*Biology for a Changing World 2e,* Chapter 14 Test Bank

1. *Staphylococcus aureus* is a type of

1. pathogenic spore.
2. virus.
3. bacteria.
4. fungi.
5. pathogenic fungi.

Answer: C

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial transmission and *Staphylococcus aureus*

2. *Staphylococcus aureus* can cause

1. boils.
2. sores.
3. pimples.
4. death.
5. All of the above.

Answer: E

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial transmission and *Staphylococcus aureus*

3. MRSA can be contracted by

1. skin-to-skin contact.
2. contact with open wounds.
3. contact with contaminated surfaces.
4. contact with contaminated soap and towels.
5. All of the above.

Answer: E

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial transmission and *Staphylococcus aureus*

4. MRSA is caused by

1. *Streptococcus aureus*.
2. a drug-resistant form of *S. aureus.*
3. *S. aureus* USA300.
4. a drug-resistant form of a virus.
5. a drug-resistant form of *Methicillin aureus.*

Answer: B

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial transmission and *Staphylococcus aureus*

5. Which of the following is NOT a possible way of transmitting a *Staphylococcus aureus* infection?

1. sharing towels
2. skin-to-skin contact
3. contact sports
4. inhalation
5. All of the above ARE possible methods.

Answer: E

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important Words/Concepts: transmission

6. What percentage of people carry ANY form of *Staphylococcus aureus* on their skin or in their noses?

A. 1%–5%

B. 5%–10%

C. 10%–25%

D. 30%–40%

E. 50%–60%

Answer: D

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Hard

Important Words/Concepts:*Staphylococcus aureus*

7. What percentage of people carry antibiotic resistant strains of *Staphylococcus aureus* on their skin or in their noses?

A. about 1%

B. about 5%

C. about 10%

D. about 12%

E. about 30%

Answer: A

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Hard

Important Words/Concepts:*Staphylococcus aureus*

8. Explain ways in which you could acquire any *Staphylococcus aureus* infection (not necessarily MRSA) at the gym.

*Answer:* Since many people naturally carry *Staphylococcus aureus*, they can easily transfer it to you from things that they touch, like towels, gym equipment, handles, or by touching you directly. If they had *Staphylococcus aureus* in their nose, the bacteria could be volatilized in a sneeze and inhaled.

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Hard

Important Words/Concepts: infection routes

9. Discuss two possible entry routes for a *Staphylococcus aureus* infection.

*Answer: Staphylococcus aureus* can infect a healthy person through any opening that allows direct contact with the bloodstream, such as an open wound, a cut or scrape, or a tear in the skin (including small tears such as those that may occur during intercourse). *Staphylococcus aureus* can also infect a person through the respiratory system, through inhalation.

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Hard

Important Words/Concepts: infection routes

10.A student who shares a dorm suite and bathroom with seven other students has contracted a skin infection caused by MRSA. Based on what you know about MRSA and about the student, where would you look first for the source of the bacteria?

A. contaminated equipment at the gym

B. contaminated shared food

C. contaminated used soap and towels

D. a suitemate with an upper respiratory infection who is sneezing and coughing

E. shared hypodermic needles

Answer: C

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Easy

Important Words/Concepts: MRSA transmission

11. All of the following are true of MRSA, EXCEPT

* 1. MRSA used to be confined to hospitals but now is showing up in healthy individuals outside hospitals.
  2. some strains may be resistant to multiple antibiotics.
  3. anyone who comes in contact with MRSA will become sick.
  4. MRSA can secrete toxins.
  5. it can be acquired through inhalation.

Answer: C

DQ: What is staph, and can it be present in the absence of an infection?

Type: Know It

Difficulty: Easy

Important Words/Concepts: drug resistance, transmission

12. If a person has a compromised immune system, why might they want to avoid seeking treatment at a hospital?

*Answer:* If someone’s immune system is compromised, they are more susceptible to a MRSA infection than if they were healthy. Drug-resistant staph is most likely to be found in a hospital, therefore, a person with a compromised immune system would be at higher risk of acquiring a MRSA infection in a hospital setting than by staying home.

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Easy

Important Words/Concepts: drug resistance, transmission

13. Which of the following people are at the lowest risk of acquiring MRSA?

* 1. a computer consultant who works from home
  2. someone who works as a guard at a local prison
  3. a rugby player on a successful team
  4. a worker in a local daycare
  5. a janitor at a major city hospital

Answer: A

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Easy

Important Words/Concepts: transmission

14. Which of the following people is/are especially vulnerable to illness caused by drug-resistant bacteria?

* 1. a 3-month-old baby
  2. a 90-year-old man
  3. an athlete with several cuts on his arms and legs
  4. a person with pneumonia
  5. All of the above people are especially vulnerable.

Answer: E

DQ: What is staph, and can it be present in the absence of an infection?

Type: Use It

Difficulty: Easy

Important Words/Concepts: transmission

15. Antibiotics should only be prescribed for

1. fungal infections.
2. viral infections.
3. bacterial and fungal infections.
4. bacterial infections.
5. a flulike illness.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important words/concepts: antibiotics, bacteria

16. ß-lactam antibiotics act by interfering with

1. bacterial cell wall synthesis.
2. the uptake of bacteria.
3. bacterial cell division.
4. bacterial chromosome replication.
5. the ability of the bacteria to avoid the host’s immune system.

