

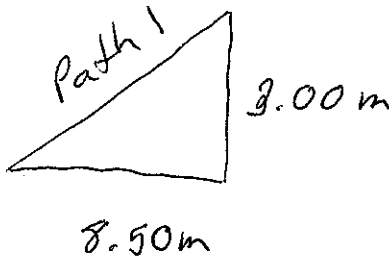
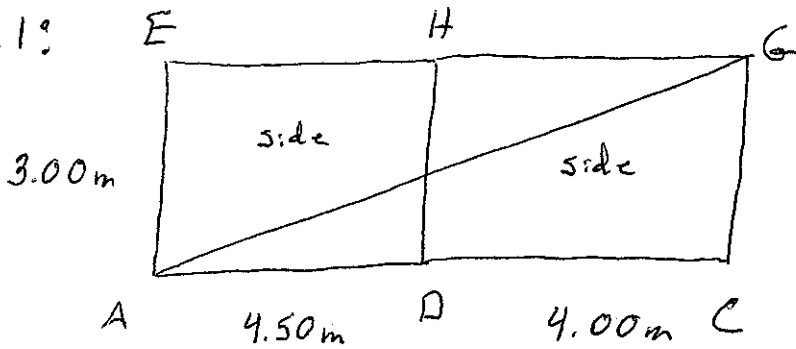
Suppose a gecko walks from point A to point G along the interior surface of the room shown above.

- (1) Determine the distance traveled by the gecko if it takes the shortest path.
- (2) Express the gecko displacement as a vector using the indicated coordinate system at point A.
- (3) What is the magnitude of the shortest possible path if the gecko was not limited to walking?

(1) Solution

Unfold the rectangular prism

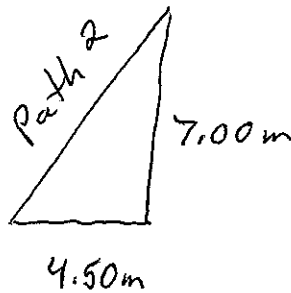
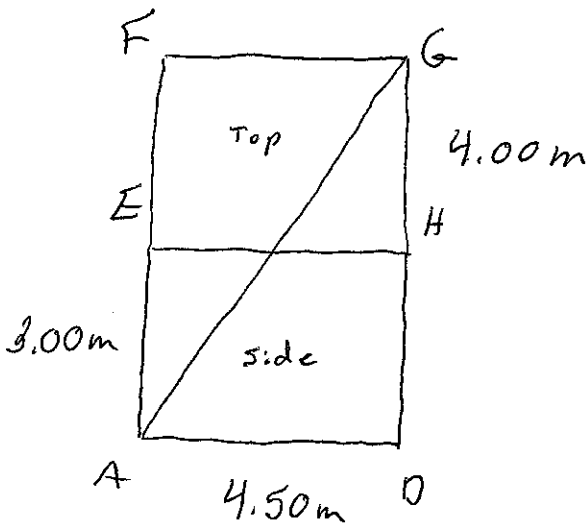
Case 1:



$$\text{Path 1} = \sqrt{(3.00\text{m})^2 + (8.50\text{m})^2}$$

$$= 9.01\text{m}$$

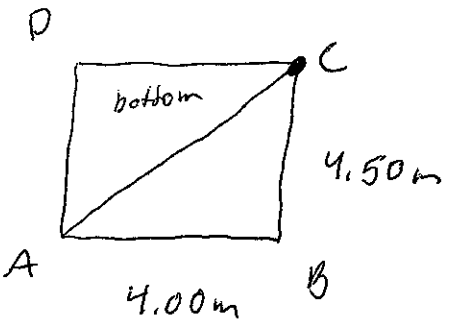
Case 2: Unfold the rectangular prism



$$\text{Path 2} = \sqrt{(7.00\text{m})^2 + (4.50\text{m})^2}$$

$$= 8.32\text{m}$$

Case 3 Diagonal across the bottom then up the CG corner.



Path 3 = diagonal + height

$$= \sqrt{(4.00m)^2 + (4.50m)^2} + 3.00m$$

$$= 9.02m$$

The shortest path is represented by case 2, 8.32m

* Notice that the shortest path was a straight line connecting the two points on the unfolded prism.

(2) solution

Displacement only concerns the beginning and end points.

$$(x, y, z)$$

$$A (0, 0, 0)$$

$$G (-4.50m, 4.00m, 3.00m)$$

$$\vec{AG} = -4.50m \vec{x} + 4.00m \vec{y} + 3.00m \vec{z}$$

(3) solution

$$|\vec{AG}| = \sqrt{(-4.50m)^2 + (4.00m)^2 + (3.00m)^2}$$

$$= 6.73m$$