

# MATHEMATICS WITH DR ZACH BOYD

## TALKING POINTS

### KNOWLEDGE & COMPREHENSION:

1. What is a network?
2. Give three examples of networks, other than those mentioned in the article.
3. What is a supply chain network?

### APPLICATION:

4. What data would you need to make a mathematical model of a supply chain network more realistic?
5. How do you think Zach studies the role of social support and applies his mathematical skills to understand how people recover from bad habits?

### ANALYSIS:

6. In Zach's pencil-making supply chain network, what might happen to PencilCo's production of pencils if the ChemCo factory shuts down?
7. If a fire destroys a large semiconductor factory, how might this trigger a cascading failure through a supply chain network? (semiconductors are crucial components in all electronic devices)
8. What are the weaknesses of the usual methods used by mathematicians and supply chain practitioners to assess the resilience of a supply chain?

### SYNTHESIS

9. When the *Ever Given* blocked the Suez Canal in March 2021, how did a single ship disrupt global trade? In what ways do you think supply chain networks may have been impacted by the blockage of this key trade route?
10. What similarities and differences do you think exist between the causes and consequences of supply chain disruption resulting from the *Ever Given* and the COVID-19 pandemic?
11. What actions do you think companies could take to increase the resilience of their supply chain networks?

### EVALUATION

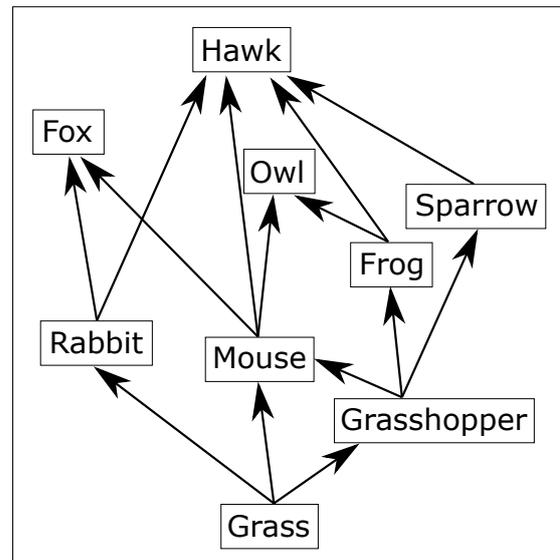
12. To what extent do you agree that maths will be essential over the coming years as humanity deals with the consequences of climate change? How could maths be used to analyse and address the climate emergency? What other societal problems could maths provide solutions for?

## ACTIVITIES

### NATURE'S NETWORKS

Networks are everywhere in the natural world, from the neural network in your brain to the social networks of primates. Food webs are another example. Look at the diagram below and answer the following questions:

- a) How would the network be affected if foxes became extinct?
- b) How would the network be affected if hawks became extinct?
- c) How would the network be affected if mice became extinct?
- d) How would the network be affected if owls stopped eating frogs?



### CLASSROOM SUPPLY CHAINS

Zach explained the concept of a supply chain network using the example of PencilCo and its suppliers. Choose a different item found in your classroom or at home and construct the hypothetical supply chain network needed to produce it.

Consider all the different materials needed to produce your item. Do these materials require production as well? Do any of these companies need to use your item in their production process? Draw your network as a web, showing how each company is related to the others.

Can you link your supply chain network to any of your classmates' networks?