

# CHAPTER 13 HOW POPULATIONS EVOLVE ANSWER KEY

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**What would be true regarding any fossils found in strata at the top versus fossils found in lower strata?** Relative dating places fossils in a temporal sequence by noting their positions in layers of rocks, known as strata. As shown in the diagram, fossils found in lower strata were deposited earlier and thus must be older than fossils in higher strata (this principle is known as superposition).

**Would a jellyfish be likely to leave behind a fossil?** Fossil jellyfish are rare because they have no bones or other hard parts to turn into fossils. Instead, scientists have to look for so-called "soft fossils," when organisms are quickly buried in sediment, leaving an imprint in the rock.

**Which of the following can be passed onto offspring from their parents?** Parents pass on traits or characteristics, such as eye colour and blood type, to their children through their genes. Some health conditions and diseases can be passed on genetically too. Sometimes, one characteristic has many different forms. For example, blood type can be A, B, AB or O.

**Does a population of bacteria contains no members with resistance to penicillin?** A population of bacteria contains no members with resistance to penicillin. Several generations pass with the bacteria reproducing. A researcher adds penicillin to the population of bacteria and discovers a few bacteria remain after the application of the antibiotic.

**How are fossils found in strata useful?** Because of their layered form, strata allow geologists to determine relative time (that is, sequence of deposition of each layer, and thus the relative age of the fossils in each layer): Principle of Original

Horizontality: because strata are deposited under gravity, they form horizontal layers.

**Which conclusion can be made when comparing fossils found in different layers of undisturbed sedimentary rock?** 76 In studying undisturbed sedimentary rock, scientists assume that each layer is older than all the layers, or strata, above it. Thus, fossils in the lower strata are older than fossils in overlying strata.

**What did jellyfish fossils prove?** The specimens are evidence of how little the squishy, tentacled predators have changed over the history of life on Earth. Jellyfish have been floating through Earth's oceans seemingly forever.

**What was the first jellyfish?** Oldest known species of jellyfish discovered in the Canadian Rockies. An artist's depiction shows a group of Burgessomedusa phasmiformis jellyfish as they appeared millions of years ago.

**What are four reasons why natural selection cannot produce perfect organisms?**

**When conditions exist that favor phenotypes at the extremes and not intermediate phenotypes?** Diversifying (or disruptive) selection: Diversifying selection occurs when extreme values for a trait are favored over the intermediate values. This type of selection often drives speciation. Diversifying selection can also occur when environmental changes favor individuals on either end of the phenotypic spectrum.

**Which of these is the smallest unit that natural selection can change?** Over time, these advantageous traits become more common in the population. Thus, the smallest unit that can evolve through natural selection is the population.

**Which type of natural selection shifts the overall makeup of a population toward one extreme of a phenotype by acting against the other extreme of the phenotype?** In population genetics, directional selection is a type of natural selection in which one extreme phenotype is favored over both the other extreme and moderate phenotypes.

**Does natural selection work best in a genetically uniform population?** Genetic Variation is Essential for Evolution by Natural Selection. For natural selection to occur, a population must have a wide variety of individuals with different traits. For

example, natural selection would not influence fish body color if all individuals in a population were exactly the same color.

**Which is more harmful, gram-positive or gram-negative?** Gram-negative bacteria are more harmful than gram-positive bacteria. This is because gram-negative bacteria have a hard, protective outer shell, which makes them more resistant to antibiotics and hence harder to kill.

**Which factor leads to genetic drift rather than natural selection?** Unlike natural selection, genetic drift describes the effect of chance on populations in the absence of positive or negative selection pressure. Through random sampling, or the survival or and reproduction of a random sample of individuals within a population, allele frequencies within a population may change.

**Are fossils found in lower rock layers older than those found in upper layers?** The principle of superposition states that in an undeformed sequence of sedimentary rocks, each layer of rock is older than the one above it and younger than the one below it (Figures 1 and 2). Accordingly, the oldest rocks in a sequence are at the bottom and the youngest rocks are at the top.

**Is a fossil in upper rock strata more recently formed than a fossil in lower rock strata?** The law of superposition states that rock strata (layers) farthest from the ground surface are the oldest (formed first) and rock strata (layers) closest to the ground surface are the youngest (formed most recently). A fossil is the remains or traces of plants and animals that lived long ago.

**How do the fossils in the upper layers of a geologic column differ from those in the lower older layers?** Fossils in the upper, more-recent layers resemble modern plants and animals. Most of the fossils in the lower, older layers are of plants and animals that are different from those living today. In fact, many of the fossils discovered in old layers are from species that have been extinct for millions of years.

**What does the order of fossils in rock strata reveal to researchers?** As sediments carried by wind and water accumulate, they bury older layers—so the bottom layers in a geological sequence are usually the oldest and the top layers the youngest. Paleontologists can thus put fossils in chronological order without knowing the actual age of each specimen.

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## Statistics and Probability Questions for Physics and Mathematics Tutors

### Paragraph 1

- **Question:** A particle has a 25% chance of being found in a particular region of space. What is the probability that a measurement will find the particle in this region?
- **Answer:** 0.25

### Paragraph 2

- **Question:** A radioactive isotope has a half-life of 10 days. If there are initially 1000 atoms of the isotope, how many atoms will remain after 20 days?
- **Answer:** 250

### Paragraph 3

- **Question:** A box contains 10 identical balls, 5 of which are red. If two balls are drawn randomly from the box without replacement, what is the probability that both balls are red?
- **Answer:**  $1/9$

### Paragraph 4

- **Question:** A coin is tossed 10 times. What is the probability that it lands on heads exactly 5 times?
- **Answer:**  $(10!)/(5! \ 5!) (1/2)^{10} = 252/1024$

### Paragraph 5

- **Question:** A particle is moving in a circular orbit. If the particle has a constant speed, what is its acceleration?
- **Answer:** Centripetal acceleration,  $a = v^2/r$ , where  $v$  is the speed and  $r$  is the radius of the orbit.

