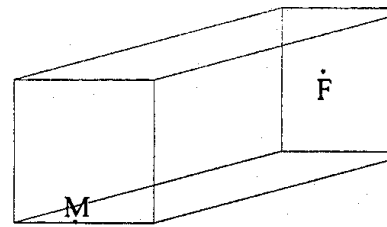


4. A rectangular room has dimensions $2 \times 2 \times 4$ and is oriented so that the two 2×2 walls are facing north and south. A male ant is at the base of the south wall, halfway between the east and west walls. A female ant is somewhere on the north wall, and the male wants to crawl to her following the shortest possible path. Now the type of route he will choose depends on exactly where the female is.



Draw a square representing the north wall, and identify and label different regions according to the path type that would be used to get to points in that region. For example, use F if only the floor is used, FW if the floor and the west wall are used, FEC if the floor, east wall and ceiling are used, etc.

As a hint, to save you a bit of work, I will tell you that the south wall would never be used. You could verify this yourself by examining a lot of cases, but the calculations are tedious.

This is an excellent problem, but it is not to be rushed. The student should be prepared (and allowed!) to spend a considerable amount of time on it. It is not overly difficult in the sense of requiring ingenuity and insight, but there's lots to be done: playing and checking things out, organizing the results, deciding how to present them, making good use of diagrams, and then writing it out. A good job is tremendously satisfying.

Well, you might reply, I can see that it's a nice problem, and no doubt it contains all the wonderful things you say it does, but my students simply don't have time to spend. There are so many techniques they have to learn and what does this problem have of those—Pythagoras and little else. How will they succeed in life if all they can do is solve problems like this?

Of course you already know my answer—I've said it 10 times already, and I'll say it 10 times more. They don't really need all those skills. What they really need is this.

Of course, there are some students who will need all the skills in the standard grade 12 text-book and more, for example, those who go on to study engineering physics. But how many such students do you teach? And such students will learn those skills through the years anyway, and those they miss they can pick up in a flash—otherwise they shouldn't be wrestling with engineering physics in the first place.