Explaining regularities

http://topdrawer.aamt.edu.au/Patterns/Big-ideas/Mathematical-patterns-are-regular/Find-the-regularity

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Description

A person has left a track of footprints in the sand, forming a repeating left-right zig-zag pattern. The distance between successive footprints is approximately constant.

Explanation

The person was walking at a constant speed and not limping. A person's track of footprints can also be viewed as two separate, parallel tracks: one made by their right foot and one by their left foot. These two tracks are parallel because people's legs are a fixed distance apart. If the person is walking at a constant speed, the footprints in each track will also be equally spaced even if they are limping.

Description

The two sides of the ladder are the same length. The rungs of the ladder are also all the same length and are equally spaced.

Explanation

The two sides of the ladder are the same length so that it can stand upright. The rungs are all the same length[*] because the same person has to fit at different places on the ladder. The rungs are equally spaced because a person would expect to make equal steps up the ladder.

* In shorter ladders, the rungs are often made longer at the bottom than the top. This adds to the stability of the ladder.

Description

Jane was surprised that the teacher could not see the pattern in her drawing. She said:

"My pattern—can't you see it's a system? Circles, then stars, then wheels. The stars are in the wheels; the wheels are in the circles. I did them four times each, one thing at a time in eight different colours ($3 \times 4 \times 8$ colours). There must be the same number of circles, stars, wheels."