

Chapter 10: page 292

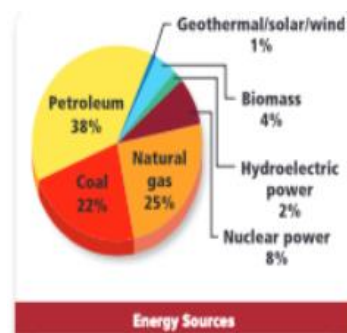
1. Energy Sources (Page 292)

Law of Conservation of energy:

Energy cannot be created or destroyed, only transformed from one form to another.

You use energy when the potential energy from fossil fuels is transformed into thermal energy used to heat your home

Around 85% (38%+22%+25%) of energy used in the US in 2008 came from burning fossil fuels. Nuclear power plants provided 8% and renewable energies 7%

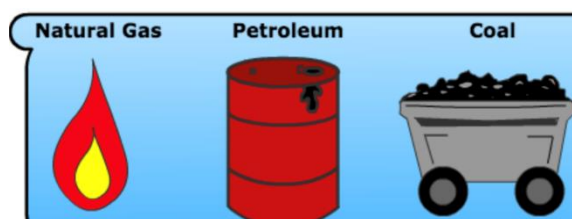


NON-RENEWABLE RESOURCES: (include fossil fuels and nuclear energy)

All fossil fuels are non-renewable. They cannot be replaced by natural processes as quickly as they are used. So, fossil fuels are decreasing and will run out one day.

Fossil fuels are coal, petrol (oil) and natural gas. They formed from remains of ancient plants and animals that were buried over millions of years.

The organism is buried under layers of sediment, then high pressure and temperature turns it into a fossil fuel



When fossil fuels are burned, combustion reaction occurs. Carbon and hydrogen atoms combine with oxygen to form carbon dioxide.

Coal:

Coal is solid, found in mines which used to be swamps. Coal comes from plants which became peat and then coal. It is the most toxic.

Petrol:

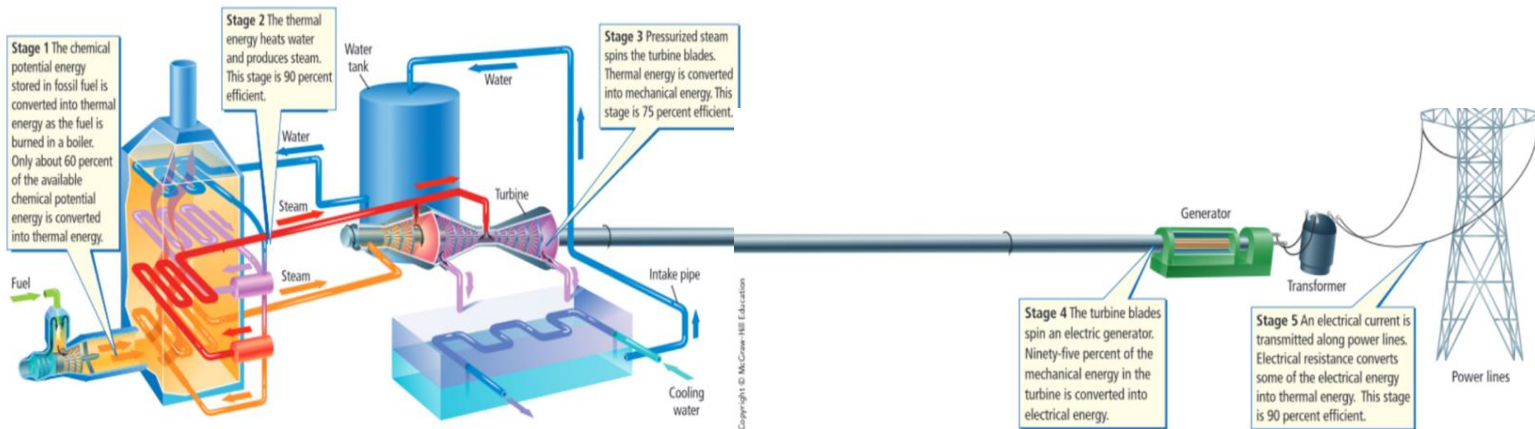
Petrol is made from marine organisms like algae and plankton. Fractional distillation can separate the hydrocarbon compounds using different boiling points. Lowest boiling points rise first.

Cars use petrol, but also plastics, cosmetics and medicines

Natural Gas:

Natural gas is found on top of petroleum deposits. Natural gas burn cleaner than other fossil fuels but it is difficult to remove from the ground. Stores the most chemical potential energy from all fossil fuels.

Burning fossil fuels:



- 1- Fuel is burned in a combustion chamber: converts chemical potential energy to thermal energy.
- 2- This heats water and produces steam.
- 3- Steam spins the turbine: converting thermal energy into mechanical energy.
- 4- The shaft of the turbine connects to an electrical generator: which converts mechanical energy into electrical energy.
- 5- Power lines take the energy to homes and schools etc.

In power plants not all chemical potential energy stored in the fuel is converted to electrical energy. No stage is 100% efficient. Overall efficiency is roughly 35%. The rest is converted into thermal energy as heat into the environment.

+ = most commonly used

- = they release carbon dioxide into the air

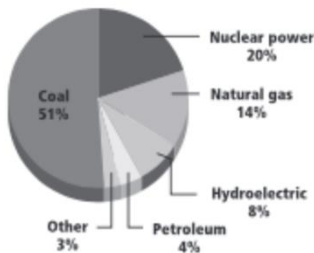
Questions:

Why are fossil fuels considered to be nonrenewable resources?

- A) They are no longer being produced.
- B) They are being produced as fast as they are being used.
- C) They are not being produced as fast as they are being used.
- D) They contain hydrocarbons.

What do hydrocarbons react with when fossil fuels are burned?

- A) carbon dioxide C) oxygen
- B) carbon monoxide D) water



The graph shows that approximately what percentage of electrical energy came from renewable energy resources?

- A. 11 percent
- B. 51 percent
- C. 65 percent
- D. 93 percent

1. The graph above shows the percentage of electrical power generated in a country that came from various energy resources. According to the graph, about what percentage came from fossil fuels?

- A. 51 percent
- B. 55 percent
- C. 69 percent
- D. 84 percent

Describe the five stages in the production of electrical energy at a fossil fuel-burning power plant.

Describe the processes that form petroleum, natural gas, and coal.

2. Nuclear Energy (Page 299)

Fusion: The sun is a giant nuclear reactor in the sky. Fusion occurs when atomic nuclei combine at very high temperatures. A small amount of mass is transformed into a tremendous amount of thermal energy.

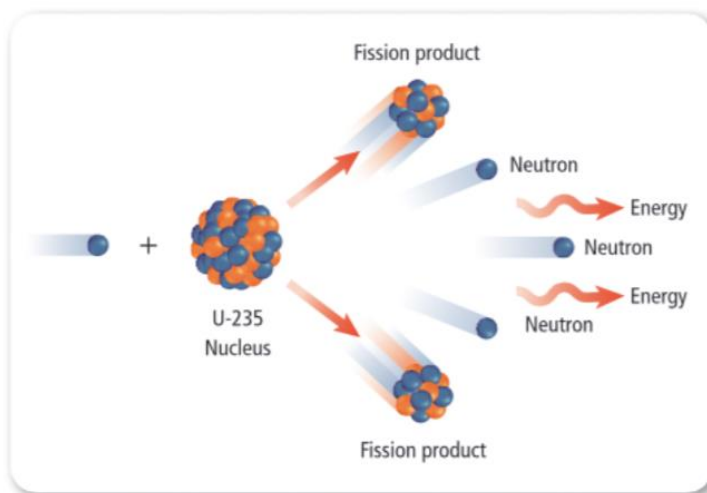


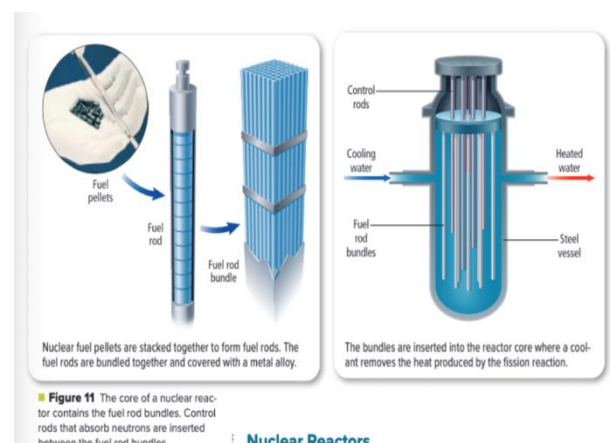
Figure 13 When a neutron strikes the nucleus of a U-235 atom, the nucleus splits apart into two smaller nuclei. In the process, two or three neutrons also are emitted. The smaller nuclei are called fission products.