Answer: A

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important words/concepts: antibiotics, bacteria

17. MRSA should routinely be treated with

1. penicillin.
2. a ß-lactam antibiotic.
3. cephalosporin.
4. vancomycin.
5. cephalexin.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important words/concepts:antibiotics, bacteria

18. MRSA is resistant to

1. penicillin.
2. ß-lactam antibiotics.
3. cephalosporin.
4. methicillin.
5. All of the above.

Answer: E

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important words/concepts: antibiotics, bacteria

19. If the cell wall of *Staphylococcus aureus* fails to form properly, water will

A. create a secondary wall around the cell.

B. drain out of the cell rapidly, causing it to dehydrate.

C. drown the bacteria.

D. rush into the cell, causing it to explode.

E. create a bridge of hydrogen bonds to repair the wall.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: bacterial cell wall

20. If the cell wall of *Staphylococcus aureus* fails to form properly, water will enter the cell

A. by the process of osmosis.

B. by the process of imbibition.

C. by active transport.

D. to destroy the bacterial DNA.

E. to help maintain the cell’s turgor pressure.

Answer: A

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: bacterial cell wall

21. Explain how interfering with cell wall production could kill *Staphylococcus aureus*.

*Answer:* When a bacterial cell divides, it must synthesize new cell-wall material. If it is unable to do that, the cells will lack an effective barrier between the cell and the surrounding environment. If the bacterial cell wall is incomplete, water will rush into the cell by the process of osmosis and the cell will explode.

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotics

22. Why doesn’t a ß-lactam antibiotic prevent the growth of new host (human) cells?

*Answer:* The ß-lactam interferes with the cell wall construction of bacteria, preventing synthesis of the proper wall material (peptidoglycan). When the wall is formed improperly, water rushes into the cell and it explodes. The host (human) cells do not have a cell wall, so ß-lactam antibiotics have no effect on these cells.

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotics

23. Why doesn’t a ß-lactam antibiotic prevent the growth of new host (human) cells?

1. The host cells are slowed down by the antibiotic, but still grow faster than the bacteria.
2. The host cells are protected by a thick layer of cell wall peptidoglycan.
3. Osmosis only occurs in bacterial cells, never in human or animal cells.
4. The antibiotic only harms bacterial cell walls; the host cells do not have cell walls.
5. Antibiotics slow host cell growth, but after the bacteria are dead and the antibiotics are removed, the host cells can grow again.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotics

24. Which of the following is TRUE of ß-lactams?

1. They are only prescribed for the most drug-resistant forms of *Staphylococcus aureus.*
2. They cause a cell to burst open from water pressure.
3. Vancomycin is one of the most effective ß-lactams.
4. They must be administered with caution because they can damage human tissues with prolonged use.
5. They are one of the few classes of drugs that are effective against both bacteria and viruses.

Answer: B

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important Words/Concepts: antibiotic, ß-lactam

25. Which of the following is TRUE of ß-lactams?

* 1. They prevent transcription.
  2. They prevent a cell from acquiring nutrients.
  3. They prevent a cell from reproducing.
  4. They prevent a cell from making ATP.
  5. They cause a cell to burst open.

Answer: E

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important Words/Concepts: antibiotic, ß-lactam

26. Describe how ß-lactams function to kill bacteria. Be specific not only about what they do but also about the results.

*Answer:* ß-lactams interfere with the ability of bacteria to form a cell wall. Thus, when water flows into the cell, the cell wall is inadequate to handle the pressure and the cell bursts open.

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotic, ß-lactam, cell wall

27. The severity of a bacterial infection is related to

1. the health of the patient.
2. whether the bacteria produce toxins.
3. whether the bacteria have a way to avoid the immune system.
4. which part of the body is infected.
5. All of the above.

Answer: E

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: infection

28. What is the drug of choice when a patient has a severe drug-resistant infection?

* 1. penicillin
  2. methicillin
  3. vancomycin
  4. cephalexin
  5. amoxicillin

Answer: C

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important Words/Concepts: antibiotic, treatment

29.If a bacterium susceptible to ß-lactam antibiotics were placed in an isotonic solution and exposed to the antibiotics,

1. its cell wall would rupture and burst due to the influx of water caused by osmosis.
2. its cell membrane would rupture and burst due to the influx of water caused by osmosis, but its cell wall would remain intact.
3. osmosis would drive water out of the cell, causing it to shrivel and die due to lack of internal fluids.
4. it would remain intact because osmosis would cause no change in water flow into or out of the cell.
5. it would remain intact because the cell wall is strong enough to withstand the pressure caused when osmosis draws water into the cell.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: cell wall, antibiotics, osmosis

# 30. Bacteria usually reproduce by

1. meiosis.
2. sexual reproduction.
3. binary fission.
4. binary fusion.
5. transformation.

