

Star Patterns

Star patterns are created by beginning at a point and connecting points at certain intervals until you arrive back to the beginning point.

n = total number of points in the circle

s = the interval or steps taken in drawing the star. (example: 2 means you draw a star connecting every other points, 3 connects every third point, and so on)

r = the number of revolutions taken to complete the star or to arrive back to the beginning point.

t = the number of points hit to complete the star.

Star Patterns 1

- On the circle worksheet have students draw the 11 stars with intervals 1 - 11.
- Fill in worksheet, Star Patterns 1, with the number of revolutions needed to complete the star and the number of point hit.
- Complete the bullets at the bottom of the worksheet
- Fill in worksheet, Star Patterns 2, using the patterns or rules discovered from the previous worksheet.

Star Patterns 2

- Have students determine a rule for the star patterns from the previous worksheet that created the same type of star. (The sum of the intervals equals the number of stars)
- Present this conjecture: If $s_1 + s_2 = n$, then star (n, s_1) will be the same as star (n, s_2)
- Students test this conjecture for stars $(9, 2)$ and $(9, 7)$

Star Patterns 3

- Have students compare star $(12, 5)$ and star $(12, 4)$. Discuss differences $(12, 5)$ hit every point and $(12, 4)$ did not.
- On sheet Number of Points $n = 12$ have students recreate star $(12, 4)$. After first triangle is drawn, begin at another point not hit and draw that pattern. Continue until all points have been hit. Determine number of paths needed to hit every point. (4)
- Continue this process for star $(12, 2)$, $(12, 3)$, $(12, 6)$, and $(12, 8)$. How many paths were needed to hit every point? (The greatest common factor)

Star Patterns 4

- From worksheet "Star Patterns 1" have students find the product of the number of revolutions and the total number of points ($n * r$) Compare these numbers to (n, s) and determine a relationship. ($n * r$ is the least common multiple of (n, s))
- Test this conjecture with worksheet "Number of points $n = 8$ " Use star $(8, 4)$, $(8, 3)$, $(8, 6)$ and $(8, 2)$

Name _____

STAR PATTERNS 1

s	n	r	t
Interval of points (steps)	Total number of points	Number of revolutions	Number of points hit
1	12		
2	12		
3	12		
4	12		
5	12		
6	12		
7	12		
8	12		
9	12		
10	12		
11	12		

- ♦ Look for patterns. What pattern do you see when you compare the first two columns with the last two columns?
- ♦ Write an equation so that you get columns 1, 3, and 4, to equal column 2.
- ♦ List any other patterns that you see.