Explain what happens to the neutrons that are released in this reaction.

Fission: Energy is released when the nucleus of an atom splits apart. These plants convert nuclear energy into electrical energy.

- 1) Uranium undergoes nuclear fission,
- 2) releasing more neutrons and energy.
- 3) These neutrons will then split the uranium again and again and this creates a chain reaction and nuclear fission continues.

Nuclear reactors: Use energy from nuclear reactions to generate electricity. They contain fuel that undergo fission and control rods to **ABSORB** neutrons and control the reaction. They have a cooling system that keeps reactor from being damaged by the enormous amount of heat produced.



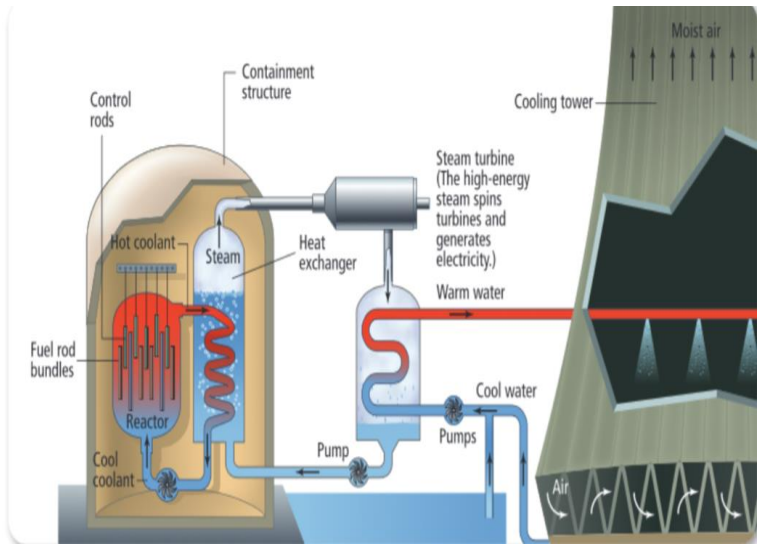
Nuclear power plants produce an electric current in a similar way to fossil fuel burning power plants. Thermal energy released in fission is used to heat water and produce pressurised steam. The steam spins a turbine

+ = Nuclear power plants do not produce air pollutants like carbon dioxide like fossil fuels do.

- = Expensive to build and can take 10 years to complete.

Produce radioactive waste that can be harmful.

Accidents may occur where radioactive waste is released into the environment. Chernobyl, Ukraine had an accident. Materials caught fire and caused a chemical explosion.



Disposal of nuclear waste : (page 304 – 305)

Uranium can be used for three years then can't be used. It is now nuclear waste. It can be dangerous. There are 2 types of nuclear waste:

- 1) **Low level:** Small amount of radioactive materials with short half-lives. Water and air filters. Stored in spill safe containers underground
- 2) **High level:** Uranium fuel that is used is called **SPENT FUEL**. Sealed in glass and metal containers, buried very deep underground as very dangerous. Containers are also covered in a pool of water

Questions:

To generate electric current, nuclear power plants produce which of the following?

- A) steam
- B) carbon dioxide
- C) plutonium
- D) water

- . How are spent nuclear fuel rods disposed?
 - A) burying them in a community landfill
 - B) storing them in a deep pool of water
 - C) burying them at the reactor site
 - D) releasing them into the air

Which of the following is NOT a source of nuclear waste?

- A. products of fission reactors
- B. U-235
- C. some medical and industrial products
- D. products of coal-burning power plants

Fusion is one of the most concentrated energy sources known. Why is it not used at nuclear plants as a source for electrical energy?

Describe the typical disposal method for high-level nuclear waste.

Explain how the nuclear power plant shown above can transform nuclear energy into electrical energy.

3. Renewable Energy Sources (page 306 – 311)

Non-renewable energy is decreasing so we need to start using renewable sources. They can be replaced faster than they are being used

SOLAR: From the sun: A photovoltaic cell / solar cell converts radiant energy directly into electrical energy.

+ = No carbon dioxide released

- = It is more expensive \$

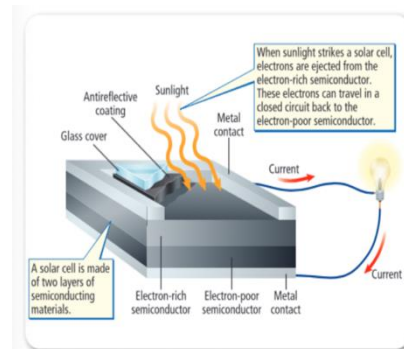
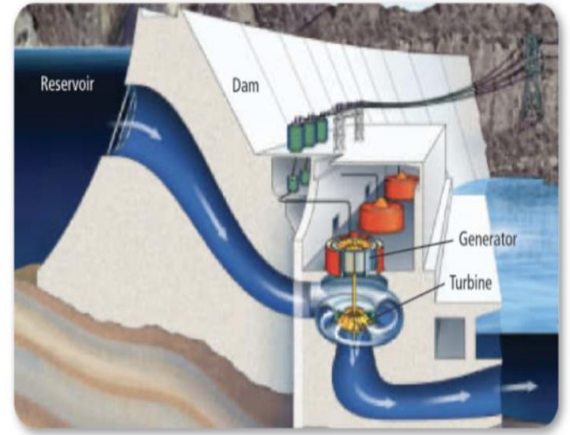


Figure 18 Radiant energy from sunlight strikes the surface of a solar cell, exciting electrons and causing them to flow through an electric circuit.
Identify two devices that use solar cells for power.

HYDROELECTRIC: From water:

Gravitational potential energy from water is large when it is in a dam (hydroelectric dams). This energy is released when the water flows through tunnels. The rushing water spins a turbine, converting gravitational potential energy to mechanical energy then to electrical energy.



Gravitational potential energy → mechanical energy → electrical energy

- + = There is almost no pollution and more efficient than fossil fuels.
- = Can disturb fish and aquatic habitats.

TIDAL HYDROELECTRIC POWER: From

oceans: Gravitational pull of the moon and sun on the oceans causes tides. As the tide rises, water spins a turbine which transforms mechanical energy into electrical energy.

- + = Pollution free and more efficient
- = Only a few places on Earth have large enough tides.



WIND: Windmills convert wind energy into electrical energy. The wind spins a turbine that is connected to a generator.

- + = No carbon dioxide released
- = only a few places on Earth have large enough winds and they are noisy and disrupt birds.



GEOTHERMAL: Energy from inside the Earth

Molten rock beneath the Earth's surface called magma.

Alternative Fuels (page 311)

Fossil fuel use would reduce if cars can run on alternative energy such as Hydrogen or Biomass

Hydrogen fuel cells: combine hydrogen with oxygen to generate electricity, water and heat.

- = Getting hydrogen requires lots of energy and it is difficult to store.

Biomass: wood, cooking oil, animal manure. Can be burned (combustion) which converts chemical potential energy to thermal energy.

Questions:

Which of the following is the source of almost all of Earth's energy resources?

- A) plants
- B) the Sun
- C) magma
- D) fossil fuels

Solar cells would be more practical to use if they were which of the following?

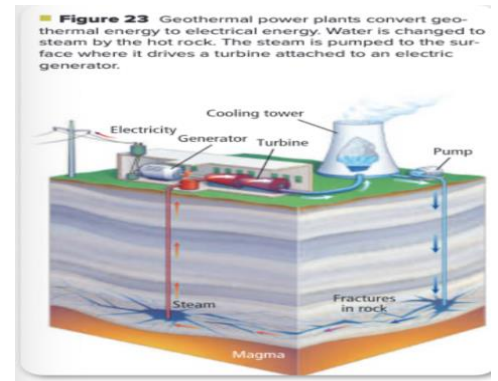
- A) pollution-free
- B) nonrenewable
- C) less expensive
- D) larger

Which of the following best describes windmills that are used for the production of electric current?

- A. They are quiet.
- B. They can be used anywhere.
- C. They are 90 percent efficient.
- D. They are nonpolluting.

Which form of energy comes from the presence of magma in Earth's crust?

