squares. The instructions are: right 4, up 3, left 2, up 2, right 5.

a. Where is the robot after right 4 and up 3?
b. Where is the robot after all five instructions?
c. The robot wants to return to (1, 1) with only two instructions. What are they?
d. How many squares does the robot travel in total on the five instructions?

## Question 11

**Question 11 – Bus stops on the town map** *(Section B · Real-life practice)*

A town map has a grid. The bus stops are at the library (1, 2), the school (4, 2), the park (4, 6) and the station (8, 6). The bus goes from stop to stop in that order, along the grid lines.

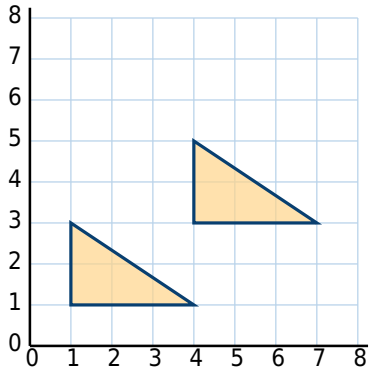



a. How many squares does the bus travel from the library to the school?
b. How many squares from the school to the park?
c. How many squares from the park to the station?
d. Each square is 200 m. How far is the whole journey from the library to the station, in metres?

## Question 12

**Question 12 – Moving the shape** *(Section B · Real-life practice)*

A triangle has corners A (1, 1), B (4, 1) and C (1, 3). It is translated 3 right and 2 up to make a new triangle.

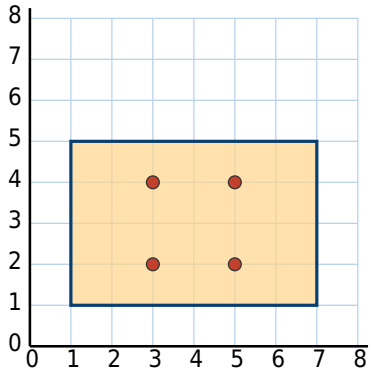


a. Find the new coordinates of A′, B′ and C′.
b. Describe the translation that moves the new triangle back to the start.
c. The triangle is translated again, 2 right and 1 down from the new position. What are the coordinates of A″?
d. What is the area of the triangle? (Area of a triangle is half of base times height.)

## Question 13

**Question 13 – The garden plan** *(Section B · Real-life practice)*

Mrs Khan plans a rectangular garden on a grid. The corners are (1, 1), (7, 1), (7, 5) and (1, 5). Each square is 1 metre. She puts a pond with corners (3, 2), (5, 2), (5, 4) and (3, 4).

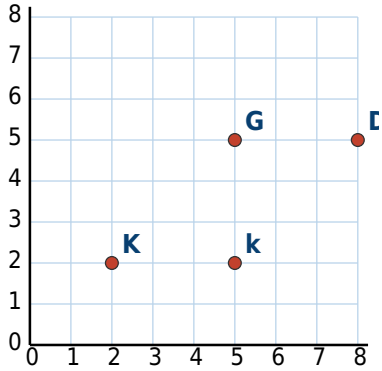



a. How long and how wide is the garden?
b. What is the perimeter of the garden?
c. What is the area of the garden? What is the area of the pond?
d. How much of the garden is left for grass?

## Question 14

**Question 14 – Computer game** *(Section B · Real-life practice)*

In a computer game a knight starts at (2, 2). A door is at (8, 5), a key is at (5, 2) and a dragon is at (5, 5). The knight can only move left, right, up or down.

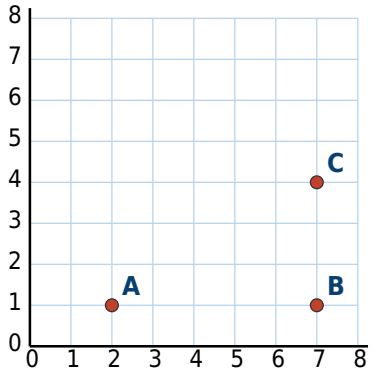



a. How many squares must the knight move to reach the key?
b. From the key, the knight goes to the door. Describe his move.
c. How many squares does he move altogether from the start to the door through the key?
d. From the key to the door the knight goes 3 right and 3 up. Which order avoids the dragon at (5, 5): right first or up first? Explain.

## Question 15

**Question 15 – Shape on a grid** *(Section C · Problem solving)*

A rectangle ABCD has A at (2, 1), B at (7, 1) and C at (7, 4).

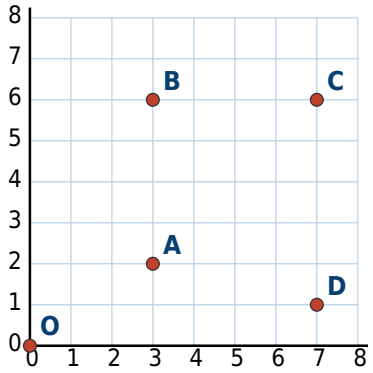



a. Find the coordinates of D.
b. Find the perimeter and the area of the rectangle.
c. The rectangle is translated 1 left and 3 up. Write the new coordinates of A, B, C and D.
d. The new rectangle is cut in half with a line from the midpoint of the top to the midpoint of the bottom. What is the width of each half?
e. Are the two halves identical? How many lines of symmetry does the original rectangle have?

