*Biology for a Changing World 2e,* Chapter 20 Test Bank

1. Race, if defined by a person’s skin tone, provides information about

1. their ancestry.
2. their financial position.
3. their social status.
4. their religion.
5. None of the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:What is race?

2. Evolution and natural selection can be witnessed in the human population by examining

1. skin-tone variation and sunlight exposure.
2. the sickle-cell trait and malaria.
3. lactase persistence and cattle farming.
4. the CF allele and cholera resistance.
5. All of the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Hard

Important Words/Concepts:What is race?

3. Variations of human skin tone is driven by

1. DNA variation in the population.
2. natural selection.
3. inheritance and survival.
4. adaptations over time.
5. All of the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts: What is race?

4. What may be a problem with racial self-identification for the future of medicine and pharmacogenomics (drugs tailored to suit one’s genome)?

1. It may be linked to cultural associations.
2. It may be defined by the possession of extreme physical traits.
3. It may have traditional or historical bias.
4. It may have a religious bias.
5. Incorrect identification of ancestral background because of all of the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Hard

Important Words/Concepts: What is race?

5. Many people define a person’s race based on that person’s physical characteristics, in particular, skin color. List at least three ways other than physical traits that may define a person’s race.

*Answer:*

genetics

history

cultural traditions

geography

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:race definition

6. All of the following statements are true, EXCEPT

* 1. race is a social, rather than biological, category.
	2. all humans, regardless of race, are members of just one species.
	3. children whose parents are different races tend to have more health problems than children whose parents are of the same race.
	4. groups of people sharing similar physical characteristics likely have more ancestors in common.
	5. some people may identify themselves as members of a race based on cultural traditions rather than on physical traits.

Answer: C

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: race definition

7. If everyone in the world looked similar to one another, such that physical traits could not be used to group people in any meaningful way, do you think people would still define themselves as belonging to different races? Explain your answer.

*Answer:* Even if physical traits are not used to group people, people might still define themselves as belonging to different races because different groups will still share similar cultural traditions, geography, and history.

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Hard

Important Words/Concepts: race definition

8. Using the figure below, label the items A–G.



*Answer:*

1. melanocyte location
2. fatty tissue
3. epidermis
4. dermis
5. sweat gland
6. oil gland
7. blood vessels

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Melanin influences skin tone.

9. Melanocytes are located

1. in the subcutaneous layer.
2. in the basal layer of the dermis.
3. in the basal layer of the epidermis.
4. in the uppermost layer of the dermis.
5. in the uppermost layer of the epidermis.

Answer: C

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:Melanin influences skin tone.

10. In a person of very dark skin tone, it is expected that their melanocytes produce

1. small quantities of melanin pigment.
2. very large quantities of melanin pigment.
3. limited quantities of melanin pigment.
4. some quantities of melanin pigment.
5. average quantities of melanin pigment.

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Melanin influences skin tone.

11. In the absence of melanin production, a person would

1. have dark skin tone.
2. have medium skin tone.
3. have light skin tone.
4. have albinism.
5. have very dark skin tone.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts:Melanin influences skin tone.

12. Humans have been a species for

* 1. 100,000 years.
	2. 200,000 years.
	3. 500,000 years.
	4. 750,000 years.
	5. 1 million years.

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Hard

Important Words/Concepts:evolution

13. Skin color is determined by the amount of \_\_\_\_\_\_\_ a person has in their skin.

* 1. fat
	2. folate
	3. lignin
	4. melanin
	5. vitamin D

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** melanin

14. Melanocytes are located in the

* 1. dermis.
	2. epidermis.
	3. fat.
	4. follicle.
	5. subcutaneous layer.