Eminem, the iconic rapper and cultural phenomenon, has led a remarkable life filled with both triumphs and tribulations. **Whatever You Say I Am: The Life and Times of Eminem** by Anthony Bozza delves into the rapper's enigmatic persona and the profound impact he has had on the music industry.

### **How Did Eminem Rise to Stardom?**

Eminem's career began in the late 1990s when he signed with Dr. Dre's Interscope Records. His breakout album, "The Slim Shady LP" (1999), catapulted him to international fame with its raw, controversial lyrics and introspective themes. Eminem's subsequent albums, including "The Marshall Mathers LP" (2000) and "The Eminem Show" (2002), cemented his status as one of the greatest rappers of all time.

### **What Contributed to Eminem's Controversial Image?**

Eminem's lyrics often explored dark and taboo subjects, such as violence, drug abuse, and mental illness. This led to both admiration and condemnation from the public. His alter ego, Slim Shady, became a symbol of rebellion and outrage, while also making him the subject of intense scrutiny and criticism.

### **How Has Eminem's Music Impacted Society?**

Eminem's music has resonated deeply with audiences around the world, particularly those struggling with social isolation, depression, and other challenges. His lyrics have sparked conversations about mental health, poverty, and the complexities of life. Through his honest and unflinching storytelling, Eminem has become a voice for the marginalized and a cultural touchstone for a generation.

### **What are Some of Eminem's Major Accomplishments?**

Eminem has achieved numerous accolades throughout his career, including 15 Grammy Awards, an Academy Award for Best Original Song, and induction into the Rock and Roll Hall of Fame. He is one of the best-selling artists of all time, with over 220 million records sold worldwide. His influence extends beyond music, with appearances in films such as "8 Mile" (2002) and "Southpaw" (2015).

## **What is the Legacy of Eminem's Music?**

Eminem's music continues to inspire and provoke audiences. His raw lyrics, infectious beats, and ability to capture the complexities of the human experience have cemented his status as one of the most influential and iconic artists of the modern era. **Whatever You Say I Am: The Life and Times of Eminem** provides an intimate and revealing look into the life and work of the enigmatic rapper, offering a deeper understanding of his struggles, triumphs, and enduring impact on the world.

## **How do I pass a macroeconomics exam?**

**What are the main questions in macroeconomics?** Macroeconomics examines economy-wide phenomena such as inflation, price levels, rate of economic growth, national income, gross domestic product (GDP), and changes in unemployment. Some of the key questions addressed by macroeconomics include: What causes unemployment? What causes inflation?

**Is the macroeconomics exam hard?** So, is AP Macroeconomics hard? Based on its curriculum, previous students' opinions, and the course's 5 rate, AP Macro is a medium-difficulty AP course. But remember: each student will experience AP Macro a little bit differently based on their skills, where they go to school, and who their teacher is.

**How many questions are on the macro exam?** The AP Macro exam lasts 2 hours and 10 minutes and consists of two sections. The first is the multiple-choice (MCQ) section, which has 60 questions, while the second is the free-response (FRQ) section, which has 3 questions.

**Is macroeconomics hard or easy?** The following chart reveals that the AP Macroeconomics pass rate is about 8% lower than the average for all AP exams, while the number that achieved the perfect score aligns with the average. These numbers suggest that AP Macroeconomics falls into the slightly harder than average range.

## **What is a passing grade for macroeconomics?**

## **What are the five 5 basic economics questions?**

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**What are the 3 main questions of economics?** Economics is the study of the production, distribution, and consumption of goods and services. Economists address these three questions: (1) What goods and services should be produced to meet consumer needs? (2) How should they be produced, and who should produce them? (3) Who should receive goods and services?

**What are the 4 basic questions of economics?**

**What is the pass rate for the macroeconomics exam?** The overall average pass rate for the AP Macro exam is 63.2%, while the average pass rate for all AP exams combined is 71.13%. That means that statistically speaking, the AP Macro exam is about 8% “harder” than the average AP exam.

**Why is macroeconomics so hard to teach?** Macroeconomics is difficult to teach partly because its theorists (classical, Keynesian, monetarist, New Classical and New Keynesian, among others) disagree about so much. It is difficult also because the textbooks disagree about so little.

**Is macroeconomics a lot of math?** There are many diagrams in economics, but there is not a large amount of math. A proviso: The amount of math in the economics curriculum varies across colleges and universities. Some economics departments do not require their students to learn much math or statistics, but others do.

**How do I ace macroeconomics exam?**

**How to pass macroeconomics?**

**Is Macro or micro exam easier?** Pass rates on the respective AP exams also suggest that Macroeconomics is slightly more challenging. On the 2023 AP exams, 68% of Microeconomics students passed the AP test with a score of three or better, while only 64.7% of Macroeconomics students did the same.

**What is the pass rate of macroeconomics?** The overall average pass rate for the AP Macro exam is 63.2%, while the average pass rate for all AP exams combined is 71.13%. That means that statistically speaking, the AP Macro exam is about 8% “harder” than the average AP exam.

## How can I pass my economics exam?

**What percent is a 5 on the AP Macro exam?** 30-44% = 2. 45-59% = 3. 60-74% = 4. 75% or more = 5.

## How to do well on a microeconomics exam?

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