B1 Cells

B1.8 Microorganisms

What are microorganisms?

274 Define *microorganism*.

275 A student writes: 'A microorganism is something we can view using a magnifying glass.' Correct their answer.

276 Define *unicellular*.

277 Which part of the microscope helps us to adjust the light shining on the slide?

278 A student says: 'All microorganisms are unicellular.' Explain why they are wrong.

279 Give two examples of microorganisms.

280 A microorganism is 0.056 cm in length. What is its length in mm?

281 A student says: 'All microorganisms are harmful to humans.' Explain why they are wrong.

282 Why is a sperm cell not a microorganism?

283 Name the six sub-cellular structures found in a yeast cell.

How do microorganisms grow?

284 Which factor affecting the growth of microorganisms has been altered when food is vacuum-packed?

285 A student writes: 'When bacteria grow, they get bigger.' Find and fix the mistake in their answer.

286 A scientist is growing bacteria on three Petri dishes. She uses nutrient agar that has a different pH in each Petri dish. She counted the number of colonies that had grown on the dishes after 72 hours. Her results are shown below:

Petri dish	Number of colonies
Low pH	50
Neutral pH	12
High pH	4

a In this experiment, what is meant by the term *colonies*?

b Which pH is the optimum for the bacteria grown by the scientist?

c Explain your answer to b.

d pH is one factor affecting the growth of microorganisms. Name three other factors that affect the growth of microorganisms.

287 Why do most bacteria struggle to survive in a vinegar solution or lemon juice?

288 The amount of air reduces as you go up a mountain. Why would food last longer at the top of a mountain compared with at the bottom?

289 Food poisoning is caused by certain bacteria. Why does cooking meat to a high temperature help prevent food poisoning?

290 Why do doctors store some medicines in tightly sealed bottles?

291 Why do canned foods stay safe to eat for a long time, even without putting them in a fridge?

292 A chef accidentally leaves rice out on the kitchen counter overnight. What factor causes the rice to spoil more quickly?

293 Why do some bacteria, like those in yoghurt, survive in an acidic environment, while others do not?

294 If you were designing a way to preserve fruit for a long journey, which factors would you focus on controlling, and why?

295 Why do some bacteria thrive in hot springs, while other bacteria would die in the same environment?

296 When people pickle vegetables, they often add vinegar. What does the vinegar do to stop microorganisms from growing?

297 A food company wants to develop a new method to preserve vegetables without freezing them. Which conditions would they need to change to stop bacteria from growing?

How do we grow microorganisms?

298 What is *nutrient agar*?

299 Why is nutrient agar used in Petri dishes for growing microorganisms?

300 Why do we use a Petri dish to grow microorganisms like bacteria?

301 What temperature do we use to grow microorganisms in schools, and why?

302 Why do we use tape to secure the lid of the Petri dish, and why is it left slightly loose?

303 What is the purpose of an incubator when growing microorganisms?

304 What is meant by *sterilised* when preparing a Petri dish?

305 Explain why it is important to keep the temperature constant when growing bacteria.

306 Why is it dangerous to grow microorganisms at a temperature higher than 25°C?

307 If a scientist used a different food source instead of nutrient agar, how might it affect microorganism growth?

308 Imagine that a scientist accidentally incubated microorganisms at 35°C. How might this affect the microorganisms in the Petri dish, and why would it be risky?

What is the body's first line of defence?

309 Define *antibody*.

310 Define *antigen*.

311 'A pathogen is a microorganism that can either help or harm people.' Correct this statement.

312 Name the body's physical defences against pathogens.

313 Name the body's chemical defences against pathogens.

314 A pathogen enters a person's nose. How does their body stop the pathogen from getting into their lungs?

315 A child falls and cuts the skin on their leg. Explain why this cut should be cleaned and covered.

316 Another child is playing in some mud. They rub their eyes with their muddy hands. How do the child's eyes protect them from pathogens in the mud?

317 A student says that antibodies for influenza, which is caused by a virus, can work for the common cold, which is caused by a different virus. Explain, in terms of antigens, why the student is wrong.

318 Explain how white blood cells protect humans from pathogens.

319 A person is warming up leftover food but does not heat it fully. There may be pathogens in the food. The person eats the food and does not become ill. How did the body's defences protect them from pathogens in the food?

320 How do antibodies work to help white blood cells kill pathogens?

How do vaccines work?

321 Why do vaccines contain dead or inactive pathogens rather than live pathogens?

322 In terms of the number of antibodies, compare how many are produced after a vaccine against a pathogen and after an infection of the same pathogen years later.

323 What do white blood cells do to the dead pathogens in a vaccine?

324 What are *antibodies*?

325 Why is it important for a vaccine to contain antigens?

326 What happens to the pathogen if most people in a population are vaccinated?

327 A student says that antibodies produced following a vaccination last longer than those made after a real infection years later. Explain why they are wrong.

328 Why are only a small number of antibodies produced initially after vaccination?

329 A student says that if most people in a population are vaccinated, the disease will completely disappear forever. Explain why this might not be true.

330 Why is it important for antibodies to be produced quickly when exposed to the real pathogen?

331 What would happen to the population if herd immunity was lost?

332 Why does vaccinating only a few people not provide herd immunity?

333 Why might a person who was vaccinated many years ago still be protected today?