- A. fossil fuels
- B. geothermal energy
- C. wind energy
- D. biomass



3. What is the energy change in hydroelectric power?

4. _____ energy is the change from radiant energy to electrical energy

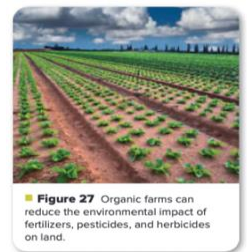
4. Environmental Impacts (page 313 – 319)

A **population** includes all of the individuals in one species living in an area. Over the years, the human population has increased because of advances in modern medicine and the availability of clean water and better nutrition. People are living longer

Carrying capacity: The largest number of individuals that the environment can support. In other words, at what point people will run out of resources (less food and water)

Land Pollution: Humans create pollution which affects land

- **Agriculture:** Farmers are planting seeds and using strong fertilisers with dangerous chemicals. They can hurt animals. To reduce this pollution, organic farming uses natural fertilisers
- **Deforestation:** the clearing of forest land (cutting down trees). It destroys animal habitats causing them to go extinct and increases the levels of carbon dioxide in the air.
- **Urban development:** Building highways, stores, houses
- **Waste:** Wastes like batteries can release dangerous substances.



National parks / Mega reserves:

Mangrove national park in Abu Dhabi

are areas of land that are preserved and protected by the UAE government. They are safe from urban development, waste disposal and deforestation.



Water Pollution:

- Industry: Mining can release metals into water that are poisonous
- Oil and Gas: can run off roads and parking lots into lakes and rivers when it rains. Oil spills also cause water pollution
- Human waste: shower and toilet water contain human waste / sewage.

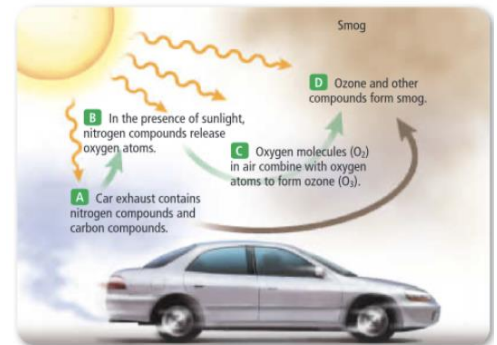


Air pollution: Comes from cars, factories, construction

There are 3 types of air pollution: smog, CFC's and acid precipitation



- **Smog:** Pollutants released from fossil fuels burning, releasing carbon dioxide. These react with oxygen making ozone. Ozone that forms high in the atmosphere protects you from UV but ozone near the Earth surface can cause breathing problems
- **CFCs:** Protective ozone layer above the Earth's surface. Chlorofluorocarbons are compounds that leak from old air conditioners and refrigerators and react with ozone, destroying ozone molecules.
- **Acid Precipitation:** Carbon dioxide from cars reacts with moisture in the air, forming acids.



Reducing Pollution

- Use less plastics,
- compost food instead of throwing it into the trash.
- Reuse and recycle material
- Use energy efficient appliances like low flush toilets and dishwashers
- Drive fuel efficient cars or use a bicycle.



■ **Figure 33** Many communities offer recycling programs where paper, plastic, and glass are reused rather than going into landfills.

Questions:

Which of the following sources contributes to the formation of acid precipitation?

- A. coal-fired power plants
- B. geothermal plants
- C. wind power plants
- D. nuclear power plants

Which term describes all the individuals of one species that occupy an area?

- A. population explosion
- B. carrying capacity
- C. population
- D. community

Fill in the blanks using the vocabulary box:

1. A(n) _____ converts radiant energy to electrical energy.
2. _____ makes use of thermal energy inside Earth.
3. _____ is precipitation that can be harmful to plants and animals.
4. _____ are nonrenewable resources such as oil, natural gas, and coal.
5. The Sun, wind, water, and Earth's internal heat are _____ because they are replaced faster than they are used.
6. The maximum number of individuals of a particular species that the environment can support is called the _____.
7. Special caution should be taken in disposing of radioactive materials, such as _____.

Use Vocabulary

1. photovoltaic cell
2. Geothermal energy
3. Acid precipitation
4. Fossil fuel
5. renewable resources
6. carrying capacity
7. nuclear waste

Short Response

Record your answers on the answer sheet provided by your teacher or on a sheet of paper.

9. Explain why hydroelectric power plants are almost twice as efficient as fossil fuel and nuclear power plants.
10. How are most of electrical energy used in the United Arab Emirates produced?
11. Why is it better for the environment for countries to work together to reduce pollution?
12. Describe the five stages in the production of electrical energy at a fossil fuel-burning power plant.
13. Describe the typical disposal method for high-level nuclear waste.
14. The core of a nuclear reactor might contain hundreds of fuel rods. Describe the composition of a fuel rod.
15. Fusion is one of the most concentrated energy sources known. Why is it not used at nuclear plants as a source for electrical energy?
16. What device can lower sulfur dioxide emissions from coal-burning power plants?
17. Should household hazardous waste be included with normal trash? Explain.

Extended Response

Record your answers on a sheet of paper.

Use the image below to answer questions 18 and 19.



18. Explain how the nuclear power plant shown above can transform nuclear energy into electrical energy.
19. What is the purpose of the large cement tower in the image above?
20. Explain how the steam that is used to run turbines is produced at a geothermal power plant.
21. Describe the processes that form petroleum, natural gas, and coal.

Chapter 11.1 Biodiversity

Notes and questions

Use the QR code to find more information on this chapter



Section 1 Review

Section Summary

- ▶ Biodiversity is important to the health of the biosphere.
- ▶ There are three types of biodiversity: genetic, species, and ecosystem.
- ▶ Biodiversity has aesthetic and scientific values, and direct and indirect economic value.
- ▶ It is important to maintain biodiversity to preserve the reservoir of genes that might be needed in the future.
- ▶ Healthy ecosystems can provide some services at a lesser expense than the use of technology.

Understand Main Ideas

1. **MAIN Idea** Explain why biodiversity is important to the biosphere.
 2. **Summarize** the three types of biodiversity.
 3. **Generalize** why maintaining biodiversity has a direct economic value to humans.
 4. **Differentiate** between the direct and indirect economic value of biodiversity.
 5. **Evaluate and discuss** the importance of maintaining biodiversity for future medical needs.
- Think Critically**
6. **Design a course of action** for the development of a building project in your community, such as a shopping mall, housing development, city park, or highway, that provides for the maintenance of biodiversity in the plan.

WRITING in Biology

7. Write a short report explaining the desirability of maintaining genetic diversity in domesticated animals, such as cats, cattle, and chickens. Include the advantages and disadvantages in your report.

Essential Questions

- ▶ What are three types of biodiversity?
- ▶ Why is biodiversity important?
- ▶ What are the direct and indirect values of biodiversity?

Review Vocabulary

gene: functional unit that controls the expression of inherited traits and is passed from generation to generation

New Vocabulary

extinction
biodiversity
genetic diversity
species diversity
ecosystem diversity

-> Biodiversity is the **variety of life** in an **area** that is calculated by the number of **different species** in that area.

-> Aesthetic value
Scientific value
Direct economic value
Indirect economic value

QUESTION: Why is biodiversity important?

Biodiversity increases the stability of an ecosystem and contributes to the health of the biosphere.

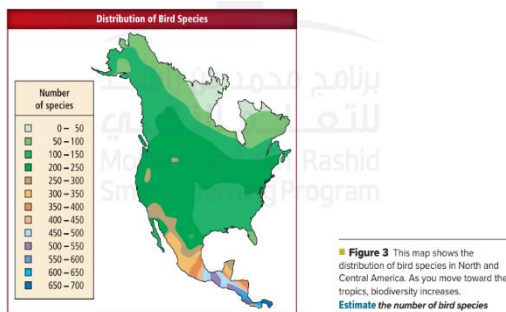
- The variety of genes or inheritable characteristics that are present in a population comprises its **genetic diversity**
- Genetic diversity increases the chances that some species will survive during changing environmental conditions or during the outbreak of disease.
- The number of different species and the relative abundance of each species in a biological community is called **species diversity**
- The variety of ecosystems that are present in the biosphere is called **ecosystem diversity**



QUESTION: Name the 3 types of biodiversity found in nature.
WRITE one example in each block.

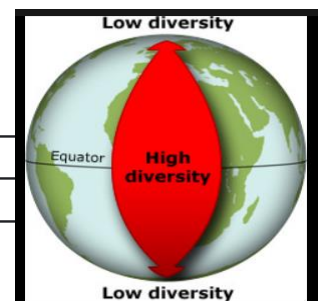
Genetic diversity	Species diversity	Ecosystem diversity
3 rabbits, one white, one gray and one black.	Different fish, crabs, shells, insects in a pond. The more you move to the equator the more the species diversity increase	A pond, a farm, a field in the wild, a part of the ocean. Different locations with different species of animals.

