Introduction

In the 19ᵗʰ Century settlers from Europe came in droves to this "new wonderful land," Australia. The settlers brought with them many customs from home. One of those customs was rabbit hunting; but "unfortunately," Australia did not have any native rabbit species. So in 1859, a European land owner named Thomas Austin imported twenty-four wild rabbits from England and released them onto his land outside the town of Winchelsea, Victoria. With few rabbit predators and diseases, the rabbits reproduced prolifically. Within only thirty years, the original twenty-four rabbits had reproduced exponentially to millions and inhabited the states of Victoria, New South Wales, and portions of Queensland and South Australia. Large areas of once relatively fertile landscapes were soon transformed into dry areas that became increasingly prone to topsoil loss and drought. In subsequent decades and throughout the majority of the 20ᵗʰ Century, rabbits have migrated to all corners of Australia and now inhabit even the most unlikely areas.

Materials
- Colored Pencils
- Calculator

Procedure

{10,2} 1.   For years biologists have collected data on the rabbit migration in Australia. Table 1 below shows rabbit migration data for the first 10 years from 1859-1868. Use the data from the table to fill in the Rabbit Migration Map (-1 for each mistake/ omission). Be sure to **use a different colored pencil** for each of the years. **Each square on the map represents 1 square mile**.

Table 1

Year	New Rabbit Migration Areas	Pencil Color (Your Choice)
1859	K-11	
1860	J-10, J-11, J-12, K-10, K-12, L-11, L-12	
1861	I-9, I-10, I-11, I-12, I-13, J-9, J-13, K9, K13, L13, M11, M12, M13	
1862	H-8, H-9, H-10, H11, H12, H13, H14, I-8, I-14, J-8, J-14, K-8, K-14, L-14, M-14, N-10, N-11, N-12, N-13, N-14	
1863	G-7, G-8, G-9, G-10, G-11, G-12, G-13, G-14, G-15, H-7, H-15, I-7, I-15, J-7, J-15, K-7, K-15, L-7, L-15, M-15, N-15, O-9, O-10, O-11, O-12, O-13, O-14, O-15	
1864	F-6, F-7, F-8, F-13, F-14, G-6, G-16, H-6, H-16, I-6, I-16, J-6, J-16, K-6, K-16, L-6, L-16, M-16, N-16, O-16, P-6, P-7, P-8, P-9, P-10, P-11, P-12, P-13, P-14, P-15, P-16	
1865	E-5, E-6, E-7. E-8, E-12, E-13, E-14, F-5, G-5, G-17, H-5, H-17, I-5, I-17, J-5, J-17, K-5, K-17, L-5, L-17, M-5, M-17, N-17, O-17, P-5, P-17 Q-5, Q-7, Q-8, Q-9, Q-15, Q-16, Q-17	
1866	D-4, D-5, D-6, D-7, D-8, D-9, E-4, F-4, G-4, G-18, H-4, H-18, I-4, I-18, J-4, J-18, K-4, K-18, L-4, L-18, M-4, M-18, N-4, N-18, O-18, P-4, P-18, Q-4, Q-18, R-4, R-5, R-6, R-7, R-8, R-15, R-16, R-17, R-18	
1867	C-3, C-4, C-5, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, D-3, E-3, F-3, G-3, G-19, H-3, H-19, I-3, I-19, J-3, J-19, K-3, K-19, L-3, L-19, M-3, M-19, N-3, N-19, O-19, P-19, Q-3, Q-19, R-3, R-19, S-3, S-4, S-5, S-6, S-7, S-8, S-14, S-15, S-16, S-17, S-18, S-19	
1868	B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, B-10, B-11, B-12, B-13, B-14, C-2, D-2, E-2, F-2, G-2, G-20, H-2, H-20, I-2, I-20, J-2, J-20, K-2, K-20, L-2, L-20, M-2, M-20, N-2, O-2, O-20, P-2, P-20, Q-2, Q-20, R-2, R-20, S-2, S-20, T-2, T-3, T-4, T-5, T-6, T-7, T-8, T-9, T-13, T-14, T-15, T-16, T-17, T-18, T-19, T-20	