## Question 16

**Question 16 – Delivery driver** *(Section C · Problem solving)*

A delivery driver starts at the depot (0, 0) and must deliver to four houses: A (3, 2), B (3, 6), C (7, 6) and D (7, 1). He drives along the grid lines. Each square is 100 m.

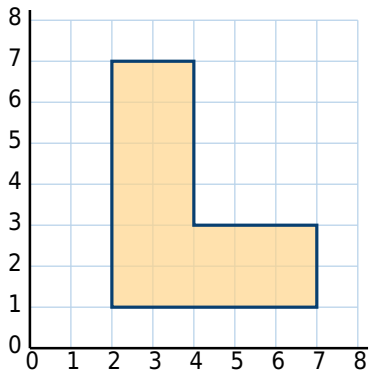



a. How far is it from the depot to house A (in squares along the grid)?
b. He drives from A to B to C to D. How many squares is that altogether?
c. How far is the whole trip from the depot, through A, B, C and D? Give your answer in metres.
d. He drives back from D to the depot along the grid lines. How many squares is that?
e. Petrol costs 8p for every 100 m. What does the whole journey, there and back, cost?

## Question 17

**Question 17 – Designing a letter** *(Section C · Problem solving)*

Zara draws the capital letter L on a grid using straight lines. The corners are (2, 1), (2, 7), (4, 7), (4, 3), (7, 3) and (7, 1).

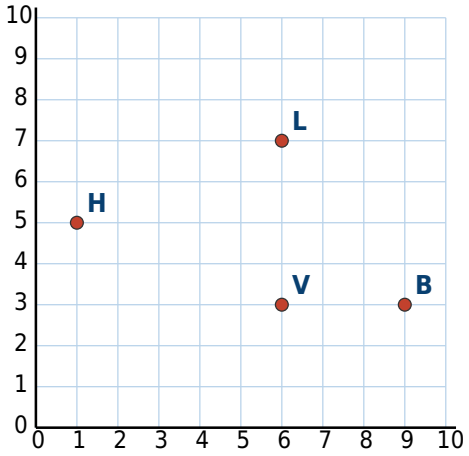



a. Which sides are vertical and which are horizontal?
b. Find the perimeter of the letter.
c. Find the area of the letter by splitting it into two rectangles.
d. Zara translates the letter 2 left and 1 down. Write the new coordinates of the six corners.
e. Is the new letter still on the grid with corners from (0, 0) to (8, 8)?

## Question 18

**Question 18 – Island map** *(Section C · Problem solving)*

A map of an island is drawn on a grid. The harbour is at H (1, 5), the lighthouse is at L (6, 7), the village is at V (6, 3) and the beach is at B (9, 3). A path goes in straight lines along the grid from H to V to B.



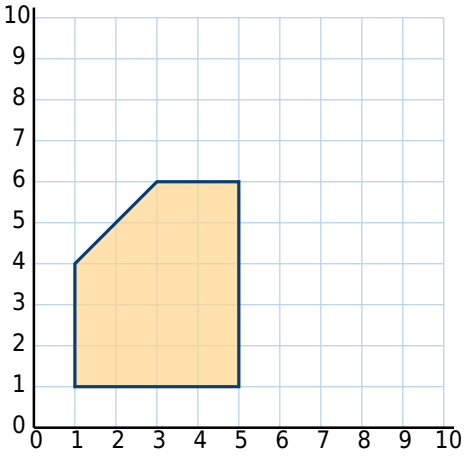

a. Describe the move from the harbour H to the lighthouse L.
b. Describe the move from H to the village V.
c. How many squares is the path from H to V (go across first, then down) and then to B?

d. The lighthouse is moved by a storm 2 left and 4 down. Where is it now? Is it on the path HV?
e. Each square is 50 m. How long is the path from H to B, in metres?

## Question 19

**Question 19 – Symmetric flag design** *(Section C · Problem solving)*

A designer draws half of a flag on a grid. The mirror line is the vertical line x = 5. The corners of the half flag on the left are (1, 1), (5, 1), (5, 6), (3, 6) and (1, 4).




a. What are the coordinates of the reflections of (1, 1), (1, 4) and (3, 6) in the mirror line x = 5?
b. What are the coordinates of the corners of the whole flag, going round?
c. What is the width of the whole flag?
d. How many lines of symmetry does the whole flag have?
e. The flag is translated 3 right and 2 up. What are the new coordinates of the top corners?

## Question 20

**Question 20 – Challenge: finding the square** *(Section D · Challenge)*

Four points are the corners of a square. Two of the corners are A (2, 2) and C (6, 6), opposite each other.

a. Find the other two corners B and D, if the square has its sides parallel to the axes.
b. Find the side length and the area of the square.
c. Is there another square with A and C as opposite corners? Explain.