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:melanin

15. Where in the skin are melanocytes located?

1. in the dermis
2. around sweat glands
3. at the base of hair follicles
4. in the epidermis
5. in both the dermis and the epidermis

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: melanin

16. A person’s skin color depends on

1. the amount of melanin in the skin; more melanin means darker color.
2. the type of melanin in the skin; one form makes people fair and one form makes people dark.
3. the location of melanocytes in the skin; the deeper the melanocytes, the fairer the skin.
4. where a person lives; people at high elevation have darker skin.
5. A, B, and C

Answer: A

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: melanin

17. Ultraviolet light destroys which vitamin essential for cell division?

1. B2
2. B12
3. B6
4. D
5. B9

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: the sun, vitamins, and your health

18. Ultraviolet light is essential for the formation of this vitamin.

1. K
2. A
3. B6
4. D
5. B9

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:the sun, vitamins, and your health

19. This molecule protects folate from destruction by damaging ultraviolet light.

1. retinol
2. melanin
3. calcium
4. bilirubin
5. chlorophyll

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: the sun, vitamins, and your health

20. Variations in skin tone correlate with a balance between these two vitamins.

1. B2 and B6
2. B12 and B6
3. D and B9
4. D and B6
5. Folic acid and B9

Answer: C

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Hard

Important Words/Concepts: the sun, vitamins, and your health

21. Variations in skin tone correlate with

1. exposure to sunlight.
2. folate stores in the body.
3. vitamin D production.
4. melanin expression.
5. All of the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Hard

Important Words/Concepts:the sun, vitamins, and your health

22. All of the following are TRUE of folate, EXCEPT

1. it increases with increased exposure to the sun.
2. it can be found in beans, citrus fruit, and dark-green, leafy vegetables.
3. it helps sperm develop normally.
4. decreased folate levels in the mother are linked to spina bifida in the baby.
5. it is needed for DNA replication and cell division.

Answer: A

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** folate

23. All of the following are good sources of folate,EXCEPT

* 1. dark-green, leafy vegetables.
	2. whole grains.
	3. citrus fruit.
	4. shellfish.
	5. hamburgers.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:folate

24. List at least three consequences of folate deficiency.

*Answer:*

low sperm count or abnormal sperm

spina bifida

anencephaly

birth defects

problems with DNA replication and cell division

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: folate

25. All of the following are TRUE of vitamin D, EXCEPT

* 1. vitamin D helps the body absorb calcium.
	2. vitamin D is important for healthy bone growth.
	3. sunlight is important for vitamin D production.
	4. pregnant women should reduce vitamin D in their diet to avoid birth defects.
	5. the need of the body for vitamin D is one factor in the evolution of skin color.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: vitamin D

26. List at least three health problems associated with a deficiency of vitamin D.

*Answer:*

preeclampsia in pregnant women, resulting from increased blood pressure

reduced bone density, especially in pregnant women

premature birth

rickets

multiple sclerosis

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Hard

Important Words/Concepts:vitamin D

27. Which of the following children isMOST LIKELY to develop rickets?

* 1. a child with dark skin who drinks milk fortified with vitamin D
	2. a child with dark skin who does not drink milk fortified with vitamin D
	3. a child with light skin who drinks milk fortified with vitamin D
	4. a child with light skin who spends a lot of time outside
	5. a child with dark skin who spends a lot of time outside

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts:vitamin D

28. Most states are cutting physical education classes, so children are not playing outside during school hours. During nonschool hours, children are frequently indoors playing video games or watching TV. Aside from increased obesity, why is this situation a health concern for our children?

*Answer:* These children are not getting enough sunlight; therefore, they are at risk of a vitamin D deficiency, which can lead to rickets and other bone abnormalities.

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts: vitamin D

29. Folate (vitamin B9) is important for reproductive health. Why?

1. Folate prevents spinal cord defects in the baby and maintains bone density in pregnant women.
2. Folate prevents abnormal bone formation in babies and maintains bone density in pregnant women.
3. Folate prevents abnormal bone formation in babies and maintains high sperm count in men.
4. Folate prevents spina bifida in babies and maintains high sperm count in men.
5. Folate prevents premature birth and maintains high sperm count in men.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: vitamin D

30. Both vitamin D and folate levels are affected by UV radiation from sunlight. Which of the following correctly explains the effects of sunlight on these vitamins?