Answer: C

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial reproduction

31. After bacterial asexual reproduction, the daughter cells produced

1. are identical to each other.
2. have half the chromosome number.
3. are genetically different.
4. have double the DNA content.
5. exchange genes by transformation

Answer: A

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial reproduction

32. Each bacteria cell typically splits into \_\_\_\_ new cells.

A. 2

B. 3

C. 4

D. 8

E. 20

Answer: A

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division

33. Binary fission is a form of

A. nuclear division.

B. aerobic reproduction.

C. anaerobic reproduction.

D. asexual reproduction.

E. sexual reproduction.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division

34. Bacteria can divide as often as once every

A. 3 hours.

B. minute.

C. hour.

D. day.

E. 20 minutes.

Answer: E

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division

35. A bacterial strain divides once every 30 minutes. After 90 minutes, a single bacterium can form a total of \_\_\_ bacteria.

A. 3.

B. 6.

C. 8.

D. 16.

E. This answer cannot be calculated from the information given.

Answer: C

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: cell division

36. Bacteria lack meiosis. Explain how they produce offspring without meiosis.

*Answer:* Bacteria reproduce by binary fission. They double the singular looped chromosome and grow in size, then pinch in half. Each of the new cells is an identical, or nearly identical, copy of the previous cell.

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Easy

Important Words/Concepts: reproduction

37.Which of the following hypothetical antibiotics would treat bacterial infections by interfering with bacterial reproduction?

1. one that changes one of the proteins on the cell membrane
2. one that interferes with cell membrane synthesis
3. one that enhances DNA replication
4. one that strengthens bacterial cell walls
5. one that enhances protein synthesis

Answer: B

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Easy

Important Words/Concepts: binary fission, antibiotics

38. Bacteria reproduce by a process called

* 1. cellular bifurcation.
  2. cleavage.
  3. bipolarization.
  4. binary fission.
  5. divergent fusion.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: binary fission, cell reproduction

39. Which of the following is TRUE of bacterial reproduction?

* 1. The daughter cells are identical to the parent cell.
  2. One cell divides to produce four cells.
  3. Reproduction is sexual and thus allows for genetic diversity in the new cells.
  4. It takes 24 hours for a bacterial population to double in size.
  5. Bacterial reproduction is called binary fusion.

Answer: A

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Hard

Important Words/Concepts: binary fission, cell reproduction

40. If bacterial cells can divide every 20 minutes, how many bacteria will be present after 2 hours if the starting population is 100 cells?

* 1. 700
  2. 1200
  3. 1300
  4. 3200
  5. 6400

Answer: E

DQ: How do bacteria resist the effects of antibiotics?

Type: Use It

Difficulty: Hard

Important Words/Concepts: binary fission, cell reproduction

41. Bacterial cell division is known as

A. friction.

B. cytofission.

C. fusion.

D. fission.

E. nuclear fission.

Answer: D

DQ: How do bacteria resist the effects of antibiotics?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division

42. What is responsible for genetic variation in bacteria?

1. mutations in the genome during binary fission
2. gene influx from a different bacterial strain
3. DNA influx from the environment
4. gene transfer from the same bacterial species
5. All of the above.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial reproduction, diversity

43. Drug-resistant populations of bacterial stains are a result of

1. fast bacterial doubling time outpacing typical drug doses.
2. **drugs or other selective environmental pressures.**
3. binary fission.
4. manipulations in the lab to create new strains for research.
5. transmission from an infected person.

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important words/concepts**:** bacterial reproduction, diversity

44. Overprescription of antibiotics and their improper use is a cause of

1. a decrease in drug-resistant species.
2. elimination of drug-resistant species.
3. a rise in drug-resistant bacterial populations.
4. keeping the level of MRSA infections stable.
5. decreasing MRSA levels in hospitals.

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial reproduction, diversity

45. A population is described as

1. all the members of the same species located on a continent.
2. the species that live in a geographic area.
3. all the species occupying a specific locale.
4. all the members of the same species living in the same area.
5. the species richness.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: bacterial reproduction, diversity

46. All the individuals of a species living in a specific area compose a

A. colony.

B. species.

C. community.

**D. population.**

E. clade.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: population

47. A bacterium has a gene that creates a ß-lactamase enzyme. It passed that gene to another bacterium it encounters. What is the result of that gene transfer?

*Answer:* This is one way of creating antibiotic-resistant bacteria. ß-lactamases destroy ß-lactam antibiotics before they can damage cell wall construction. The bacterium that received the gene transfer is now resistant to ß-lactams.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: gene transfer

48. What is gene transfer?

*Answer:* Gene transfer is bacteria’s ability to pass small parts of their DNA to other bacteria.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gene transfer

49. Assume that every time you copy DNA, whether it is bacterial DNA or human DNA, you have the same rate of mutation. If that is the case, explain why bacteria mutate to adapt to their environment much faster than humans.

*Answer:* Bacteria are simple cells with a quick lifespan and a very short generation time. Each time a cell divides, it creates the next generation of bacteria, and that can be as often as once every 20 minutes. Humans live many years before they duplicate DNA to pass on to the next generation. Thus, in the same period, the bacterial DNA has many more chances to pass on mutations to the next generation.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: compare human and bacterial mutation

50. If a man fathers a child at 20 years of age, the DNA that was passed on to the child was created 20 years after the zygote that created the man. How many generations of bacteria could be formed in that same 20 years (ignore leap years)? How many more chances of mutation would the bacterial DNA have?

