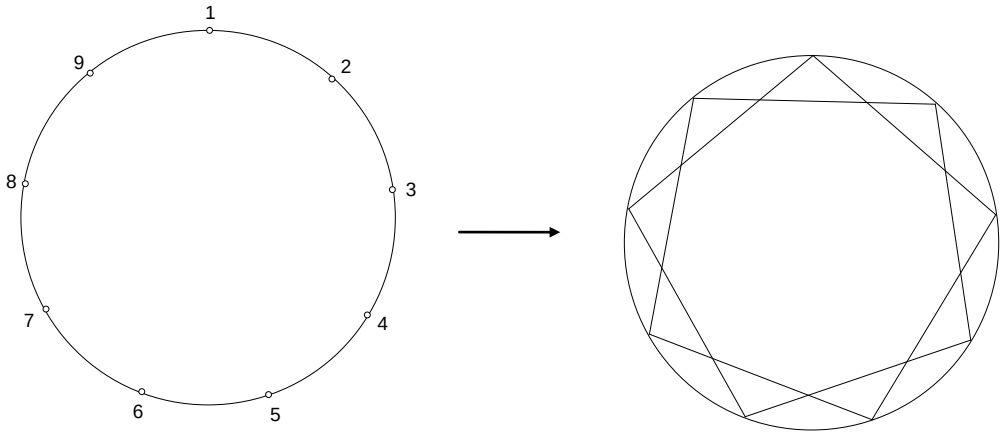
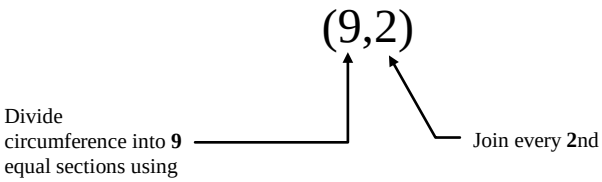
STAR POLYGONS

Star polygons are formed by marking equally spaced points around the circumference (outside) of a circle, and joining every second (or third or fourth etc.) point. Every circumference point must be joined according to the rule chosen. For example, we could divide a circle's circumference into 9 equal sections and join every second point as follows.



A convenient way to describe this star polygon is



1. Construct a large circle by drawing two semi−circles using Geo−Pro's protractor. Use the protractor divide the circle into 9 equal sections around the circumference. (Hint: mark points 40° apart.) Repeat for 2 more circles.

2. Sketch the following star polygons:
   (a) (9,3)
   (b) (9,4)
   (c) (9,5)
   (d) What do you notice?

3. What would (9,6) and (9,7) look like?

4. Why are (9,8) and (9,1) not true star polygons?

5. Investigate star polygons using 12 sections. How many degrees are between each section? Why is (12,6) unusual?

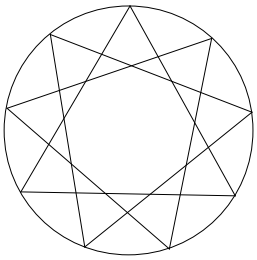
6. Sketch (5,2).

7. Colour some of your designs. You may wish to make a large version of one or more for display.

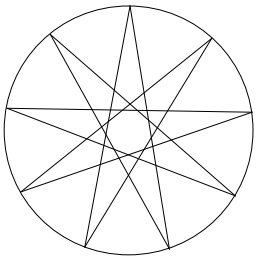
Answers

STAR POLYGONS

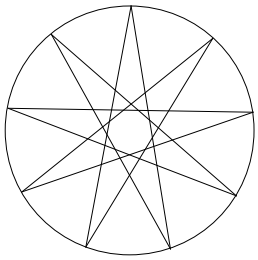
2. (a) (b) (c)



(9,3)



(9,4)



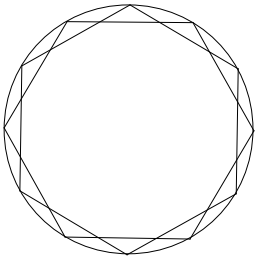
(9,5)

(d) (9,4) has sharper points than (9,3), which in turn has sharper points than (9,2). (9,5) is the same as (9,4).

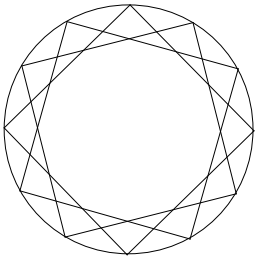
3. (9,6) is the same as (9,3). (9,7) is the same as (9,2).
In general, (*m*,*n*) is the same as (*m*,*m*–*n*).

4. (9,8) and (9,1) are simple nonagons (9 equal angles and sides).

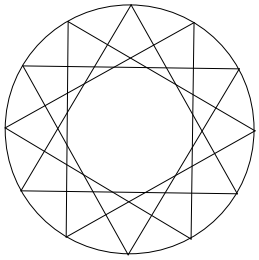
5. The star polygons of the form (12,*n*) are shown below.



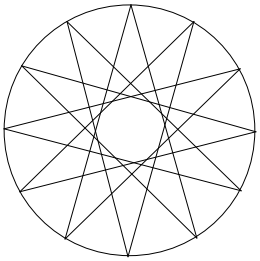
(12,2) and (12,10)



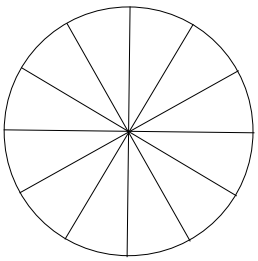
(12,3) and (12,9)



(12,4) and (12,8)



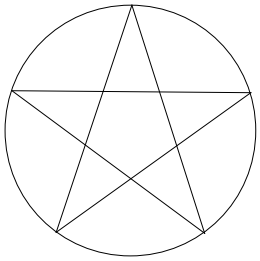
(12,5) and (12,7)



(12,6)

There are 30° between each section in star polygons of the form (12,*n*). (12,6) is an asterisk made of 6 straight lines passing through the centre.

6.



(5,2)