1. Both vitamin D and folate are degraded by UV radiation from sunlight.
2. Sunlight is necessary for both vitamin D and folate formation.
3. Sunlight degrades vitamin D but helps build folate.
4. Sunlight degrades folate but helps build vitamin D.
5. Moderate sunlight is necessary to build both vitamin D and folate, but excess sunlight degrades both.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: vitamin D

31. Both vitamin D and folate can be obtained from the food we eat. Which of the following correctly identifies the foods from which each can be obtained?

1. Vitamin D is found in fortified dairy products; folate is found in beans, dark-green, leafy vegetables, and several other foods.
2. Vitamin D is found in whole grains and “orange” vegetables (carrots, squash); folate is found in beans, red meat, and fish.
3. Vitamin D is found in fortified grains (such as breads); folate is found in poultry, pork, and liver.
4. Vitamin D is found in dark-green vegetables and whole grains; folate is found in fortified dairy products and cereals.
5. Both vitamin D and folate are found in dark-green vegetables, fish, and whole grains.

Answer: A

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: vitamin D

32. Which continent receives the most UVB exposure per land mass?

1. Asia
2. Africa
3. North America
4. South America
5. Australia

Answer: B

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts:skin-tone variation and geography

33. It would be expected that a population geographically located where UVB exposure is maximal to have a skin tone that is

1. very light.
2. light.
3. medium.
4. dark.
5. very dark.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: skin-tone variation and geography

34. It would be expected that a population geographically located where UVB exposure is minimal to have a skin tone that is

1. very light.
2. light.
3. medium.
4. dark.
5. very dark.

Answer: A

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Know It

Difficulty: Easy

Important Words/Concepts: skin-tone variation and geography

35. The correlation between vitamin D, folate, sunlight exposure, and the resulting variations of skin tones is an example of

1. a genetic strategy to increase fitness.
2. natural selection.
3. human evolution.
4. descent with modification.
5. All the above.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts:skin-tone variation and geography

36. Discuss the evolution of human skin color. Specifically, relate sunlight, folate, and vitamin D to skin color and geographic distribution.

*Answer:* Human skin color evolved to balance the body’s need to protect its folate against its need to produce vitamin D. People living in areas of the world with intense sunlight have darker skin due to the need to protect folate, while people living farther from the equator in areas with weak ultraviolet radiation have light skin due to a greater need for vitamin D production.

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Hard

Important Words/Concepts:evolution, folate, geography, vitamin D

37. Put the following countries in order from lightest to darkest skin pigmentation:

* 1. England→Kenya→Saudi Arabia→Italy
	2. England→ Saudi Arabia→Kenya→Italy
	3. England→Italy→Saudi Arabia→Kenya
	4. Italy→England→Saudi Arabia→Kenya
	5. Kenya→Saudi Arabia→Italy→England

Answer: C

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Easy

Important Words/Concepts: evolution, folate, geography, vitamin D

38. Which of the following BEST summarizes the correlation between skin pigmentation and geography?

1. Skin is lightest toward the equator, where UV radiation is strongest.
2. Skin is lightest toward the poles, where UV radiation is strongest.
3. Skin is darkest toward the equator, where UV radiation is strongest.
4. Skin is darkest toward the poles, where UV radiation is strongest.
5. Skin is darkest toward the equator, where UV radiation is weakest.

Answer: D

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: evolution, geography

39. Who is mitochondrial Eve?

1. an African maternal ancestor of all humanity today
2. a female descendent from Africa
3. the only female that lived in Africa many years ago
4. a female that is our ancestor from Asia
5. the first female to migrate out of Africa

Answer: A

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts: mitochondrial Eve and human evolution

40. What fact was used to determine that mitochondrial Eve is every human’s ancestor?

1. Only males pass on mitochondrial genes in the sperm.
2. The sperm and egg’s chromosomes undergo meiosis and independent assortment.
3. Only females pass on mitochondrial genes in the egg cell.
4. The sperm contains mitochondria in its flagella, which is passed on to the zygote.
5. Egg cells have no mitochondria to be passed on to the developing zygote.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:mitochondrial Eve and human evolution

41. Mitochondrial Eve can be traced back to

1. Asia, 150–200,000 years ago.
2. southern Africa, 150–200,000 years ago.
3. western Africa, 150–200,000 years ago.
4. eastern Africa, 150–200,000 years ago.
5. northern Australia, 150–200,000 years ago.

