Question

Question:
Write the coordinates of a point $\mathbf{P}$ on the x-axis which is equidistant from the points $\mathbf{A}(-2,0)$ and $\mathbf{B}(6,0)$.

Theoretical solution

Let the point P be on the x-axis with coordinates:

$$P(x, 0) \tag{1}$$

Since P is equidistant from A and B, their distances from P are equal:

$$PA = PB \tag{2}$$

Distance Formula

Using the distance formula:

$$\sqrt{(x+2)^2+(0-0)^2} = \sqrt{(x-6)^2+(0-0)^2} \tag{3}$$

This simplifies to:

$$|x+2| = |x-6| \tag{4}$$

Solving Cases

Case 1:

$$x + 2 = x - 6 \quad \Rightarrow \quad 2 = -6 \quad \text{(Not possible)} \tag{5}$$

Case 2:

$$x + 2 = -(x - 6) \tag{6}$$

$$x + 2 = -x + 6$$

$$2x = 4 \quad \Rightarrow \quad x = 2$$

Answer

Therefore, the coordinates of point P are:

$$\boxed{(2, 0)} \tag{7}$$

Python Code

```python
import matplotlib.pyplot as plt

# Define points
A = (-2, 0)
B = (6, 0)
P = (2, 0)

# Create figure and axis
fig, ax = plt.subplots()

# Plot points
ax.plot(A[0], A[1], 'ro') # Red point A
ax.plot(B[0], B[1], 'bo') # Blue point B
ax.plot(P[0], P[1], 'go') # Green point P

# Draw x and y axis
ax.axhline(0, color='black', linewidth=0.5)
ax.axvline(0, color='black', linewidth=0.5)
```

Python Code

Add point labels ax.text(A[0], A[1] - 0.3, 'A(-2, 0)', color='red', fontsize=10, horizontalalignment='center') ax.text(B[0], B[1] - 0.3, 'B(6, 0)', color='blue', fontsize=10, horizontalalignment='center') ax.text(P[0], P[1] + 0.3, 'P(2, 0)', color='green', fontsize=10, horizontalalignment='center')
Add annotation about P being equidistant from A and B ax.text(2, 0.3, 'P is equidistant from A and B', fontsize=10, verticalalignment='bottom', horizontalalignment='left')
Show the plot plt.show()

C Code

```c

#include <stdio.h>

int main() {
    // Define points A and B on x-axis
    int A_x = -2, A_y = 0;
    int B_x = 6, B_y = 0;

    // Coordinates of point P to be found
    int P_x;

    // Next part will calculate P_x
```

C Code

```c
    // Solve |x + 2| = |x - 6|
    // Case 2: x + 2 = -(x - 6)
    P_x = (6 - 2) / 2; // P_x = 2

    printf("Coordinates of point P are: (%d, 0)\n", P_x);

    return 0;
}
```

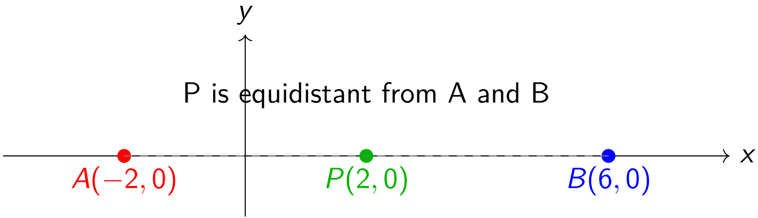
Python and C Code

```python
# Compile the C program
subprocess.run(["gcc", "equidiistance.c", "-o", "equidistance"])

# Run the compiled C program
result = subprocess.run(["./equidistance"], capture_output=True,
    text=True)

# Print the output from the C program
print(result.stdout)
```

Graphical Representation


y
P is equidistant from A and B
x
$A(-2,0)$
$P(2,0)$
$B(6,0)$