*Answer:* In that 20 years, a bacterium that was formed at the exact second the zygote was formed would have gone through as many as 525,600 generations (not counting leap years): Multiply 3 times per hour times 24 hours/day times 365 days/year times 20 years. That’s 525,599 more chances of mutation happening.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: compare human and bacterial mutation

51.Your friend has contracted a bacterial infection. Which of the following hypothetical drugs would you suggest as the best way to prevent an antibiotic-resistant allele from arising and spreading throughout the bacterial population in her body?

* 1. a drug that prevents mutations but allows gene swapping
  2. a drug that doesn’t prevent mutations, but does prevent gene swapping with individuals of its own species
  3. a drug that doesn’t prevent mutations, but does prevent gene swapping with individuals of other species
  4. a drug that doesn’t prevent mutations, but prevents gene swapping with any individual of any species
  5. a drug that prevents both mutations and gene swapping

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: antibiotic-resistance, gene swapping, mutations

52. Drug resistance may take which of the following forms?

* 1. Bacteria may produce ß-lactamases.
  2. Bacteria may produce proteins that can disable antibiotics.
  3. Bacteria may produce proteins with altered shapes that antibiotics can no longer bind to.
  4. All of the above.
  5. None of the above.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: drug resistance, mutation

53. Which of the following factors will NOT influence the rate at which drug resistance can evolve in a population of bacteria?

* 1. mutation rate
  2. the frequency of gene swapping with members of the same species
  3. the frequency of gene swapping with members of different species
  4. the frequency of reproduction
  5. **the age of the host**

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts:drug resistance, gene swapping, mutation, reproduction

54. Do you think drug resistance is more likely to develop in a species of bacteria that can double its population every 20 minutes or a species that doubles its population every 24 hours? Explain your answer.

*Answer:* Drug resistance is more likely to develop in a species of bacteria that doubles its population every 20 minutes because the more rapid reproduction rate means that DNA is also being copied rapidly. Every time DNA is copied, there is a chance of mutations arising, and some of these mutations may confer drug resistance. Therefore, the more rapidly a population divides, the faster that population may acquire drug resistance.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: cell reproduction, drug resistance, mutation

55. What are the two mechanisms by which a bacterial cell can become resistant to antibiotics?

*Answer:* Cells can become resistant to antibiotics through random mutations as well as by picking up resistance genes from other cells via gene transfer.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: drug resistance, gene swapping, mutation

56. A bacterial strain will most likely become antibiotic resistant when it is grown in

1. high heat.
2. extreme cold.
3. the presence an acidic environment.
4. the presence of MRSA.
5. a laboratory that researches viruses.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: drug resistance, gene transfer

57. A highly resistant antibiotic strain of *S. aureus* would reproduce best in

1. the presence of antibiotic.
2. the absence of antibiotic.
3. the presence or absence of antibiotic.
4. a moderate concentration of antibiotic.
5. a fluctuating concentration of antibiotic

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: phenotype and “survival of the fittest”

58. How would the resistance level of an antibiotic-sensitive variant in culture medium containing a minimal amount of antibiotics change over time?

1. resistance will remain low
2. resistance will remain medium
3. resistance will remain high
4. resistance will change from high, to medium, and finally low
5. resistance will change from low, to medium, and finally high

Answer: A

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: phenotype and “survival of the fittest”

59. Which bacterial phenotype would have the highest fitness if it were cultured in a medium containing antibiotics?

1. a slightly antibiotic-resistant variant
2. a moderately antibiotic-resistant variant
3. a highly antibiotic-resistant variant
4. an antibiotic-sensitive variant
5. all phenotypes have equal fitness

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts:phenotype and fitness

60. Five different strains of bacterial cultures were grown overnight in a medium containing antibiotics. Of the resulting population densities listed below, which was the most fit?

1. 5 x 105 cells/ml
2. 6 x 106 cells/ml
3. 7.5 x 107 cells/ml
4. 0.075 x 108 cells/ml
5. 5 x 107 cells/ml

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: phenotype and fitness

61. An organism’s ability to survive and reproduce is called the organism’s

A. natural selectivity.

B. advantage.

C. phenotype.

D. genotype.

E. fitness.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: fitness

62. Which of the following is more fit?

A. a 5000-year-old bristlecone pine tree that produced 1 offspring every 100 years

B. a 5000-year-old bristlecone pine tree that produced 3 offspring every 100 years

C. a 3000-year-old bristlecone pine tree that produced 100 offspring every 100 years

D. a 2000-year-old bristlecone pine tree that produced 100 offspring every 10 years

E. a 500-year-old bristlecone pine tree that produced 100 offspring every year

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: fitness

63. Which has made the biggest impact on future generations?

A. a 5000-year-old bristlecone pine tree that produced 1 offspring every 100 years

B. a 5000-year-old bristlecone pine tree that produced 3 offspring every 100 years

C. a 3000-year-old bristlecone pine tree that produced 100 offspring every 100 years

D. a 2000-year-old bristlecone pine tree that produced 100 offspring every 10 years

E. a 500-year-old bristlecone pine tree that produced 100 offspring every year

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: fitness

64. You’ve gone to the doctor and she has determined that you have a*Staphylococcus aureus* infection, and it is one of the following possible strains (A-E), but she is not sure which. Which antibiotic is most likely to be effective?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Resistant (+) or Sensitive (−) to:** | | | |
| **Bacterium** | **Ampicillin** | **Penicillin** | **Methicillin** | **Vancomycin** |
| **A** | **+** | **+** | **−** | **+** |
| **B** | **+** | **−** | **−** | **+** |
| **C** | **−** | **−** | **−** | **−** |
| **D** | **+** | **+** | **+** | **+** |
| **E** | **−** | **−** | **−** | **−** |

