An ant lives on the surface of a cube with edges of length 7cm. It is currentlylocated on an edge x cm from one of its ends. While traveling on the surface of the cube, it has to reach the grain located on the opposite edge (also at a distance xcm from one of its ends) as shown below.

(i)   What is the length of the shortest route to the grain if x = 2cm? How many routes of this length are there?
The shortest way is

$$S = (7 - x) + 7 + 7 + x = 21 \; cm.$$

The are two such ways.

(ii) Find an x for which there are four distinct shortest length routes to the grain.

For x= 3.5 cm there are 4 such ways.