

Proportionality

I. The notion of one quantity being proportional to another is fundamental. For example, the distance travelled by a vehicle moving at constant speed is proportional to the time of the trip. In a sentence or two give a precise mathematical definition of ‘ y is proportional to x ’. Along the way you will naturally define the related notion, ‘constant of proportionality’. Give one further example of these notions. You might consider ‘scale’.

II. Recall that the diameter of a convex planar region is the length of the largest line across the region. In general, the area of region is proportional to the square of its diameter. Compute the constant of proportionality expressing this relation for various regions. Choices include a circle of radius a , a square with side length a , a rectangle with one side of length a and the other of length $4a$.

How do these computations connect with our previous discussion comparing the AGI and the average grain area methods of calculating crystal size.