*Answer:* Methicillin will affect four of the five strains; so it is most likely to be effective.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: fitness

65. Which of these strains of bacteria (A-E) is most fit in a hospital situation? Explain.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Resistant (+) or Sensitive (−) to:** | | | | | |
| **Bacterium** | **Ampicillin** | **Penicillin** | **Methicillin** | **Vancomycin** | **Extreme heat** | **Extreme cold** |
| **A** | **+** | **+** | **+** | **+** | **−** | **−** |
| **B** | **+** | **−** | **−** | **+** | **−** | **−** |
| **C** | **−** | **−** | **−** | **−** | **+** | **+** |
| **D** | **+** | **+** | **+** | **+** | **+** | **−** |
| **E** | **−** | **−** | **−** | **−** | **−** | **−** |

*Answer:* D is most fit in a hospital because it is resistant to the largest number of antibiotics and to heat that is used to sterilize linens and equipment.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: fitness

66. Which of these bacteria (A-E) are LEAST fit in a forest situation? Explain. (Note: More than one bacterium may be correct.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Resistant (+) or Sensitive (−) to:** | | | | | |
| **Bacterium** | **Ampicillin** | **Penicillin** | **Methicillin** | **Vancomycin** | **Extreme heat** | **Extreme cold** |
| **A** | **+** | **+** | **+** | **+** | **−** | **−** |
| **B** | **+** | **−** | **−** | **+** | **−** | **−** |
| **C** | **−** | **−** | **−** | **−** | **+** | **+** |
| **D** | **+** | **+** | **+** | **+** | **+** | **−** |
| **E** | **−** | **−** | **−** | **−** | **−** | **−** |

*Answer:* A, B, and E have an equally low level of fit for a natural situation, because they all lack heat and cold tolerances.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: fitness

67. Which of these are most fit in a sauna or jacuzzi? Which of these would be more likely to be transferred between humans in these locations. Explain. (Note: More than one bacterium may be correct.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Resistant (+) or Sensitive (−) to:** | | | | | |
| **Bacterium** | **Ampicillin** | **Penicillin** | **Methicillin** | **Vancomycin** | **Extreme heat** | **Extreme cold** |
| **A** | **+** | **+** | **+** | **+** | **−** | **−** |
| **B** | **+** | **−** | **−** | **+** | **−** | **−** |
| **C** | **−** | **−** | **−** | **−** | **+** | **+** |
| **D** | **+** | **+** | **+** | **+** | **+** | **−** |
| **E** | **−** | **−** | **−** | **−** | **−** | **−** |

*Answer:* C and D are most fit in a sauna or jacuzzi because of their heat tolerance. However, D would be more likely to be transferred between humans because of its multiple antibiotic resistance.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: fitness

68. All of the following are true of evolution, EXCEPT

* 1. evolution leads to individuals with higher fitness than their predecessors.
  2. individuals adapt their genes to improve survival.
  3. the environment plays a large role in the process of evolution.
  4. individuals with the most adaptive phenotypes have the most offspring.
  5. evolution works through natural selection.

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution, fitness, natural selection

69. Two bacteria are genetically identical in all ways except that one has a gene that confers resistance to penicillin. These two cells are grown in the laboratory in cell-culture medium that is free of antibiotics. Will one cell reproduce faster than the other one? If so, which one? Explain your answer.

*Answer:* In an environment free of antibiotics, neither cell should have an advantage over the other one, so they should reproduce at the same rate.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotic, evolution, fitness, natural selection

70. What is the role of natural selection in evolution?

*Answer:* Natural selection is the process by which individuals who are best adapted to their environment are likely to have more offspring than individuals less suited to their environment. Therefore, the alleles carried by the fittest individuals will increase in frequency in the population.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution, fitness, natural selection

71. Which is necessary for natural selection to proceed?

1. variation within a population
2. a mechanism of inheritance
3. acquisition of adaptations
4. generations reproducing over time
5. All of the above.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: natural selection and populations

72. Natural selection causes

1. changes in an individual’s genes.
2. changes in allele frequencies within a population.
3. a decrease in reproductive fitness in a population.
4. the inheritance of acquired characteristics.
5. changes in the mechanism of inheritance.

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: natural selection, allele frequencies, and populations

73. What would the outcome be if an antibiotic-sensitive homogeneous (no variation) strain of *S. aureus* was grown in the presence of antibiotics?

