Students may use a variety of strategies to solve the task. Some possible solutions include:

**Total Square Footage of Painting Needed:** 1212 square feet

**Solution:** 161.6 minutes…just under 3 hours

**Determining the how fast we paint together:**

My brother: 180 square feet in 40 minutes

Me: 180 square feet in 60 minutes --- meaning I can paint 2/3(180 square feet) in 40 minutes or 120 square feet in 40 minutes. Combined we can paint 300 square feet in 40 minutes---or 7.5 square feet per minute

If we have 1212 square feet to paint, 

**Generating a Table of Values:**

|  |  |
| --- | --- |
| **Number of Minutes Painting** | **Square Feet Painted** |
| 40 | 300 |
| 80 | 600 |
| 120 | 900 |
| 160 | 1200 |
| 200 | 1500 |
| 240 | 1800 |

It takes between 160 and 200 minutes to paint the 1212 square feet.

From this point, students may either break the table into smaller increments of time to narrow to the exact time or may find the rate of change to find when 1212 square feet will be painted.

|  |  |
| --- | --- |
| **Number of Minutes Painting** | **Square Feet Painted** |
| 160 | 1200 |
| 170 | 1275 |
| 180 | 1350 |

It takes between 160 and 170 minutes to paint 1212 square feet. From this point, students may either break the table into smaller increments of time to narrow to the exact time or may find the rate of change to find when 1212 square feet will be painted.

 7.5 square feet painted every 1minute

|  |  |
| --- | --- |
| **Number of Minutes Painting** | **Square Feet Painted** |
| 160 | 1200 |
| 161 | 1207.5 |
| 162 | 1215 |
| 163 | 1222.5 |

It takes between 161 and 162 minutes to paint 1212 square feet. It takes between 2 hours and 41 minutes and 2 hours and 42 minutes to paint 1212 square feet.

Students might take this even further and find the exact second.

**Proportional Reasoning:**

I can paint . My brother can paint . Together we can paint 7.5 ft2/min.

 *x* = 484.8 square feet I will be painting.

 *x* = 727.2 square feet my brother will be painting.



**Extension Question:**

1212 square feet – (3 sq ft/min)(60 min) = 1032 square feet remaining when the brother returns.

 for both siblings to complete the room. So the total time to complete the painting is 137.6 + 60 = 197.6 minutes or 3 hours 17.6 minutes.

# **Misconceptions:**

1. Watch for students who might count and include the two original walls in the total again.
2. The back wall of the bedroom, the one wall that is shared with the office might not get included. Students might only count this as one wall even though it is two separate walls that are shared by both rooms.
3. Students might not consider the size of the wall and just assign a time to each wall.
4. Students may miscalculate the combined rate for both siblings to paint the walls.