Chapter 8 Note Outline

Chapter 8 Section 1 Objectives: Evidence of the Past

1) Explain how fossils are dated.

2) Describe the geologic time scale and the information it provides to scientists.

3) Describe the possible causes of mass extinctions.

4) Explain the theory of plate tectonics. ​

Evidence of the Past

-Paleontologists:

-How can we find out what occurred before early humans were able to write down history?

Fossils

● Fossils are traces or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of once living things.

● Plants, animals, bacteria and fungi.

● Sediments: broken down rock (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) or earth that is transported by water or ice.

● Fossils are preserved in layers of sediment which will become rock.

● Layers of sediment are like the rings in a tree.

The Age of Fossils: How can we determine the age of a fossil? Two ways…

● Relative Dating: Using layers of rock to determine the age of fossils.

● Newer fossils are on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

● Absolute Dating: Finding the approximate age of a fossil by examining the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that make up the fossil

● Carbon dating: Because the parts of an atom are never 100% stable, they will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over a certain amount of time

● The time that it takes ½ of the atoms in a substance to decay is called it’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

● The half-life of carbon is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_years.

The Geologic Time Scale

● The history of life on earth is recorded on a geological time scale.

● It is called “geologic” because most of the information used to make this time scale uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

● It is useful because it can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all of the organisms that have ever lived on Earth.

● This timeline shows us what organisms lived \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and how many years ago.

Divisions in the Geological Time Scale

-The geological time scale is broken down into \_\_\_\_\_\_\_\_, which are broken down further into \_\_\_\_\_\_\_\_\_\_\_\_\_

-Eras begin and end at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that occurred in the Earth’s history.

Mass Extinctions

-Some of the important events that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are called mass extinctions.

​-Extinction:

-Large-scale extinctions where many species may die out are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

-Theories on why mass extinctions happen:

● \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ collision with Earth

● \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of continents

\*\*\* these can only be proven with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ evidence.

The Changing Earth

-Pangea:

- proposed by: Alfred \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the early \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

-Evidence to prove this:

1) Shapes of continents appear to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_together.

2) Fossils of plants and animals on either side of the Atlantic Ocean are very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3) Glaciers had existed in places that now have very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ climates.

Do the Continents Move?

-J. Tuzo Wilson came up with the idea that there were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that made up the Earth’s crust.

-Tectonic Plates: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, push \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ each other.

-This movement causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ formation.

Adaptation in Slow Motion

● Tectonic plates move very\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

● Organisms can usually adapt to the environmental changes that occur because of plate movement.

● Natural disasters can cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ changes and not all organisms and species will survive.

● From fossil evidence, only 1/20 of 1% (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) of all the species that have ever existed on Earth are living today!

● If a species cannot keep up they will go \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!

Chapter 8 Section 2 Objectives: Eras of Geological Time

5) Outline the major developments that allowed for the existence of life in Earth.

6) Describe the different types of organisms that arose during the four eras of the geologic time scale.

Eras of the Geological Time Scale

Each layer of the earth can tell us:

1) The events that occurred when that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was formed.

2) The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that lived during that time.

● Geologic time was divided into \_\_\_\_\_\_\_ eras based on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ events in the history of life on earth.

Precambrian Time

-Began: ​-Ended:

- During this time life began and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the planet.

- Before living organisms occupied the Earth:

- The atmosphere lacked oxygen but was rich with nitrogen, carbon dioxide, hydrogen and carbon monoxide.

- Violent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ were common.

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bombarded the surface of the Earth.

How did Life Begin?

-Based on scientific evidence, scientists hypothesize that life developed from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter.

​- Chemicals, gases in the atmosphere and energy emitted by lightning.

- Small complex \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ floated in the ancient oceans and combined to become more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- These molecules became the first true \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

​- Anaerobic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (cyanobacteria).

Earth’s First Pollution

- Cyanobacteria showed up about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years ago.

- The atmosphere was mostly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Cyanobacteria: bacteria that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ food from the sun.

- Cyanobacteria produced so much \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that it changed the Earth’s atmosphere.

​- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Radiation Shield

-About 2 billion years ago: the first \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells appeared in the fossil record.