Species diversity increases towards the equator and decreases towards the poles.



QUESTION: Why does the species diversity increase as you move to the equator?

ANSWER:



- An ecosystem is made up of interacting populations and the abiotic factors that support them.

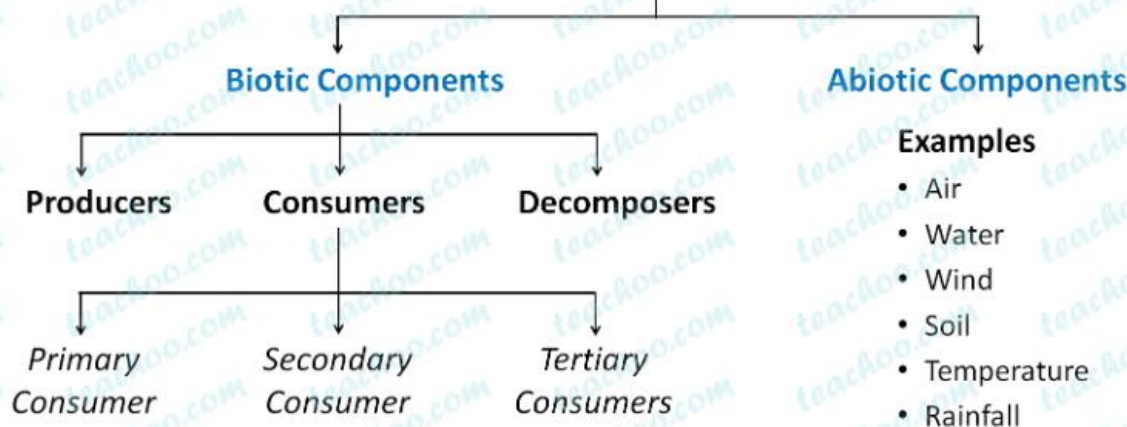
MAIN Idea Biodiversity maintains a healthy biosphere and provides direct and indirect value to humans.



■ **Figure 1** These Asian ladybird beetles, *Harmonia axyridis*, demonstrate some visible genetic diversity because of their different colors.
Suggest some other characteristics that might vary among the beetles.

- Amount of spots
- Size
- Food preference
- Fly or not fly

▪ Ecosystem



- The importance of biodiversity:

Biodiversity has aesthetic and scientific value.

Healthy ecosystems can provide some services at lesser expenses than the use of technology.

Direct economic value

We as humans use plants to eat, medicine, clothing and shelter.

We only use a few species.

These species, can become extinct, what do we do then?

Well, we have to protect our plant and animal species, and we also have to protect the species we are not using, because they can be useful later.

Scientists can cross breed species to get other or better properties that might make them bigger, better or stronger.

We can use the genetic diversity.

We use a process called genetic engineering.

QUESTION: Explain why preserving biodiversity is important in human food supply?

Answer: _____

QUESTION: Why is it important to maintain biodiversity for medical reasons?

Answer: _____

Scientists continue to find new extracts from plants and other organisms that help in the treatment of human diseases.

- Wild species serve as reservoirs of desirable genetic traits that might be needed to improve domestic crop species.

Indirect economic value

- A healthy biosphere provides many services to humans and other organisms that live on Earth.
- Green plants provide oxygen to the atmosphere and take out carbon dioxide.
- Natural processes provide drinking water that is safe for human use.
- Taking care of ecosystems is less expensive than using technology.

The importance of biodiversity	
Direct economic value	Indirect economic value
Plants provide food Medicine, clothing, energy and shelter	Green plants provide oxygen Natural processes provide clean drinking water

■ **Figure 4** The biosphere contains many ecosystems with diverse abiotic factors that support a variety of organisms.

Abiotic – NON -living
Biotic - Living

Biosphere -The biosphere is **made up of the parts of Earth where life exists—all ecosystems**. The biosphere extends from the deepest root systems of trees, to the dark environments of ocean trenches, to lush rain forests, high mountaintops, and transition zones like this one, where ocean and terrestrial ecosystems meet.

Diverse
made of different qualities
The colors and shapes of flowers are very diverse.

Chapter 11.2 Threats to biodiversity (Page 336 – 342)

Section 2

Essential Questions

- What are the threats to biodiversity?
- How is the current extinction rate different from the background extinction rate?
- How can the decline of a single species affect an entire ecosystem?

Review Vocabulary

food web: a model representing the many interconnected food chains and pathways in which energy and matter flow through a group of organisms

New Vocabulary

background extinction
mass extinction
natural resource
overexploitation
habitat fragmentation
edge effect
biological magnification
eutrophication
introduced species

Threats to Biodiversity

MAIN Idea Some human activities reduce biodiversity in ecosystems, and current evidence suggests that reduced biodiversity might have serious long-term effects on the biosphere.

What are the threats to biodiversity?

Section 2 Review

Section Summary

- Some scientists estimate that the current rate of species extinction is abnormally high.
- Species on islands are particularly vulnerable to extinction.
- Historically, overexploitation by humans has led to the extinction of some species.
- Human activities can result in a decrease in biodiversity.

Understand Main Ideas

- MAIN Idea** Explain three ways that humans threaten biodiversity.
- Summarize** what has caused a recent increase in the rate of extinction.
- Choose** one of the factors that threatens biodiversity and suggest one way in which biodiversity can be preserved in a real-life scenario.
- Summarize** how the overharvesting of a single species, such as baleen whales, can affect an entire ecosystem.

Think Critically

- Design** a planned community that preserves biodiversity and accommodates the human population. Work in small groups to accomplish this task.
- Survey** your community to identify at least five threats to biodiversity and suggest ways in which biodiversity can be preserved.

Extinction

Humans are changing conditions on Earth faster than new traits can evolve to cope with the new conditions.

- Background extinction** is the gradual process of species becoming extinct, one by one.
- and **mass extinction** is an event when a large percentage of species become extinct in a short period of time.
- Natural resources:** all minerals and organisms found in the biosphere, like fossil fuels, nuclear fuels, plants, animal, water, air, soil
- Overexploitation**
Is the excessive of species that have economic value.
- Habitat loss,**
- Destruction** of habitat when habitats are destroyed due to cutting of trees in forest or urban development.
- Disruption** of habitat, if the habitat is not destroyed but something changes or goes wrong effecting one by one specie at a time, leading to disruption of a whole bigger system area.
- Habitat fragmentation:** separation of ecosystems into small pieces of land This smaller land can support fewer species, and less reproduction opportunities with other species, and so lowering the genetic diversity, Less genetic diversity is less resistant to diseases and conditions and can die easily.
- Edge effects,** like a forest near a busy road, and the dangers it can have.
- Pollution**
- Acid precipitation** caused by burned fossil fuels, that pollute the air, and the

rainwater damaged plants and animal.

- Acid rain deprive the soil from its nutrients and slows plant growth, it can also kill plants and animals.
- **Eutrophication**
- the process in which a water body becomes overly enriched with nutrients, leading to plentiful growth of simple plant life. The excessive growth (or bloom) of algae and plankton in a water body are indicators of this process.
- The algae uses up the oxygen and other organism suffer.
- **Introduced species**, can become a problem in a new environment, due to over population, and be a threat to native species.

Table 2		Estimated Number of Extinctions Since 1600				
Group	Mainland	Island	Ocean	Total	Approximate Number of Known Species	Percent of Group Extinct
Mammals	30	51	4	85	4000	2.1
Birds	21	92	0	113	9000	1.3
Reptiles	1	20	0	21	6300	0.3
Amphibians*	2	0	0	2	4200	0.05
Fish	22	1	0	23	19,100	0.1
Invertebrates	49	48	1	98	1,000,000+	0.01
Flowering plants	245	139	0	384	250,000	0.2

*An alarming decrease of amphibian populations has occurred since the mid-1970s, and many species might be on the verge of extinction.

Question: Which species had the highest loss of genetic diversity and why?

QUESTION: how is a larger percentage of land effected by edge effects when a piece of land is fragmented?

QUESTION: Which areas of a country would be most likely to have acid precipitation problems?



Reading Check Explain why organisms found on islands are more vulnerable to extinction than other organisms.

Answer: _____

Explain the ways that humans threatened biodiversity	
Natural resources	
Overexploitation	
Habitat loss	
Habitat disruption	
Pollution	
Eutrophication	

QUESTION: What has caused RECENT increase in rate of extinction?

HUMANS

More than a century of habitat destruction, pollution, the spread of invasive species, overharvest from the wild, climate change, population growth and other human activities have pushed nature to the brink.