{4} 2. Complete Table 2 at the right by totaling the number of areas the rabbits entered each year.
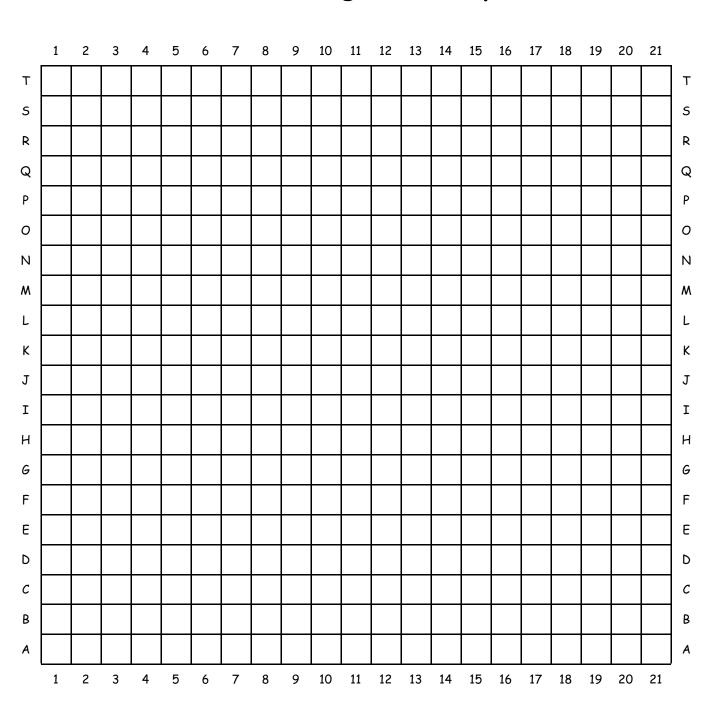
Analysis

{1} 1. How many <u>new</u> square miles did the rabbits take over in 1860? _____

{1} 2. By the end of 1861, how many square miles were rabbit infested? _____

{1} 3. How many <u>new</u> square miles did the rabbits take over in 1863? _____

{2} 4. Assuming each square mile has 46 rabbits, how many rabbits were there in Australia by 1863? _____

{3} 5. List several factors (3) in the environment that had to be present in order for the rabbits to continue to spread out into new areas.
_____
_____

{3} 6. List some possible reasons (3) why there are no rabbits in some areas on the map.
_____
_____

Table 2

Year	Number of New Rabbit Migration Areas	Running Total of Rabbit Migration areas
1859		
1860		
1861		
1862		
1863		
1864		
1865		
1866		
1867		
1868		

Since the introduction of rabbits to Australia, the surrounding wildlife has been greatly affected including farm livestock populations. It was estimated in 1936 that the extermination of the rabbit population in New South Wales would liberate enough land to accommodate twelve to twenty million more sheep. In addition to effects on livestock, adverse effects were also placed upon other traditional prey species. Soon after the introduction of rabbits, Australian authorities realized they had a problem, so they introduced European foxes into the environment. The authorities thought that since foxes naturally prey on rabbits, they would be the perfect solution to the rabbit problem. However, the foxes seemed to take advantage of their relatively exotic surroundings and turned their attention to easier caught prey including rare ground birds, indigenous marsupials, and rodents. The only remaining semi-natural enemy of the rabbit population in Australia is now the dingo. However, in the early 20th Century, dingos were frequently slaughtered due to their aggressive carnivorous habits toward farmers' livestock. Without a traditional predator/prey environment, the rabbits were left to an uninhabited lifestyle.

In the last 150 years, Australia has tried many methods to halt the spreading rabbit population. The legislature even passed laws that, among other things, required land owners to trap, poison or kill rabbits on their property. Because of the enormous numbers of rabbits, every attempt to cut down the rabbit population was doomed to failure. After World War II Australia declared war on the rabbits and released a deadly virus that was 99.8% effective at killing them. At last Australians thought they had discovered the "magic bullet." However, the .2% of the rabbit population that survived was immune to the virus. As the immune rabbits reproduced, they passed on this immunity to their offspring, and the new immune rabbit population has ballooned into the millions. It seems that Australians are destined to live with millions of rabbits for quite some time.

{2} 7. Why was introducing foxes ineffective at quelling the rapidly-growing rabbit population?
_____
_____

{2} 8. Why did the anti-rabbit virus seem to be an answer to Australia's rabbit problem?
_____
_____

{2} 9. Why didn't it work?
_____
_____

{2} 10. What could be the potential harm of people releasing their unwanted pets into the environment?
_____
_____

Rabbit Migration Map