

Outbreak at Seaview Secondary

Simulation: edtechsims.com/disease-outbreak

Name: _____ Class: _____ Date: _____



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Part A: The Investigation

On the sim: Students at Seaview Secondary are falling ill with flu and pneumonia, and the Health Ministry has called in your Rapid Response Team. Clear stations to collect evidence. The Final Case Report unlocks after 6 of the 9 stations.

A1 Record your progress. For each station you clear, note one misconception it warned you about.

Station	Cleared (✓)	Misconception I learned about
Infectious or Not?		
Build-a-Pathogen		
Friend or Foe?		
The Clinic		
Outbreak Simulator		
Second Encounter		
Antibiotic Lab		
The Prescription Desk		
Superbug Evolution		

A2 Record your final results.

Final time	Wrong answers	Hints used

Part B: Station Practice

The game's questions change every time. Use these questions to practise the same skills.

B1 Infectious or Not?

Classify each disease as infectious (I) or non-infectious (N).

[4]

Disease	I / N	Disease	I / N
Influenza		Type 2 diabetes	
Pneumococcal pneumonia		Lung cancer	
Tuberculosis		Scurvy (vitamin C deficiency)	
COVID-19		Sickle-cell anaemia	

B2 Build-a-Pathogen

Complete Table 1 to compare a virus with a bacterium.

[5]

Feature	Virus	Bacterium
Relative size		
Genetic material		
Has a cell wall?		
Can reproduce on its own?		
Killed by antibiotics?		

Table 1

B3 Friend or Foe?

Give one example of a bacterium that causes disease and one that is generally helpful to humans, and explain its role.

[2]

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B4 The Clinic

(a) State two ways in which influenza differs from a common cold.

[2]

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(b) Name two diseases, other than pneumonia, that can be caused by the pneumococcus bacterium.

[2]

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B5 Outbreak Simulator

(a) Describe two ways in which influenza spreads from person to person.

[2]

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(b) Suggest three measures the school could take, and explain why using only one measure may not stop the outbreak.

[4]

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B6 Second Encounter

Fig. 1 shows the antibody concentration in a student's blood after vaccination and after later exposure to the real pathogen.

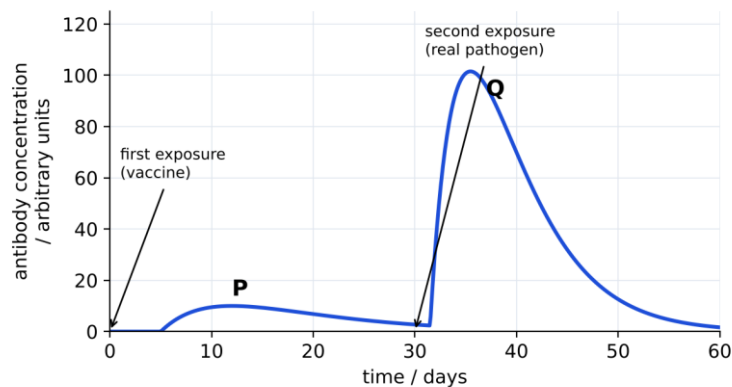


Fig. 1

(a) Describe two differences between response P and response Q.

[2]

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(b) Explain why the student does not become ill after the second exposure.

[2]

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(c) A classmate says the vaccine contains the live, dangerous pathogen. Correct this statement.

[1]

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B7 Antibiotic Lab

Discs soaked in four antibiotics, A to D, were placed on a dish of bacteria. After incubation, a clear zone formed around some discs (Fig. 2).

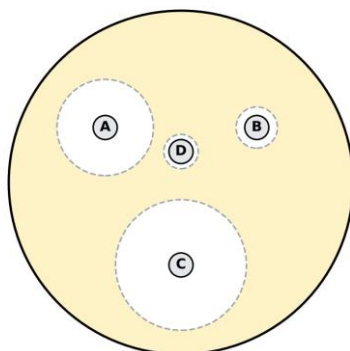


Fig. 2

Antibiotic	Diameter of clear zone / mm	Antibiotic	Diameter of clear zone / mm
A	25	B	11
C	34	D	0 (no clear zone)

(a) Which antibiotic is most effective against these bacteria? Explain. [2]

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(b) Suggest why there is no clear zone around disc D. [1]

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(c) The experiment is repeated with influenza viruses instead of bacteria. Predict and explain the result. [2]

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B8 The Prescription Desk

Decide whether each patient should be given antibiotics. [3]

Patient	Antibiotics?	Reason
Mei, 15: runny nose, sore throat, mild cough for 2 days		
Mr Tan, 72: high fever, chest pain, coughing up thick mucus; tests show <i>Streptococcus pneumoniae</i>		
Arif, 16: sudden high fever, aching muscles, extreme tiredness; tests show influenza virus		

Explain why Mr Tan must finish the whole course of antibiotics, even when he feels better. [2]

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B9 Superbug Evolution

Number the stages in the development of an antibiotic-resistant population of bacteria from 1 to 5. [3]

Stage	Order
The antibiotic kills the non-resistant bacteria	
A random mutation makes one bacterium resistant	
The whole population is now resistant	
The antibiotic is used to treat an infection	
Resistant bacteria survive and reproduce, passing on the resistance gene	

A patient says, "I have taken so many antibiotics that my body is now resistant to them." Correct this statement. [2]

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Part C: The Final Case Report

Present your findings on the Seaview outbreak to the Principal.

1. Identify the two pathogens causing the outbreak, and state whether each is a virus or a bacterium. [2]

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2. State how each pathogen is transmitted. [2]

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3. Recommend three interventions to the Principal. [3]

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4. Explain why antibiotics will help the students hospitalised with pneumonia but not those with flu. [2]

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Part D: Practice Questions

D1 Define the term pathogen. [1]

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D2 Explain why doctors are concerned about the overuse of antibiotics. [3]

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D3 Explain why a new flu vaccine is needed every year. [2]

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