VOCABULARY
WORD ORIGIN
Native
 from the Latin word *nativus*,
 meaning to be born.....

QUESTION: How will the overharvesting of the baleen whale effect the ecosystem?

The over-harvesting of a single species of whale such as baleen whales can negatively affect an entire ecosystem because whale fecal matter contains many essential nutrients like phosphorus, nitrogen, iron that help the microalgae(phytoplankton) to grow.

These microalgae support the population of zooplankton and zooplanktons support the population of small invertebrates like krills and small fishes.

Studies showed that a decrease in the population of baleen whale decreases the primary production i.e., the production of phytoplankton in oceans which in turn decrease the population of krills and fishes. The overharvesting of one species can affect the whole ecosystem of the ocean.

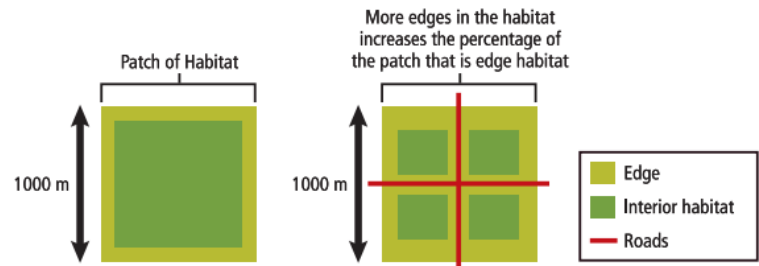
Activity: You live in a small community of 100 people. List 5 ways you can preserve biodiversity and accommodate the human population.



Reading Check Explain the term overexploitation as it relates to species extinction.

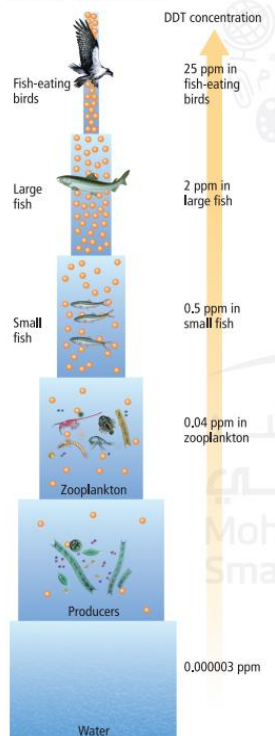
Look at the picture and answer the following questions:

■ **Figure 12** The smaller the habitat size, the greater percentage of the habitat that is subject to edge effects.



Name the effects that can be a problem as seen in the picture above.

Explain why the upper levels of the trophic levels has more toxic material then the lower levels:





Forest damage



Fish kill

Figure 14 Acid precipitation damages plant tissues and can kill fish if the acid concentration is high.

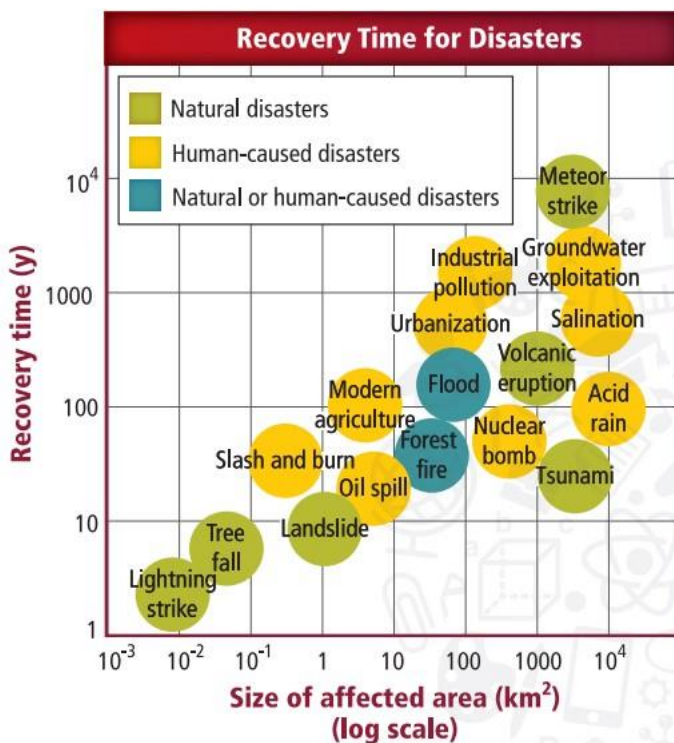
Infer Which areas of your country would most likely have acid precipitation problems?

QUESTIONS Part 1

1. Eutrophication is where pollution builds up in animals. Animals at the top of the food chain will have the most pollution in their bodies

True or False

2. What's the difference between mass extinction and background extinction?



3. Which human made disaster needs the most recovery time?

Look at the picture:

Which problem needs the most time to recover? _____

How much time does acid rain need to recover? _____

Fill in the blanks:

4. Humans need bacteria to survive. There is good bacteria and bad bacteria

for humans. Bacteria is an example of a _____ factor

5. Humans also need oxygen to survive. Oxygen is an example of a _____ factor

Circle the correct answer:

6. Which of these options best describes an indirect economic value of biodiversity?

Choose:

- Food
- Clothes
- Flood protection
- Medicine

7. What type of diversity do these rabbits best show?

Choose:

- Genetic diversity
- Ecosystem diversity
- Species diversity
- Animal diversity

8. What can reduce biodiversity?

Choose:

- Extinction
- Cleaner environments
- Less competition
- More food

9. EXPLAIN why it is not a good idea to send exotic pets into a local ecosystem.

QUESTIONS Part 2

INSERT THE MISSING WORD:

Genetic	diversity	ecosystem	mass extinction
background extinction	biodiversity	species	
diversity	ecosystem diversity	vulnerable	
	overexploitation		

1. _____ is important to the health of the biosphere.
2. There are 3 types of biodiversity: _____ , _____ and _____.
3. Biodiversity has _____ and _____ value as well as _____ and _____ economic value.
4. It is important to maintain _____ to preserve the reservoir of genes that might be needed in the future .
5. Healthy _____ can provide some services as a lesser expensive than the use of technology.
6. Some scientists estimate that the current rate of species extinction is leading to a _____.
7. Species on an island are particularly _____ to extinction.
8. _____ of species by humans have led to extinction.
9. _____ activities can result in decrease in biodiversity.

QUESTIONS Part 3

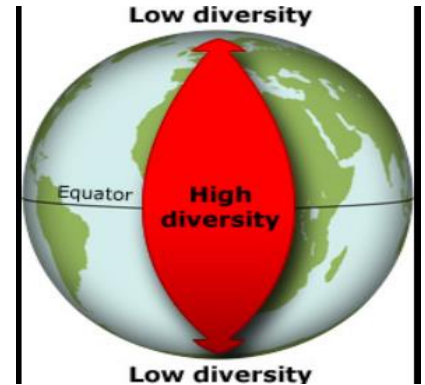
Circle the correct option:

1. An ecosystem contains Biotic and Abiotic components.

- True
- False

2. Does species diversity increase or decrease as we move to the equator?

- Increase
- Decrease
- No change



3. In biodiversity there are 3 main types. Choose the option that does NOT fit.

- Species diversity
- Colour diversity
- Genetic diversity
- Ecosystem diversity

4. Why is biodiversity so important to use as humans?

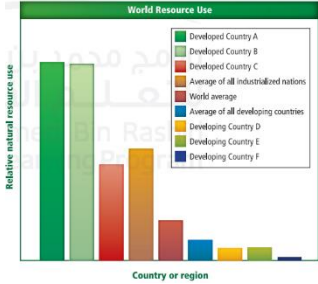
- The book says so
- It has value
- It provides direct and indirect economic value
- biodiversity is not important.

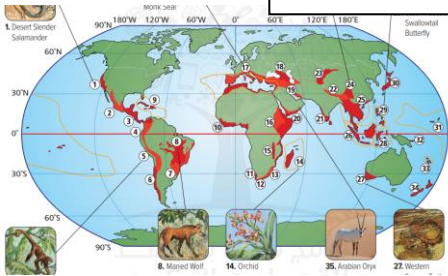
5. What is biodiversity? Choose the BEST answer for this question.

- Something to do with biology
- Something to do with animal and plants
- Protecting the environment of plants and animal species in the world.
- the variety of life in an area that is determined by the number of different species in that area.

