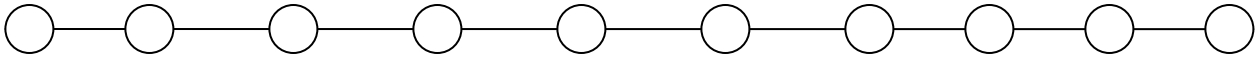
Point counts are a tool that Ornithologists use to estimate bird populations in an area. They do this by setting up transect lines in a study area that have pre-determined plots or "points" along them (see diagram). The transect line is an imaginary line that follows a constant compass bearing within the study area. Each point along the transect line has a known area; usually the radius of each circular plot is 50 meters. The points are at least 250 meters apart and there are 10 points along each transect line.



Once the transect line has been established the next step for the Ornithologist is to visit each point along the transect line to record the number of birds that he/she hears and sees. The time limit at each point is 10 minutes. After 10 minutes, the Ornithologist moves on to the next point until all 10 have been completed. The information collected during the point counts can be used to make population estimates for bird species in the study area. Let's try an example.

The table below represents sample data was collected during point counts in a forest that has an area of 100,000 m^2. The radius of each plot is 50 meters.

Point #	Northern Cardinals	Carolina Wrens	Tufted Titmouse	Eastern Towhees
1	0	2	2	0
2	4	2	0	0
3	1	1	0	0
4	0	4	0	0
5	2	0	0	0
6	3	6	1	0
7	2	1	1	0
8	0	0	2	1
9	1	0	1	2
10	2	2	0	1
Total				
Average per point				

Use the data for each bird species in the table above to calculate their estimated population. To do this you must first find the average number of birds per point. We also need to know the area of each point/plot (***Hint: How do you calculate the area of a circle?***). Since we know the area of the forest 100,000 m^2, then we can set up a proportion to estimate the population of each bird species within the forest. Use the following equation to estimate the population of each bird species.

$$\frac{\text{Average \# of birds per plot}}{\text{Area of each plot}} = \frac{\text{X}}{100{,}000\text{m}^2}$$

Show your work on the back.

Standard
SCSh5.e: Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.