​- Eukaryote: has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a complicated internal structure.

- Over the next 2.5 billion years, eukaryotic cells evolved into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms.

The Paleozoic Era

-Began: ​-Ended: ​

- Paleozoic =

- Common Paleozoic organisms include:

New Organisms

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, fungi and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ animals came onto dry land during the Paleozoic era. ​

- All major plant groups except for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plants covered the Earth at this time.

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ were the first land-dwelling animals followed by small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/ reptile-like animals.

- Near the end of the Paleozoic animals appeared:

Paleozoic Mass Extinction

-About \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ million years ago there was a mass extinction. ​

- \_\_\_\_\_\_\_% of marine species died out.

- Plant, reptile and marine species that survived were the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for all Mesozoic species.

- Because of the new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ there was a burst of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to start the Mesozoic era.

The Mesozoic Era

-Began: ​-Ended:

-Mesozoic =

- The Mesozoic is also referred to as the “ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”

- Animals and plants branched off dramatically from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Life on Land

- Early Mesozoic: large land-dwelling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, large forests of \_\_\_\_\_\_\_\_\_\_\_\_\_\_- bearing trees.

- Late Mesozoic: first \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and flowering plants appeared.

Mesozoic Mass Extinction

-After \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ million years, a large \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hit the Earth and

generated large \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ clouds and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

​- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was blocked from reaching the Earth.

​- Plants could not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

​- The Earth’s climate became \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Only a few living things survived this mass extinction including small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- These surviving organisms are the ancestors of all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ today.

The Cenozoic Era

-Began: ​- Ended:???​

- Cenozoic =

- Common Cenozoic organisms include:

- Fossils give us evidence to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species that are now extinct.

Chapter 8 Section 3 Objectives: Human Evolution

7) Discuss the shared characteristics of primates.

8) Describe what is known about the differences between hominids.

Human Evolution

-Evidence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ evolution is the same for all living organisms.

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Primates

-Humans have unique characteristics that they share with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Five \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fingers.

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ thumbs.

- Eyes are located at the front of the head ( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) ​

- Based on physical and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ similarities, the closest living relative to humans is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Ancestors of both humans and chimpanzees is thought to have diverged about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Hominids

-Hominid refers specifically to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ancestors.

- Characteristics that differ from primates: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, upright \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hominid Evolution

-The first primate ancestors appeared \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: small, rat-like mammals (lemurs)

- Scientists believe that hominid evolution began in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about \_\_\_\_\_\_\_\_\_\_\_\_

-Oldest hominids are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: southern ape man.

- Mary Leaky found \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Brains are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than ape brains but smaller than modern-day humans.

Lucy

- 1979 fossils were discovered in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the most complete \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an australopithecine from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Scientists named her \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and examined her bones to determine her stature.

​- Lucy stood \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but had a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ brain.

Homo Habilis and Homo erectus

- About \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, hominids evolved to have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ features that are more familiar today.

​- Homo habilis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

​- Homo erectus: Larger in size but had a smaller, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ jaw.

-May have lived in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, worn clothing and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ large animals.

- Evidence of sophisticated \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ made from flint and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Migration

- Homo erectus survived for about \_\_\_\_\_ million years.

- During that time they traveled throughout the globe but went \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about 200,000 years ago.

- Present day humans (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) first appeared in the fossil record during this time.

- Homo sapiens arose in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and migrated to Europe, Asia, North and South America.

Neanderthals

- Neanderthals are thought to be either a different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or race of Homo sapiens.

- They arrived about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years before Homo sapiens in the fossil record and were located in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Cultural habits that are similar to early Homo sapiens:

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Cro-Magnons

- Unique fossil evidence of Cro-Magnons:

- Cro-Magnons are thought to have existed in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about 100,000 years ago and migrated from Africa bout 40,000 years ago.

- Cro-Magnons may have gone extinct through\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Cro-Magnon Culture

- Evidence for Cro-Magnon culture comes from:

New Evidence of Human Evolution

- Evidence:

- New evidence is being found every day.

- Scientists can only use the evidence they have and clues to help them make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about how, where and when