Chapter 11.3 Conversing Biodiversity

Chapter 11.3 Revision notes Page 343 – 349

How can we conserve biodiversity?	- Use natural resources more sustainably. - Protect biodiversity - Restore ecosystems 1. MAIN Idea Describe three approaches used to slow down the rate of extinction or to preserve biodiversity.
Who is using the most natural resources?  PAGE 343	- Humans in developed countries which are wealthier, use more natural resources faster than they can be replaced.
Why are developed countries using more natural resources? PAGE 343	- The population of humans in developed countries is growing faster than undeveloped countries. - There are more humans in developed countries than need and use MORE resources. - People in developed countries has access to more money and can spend more on resources.
What are the types of resources? PAGE 344 31. What are resources called that are found in limited amounts or are replaced by natural processes over extremely long periods of time?	- There are renewable and non-renewable resources. - Renewable resources: can be replaced once used - Non-renewable resources: limited supply, once used cannot be replaced easily 2. Define the two classes of natural resources.
Give some examples of non-renewable and renewable resources. PAGE 344 28. What are resources called that are replaced by natural processes faster than they are consumed?	- Non-renewable resources include: fossil fuels and mineral deposits like uranium deposits which are used as fuel in nuclear power plants. - Renewable resources include: water, plants, animals used to make food and food products (cows for milk, chickens for eggs, sheep for wool and air).
How can renewable resources be under threat? PAGE 344	- If the demand and use of resources are too HIGH, then it will take much longer to replace and replenish them. 12. List an example of a renewable resource and a nonrenewable resource, and analyze why they are classified as such.

Trees are renewable, but how can they be non-renewable?	- If you cut down one or a few trees, you can easily replace them by grow more trees from seeds. - But if your clear an entire forest, you're also removing entire habitats that other organisms depends on for life. This makes it non-renewable
What is sustainable use? PAGE 344	- When we use natural resources more responsibly, and at a rate at which they can be replaced or recycled while preserving the health of the biosphere.
How can we protect Biodiversity? PAGE 345 Protecting Biodiversity Conservation biologists have identified locations around the world that are characterized by exceptional levels of endemic species—species that are only found in that specific geographic area and critical levels of habitat loss. To be called a hot spot, a region must meet two criteria. First, there must be at least 1,500 species of vascular plants that are endemic, and the region must have lost at least 70 percent of its original habitat. The 34 internationally recognized hot spots are shown in Figure 16. Approximately half of all plant and animal species are found in hot spots. These hot spots originally covered 17 percent of Earth's surface; however, only about a tenth of that habitat remains. Biologists in favor of recovery efforts in these areas argue that focusing on a limited area would save the greatest number of species. Other biologists argue that concentrating funding on saving species in these hot spots does not address the serious problems that are occurring elsewhere. For example, saving a wetland area might save dozen species, but the wetland provides greater services by filtering water, regulating floods, and providing a nursery for fish. These biologists think that funding should be spent on areas around the world rather than focused on the biodiversity hotspots. VOCABULARY Species: those vs. Common: those vs. Endemic: those Corridor: Biologist: a person who studies life and living organisms, their interactions with each other and their environments. Conservation: a program or action to protect and preserve natural resources, the environment, or the animals and plants that live there. Endemic: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Hot spot: a small area that contains a high number of species that are found nowhere else in the world. Habitat: the natural environment of an organism. Native: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Recovery: the process of restoring a natural resource to its original state. Species: those vs. Common: those vs. Endemic: those Corridor: Biologist: a person who studies life and living organisms, their interactions with each other and their environments. Conservation: a program or action to protect and preserve natural resources, the environment, or the animals and plants that live there. Endemic: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Hot spot: a small area that contains a high number of species that are found nowhere else in the world. Habitat: the natural environment of an organism. Native: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Recovery: the process of restoring a natural resource to its original state.	- Protect the land by implementing laws that stop over-use, focus on preserving the area and protecting it from development. - Identify hot spots where there may be many endemic species - Create corridors between habitat fragments.
What are hot spots? PAGE 347 	- Hot spots are areas on earth where there are a very LARGE number of endemic species that are under threat. - 17% of the Earth's surface are hot spots for biodiversity
What is an endemic species?	- Species that are only found in that specific geographic area 29. What are species called that are found in only one geographic location?
How do we know if a place is a hot spot? Biodiversity hot spots Conservation biologists have identified locations around the world that are characterized by exceptional levels of endemic species—species that are only found in that specific geographic area and critical levels of habitat loss. To be called a hot spot, a region must meet two criteria. First, there must be at least 1,500 species of vascular plants that are endemic, and the region must have lost at least 70 percent of its original habitat. The 34 internationally recognized hot spots are shown in Figure 16. Approximately half of all plant and animal species are found in hot spots. These hot spots originally covered 17 percent of Earth's surface; however, only about a tenth of that habitat remains. Biologists in favor of recovery efforts in these areas argue that focusing on a limited area would save the greatest number of species. Other biologists argue that concentrating funding on saving species in these hot spots does not address the serious problems that are occurring elsewhere. For example, saving a wetland area might save dozen species, but the wetland provides greater services by filtering water, regulating floods, and providing a nursery for fish. These biologists think that funding should be spent on areas around the world rather than focused on the biodiversity hotspots. VOCABULARY Species: those vs. Common: those vs. Endemic: those Corridor: Biologist: a person who studies life and living organisms, their interactions with each other and their environments. Conservation: a program or action to protect and preserve natural resources, the environment, or the animals and plants that live there. Endemic: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Hot spot: a small area that contains a high number of species that are found nowhere else in the world. Habitat: the natural environment of an organism. Native: a species, or a plant, or an animal, that is native to a particular area and is found nowhere else in the world. Recovery: the process of restoring a natural resource to its original state.	- If there are at least 1500 types of vascular plants - AND - 70% of its original habitat was lost MATH in Biology 6. If Earth has 150,100,000 km² of land area, how much land area is included in the biodiversity hot spots?
What are the challenges with saving hot spots?	- Even though you might save species from going extinct it costs a lot of money - It might be better to use the same money to preserve other resources like wetlands
Why should use funding to preserve wetlands instead of saving a few species in a hot spot?	- It filters water, regulates floods, provides nursery for fish.