1. cell growth that begins slowly but proceeds rapidly
2. rapid mutation and growth
3. no cell growth
4. eventual rise of antibiotic-resistant cells
5. rapid growth then sudden death

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** natural selection and diversity

74. What would the outcome be if a homogeneous (no variation) antibiotic-sensitive strain of *S. aureus* was grown in the presence of antibiotics? Why?

*Answer:* Population is homogeneous, which means no diversity within the population, so no evolution and therefore no growth.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: natural selection and diversity

75. You have a population of boa constrictors (snakes) on a Caribbean island that is 100 square miles and has a rich supply of lizard, bird, and mammal prey, and the island lacks boa constrictor predators (including humans). The boas are capable of reaching 16 feet in length in these conditions. Overall boa growth is strongly linked to habitat size and food availability. A hurricane comes along and moves 18 pregnant female boas to three different islands (6/island).

Island A is 10 square miles, has no mammal or bird prey, has three sizeable human settlements, and is farmed extensively.

Island B is 30 square miles, has a lot of mammal, bird, and lizard prey items and very few humans.

Island C is 50 square miles, has limited bird prey, no mammal prey items, and moderate small lizard prey items.

After 100 years, on which of these three islands would you expect to find the largest boas?

*Answer:* Island B. It is moderate in size and has ample prey items and very little human pressure.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, selection

76. You have a population of boa constrictors on a Caribbean island that is 100 square miles and has a rich supply of lizard, bird, and mammal prey, and the island lacks boa constrictor predators (including humans). The boas are capable of reaching 16 feet in length in these conditions. Overall boa growth is strongly linked to habitat size and food availability. A hurricane comes along and moves 18 pregnant female boas to three different islands (6/island).

Island A is 10 square miles, has no mammal or bird prey, has three sizeable human settlements, and is farmed extensively.

Island B is 30 square miles, has a lot of mammal, bird, and lizard prey items and very few humans.

Island C is 50 square miles, has limited bird prey, no mammal prey items, and moderate small lizard prey items.

After 100 years, on which of these three islands would you expect to find the smallest boas?

*Answer:* If the boas survived human pressure on Island A, they would be the smallest. However, they are likely to have been wiped out. In that case, the smallest boas would be on island C, which is large but has limited food resources.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, selection

77. A number of mosquito populations today are resistant to specific insecticides, even though those insecticides were highly effective when they were first introduced. Biologists believe that insecticide resistance evolved in mosquitoes because

1. individual mosquitoes built up an immunity to an insecticide after being exposed to it.
2. mosquitoes needed to develop insecticide resistance to survive after the insecticide was used.
3. a few mosquitoes were probably resistant to the insecticide before it was ever used. These survived and passed that trait on to their offspring.
4. the presence of the insecticide caused some mosquitoes to develop resistance; they survived and passed the trait to their offspring.
5. current mosquito populations are phenotypically variable and exhibit differential fitness in different environments.

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: fitness, artificial selection

78. All of the following are true of natural selection, EXCEPT

* 1. it works best in genetically uniform populations.
  2. it results in populations better suited to their environment than their predecessors.
  3. it is the process by which evolution occurs.
  4. it results in some individuals surviving better and reproducing more than others.
  5. it results in a change in allele frequencies over time.

Answer: A

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution, fitness, natural selection

79. Describe the relationship between an organism’s genotype, phenotype, environment, and natural selection.

*Answer:* An organism’s genotype determines its phenotype. The phenotype interacts with the environment such that organisms whose phenotypes are best suited to survival and reproduction in that environment will pass on their genes at a higher frequency than individuals that are less adapted. Thus, allele frequencies change over time and the population evolves.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, fitness, genotype, natural selection, phenotype

80. A species of small lizard has three color forms: pale gray, brown, and black. In its original range, the colors of the rocky environment were mixed from pale gray to very dark, and the population had an even mix of all three color forms. The blending of colors with the environment helps the lizards hide from predators. A group of these lizards ended up on an island with all gray rocks, and the island has no predators that eat lizards. What will the lizards look like in 50 years?

*Answer:* With no predators to affect which lizard color is successful, the ratio of colors will remain unchanged.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, selection

81. Human birth weight is an example of

1. directional selection.
2. diversifying selection.
3. guided selection.
4. stabilizing selection.
5. uniform selection.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: directional, stabilizing, and diversifying selection

82. MRSA in humans is an example of

1. directional selection.
2. diversifying selection.
3. guided selection.
4. stabilizing selection.
5. uniform selection.

Answer: A

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: directional, stabilizing, and diversifying selection

83. The African finch *Pyrenestes* is an example of

1. directional selection.
2. diversifying selection.
3. guided selection.
4. stabilizing selection.
5. uniform selection.

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: directional, stabilizing, and diversifying selection

84. Natural selection that favors survival of extreme phenotypes of a population is called

1. artificial selection.
2. stabilizing selection.
3. diversifying selection.
4. directional selection.
5. extremophenotypic selection.

