

Student name: _____

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

Scientists don't have any way to estimate the age of the universe.

true

false

The abundant surface water on Earth is one major aspect of its uniqueness in the solar system.

true

false

Because geologists cannot directly sample Earth's interior, it is impossible for us to know the internal composition or structure of Earth.

true

false

The most dense minerals are concentrated in Earth's core.

true

false

Organisms with hard parts became widespread about 541 million years ago, as indicated by the rock record.

true

false

Anatomically modern human remains appear quite late in the geologic record, about 300,000 years ago.

true

false

World population growth rate is currently highest in Asian countries.

true

false

Population growth rates are fastest in technologically advanced countries.

true

false

At present (2021) growth rates, the doubling time of the world's population is about 70 years.

true

false

Exporting U.S. agricultural production methods to the rest of the world might increase food production but would also increase energy demands.

true

false

Arable land is in abundant supply on Earth.

true

false

World population has now stabilized because of limitations imposed by resource shortages.

true

false

Our estimates of Earth's carrying capacity for humans vary widely because, in part, of different assumptions in farmland productivity.

true

false

The seriousness of many environmental problems is a direct result of the large number of humans interacting with the environment.

true

false

When a population is growing exponentially, it is increasing by a fixed percentage per unit time.

true

false

Africa will likely experience relatively large population growth in the next 30 years.

true

false

The continents have remained stable and virtually unchanged since they formed.

true

false

Geologic processes occur in distinct, unconnected cycles of air, water, and rock.

true

false

CHECK ALL THE APPLY. Choose all options that best completes the statement or answers the question.

Check all the current issues that geologists play a direct role in addressing.

Flooding

Earthquake hazards

Mineral resources

Pandemics

Which of these regions are expected to have a smaller percentage of the total world population in 2050 than they did in 2020?

Asia

Africa

Europe

North America

What are two of the primary concerns with growing genetically engineered foods to feed large populations of people?

Poor nations may not be able to afford specially developed seeds or animal strains.

Less crop diversification may lead to devastating losses from new pests or diseases.

All genetically engineered foods are untested and unsafe.

Genetically engineered foods require more water to grow.

Carrying capacity involves many resources, including land. Which of these correctly explain the relationship of land and carrying capacity?

Not all land is inhabitable, and there are only so many people than can live within a single square kilometer of land.

Land is needed to dispose of waste that humans create.

There are many types of land that are hazardous to inhabit because of the underlying geology.

All land is roughly equal, so there is no need for us to plan on how to best use it.

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

Evidence that the universe originated in a nearly instantaneous expansion we call the "big bang" includes the

differences in planetary compositions.

observation that stars are moving apart.

fact that stars radiate energy.

All of these choices are correct.

Which of these best describes the formation of the planets in our solar system?

They formed from the same cloud of gas and dust as the Sun.

They formed in different places outside the solar system and were gravitationally drawn to the Sun.

They formed billions of years after the Sun formed.

They were ejected from the very young Sun as molten matter.

The compositions of the planets

are all very similar, so other planets may be able to support life or provide needed resources.

are entirely unknown; geologists cannot judge their similarity to Earth.

were originally all the same but have been changed by radiation from the Sun over the life of the solar system.

were determined largely by the distance from the Sun at which each formed.

Earth is approximately _____ billion years old.

4.5

4.0

7.5

1.0

The presence of free oxygen in the atmosphere is attributed mainly to which of the following?

volcanic activity

photosynthesizing cyanobacteria

formation of the inner core

interaction of the air and the ocean surface

Human beings, as the species *Homo sapiens*, have existed on Earth for _____ of Earth's history.

much less than 1%

about 1%

about 10%

about 25%

Which of the following has existed unchanged from the time of Earth's formation to the present?

continents

the sea floor

the atmosphere

None of these has remained unchanged.

Considerations that complicate our understanding of geologic processes include the very long times required for some kinds of changes to occur.

fact that many different events may have affected one rock during its history.

fact that it may be difficult to relate the results of controlled laboratory experiments to natural systems.

All of these choices are correct.

A scientific hypothesis that is extensively tested and continues to appear valid may then be called a

scientific method.

theory.

fact.

prediction.

The best definition for a scientific explanation of a geologic phenomenon that has not been rigorously tested is a

theory.

law.

hypothesis.

conjecture.

As population increases,

demand for resources will tend to increase.

growing demand for resources will ensure that more will always be found.

natural systems will continue to compensate adequately for such disruptions as pollution.

All of these choices are correct.

The maximum population of a species that an ecosystem can sustain is called

carrying capacity.

limiting capacity.

maximum limiting population.

maximum sustaining population.

A population's doubling time

increases as life expectancy increases.

is the length of time required for that population to double in size.

will be 50 years if the population grows at 2 percent per year.

All of these choices are correct.

In which of the following areas is population growth presently most rapid?

North America

the former Soviet Union

Europe

Africa

The average global population growth rate is _____ per year.

10 percent

3 percent

1 percent

zero

Which of the following statements associated with access to natural resources is not true?

If all of the world's people enjoyed a standard of living similar to that in the United States, resource consumption would increase dramatically.

People are unevenly distributed around the world, but resources are uniformly distributed among nations.

Political considerations may affect resource availability.

Increasing resource use is generally accompanied by increasing production of waste.

The Big Bang occurred _____ years ago.

about 14 billion

2 million

4.5 billion

450 million

Earth and the rest of our solar system formed approximately _____ years ago.