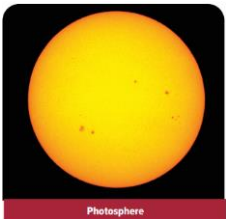
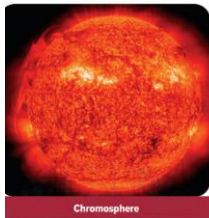
What are corridors between habitat fragments? PAGE 347 	Bridges built over roads for animals to safely cross over from one place to another. 33. Which is an advantage of the habitat corridor shown above? A. Corridors increase the edge effect in the area. B. Diseases are passed easily from one area to another. C. Parasites are passed easily from one area to another. D. Members of species can move safely from one area to another.																																																																								
What are the problems or disadvantages with corridors?	- Diseases can still pass from one area to another - Increases EDGE EFFECTS																																																																								
How can we restore ecosystem? PAGE 348	1) biological remediation 2) biological augmentation																																																																								
What are some examples of an ecosystem that is destroyed?	1) soil from tropical rain forests that were turned into farms become unfertile after a few years. 2) after an area is mined, the place is abandoned (nobody takes care of it again) in a condition that cannot support biodiversity 3) accidental oil spills and toxic chemicals pollute an area and the native species cannot live there anymore.																																																																								
How long does it take to restore or fix and ecosystem? <table><caption>Approximate data points from Figure 21</caption><thead><tr><th>Disaster Type</th><th>Disaster</th><th>Size of affected area (km²)</th><th>Recovery time (y)</th></tr></thead><tbody><tr><td>Natural</td><td>Lightning strike</td><td>10⁻³</td><td>1</td></tr><tr><td>Natural</td><td>Tree fall</td><td>10⁻²</td><td>1</td></tr><tr><td>Natural</td><td>Landslide</td><td>10⁻¹</td><td>10</td></tr><tr><td>Natural</td><td>Slash and burn</td><td>10⁰</td><td>10</td></tr><tr><td>Natural</td><td>Oil spill</td><td>10¹</td><td>10</td></tr><tr><td>Natural</td><td>Modern agriculture</td><td>10²</td><td>100</td></tr><tr><td>Natural</td><td>Forest fire</td><td>10³</td><td>100</td></tr><tr><td>Natural</td><td>Flood</td><td>10⁴</td><td>100</td></tr><tr><td>Natural</td><td>Urbanization</td><td>10³</td><td>1000</td></tr><tr><td>Natural</td><td>Industrial pollution</td><td>10³</td><td>1000</td></tr><tr><td>Natural</td><td>Volcanic eruption</td><td>10³</td><td>1000</td></tr><tr><td>Natural</td><td>Salination</td><td>10⁴</td><td>1000</td></tr><tr><td>Natural</td><td>Acid rain</td><td>10⁴</td><td>1000</td></tr><tr><td>Natural</td><td>Nuclear bomb</td><td>10⁴</td><td>1000</td></tr><tr><td>Natural</td><td>Tsunami</td><td>10⁴</td><td>1000</td></tr><tr><td>Natural</td><td>Meteor strike</td><td>10⁴</td><td>10000</td></tr><tr><td>Natural</td><td>Groundwater exploitation</td><td>10⁴</td><td>10000</td></tr></tbody></table> Figure 21 The recovery time for disasters is dependent upon the size of the area affected and on the type of disturbance. Determine the approximate recovery time for a landslide. 10	Disaster Type	Disaster	Size of affected area (km²)	Recovery time (y)	Natural	Lightning strike	10 ⁻³	1	Natural	Tree fall	10 ⁻²	1	Natural	Landslide	10 ⁻¹	10	Natural	Slash and burn	10 ⁰	10	Natural	Oil spill	10 ¹	10	Natural	Modern agriculture	10 ²	100	Natural	Forest fire	10 ³	100	Natural	Flood	10 ⁴	100	Natural	Urbanization	10 ³	1000	Natural	Industrial pollution	10 ³	1000	Natural	Volcanic eruption	10 ³	1000	Natural	Salination	10 ⁴	1000	Natural	Acid rain	10 ⁴	1000	Natural	Nuclear bomb	10 ⁴	1000	Natural	Tsunami	10 ⁴	1000	Natural	Meteor strike	10 ⁴	10000	Natural	Groundwater exploitation	10 ⁴	10000	- It depends on the size of the area - It depends on the TYPE of disturbance or destruction MAIN POINT: Bigger the area, the longer it takes. Doesn't matter if it's a natural disaster 34. Which human-caused disaster requires the greatest recovery time? A. groundwater exploitation B. industrial pollution C. nuclear bomb D. oil spill 35. Which natural disaster requires the least amount of recovery time? A. lightning strike B. meteor strike C. tsunami D. volcanic eruption
Disaster Type	Disaster	Size of affected area (km²)	Recovery time (y)																																																																						
Natural	Lightning strike	10 ⁻³	1																																																																						
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What is bioremediation?	- Using living organisms like fungi, prokaryotes or plants to DETOXYFY a polluted area																																																																								
How has bioremediation been used before? PAGE 348	- An oil spill was caused fuel to get soaked into the soil and the underground water - Some microorganisms were used to breakdown the carbon-based fuels into carbon dioxide.																																																																								

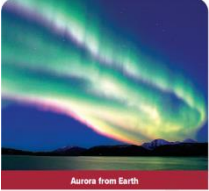
How can microorganisms be used in bioremediation? 30. What is the name of the process of using living organisms to detoxify a location?	- The microorganisms can be used in ecosystems to BREAKDOWN toxins from soils that are contaminated by accidental oil or fuel spills - Some plants can absorb and store toxic substance from contaminated soils. The plants are harvested and removed from the ecosystem.
What are some examples of toxic substances that some plants can absorb? 37. CAREERS IN BIOLOGY Explain how an environmental microbiologist might use bioremediation to detoxify polluted areas.	- Lead, nickel, zinc and other organic chemicals.
Why is bioremediation not widely used?	- It is a fairly new type of technology.
What are the advantages and disadvantages of small reserves?	Advantage: Easy to manage, can focus on certain species to protect, less expensive Disadvantage: might need more space to preserve more once the population increases
What are the advantages and disadvantage of LARGE RESERVES? 36. MAIN Idea Explain why reserves protect biodiversity.	Advantages: a large number of species can be protected and preserved and have more space to expand and thrive Disadvantages: costly, difficult to manage
What is biological augmentation? PAGE 349	- using a natural PREDATOR into an area to remove a pest example: aphids are insects that eat plants. On farms they eat all the crops. Farmers introduce ladybugs because they eat the aphids that eat the plants.  Ladybugs do not destroy or damage the crops.
How can laws help to protect biodiversity? countries are signatory to agreements Legally Protecting Biodiversity During the 1970s a great deal of attention was focused on destruction of the environment and maintaining biodiversity. Laws were enacted in countries around the world, and many treaties between countries were signed in an effort to preserve the environment. In the United States, the Endangered Species Act was enacted in 1973. It was designed to legally protect the species that were becoming extinct or in danger of becoming extinct. An international treaty, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), was signed in 1973. It outlawed the trade of endangered species and animal parts, such as ivory, elephant tusks, and rhinoceros horns. Since the 1970s, more laws have been enacted and treaties have been signed with the goal of preserving biodiversity for future generations. PAGE 349	- Countries around the world sign treaties to preserve the environment Example: Convention on International Trade in Endangered Species (CITES) in 1975 - There have been more law passed since then

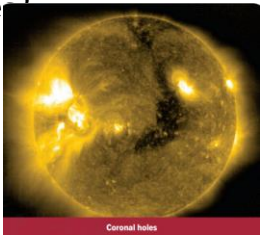
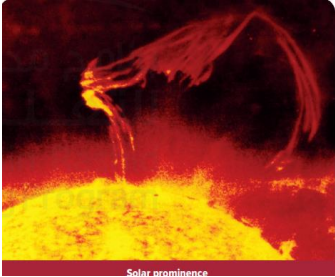
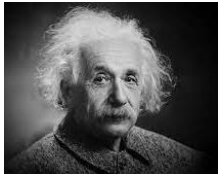
32. Which term is a method that is used to restore biodiversity to a polluted or damaged area?
- A. biological augmentation C. renewable resource
B. biological corridor D. sustainable use

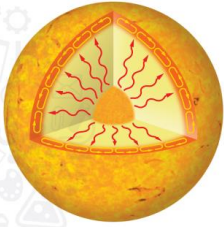
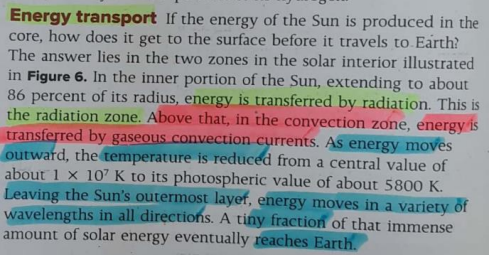
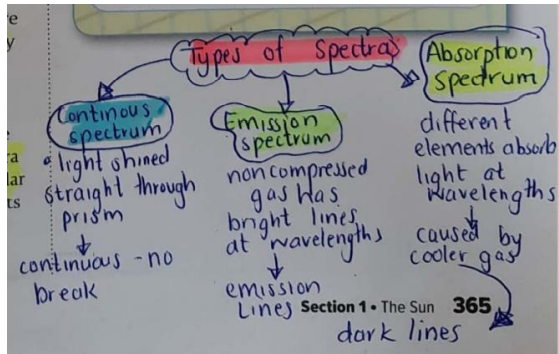
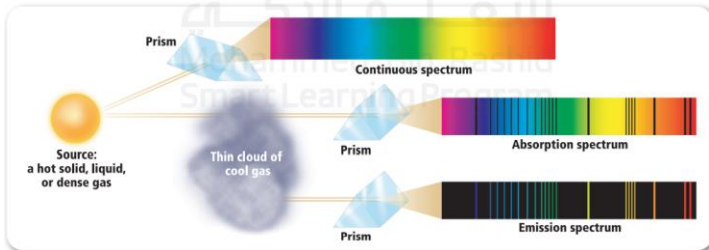
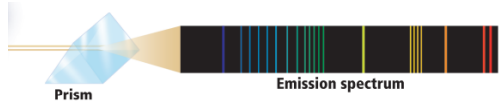
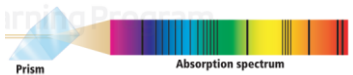
Chapter 12.1 The Sun

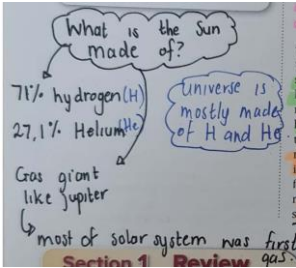
Chapter 12.1 Revision notes Page 360 – 366