Answer: D

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:mitochondrial Eve and human evolution

42. How do we know mitochondrial Eve is every human’s ancestor?

1. because only males pass on mitochondrial genes
2. global comparison of nuclear DNA
3. global comparison of human mitochondrial and nuclear sequences
4. comparison of African mitochondrial DNA from the past
5. from fossil remains found in East Africa around 50,000 years ago

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts:mitochondrial Eve and human evolution

43. Which of the following statements about human evolutionary history is TRUE?

* 1. All modern humans can trace their ancestry to one female.
	2. All modern humans can trace their ancestry to one male.
	3. All modern humans can trace their ancestry to one female and one male
	4. All modern humans can trace their ancestry to a small group of females.
	5. All modern humans can trace their ancestry to a small group of males.

Answer: A

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts: evolution, mitochondrial Eve

44. Which of the following statements about mitochondrial Eve is TRUE?

* 1. Mitochondrial Eve lived in western Asia.
	2. Mitochondrial Eve lived about 200,000 years ago.
	3. Mitochondrial Eve is the ancestor of modern women but not men.
	4. Mitochondrial Eve represents a small group of unrelated women.
	5. Mitochondrial Eve was traced through analysis of nuclear DNA.

Answer: B

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:evolution, mitochondrial Eve



45. The table illustrates the ancestry of a human female (F Current Generation). The Fs represent female ancestors; the Ms are males. GGM means great-grandmother; GGF means great-grandfather. Individuals in the top row are great-great grandparents. Each set of parents is shown directly above its offspring.

Which of the following correctly identifies the number of nuclear DNA and mtDNA ancestors the female has based on this table?

1. She has 8 nuclear DNA ancestors and 8 mtDNA ancestors.
2. She has 1 nuclear DNA ancestor and 1 mtDNA ancestor.
3. She has 16 nuclear DNA ancestors and 8 mtDNA ancestors.
4. She has 16 nuclear DNA ancestors and 1 mtDNA ancestor.
5. She has 1 nuclear DNA ancestor and 8 mtDNA ancestors.

Answer: D

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Medium

Important Words/Concepts: evolution, mitochondrial Eve

46. Mitochondrial Eve is

1. the only human woman whose children survived and reproduced to ultimately give rise to all humans alive on the planet today.
2. the most recent ancestor from whom all humans today inherited their nuclear DNA.
3. the most recent common ancestor from whom all humans today inherited their mitochondrial DNA**.**
4. the earliest human female to arise on the planet.
5. All of the above.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Medium

Important Words/Concepts: evolution, mitochondrial Eve

47. Which is TRUE of mitochondrial DNA?

1. Mitochondrial DNA is found in the sperm’s tail.
2. Mitochondrial DNA from the sperm is not found in the fertilized egg.
3. Mitochondrial DNA can be traced for many generations.
4. A son cannot pass his mother’s mitochondrial DNA to his progeny.
5. All of the above.

Answer: E

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:mitochondrial Eve and human evolution

48. Mitochondrial DNA can be used to trace matrilineal evolutionary history because

1. the Y chromosome has more mutations.
2. there are fewer mutations than nuclear DNA.
3. there is no recombination between male and female mitochondrial DNA.
4. mitochondrial DNA is passed from both parents.
5. it is impossible to analyze nuclear DNA because of meiosis.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts: mitochondrial Eve and human evolution

49. Which offspring would not inherit their mother’s (maternal) mitochondria?

1. daughter
2. son
3. daughters’ daughter
4. son’s daughter
5. daughter’s son

Answer: D

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Easy

Important Words/Concepts:mitochondrial Eve and human evolution

50. How is mitochondrial DNA different from nuclear DNA?

*Answer:* It is inherited only from the mother, and it does not undergo recombination.