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: directional, stabilizing, and diversifying selection

85. Natural selection that favors survival of an intermediate phenotype of a population is called

1. artificial selection.
2. diversifying selection.
3. directional selection.
4. stabilizing selection.
5. mediophenotypic selection.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: directional, stabilizing, and diversifying selection

86. What is decreased as a result of stabilizing selection?

1. the middle phenotypic range of variation
2. one extreme of the phenotypic variation range
3. the most suited phenotypic range
4. population growth
5. the range of phenotypic variation

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important words/concepts: directional, stabilizing, and diversifying selection

87. A species of small lizard has three color forms, pale gray, brown, and black. In its original range, the colors of the rocky environment were mixed from pale gray to very dark, and the population had an even mix of all three color forms. The blending of colors with their environment helps the lizards hide from predators. A group of these lizards ended up on an island with all gray rocks. Eventually, only gray lizards remained. This is an example of

A. artificial selection.

B. mutation.

C. diversifying selection.

D. directional selection.

E. stabilizing selection.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: selection

88. A species of small lizard has three color forms, pale gray, brown, and black. In its original range, the colors of the rocky environment were mixed from pale gray to very dark, and the population had an even mix of all three color forms. The blending of colors with the environment helps the lizards hide from predators. A group of these lizards ended up on an island with only gray and black rocks. Eventually, the brown lizards disappeared. This is an example of

A. artificial selection.

B. mutation.

C. diversifying selection.

D. directional selection.

E. stabilizing selection.

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: selection

89. Natural selection is the process that leads to evolution. Natural selection responds to the environment and yields more fit creatures, yet it is said that evolution is NOT goal oriented. How can you reconcile this?

*Answer:* Natural selection favors individuals that fit the environment better *now*. However, the environment can change. So, a change that made a species fit the environment better now might end up being a detriment in the future; thus, an evolutionary pathway may end up being a dead end.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution

90. Explain how evolution can lead to dead ends (groups that have gone extinct) and reconcile this with natural selection.

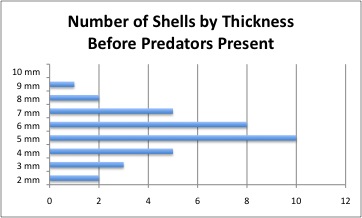
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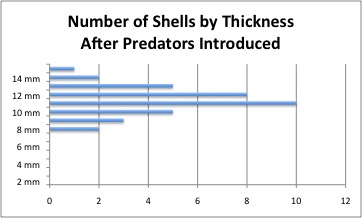
DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution

91. Eighty years ago, a predatory crab was introduced to a region it previously did not inhabit and began preying on a species of marine snail. A scientist was able to locate museum specimens of the snail’s shells from prior to the crab’s introduction and to compare their thickness—an important factor in how protective the shells are—to the thickness of shells from current snails. Based on the graphs of her results (shown here), what form of evolution/natural selection has taken place?



1. nonadaptive evolution
2. stabilizing selection
3. directional selection
4. diversifying selection
5. neutral selection

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts:directional selection, evolution

92. Which of the following will result in diversifying selection?

* 1. Giraffes with the longest necks can eat leaves from the tallest trees.
  2. Male frogs that call softly do not attract mates, while those who call very loudly get eaten by predators.
  3. In an environment with patches of black and white rocks, both black and white rabbits can hide, but gray rabbits are always visible and are eaten by predators.
  4. Blue birds with fewer than four chicks do not pass on many genes, blue birds with four chicks can raise them all, and blue birds with more than four chicks risk all of them dying due to lack of food.
  5. Black and white moths exist in an area where the trees on which they rest have been turned black by pollution.

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, diversifying selection, natural selection

93. When extreme phenotypes are selected against and disappear, which pattern of natural selection is at work?

1. bifurcating selection
2. directional selection
3. diversifying selection
4. intermediate selection
5. stabilizing selection

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts:evolution, natural selection, stabilizing selection

94. Which pattern of natural selection is most common in patchy (nonuniform) environments?

* 1. bifurcating selection
  2. directional selection
  3. diversifying selection
  4. intermediate selection
  5. stabilizing selection

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution, diversifying selection, natural selection

95. If two alleles are incompletely dominant to each other and heterozygotes almost never survive, which pattern of natural selection would you expect to see?

* 1. bifurcating selection
  2. directional selection
  3. diversifying selection
  4. intermediate selection
  5. stabilizing selection

Answer: C

DQ: How do populations evolve, and what is the role of evolution in antibiotic

resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: evolution, diversifying selection, natural selection

96. Antibiotic resistance is an example of which pattern of natural selection?

* 1. bifurcating selection
  2. directional selection
  3. diversifying selection
  4. intermediate selection
  5. stabilizing selection

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: evolution, directional selection, natural selection

97. A population of lizards lives on an island and has a large range of adult body sizes. A new predator is introduced to the island, and this predator prefers eating only small lizards. What pattern of natural selection would you expect the lizard population to experience as a result of this change in their environment?

* 1. bifurcating selection
  2. directional selection
  3. diversifying selection
  4. intermediate selection
  5. stabilizing selection

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: evolution, directional selection, natural selection

98. What is the difference between stabilizing and diversifying selection?

*Answer:* In stabilizing selection, phenotypes in the middle of their range are best suited to their environment, while in diversifying selection, phenotypes at the extremes of their range are best suited to their environment.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution, diversifying selection, natural selection, stabilizing selection

# 99. All of the following will decrease the spread of antibiotic-resistant bacterial strains, EXCEPT

1. taking the recommended dose of antibiotics for a cold.
2. reducing antibiotics in animal feed.
3. washing hands frequently.
4. disinfecting contaminated surfaces.
5. keeping sports equipment clean.

