

## 1.3.5

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August 22,2025

# Question

If  $(3, 3)$ ,  $(6, y)$ ,  $(x, 7)$  and  $(5, 6)$  are the vertices of a parallelogram taken in order, find the values of  $x$  and  $y$ .

# Theoretical Solution

## Solution:

In a parallelogram, the diagonals bisect each other. Therefore, the midpoint of diagonal joining  $(3, 3)$  and  $(x, 7)$  is equal to the midpoint of diagonal joining  $(6, y)$  and  $(5, 6)$ .  
$$\left(\frac{3+x}{2}, \frac{3+7}{2}\right) = \left(\frac{6+y}{2}, \frac{y+6}{2}\right)$$

endalign

$$\left(\frac{3+x}{2}, 5\right) = \left(\frac{11}{2}, \frac{y+6}{2}\right)$$

Equating the coordinates, we get:  $\frac{3+x}{2} = \frac{11}{2} \Rightarrow x = 8$

$$5 = \frac{y+6}{2} \Rightarrow y = 4$$

**Final Answer:**  $x = 8, y = 4$

```
#include <stdio.h>

int main() {
    int x, y;

    // Using midpoint property of diagonals of
    // parallelogram
    x = 11 - 3;    // From  $(x+3)/2 = 11/2$ 
    y = 10 - 6;    // From  $(y+6)/2 = 5$ 

    printf( The values are: x = %d, y = %d\n , x, y);

    return 0;
}
```

# Python Code

```
# Using midpoint property of diagonals of
    parallelogram

# From  $(x+3)/2 = 11/2 \Rightarrow x = 11 - 3$ 
x = 11 - 3

# From  $(y+6)/2 = 5 \Rightarrow y = 10 - 6$ 
y = 10 - 6

print(f The values are: x = {x}, y = {y} )
```

# Python Code Using C Functions

```
# Function to calculate x using diagonal midpoint
property
def find_x():
    #  $(3 + x)/2 = (6 + 5)/2$ 
    return 11 - 3    # x = 8

# Function to calculate y using diagonal midpoint
property
def find_y():
    #  $(3 + 7)/2 = (y + 6)/2$ 
    return 10 - 6    # y = 4

# Main function (like in C)
def main():
    x = find_x()
    y = find_y()
    print(f The values are: x = {x}, y = {y} )
```

