Is There a Relationship Between Two Variables?

Researchers were interested in attack of a plant by one organism induced resistance to subsequent attack by a different organism. Individually potted cotton plants were randomly allocated to two groups: infestation by spider mites or no infestation. After two weeks the mites were dutifully removed by a conscientious research assistant, and both groups were inoculated with Verticillium, a fungus that causes Wilt disease. The accompanying table shows the number of plants that developed symptoms of Wilt disease.

	Mites	No Mites	Total
Wilt disease	11	17	28
No Wilt disease	15	4	19
Total	26	21	47

1.   Is there a relationship between infestation and Wilt disease?

2.   Here, what do you think is the explanatory variable?

        The response variable?

3.   What is the risk of not developing Wilt disease, for the mites group?

4.   What is the risk of not developing Wilt disease, for the no mites group?

5.   What is the relative risk of not developing Wilt disease, comparing mites to no mites?

6.   If there were no association between mites and Wilt disease, what would the relative risk be?

7.   Let X be the number of plants in the mites group that did not develop Wilt disease. In terms of X, what would be a more extreme result? X =

        What would another extreme result be X =

8.   Creating a Physical Simulation:

Using a deck a playing cards, define the red cards to be the plants with mites and the black cards to be the plants without mites. You will need 26 black cards to represent the mites and 21 red cards to represent the no mites.

> Sampling Process:
> a.   Select 47 cards from a standard 52 card deck, 26 black cards (mites) and 21 red cards (no mites)
> b.   Shuffle the cards well.
> c.   Deal out 19 cards, and count the number of black cards (number of plants with mites that did not have Wilt disease)
> d.   Repeat steps b-c three more times
> e.   When you are done, add your results to the dot plot on the class computer

Your results

X1=	X2=	X3=	X4=

9.   From looking at the dot plot, describe what you observe about the distribution.

How often was the number of black cards as large or larger than the 15 cases that were originally observed?

What proportion of the trials did an extreme event occur?

10.   Creating a Computer Simulation

How can we use Fathom to get a more accurate estimate of the proportion of random assignments that put 15 or more "no Wilt disease" into the mites group?