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts:mitochondrial DNA

51. A woman has a child but does not know the identity of the father. The mitochondrial DNA sequences are shown below.

Child: CGAATCTG

Man 1: CGAATCTG

Man 2: CGTATCTG

Man 3: CGTATCTA

Based on these data, what do you conclude?

1. Man 1 is the father.
2. Man 2 is the father.
3. Man 3 is the father.
4. None of these men could be the father.
5. The father cannot be determined.

Answer: E

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Hard

Important Words/Concepts:mitochondrial DNA

52. Why is mitochondrial DNA inherited only from the mother?

*Answer:* Mitochondrial DNA is inherited only from the mother because the egg contributes all the cytoplasm and organelles, including mitochondria, to the developing embryo. Sperm only contribute nuclear DNA.

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts:mitochondrial DNA

53. Which of the following BEST describes mitochondrial inheritance in humans?

1. Mitochondria are inherited only from the mother. Once the mitochondrion from the sperm enters the egg, it is inactivated. Only maternal mitochondria divide as the fertilized egg divides.
2. Mitochondria are inherited only from the mother. Sperm don’t have mitochondria, only eggs do.
3. Mitochondria are inherited only from the mother. Sperm mitochondria aren’t contained in the head of the sperm, which is the only part that penetrates the egg.
4. Mitochondria are inherited only from the father. Eggs don’t have mitochondria, but sperm do.
5. Mitochondria are inherited from both parents. Both eggs and sperm contain mitochondria, so every cell in a human body includes both paternal and maternal mitochondria.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Medium

Important Words/Concepts: mitochondrial DNA

54. A man and a woman have two sons and three daughters. Each son has three daughters. Each daughter has one son. In how many of her grandchildren are the mother’s mitochondria found?

1. 0
2. 3
3. 6
4. 12
5. This can’t be answered with the information provided.

Answer: A

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Medium

Important Words/Concepts: mitochondrial DNA

55. The ancestral population of humans lived in

1. Africa.
2. Asia.
3. Pangaea.
4. northern Europe.
5. Australia.

Answer: A

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts: human migration from Africa

56. The oldest know fossils of modern humans found in eastern Africa date to

1. 75–100,00 years ago.
2. 50–75,000 years ago.
3. 160–195,000 years ago.
4. 25–50,000 years ago.
5. 200–300,000 years ago.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:human migration from Africa

57. What are at least two reasons scientists have for believing humans evolved in Africa?

*Answer:*

There are more mutations in mitochondrial DNA in people from Africa, suggesting an old lineage with more time to accumulate mutations.

There is more diversity in the nuclear DNA of people from Africa, suggesting an old lineage with more time to accumulate mutations.

Fossils of the oldest modern humans have been found in Ethiopia, and these fossils date to the time when mitochondrial Eve is believed to have lived.

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts:evolution

58. Scientists use genetics to trace the evolution and migration of humans. How do scientists know which populations are older than others?

* 1. Members of older populations have identical mitochondrial genomes.
	2. Members of older populations have more genes in their mitochondrial genomes.
	3. Members of older populations have more genetic variability.
	4. Members of older populations have fewer nuclear genes.
	5. Members of older populations have more nuclear genes.

Answer: C

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts:evolution

59. Which of the following describes the migration of humans in order from oldest populations to youngest populations?

1. Western Europe→Africa→Eastern Europe→North America→South America
2. Northeast Europe→Western Europe→Africa→South America→North America
3. Africa→Western Europe→South America→North America→Northeast Europe
4. Africa→Northeast Europe→Western Europe→North America→South America
5. Africa→Western Europe→Northeast Europe→North America→South America

Answer: E

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Easy

Important Words/Concepts:evolution

60. Put in order the timeline of migration of humans from earliest to most recent, across the globe.

1. Africa, Oceania, Asia, Europe, and America
2. Africa, Asia, Oceania, Europe, and America
3. Asia, Africa, Oceania, Europe, and America
4. Africa, Asia, Oceania, America, and Europe
5. Oceania, Africa, Asia, Europe, and America

Answer: B

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts: human migration from Africa

61. Less genetic variation is found outside Africa because of

1. decreased mutation rate.
2. increased mutation rate.
3. loss of alleles.
4. founder effect.
5. genetic drift.

