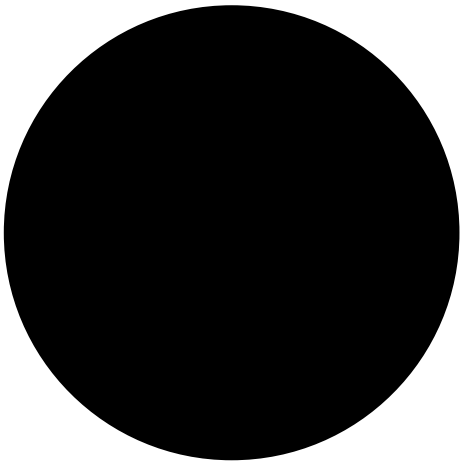
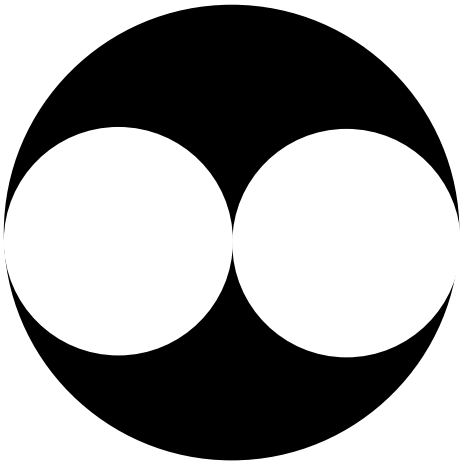
Circle Pattern

Here is a developing circle pattern.

Here is one black circle.



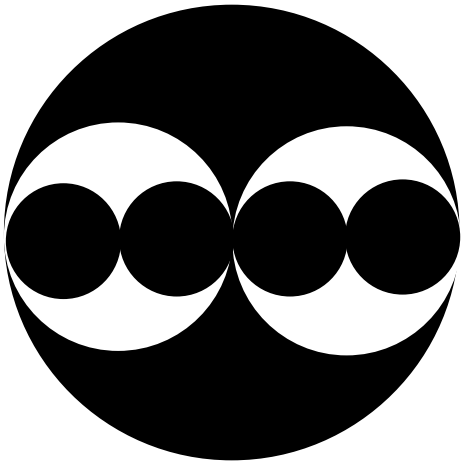
Two white circles of half the radius have been added to the diagram.



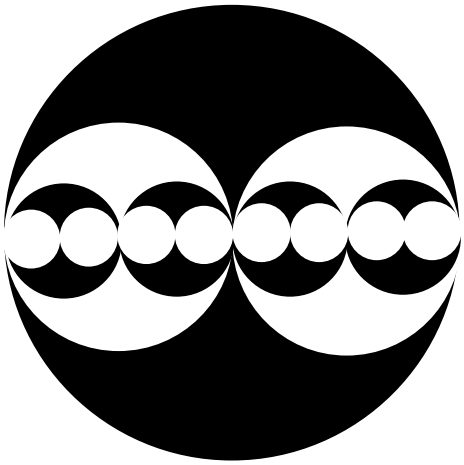
1. Show that the fraction of the diagram that is now black is one half.

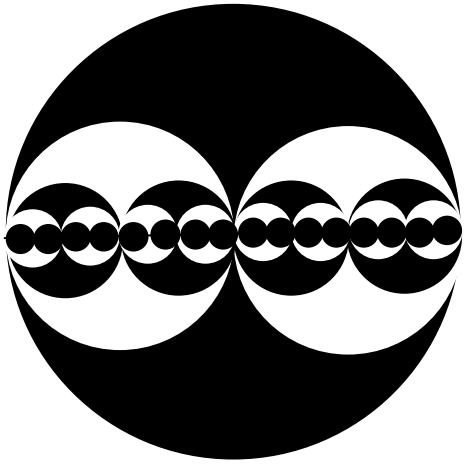
Four black circles have now been added.

2. What fraction of the diagram is now black?



3. Fill in the table to show what happens as the pattern continues.





Pattern	**Black fraction**	**White fraction**
One black circle	1	0
Two white circles	$\frac{1}{2}$	$\frac{1}{2}$
Four black circles		
Eight white circles		
Sixteen black circles		

4. Write a description of what is happening to the black and white fractions as the pattern continues.

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Circle Pattern	Rubric	
	Points	Section points
1. Gives correct explanation such as: Let radius white circle be r, then area = πr^2 Radius black circle is 2r, then area = 4 πr^2 Area of two white circles is 2 πr^2 *Partial credit* May use numbers rather than variables	2 (1)	2
2. Gives correct answer: **3/4**	2	2
3. Gives correct answers: **3/4, 1/4, 5/8, 3/8, 11/16, 5/16** *Partial credit* 4 correct two points 3 correct two points 2 correct one point	4 (3) (2) (1)	4
4. Gives correct explanation such as: Each time a half of the previous fraction is added or subtracted from the black fraction. (The limit of the black fraction is 2/3.) *Partial credit* For a partially correct explanation that either addresses change by half or the oscillating adding or subtracting.	2 (1)	2
Total Points		**10**