Name _____

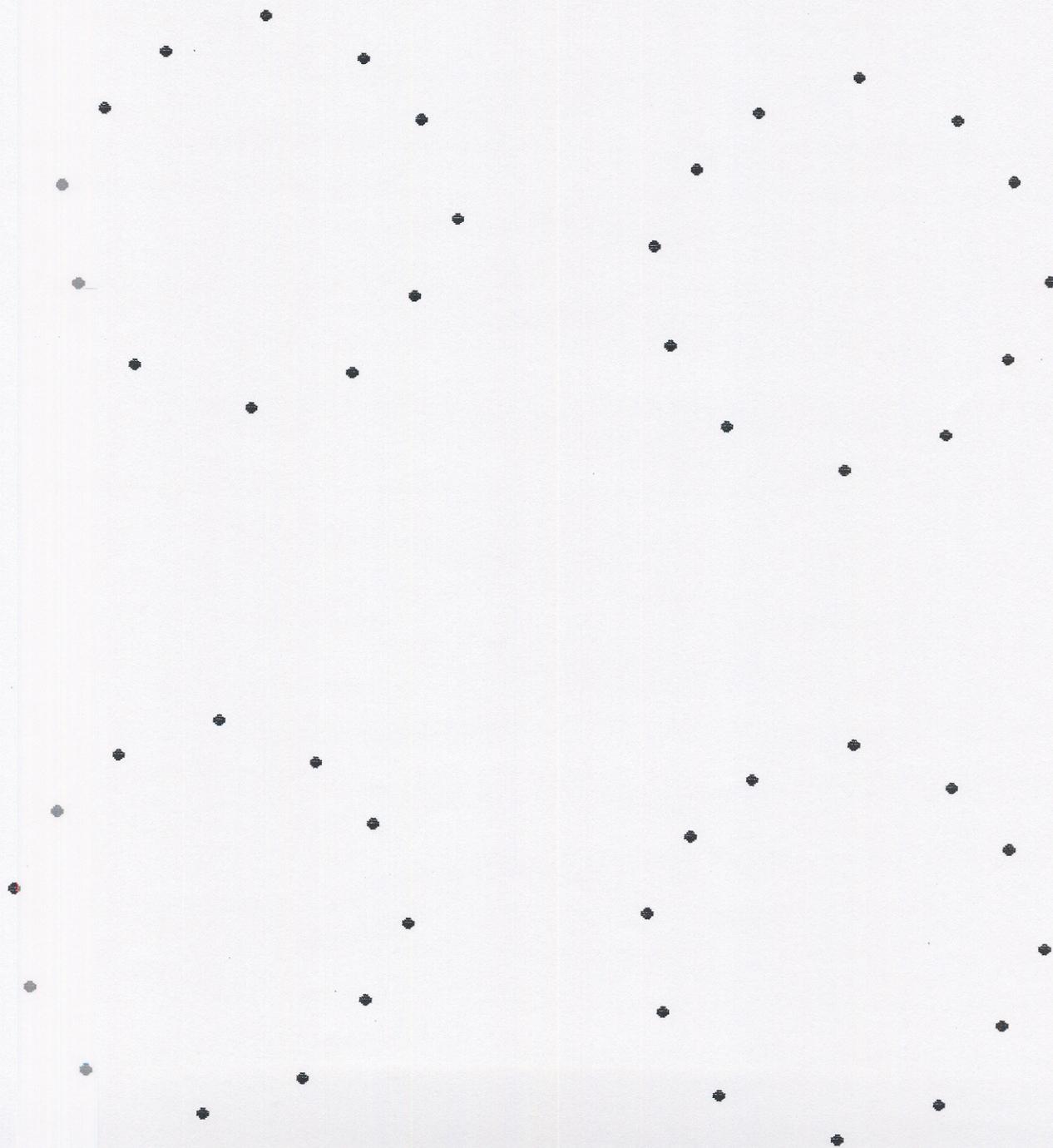
STAR PATTERNS 2

From what you learned from the first exercise, fill in the last two columns.

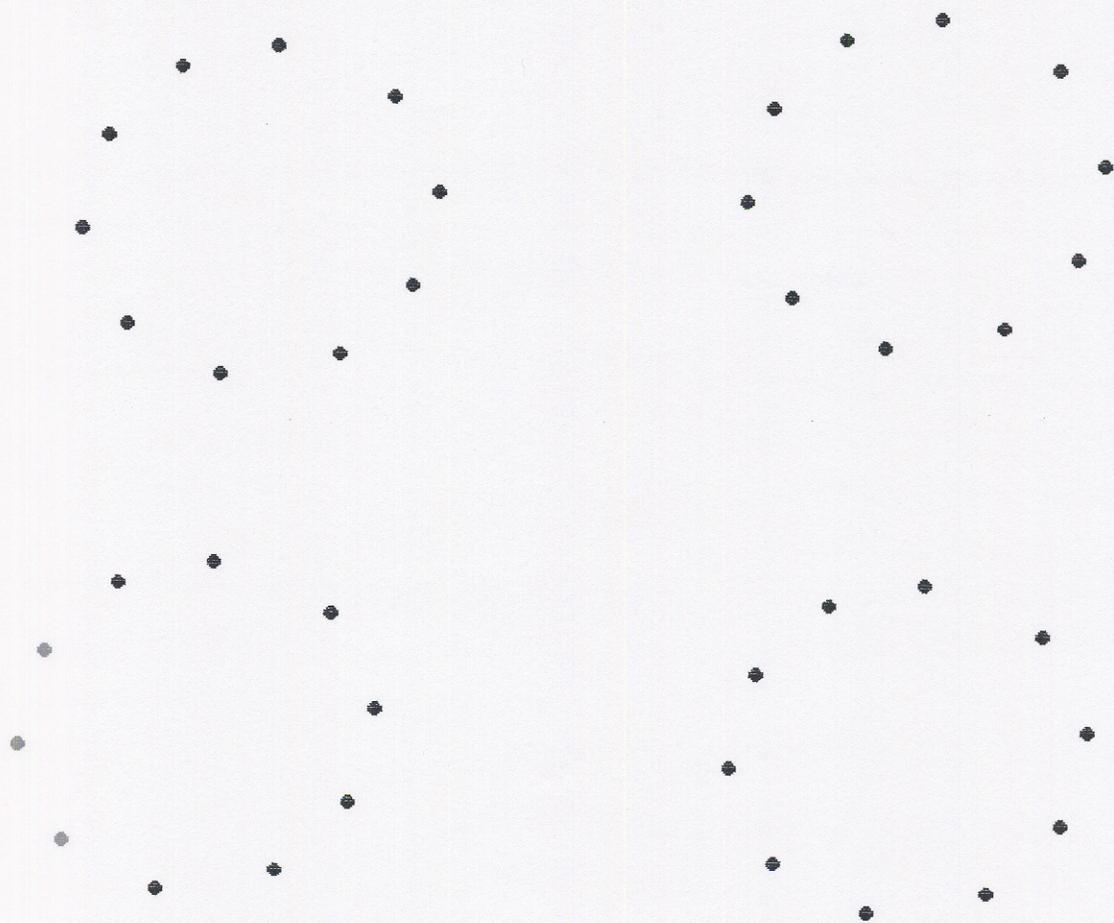
s	n	r	t
Interval of points (steps)	Total number of points	Number of revolutions	Number of points hit
1	24		
2	24		
3	24		
4	24		
5	24		
6	24		
7	24		
8	24		
9	24		
10	24		
11	24		
12	24		
13	24		
14	24		
15	24		
16	24		
17	24		
18	24		
19	24		
20	24		
21	24		
22	24		
23	24		

Number of Points

$n = 12$



Number of Points $n = 9$



Number of Points $n = 8$