Answer: D

DQ: Where did the earliest humans evolve, and how do we know?

Type: Know It

Difficulty: Hard

Important Words/Concepts: human migration from Africa

62. Anatomically modern humans

1. left Africa 150–200,000 years ago and arrived in both western Europe and Australia around 40,000 years ago—before they arrived in North or South America.
2. left Africa 200–500,000 years ago and arrived in both western Europe and Australia around 40,000 years ago**—**before they arrived in North or South America.
3. left Africa 150–200,000 years ago and arrived in western Europe first, followed by eastern Europe, Asia, and Australia.
4. left Africa 200–500,000 years ago and arrived in western Europe first, followed by Eastern Europe, Asia, and Australia.
5. left Africa around 3.5 million years ago and arrived simultaneously in western Europe, Australia, and Asia, around 1 million years ago.

Answer: A

DQ: Where did the earliest humans evolve, and how do we know?

Type: Use It

Difficulty: Medium

Important Words/Concepts: human migration from Africa

63. Hominids include

1. living humans, orangutans, chimpanzees, and gorillas,
2. living and extinct great apes, orangutans, chimpanzees, and gorillas.
3. extinct great apes, humans, orangutans, chimpanzees, and gorillas.
4. living great apes, humans, orangutans, chimpanzees, and gorillas.
5. living and extinct great apes, humans, orangutans, chimpanzees, and gorillas.

Answer: E

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:hominid evolution

64. The most recent common ancestor of modern day humans is the

1. orangutan.
2. monkey.
3. gorilla.
4. great ape.
5. chimpanzee.

Answer: E

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts: hominid evolution

65. Chimpanzee and human divergence occurred

1. 6 million years ago.
2. 13 million years ago.
3. 50–100,000 years ago.
4. 1 million years ago.
5. 6 million years ago.

Answer: A

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts: hominid evolution

66. Modern humans and present-day apes shared a common ancestor

1. 6 million years ago.
2. 13 million years ago.
3. 50–100,000 years ago.
4. 1 million years ago.
5. 6 million years ago.

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts: hominid evolution

67. List at least three features of *Australopithecus* that made them different from previous hominids.

*Answer:*

They were the first tool users.

They walked upright.

They did not have an opposable big toe, so they did not live in trees,

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts:evolution

68. The first tool users were members of genus

1. *Ardipithecus*
2. *Australopithecus*
3. *Homo*
4. *Paranthropus*
5. *Pan*

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution

69. Place the following evolutionary milestones in order from first to most recent.

* 1. ability to walk upright→tool use→use of fire→big brain
	2. ability to walk upright→use of fire→tool use→big brain
	3. ability to walk upright→big brain→tool use→use of fire
	4. big brain→ability to walk upright→tool use→use of fire
	5. big brain→tool use→ability to walk upright→use of fire

Answer: A

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts: evolution

70. Members of family Hominidae include

1. all monkeys.
2. all monkeys and all baboons.
3. all monkeys and the great apes.
4. all monkeys, all baboons, and the great apes.
5. just the great apes.

Answer: E

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts: evolution

71. The family tree that includes humans and chimpanzees is BEST described how?

1. As a simple tree with two branches—one leading to chimps and one leading from early to modern humans. Only one species of early human was present on Earth at a time.
2. As a complex tree with two major branches—one leading to chimps and one leading to modern humans. The “human” tree itself has many branches, and multiple early human species were present at various times during human evolution**.**
3. As a complex tree with three major branches—one leading to chimps, one leading to Neanderthal Man, and one leading to modern humans. Only one species of early human was present on Earth at a time.
4. As a complex tree with two major braches—one leading to chimps and one leading to modern humans. The “human” tree has many branches, but only one species of early human was present on Earth at a time.
5. As a complex tree with many major branches—one to chimps and one to each of many early human species. A dozen or more early human species were present on Earth before anatomically modern humans arose.