Answer: A

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: prevention of drug-resistant bacterial strains

100. Why are antibiotics given to livestock?

1. to reduce bacterial growth in manure
2. to promote the growth of animals
3. to improve reproduction
4. to reduce digestive difficulties
5. to transmit bacterial resistance

Answer: B

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: prevention of drug-resistant bacterial strains

101. All of the following are reasons to complete a prescribed course of antibiotics, EXCEPT

1. to protect yourself from antibiotic-resistant strains of bacteria.
2. to protect other people from infection with antibiotic-resistant strains of bacteria.
3. to ensure total elimination of the original infection.
4. to prevent the selection in your body of antibiotic-resistant strains.
5. to ensure your immune system will not have to fight the bacteria.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important words/concepts: prevention of drug-resistant bacterial strains

102. Why is it recommended to keep locker rooms and sports equipment clean?

1. Staph infections can spread by surface contact.
2. A person colonized with *S. aureus* may have used the equipment previously.
3. Athletes may have open wounds that are more susceptible to infection.
4. It helps to reduce the transmission of antibiotic-resistant infections.
5. All of the above.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important words/concepts: prevention of drug-resistant bacterial strains

103. Strains of pneumonia-causing \_\_\_\_\_\_ are becoming resistant to every available antibiotic.

A. *Klebsiella*

B. *Staphylococcus*

C. *Pneumatococcus*

D. *Botulinum*

E. *Streptococcus*

Answer: A

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts:antibiotic resistance

104. Explain how giving antibiotics to cattle and chickens can contribute to the evolution of superbugs.

*Answer:* Antibiotics in our food animals are leading to resistant strains of bacteria that affect them. Several types of bacteria are commonly acquired from the food we eat, such as *Salmonella* and *Campylobacter*. If these have been exposed to the antibiotics in the food items, they may have developed antibiotic resistance.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: antibiotic resistance

105. Explain how prescribing an antibiotic for a cold would be a bad thing.

*Answer:* Colds are caused by viruses, so antibiotics have no impact on them. However, the antibiotics could have an effect on the natural bacterial flora of your body—all of the bacteria that live in and on you. Repeated antibiotic exposure can turn those normally harmless bacteria into resistant strains. Even if they themselves never become problematic, they have the ability to pass that resistance on to other nastier bacteria through gene transfer.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: antibiotic resistance

106. You are about to move into a dorm suite and bathroom shared by seven other students. To reduce the likelihood of contracting an antibiotic-resistant bacterial infection, you and your suitemates should

1. keep common surfaces, such as those in the bathroom, disinfected.
2. not share soap or towels.
3. not take antibiotics for viral infections.
4. wash your hands frequently.
5. do All of the above.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts:antibiotic resistance, preventing infection

107. All of the following will help reduce the spread of drug-resistant bacteria, EXCEPT

* 1. hand washing.
  2. eliminating antibiotics fed to livestock.
  3. disinfecting public restrooms frequently.
  4. taking a strong antibiotic at the first sign of illness.
  5. developing vaccines.

Answer: D

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts:transmission

108. Which of the following have contributed to the emergence of drug-resistant bacteria?

* 1. prescribing antibiotics for colds
  2. prescribing antibiotics for bacterial infections
  3. failure of hospital personnel to wash hands
  4. giving livestock antibiotics
  5. All of the above.

Answer: E

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Know It

Difficulty: Easy

Important Words/Concepts: drug resistance

109. You are discussing antibiotic resistance with a friend, and the friend says the obvious solution is to develop stronger antibiotics. Do you agree? Why or why not?

*Answer:* Developing stronger antibiotics will not be a solution to antibiotic resistance because when bacteria are exposed to the new antibiotic, they will eventually develop resistance to that antibiotic as well.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts:drug resistance, transmission

110. A scientist studying bacteria that lives in streams happens upon several species that display resistance to two different antibiotics. This is surprising because these bacteria cannot live in humans or any other mammal. Looking around, the scientist notices the presence of a cattle farm in the distance. Could this cattle farm be a possible explanation for the observation of antibiotic resistance in these bacteria? Why or why not?

*Answer:* Yes, the cattle farm is quite likely the reason these bacteria exhibit antibiotic resistance. When livestock are fed antibiotics, not all the antibiotic is digested. Undigested antibiotic is passed out in the manure. Antibiotics in this manure can then contaminate the environment by seeping into the groundwater, especially when this manure is used as fertilizer.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Hard

Important Words/Concepts: transmission

111. Why should someone take an entire course of prescribed antibiotic, even if they are feeling better after just a few days?

*Answer:* Taking an antibiotic for only a few days means that the most resistant bacteria will survive. These resistant bacteria are then the ones who pass on their resistance genes to the next generation.

DQ: How do populations evolve, and what is the role of evolution in antibiotic resistance?

Type: Use It

Difficulty: Easy

Important Words/Concepts: drug resistance