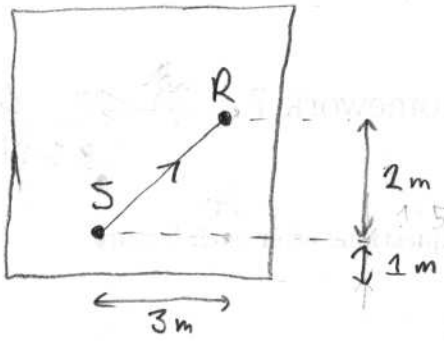
5/18/07
Barnett

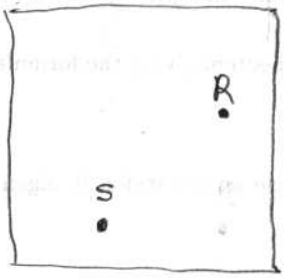
MATH 5 WORKSHEET : Image lattice

Consider a square room with source & receiver. The walls are completely reflective (absorption $\alpha = 0$)



What is the length of the direct path? [Hint: right triangle]

Draw all paths that reflect <u>once</u> off a wall between going S → R
↓ on this diagram

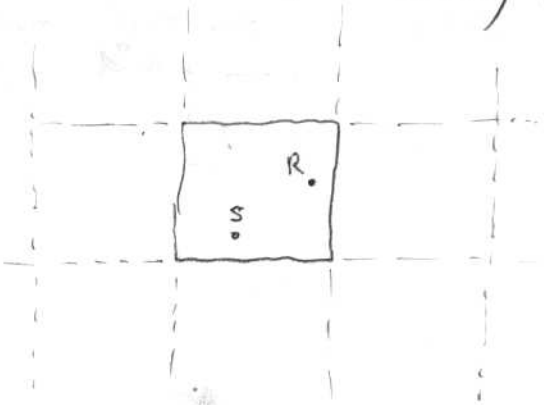


How many such paths are there?

Draw the <u>image</u> locations (S') which give the same signal at R

Compute the <u>length</u> of the path which reflects off the bottom wall:

Draw a path that bounces first off bottom wall then off right wall before reaching R:



What image location did this come from [Hint: reflect it twice!]

What is the <u>complete</u> set of images accounting for all possible reflections? Draw the pattern.

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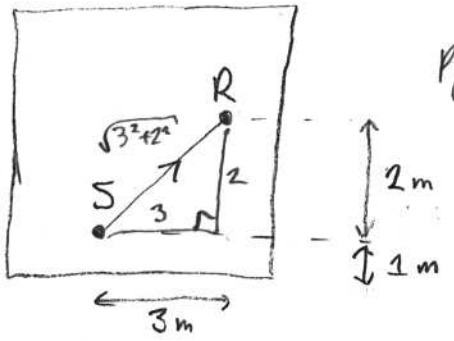
MATH 5 WORKSHEET : Image lattice

Consider a square room with source & receiver. The walls are completely reflective (absorption $\alpha = 0$)



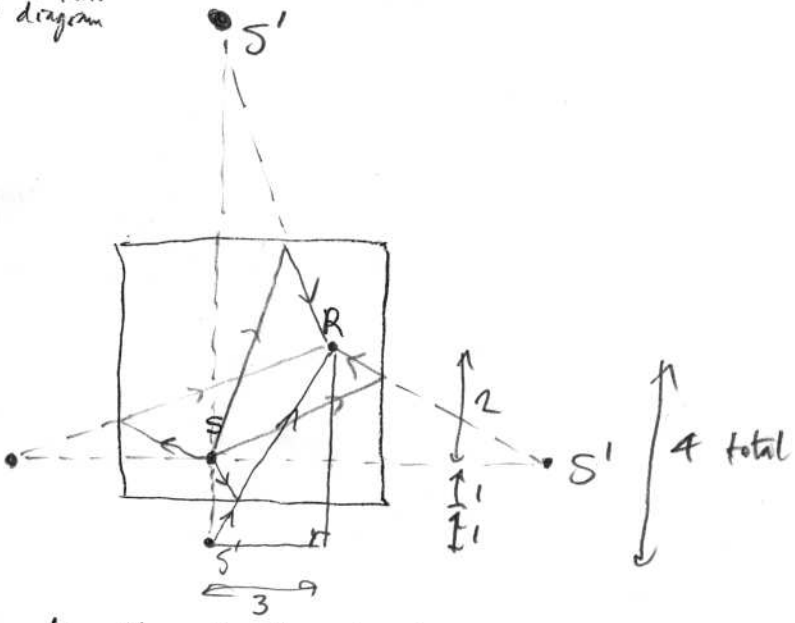
Pythagoras

What is the length of the direct path? [Hint: right triangle]

$L = \sqrt{3^2+2^2} = \sqrt{13}$

Draw all paths that reflect <u>once</u> off a wall between going S → R

↓ on this diagram



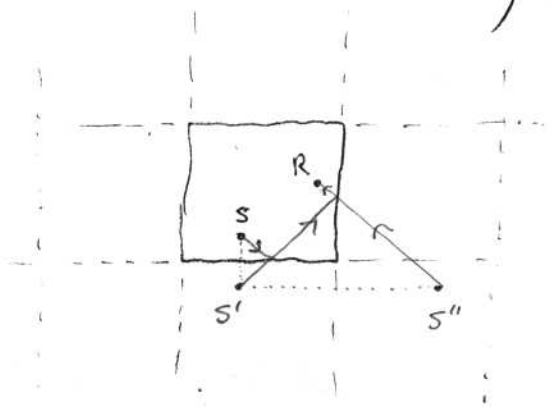
How many such paths are there?

4

Draw the <u>image</u> locations (S') which give the same signal at R

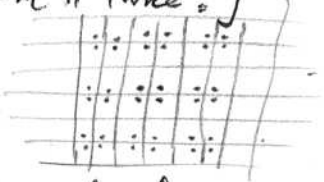
Compute the <u>length</u> of the path which reflects off the bottom wall: $\sqrt{3^2+4^2} = 5$.

Draw a path that bounces first off bottom wall then off right wall before reaching R:



'unfolding' the path to straight line S'' → R

What image location did this come from [Hint: reflect it twice!]



etc

What is the <u>complete</u> set of images accounting for all possible reflections? Draw the pattern.

2d lattice, ∞ number of reflection paths.