How does the sun affect other planets? Page 360	- The sun contains 99% of mass in the solar system - Its mass and density exert a strong gravitational pull on all the planets and moons in the solar system
what are the properties of the sun? Page 360	- It is gaseous - Plasma is ionized gas in the centre of the sun. - Plasma is made of atomic nuclei and electrons - Plasma is only at the centre of the sun because it the temperature is high enough.
What is the atmosphere of the sun made of? Page 360	- Photosphere - Chromosphere - Corona - Solar wind 1. MAIN Idea Identify which features of the Sun are typical of stars.
Describe the photosphere Page 361  Photosphere	- Innermost layer of the sun - It is the visible surface of the sun (the part we see) - 400 km thick and temperature of 5800 K - Visible light is emitted
Describe the chromosphere Page 361  Chromosphere Figure 1 Sunspots appear dark on the photosphere, the visible surface of the Sun. The white-hot areas are almost 6000 K while the darker, red areas are closer to 3000 K. The chromosphere of the Sun appears red with prominences and flares suspended in the thin layer. Deduce why the images look so different.	- It is outside the photosphere - 2500 km thick with a temperature of 15 000 K (hotter than photosphere) - Emits Ultraviolet radiation - Only visible during a solar eclipse - Red is the strongest band of emission – that is why it appears red in colour 2. Describe the outer layers of gas above the Sun's visible surface.
What do astronomers use to see the chromosphere?	- Special filters are used to block out wavelengths of light
Describe the corona Page 361  Figure 2 The Sun's hottest and outermost layer, the corona, is only seen when the disk of the Sun is blocked as by this solar eclipse.	- It is the outermost layer of the sun's atmosphere - Extends several millions of kilometres from the chromosphere - It is the hottest layer of the atmosphere - Temperature 3 – 5 million K - Emits x-ray radiation - 1. the outermost layer of the Sun's atmosphere, having a temperature of about 1 million K
What instrument is used to monitor the corona?	- Astronomers use coronagraphs to monitor the corona

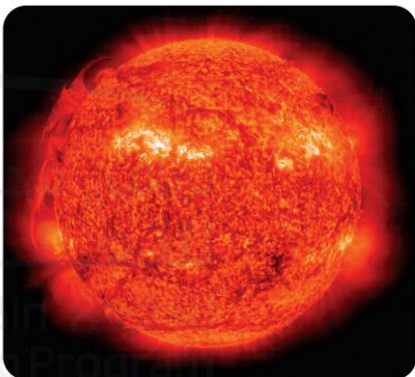
Why is the corona dim, and not easy to see?	- The corona is dim because the gas has a low density
What is solar wind? Page 362	- When plasma shows outward from the corona at high speed it creates solar wind
What is the solar wind made from?	- Solar wind is made of charged particles called ions
How are aurora lights formed? Page 362	 - Charged particles called ions are deflected by the magnetic field of earth in Van Allen belts - The particles collide with gas in earth's atmosphere creating a light or aurora.
Where are aurora lights visible?	- In the polar region
Which are permanent features of the sun?	- Photosphere, chromosphere, corona and solar wind
Which are changing features of the sun? Page 363	- Sun spots - Solar flares - Prominence
What are sun spots?	- Dark spots on the surface of the photosphere - It is cooler than the rest of the surface of the sun, this is why it appears darker
22. Why do sunspots appear dark? A) They are cooler than their surroundings. B) They are holes in the interior of the Sun. C) They do not have strong magnetic fields. D) They are hotter than their surroundings. 3. dark spots where the surface is cooler on the photosphere of the Sun	
What is the solar activity cycle of the sun?  Page 363	Figure 4 Sunspots are dark, relatively cool spots on the surface of the photosphere. These dark areas are associated with the Sun's magnetic field. Sunspots typically last several days, but can last for many months. - Sunspots are predictable - It takes 11 years to complete one cycle and then another 11 years to reverse to its original cycle - Sunspots polarity reverses when the sun's magnetic poles reverse - In total 22 years for the sun's magnetic pole to reverse and then return to its original cycle
	24. How is the Sun's magnetic behavior associated with its activity cycle? A) The magnetic field turns off when the activity cycle turns on. B) The activity cycle is coordinated with the peak number of sunspots. C) The activity cycle is independent of the number of solar flares. D) Solar flares are not coordinated with magnetic storms on Earth.
Describe solar flares.	- Solar flares : violent eruptions of radiation from the surface of the sun - It is very fast 9 million km/h

 Solar flares	- releases charged particles that can interact with earth 5. the outward flow of charged particles from the Sun's corona flowing throughout the solar system
What are coronal holes?  Coronal holes	- Areas of low density gas - Part of the sun's atmosphere where solar winds escape
How long does it take for solar flares to interact with earth?	- Particles in solar flares bombard earth a few days after it escapes the surface of the earth
Describe prominence  Solar prominence	- Prominence: arc of gas ejected from the chromosphere, gas condenses and rain back onto the surface of the sun - Very hot with temperatures of 50 000 K - Last from a few hours to months - Vary with magnetic fields and solar-activity cycle 7. Relate the solar activity cycle with solar flares and prominences.
What is fusion in the sun? Page 364	- Fusion is the combination of lightweight, atomic nuclei into heavier nuclei such as hydrogen fusing into helium 4. Describe the process of fusion in the Sun. 2. combining of lightweight nuclei such as hydrogen into heavier nuclei
What is fission?	- The splitting of heavy atomic nuclei into smaller, lighter nuclei. Example uranium into lead
How is energy produced in the sun? Page 364	- Most of the energy is made from the fusion of hydrogen into helium in the core - The mass one helium nucleus is less than the mass of 4 hydrogen nuclei - Mass is converted into energy (Albert Einstein) - The sun has enough energy to last another 5 billion more years
What is the Theory of Relativity? 	- Mass can be converted into energy and vice versa - $E = mc^2$ - E energy (J joules) , m mass (kg kilogram) , c speed of light (m/s meter per second)

How is energy transported out of the sun?  Page 364 21. Starting at the center, which is the correct order of solar layers? A) radiation zone, core, convection currents B) core, convection currents, radiation zone C) core, radiation zone, convection currents D) convection currents, mantle, radiation zone	- Radiation zone: energy transferred by radiation - Convection zone: energy transferred by gaseous convection currents 
Describe the change in temperature as the sun's energy leaves the convection zone.	- As energy moves outward, temperature is reduced to 5800 K
How are dying stars similar to the sun?	- They still have hydrogen and helium in their outer layers - 10% of Fusion reactions still occur
How can heavier elements form from stars?	- The larger the mass of a star is at inception, the more likely it will create heavier elements
What does a dying star do with its mass?	- It returns 50% of its mass to interstellar space to get recycled into new stars
What are the types of spectra? Page 365 	1. Continuous spectrum 2. Emission spectrum 3. Absorption spectrum 
Describe continuous spectrum 	- Produced when light shines straight through a prism or from compressed gas - It produces a spectrum of colours with no breaks between the different colour
Describe the emission spectrum 	- Produced when Non-compressed gas contains shines through a prism and produces bright lines at certain wavelengths - You will see it as lines or EMISSION LINES
Describe the absorption spectrum 	- When different chemicals absorb light at specific wavelengths it produces dark lines - Absorption is caused by cooler gas in front of a source that emits a continuous spectrum

How can you identify the elements present in the absorption spectrum?	- Burn or react various metals and observe the colour of light they produce when burnt - Compare the wavelengths of the light to the wavelength of the lines on the absorption spectrum.
What is the sun composed of? Page 366 	- 71% hydrogen, 27,1% helium and the rest are other elements - Most stars in our galaxy and other gas giants have the same composition of gases, just different masses.
How does the sun and gas giants compare? 23. Why is the Sun's composition similar to that of the gas giant planets? A) They all formed at the same time. B) They both lost heavy elements. C) They all formed from the same interstellar cloud. D) They both gained heavy elements.	- They are composed of similar gases in composition - It leads us to believe that they formed from the same interstellar cloud 5. Compare the composition of the Sun in Figure 8 to the gas giant planets' compositions. 5. Which gas giant planet is the largest? A. Jupiter C. Uranus B. Saturn D. Neptune
What is the universe composed of?	- Mostly hydrogen and helium
Describe what happens in dying stars.	- They still have hydrogen and helium - At least 10% of the hydrogen is converted to helium because the temperatures is still high enough - At least 50% of the mass of a dying star is returned to space and recycled into new stars

Extra questions:



- 32. Identify** the visible layers of the Sun in this photo.
- 33. Identify** the light and dark areas of the Sun's surface in the photo.

- 10.** What causes sunspots on the Sun?
- A.** intense magnetic fields poking through the photosphere
 - B.** charged particles flowing into the solar system
 - C.** spots on the surface of the photosphere, which are hotter than the surrounding areas
 - D.** areas of low density in gas of the Sun's corona