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Use It

Difficulty: Medium

Important Words/Concepts: evolution

72. Which of the following correctly lists important steps in human evolution in the correct order, from earliest to most recent?

1. big brain, upright walking, tool use, control of fire
2. big brain, upright walking, control of fire, tool use
3. upright walking, big brain, tool use, control of fire
4. upright walking, tool use, control of fire, big brain
5. upright walking, big brain, control of fire, tool use

Answer: D

DQ: What can we learn about human evolution from the fossil record?

Type: Use It

Difficulty: Medium

Important Words/Concepts: evolution

73. Positive selection on a population confers

1. heterozygote advantage.
2. increased fitness.
3. decreased reproduction.
4. increased strength and reproductive success.
5. All of the above.

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:hominid evolution

74. The term “survival of the fittest” refers to

1. heterozygote advantage in an environment.
2. the strongest competing and surviving in an environment.
3. the most reproductively successful in an environment.
4. the strongest surviving and reproducing in an environment.
5. the weakest being unable compete for resources and dying in an environment.

Answer: C

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:hominid evolution

75. If a population undergoes negative selection, the allele frequency will

1. become fixed.
2. stay the same.
3. increase.
4. decrease.
5. fluctuate.

Answer: D

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:hominid evolution

76. Why would a harmful allele be maintained in a population?

1. Heterozygotes have increased fitness.
2. Homozygotes survive and reproduce.
3. It would be a dominant phenotype.
4. There is a lack of reproductive partners who are unaffected.
5. There is a lack of genetic diversity in the population.

Answer: A

DQ: What can we learn about human evolution from the fossil record?

Type: Use It

Difficulty: Easy

Important Words/Concepts:hominid evolution

77. Mutations are

* 1. usually detrimental.
	2. usually neutral.
	3. usually beneficial.
	4. necessary for evolution.
	5. usually weeded out of a population.

Answer: D

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:natural selection

78. Which of the following statements about natural selection is TRUE?

* 1. Natural selection is a random process.
	2. Natural selection acts on phenotypes that are controlled by genes.
	3. Natural selection adapts a species to its environment, but it is not the process by which new species evolve.
	4. Natural selection changes the frequency of alleles in an individual.
	5. Natural selection operates independently of the environment.

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts:natural selection

79. What does it mean to say that an allele is “fixed” in a population? What could lead to such a fixed allele?

*Answer:* When an allele is “fixed” in a population, it means that nearly 100% of the individuals in that population have the same allele. This is likely to happen when an allele confers such an advantage on an individual that the individual is able to leave more offspring than those without the allele, and eventually those children with the allele will outcompete all others.

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts: natural selection

80. All of the following are TRUE of natural selection, EXCEPT

* 1. the environment plays a large role.
	2. natural selection acts upon phenotypes that are controlled by genes.
	3. individuals with advantageous mutations will leave more offspring than those without the mutation.
	4. a mutation that is advantageous to an individual will be advantageous to all individuals in all environments.
	5. as a result of natural selection, allele frequencies in a population change.

Answer: D

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Easy

Important Words/Concepts:natural selection

81. A gene that has been favored by natural selection

* 1. will be found in both nuclear and mitochondrial DNA.
	2. will have less sequence variation than average.
	3. will have a longer sequence than average.
	4. will be translated more often than average.
	5. will always display dominant inheritance.

Answer: B

DQ: What can we learn about human evolution from the fossil record?

Type: Know It

Difficulty: Hard

Important Words/Concepts:natural selection

82. You are examining a gene that controls the amount of enamel deposited on teeth. You collect DNA from two populations. Approximately 99% of the individuals in population A are homozygous for the same allele. In population B, however, there are 15 different alleles for this gene. What can you conclude about this gene?

*Answer:* If 99% of the individuals are homozygous for the same allele in population A, then this gene underwent strong natural selection and the allele likely confers an advantage to people living in this environment. On the other hand, the fact that there are 15 different alleles for the same gene in population B indicates that this gene has not undergone intense natural selection, and no one allele offers a significant advantage in this environment.

