

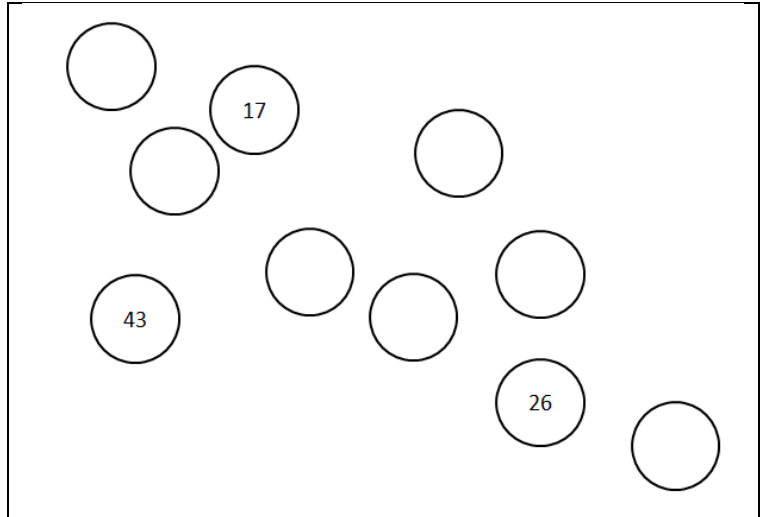
Exploring the World of Math

Name: _____ Date: _____

Population Density

- Tracy counts 3256 penguins in a square kilometer on this coastline of the Antarctica. On the 87 km long coastline the dense population stays no more than 2 kilometers from the shoreline. Estimate the number of penguins in this region.

- Francine counts the parrots in her preserve. She has multiple islands that are approximately 2.5 square km each. She counted parrots in three areas. What is the estimated number of parrots in the preserve?



Inbreeding Effective Size

- N_{ef} is the Inbreeding Effective Size and in formula t is the number of generations. N_0 is the number in the initial population. N_1 is the amount in the next generation and so on.

$$N_{ef} = \frac{t}{\frac{1}{N_0} + \frac{1}{N_1} + \frac{1}{N_2} + \dots + \frac{1}{N_{(t-1)}}$$

In the table, we can see the population of the reptiles over a period of time.

Year	Population
2006	99
2007	201
2008	89
2009	33
2010	161

Calculate the Inbreeding Effective Size for the reptile using the population in the chart.

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4. N_{ef} is the Inbreeding Effective Size and in formula t is the number of generations. N_0 is the number in the initial population. N_1 is the amount in the next generation and so on.

$$N_{ef} = \frac{t}{\frac{1}{N_0} + \frac{1}{N_1} + \frac{1}{N_2} + \dots + \frac{1}{N(t-1)}}$$

In the table, we can see the population of the reptiles over a period of time.

Year	Adult Population	Adult Females	Adult Males	Corrected Population
2006	121	80	41	
2007	37	22	15	
2008	35	18	17	
2009	39	26	13	
2010	36	22	14	
2011	40	24	16	
2012	33	23	10	

Calculate the Inbreeding Effective Size for the reptile using the population in the chart.

We can apply the sex ratio to the data $N_e = (4N_m N_f) \div (N_m + N_f)$ of the above table.

Example: $N_e(2006) = (4 \times 41 \times 80) \div (41 + 80) = 13120 \div 121 = 108.4298$

5. Calculate the corrected population for 2007 to 2012