10 to 15 billion

2 million

4.5 billion

450 million

The two most abundant elements in the crust are

magnesium and potassium.

iron and aluminum.

sodium and calcium.

oxygen and silicon.

Earth's internal layers, in order from outermost to innermost, are

core, mantle, crust.

crust, core, mantle.

mantle, crust, core.

crust, mantle, core.

Earth's core is composed mostly of

ferromagnesian silicates.

iron.

aluminosilicates.

potassium-rich silicates.

Which layer within Earth is molten (liquid)?

oceanic crust

outer core

inner core

mantle

Most of the mass of the solar system is concentrated in

Jupiter and Saturn.

Earth.

dark matter.

the Sun.

Continental crust differs from oceanic crust in that it

has a composition more like that of the mantle.

is denser than oceanic crust.

is thinner than oceanic crust.

contains more light minerals than oceanic crust.

Earth's outer core is

solid.

semisolid.

liquid.

gaseous.

Earth's early atmosphere

was similar in composition to the present atmosphere.

consisted mainly of sulfur gases.

consisted mainly of methane and ammonia.

contained little or no oxygen.

Cyanobacteria of the early Earth enriched the atmosphere with oxygen through the life process of chemosynthesis.

photosynthesis.

iron consumption.

sulfur consumption.

Uranus and Neptune are _____ planets.

gas giant

ice giant

inner rocky

dwarf

Which of these planets is the least dense?

Venus

Earth

Saturn

Neptune

One of the biggest challenges in studying geology is

recreating geologic processes in the laboratory.

finding pertinent questions to answers.

making sure to follow the scientific method exactly.

a lack of field sites available to be studied.

How does a professional geologist most likely incorporate the scientific method in their research?

They follow a distinct set of rules in a distinct order.

They can decide to follow or not follow the scientific method, depending on how difficult their research is.

They incorporate the best practices of the scientific method to make sure their research is acceptable to the wider scientific community.

They hand pick a few of the tenets of the scientific method that best fit the desired outcome.

What region currently has a negative growth rate?

Europe

North America

Africa

Latin America and the Caribbean

Human population reached 1 billion around the year

1800

1900

2000

1700

The growth rate of Africa has been increasing, which also means the population doubling time is also increasing.

decreasing.

not changing.

Which of these countries is projected to have the highest increase in population (by %) by 2050?

Israel

Saudi Arabia

Poland

Bulgaria

Given a defined amount of arable land, what is the major limitation on the amount of people that can be fed from that land?

The availability of freshwater.

The distance of the land from city centers.

The type of crops grown on that land.

The exact type of soil involved.

What is the relationship between the location of human populations and the location of natural resources?

Human populations are concentrated in areas with large amounts of natural resources.

Human populations and natural resources are both uniformly distributed across Earth's surface.

Human populations and natural resources may coincide, but not for all resources, because both are unevenly distributed.

Dense human populations almost never coincide with the location of natural resources.

What is the relationship between population density and industrialization?

The densest populations always coincide with industrialized areas.

The densest populations often, but not always, coincide with industrialized areas.

The densest populations rarely coincide with industrialized areas.

The densest populations never coincide with industrialized areas.

Natural systems tend toward balance, but currently _____ overwhelming many Earth processes on a timescale that is particularly detrimental to life.

the vast number of people and their activities

massive volcanic activity is

solar flares are

more frequent earthquakes are

The interior of Earth differentiated into layers

on the basis of the density of different materials.

based on the age of formation, i.e., the inner core is the oldest, the outer core is the next oldest, and so on.

only after all the major continents formed.

many times, some being a very different pattern than Earth currently has.

Which characteristics best describe the four planets that formed the farthest from the Sun in our solar system?

high metal and rock content, with little water or gas

large proportion of ice and gas, with no definite surface layer

relatively dense compared to those that are closer to the Sun

surface features that include volcanos, dunes, slumps, and stream channels

Population growth occurs when new individuals are added to the population faster than existing individuals are removed from it. Even when the population growth rate is constant, the number of *individuals* added per unit of time increases over time. This is known as _____ growth.

consistent

exponential

logistic

density

FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

The water cycle, which describes the movement and storage of water in all its forms on Earth, is also called the _____ cycle.

Answer Key

Test name: CH1 Environmental Geology E12

FALSE

Scientists have estimated the age of the universe using various techniques including a back-calculation of the universe's expansion.

TRUE

FALSE

There are many lines of indirect evidence, including data gathered from geophysics and meteorites.

TRUE

The core is mostly iron and nickel, which are both very dense minerals.

TRUE

TRUE

FALSE

Africa has the highest growth rate of about 2.5% per year. Asian countries are at 0.9%.

FALSE

Just the opposite; technology advanced countries tend to have the lowest population growth rates.

TRUE

TRUE

FALSE

Land for growing crops is not in abundant supply.

FALSE

Population is still increasing, even though some resources are in short supply or are disappearing altogether.

TRUE

Estimates range from less than 7 billion to over 100 billion people.

TRUE

TRUE

TRUE

FALSE

Continents are constantly in motion, are being uplifted and eroded, changing in size, but a lot of this happens at rates that are very slow compared to our lifetimes.

FALSE

These processes are connected in many ways.

[A, B, C]

[A, C, D]

[A, B]

[A, B]

B

A

D

A

B

A

D

D

B

C

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A

C

B

A

A

B

B

Even when the population growth rate is constant, the number of *individuals* added per unit of time increases over time. This is called **exponential growth**, a concept to which we will return when discussing resources in Section 4. The effect of exponential growth is similar to interest compounding.

hydrologic