DQ: What can we learn about human evolution from the fossil record?

Type: Use It

Difficulty: Hard

Important Words/Concepts:natural selection

83. A mutation arises in a population of humans that allows them to digest milk from domesticated cattle. The trait is favorable and increases in frequency over time. This is an example of

1. positive selection.
2. negative selection.
3. stabilizing selection.
4. neutral selection.
5. disruptive selection.

Answer: A

DQ: What can we learn about human evolution from the fossil record?

Type: Use It

Difficulty: Medium

Important Words/Concepts: natural selection

84. If the first humans in Africa developed a mutation that allowed them to make vitamin D without sunlight, how do you think that would have affected skin color in modern humans across the world?

*Answer:* If early humans had a mutation that allowed them to make vitamin D without sunlight, then modern humans across the world would likely all have dark skin. Because there would still be less of a need to protect folate from UV radiation in northern climates, however, these areas could show a wider variation in skin color because the genes controlling skin color would be under less environmental pressure, thus allowing for mutations to arise which would not be selected against.

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Hard

Important Words/Concepts: folate, natural selection, vitamin D

85. If humans had evolved in northern climates, what do you think humans would look like today in terms of body hair and skin pigmentation?

*Answer:* If humans had evolved in northern climates, those populations would likely have retained their body hair and light skin. As they migrated to other, more southerly regions, some populations are likely to have lost their body hair as an adaptation to the increased warmth of southern latitudes. These people would then have faced the problem of folate degradation due to high UV exposure, so these populations would have also evolved darker skin. Thus, modern humans may have had races that differ not only in skin color, but also in their amount of body hair.

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Hard

Important Words/Concepts: folate, natural selection



86. The map illustrates the positions of human populations as they existed 5,000 years ago (i.e., after they migrated out of Africa and were well established in their environments). In which populations would skin color have been darkest?

1. 1, 2, and 3
2. 1, 2, and 5
3. 1, 3, and 4
4. 1, 5, and 6
5. 1, 3, and 6

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: folate, natural selection, vitamin D

87. Consider human populations living in equatorial South America, who arrived there via North America in a migration that took them from Africa, through Europe, across the Bering Land Bridge into North America, and south to their current location. How, if at all, would skin color have changed over the course of this long migration?

1. Skin color would have been dark in populations migrating out of Africa, lightened as populations were established in northern regions, then darkened again as populations were established in South America.
2. Skin color would have been dark in populations migrating out of Africa. It would not have changed as populations expanded to South America because natural selection would not have had time to select for different skin colors.
3. Skin color would have been dark in populations migrating out of Africa, lightened as populations were established in northern regions, then remained light until populations had been established in South America for at least 10,000 years.
4. Skin color would have been dark in populations migrating out of Africa, remained dark as populations expanded into North America, then become even darker as populations expanded into South America.
5. Skin color would not have changed because the same selection pressures operate in South America than do in Africa.

Answer: A

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: folate, natural selection, vitamin D

88. Which of the following BEST describes the evolutionary basis for variation in human skin color?

1. Skin color is lighter at high latitudes than it is toward the equator. UV radiation is weaker at high latitude, so we don’t need to protect against the breakdown of folate. Lighter skin color permits enough UV to be absorbed to build vitamin D.
2. Skin color is lighter at high latitudes than it is toward the equator. UV radiation is weaker at high latitude, so we need light skin to allow the buildup of folate. UV radiation is too weak to break down vitamin D.
3. Skin color is darker near the equator. UV radiation is stronger there, so we need dark skin to protect us from folate breakdown. Enough UV radiation will still be absorbed to provide enough vitamin D.
4. Skin color is darker near the equator. UV radiation is stronger there, so we need dark skin to protect against vitamin D breakdown. Enough UV radiation will still be absorbed to provide enough folate.
5. A and C together make up the best explanation.

Answer: E

DQ: What contributes to human skin color, and why is there so much variation in skin color among different populations?

Type: Use It

Difficulty: Medium

Important Words/Concepts: folate, natural selection, vitamin D