

Answer the following questions on the sheet provided, showing all of your work for full credit. You must work independently of others, but you may refer to your notes, worksheet and homework assignments. This assessment assignment is due in Lab 1 1020 by 4:00 pm on Thursday Nov 3rd.

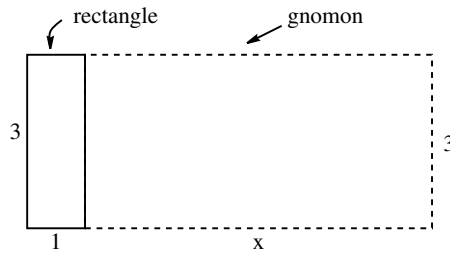
1. For the following sequences of numbers, describe them as arithmetic or geometric, write down both a recursive formula and a general formula for the n th term u_n , and give the formula for the n th partial sum s_n .

(a) 3, 7, 11, 15, ...

(b) 405, 135, 45, 15, ...

2. A measuring tape with a thickness of 1.5 mm, is coiled around rod with radius 2.0 cm. Find an expression for the radius of the roll of tape as a function of the number coils n . What type of spiral is this?
3. A snail shell grows in a spiral by accretion. If the radius of the shell increases by 10% (ie a factor of 1.1) every 30° find an expression for its radius as a function of angle θ , measured from a starting radius of 2 cm. What type of spiral is this?

4. The rectangle below grows isometrically by adding gnomons.



(a) What is the meaning of the term gnomon?

(b) One possible gnomon is shown. Find the dimensions of this gnomon and indicate the factor by which the area grows in each generation.

(c) Draw two other shapes that could be used as gnomons to this rectangle instead.

5. The following sequence of images illustrates how to form a fractal tower shape. The first figure is formed by taking an equilateral triangle with unit area and removing an equilateral triangle which is half its height (and hence one quarter the area). At each step the pattern is repeated in the triangle above the one that is removed. Find the area of the shaded area of each figure. Find the limit of the sequence formed. (Hint: It is easier to find the area of the white regions first.)

