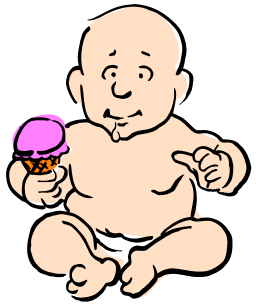
TAKS Objective 2

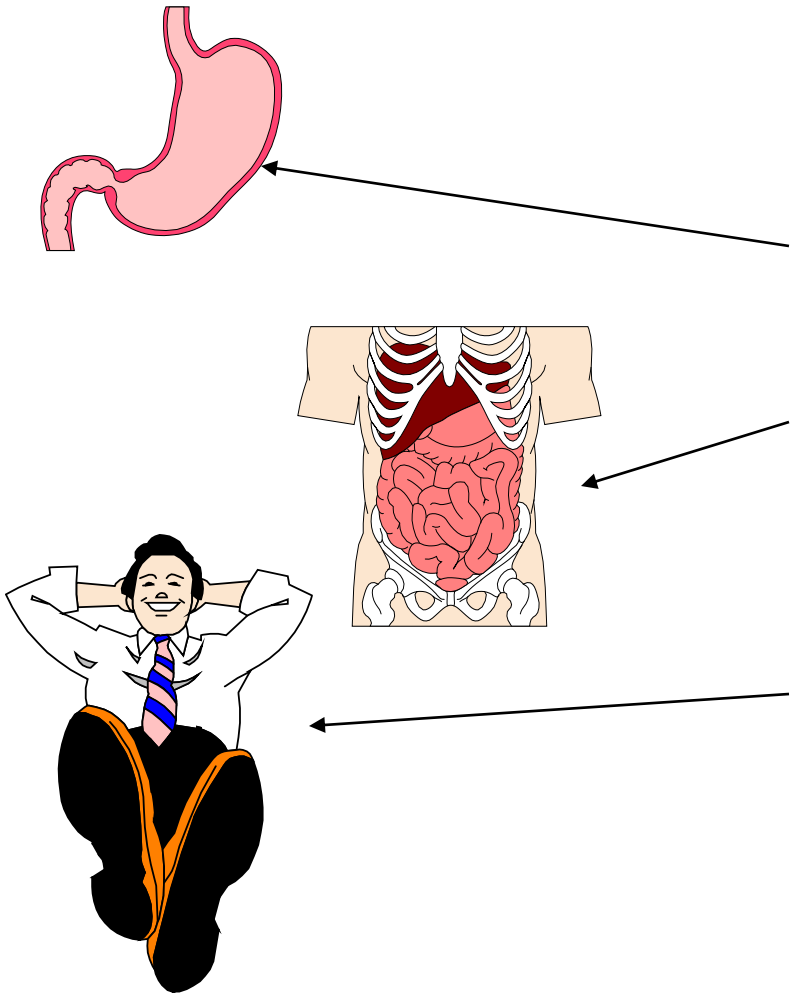
The student will demonstrate an understanding of the organization of living systems.

Living things are . . .

- Organized into cells.
- Grow and develop.
- Respond to the environment.
- Use energy
- Reproduce



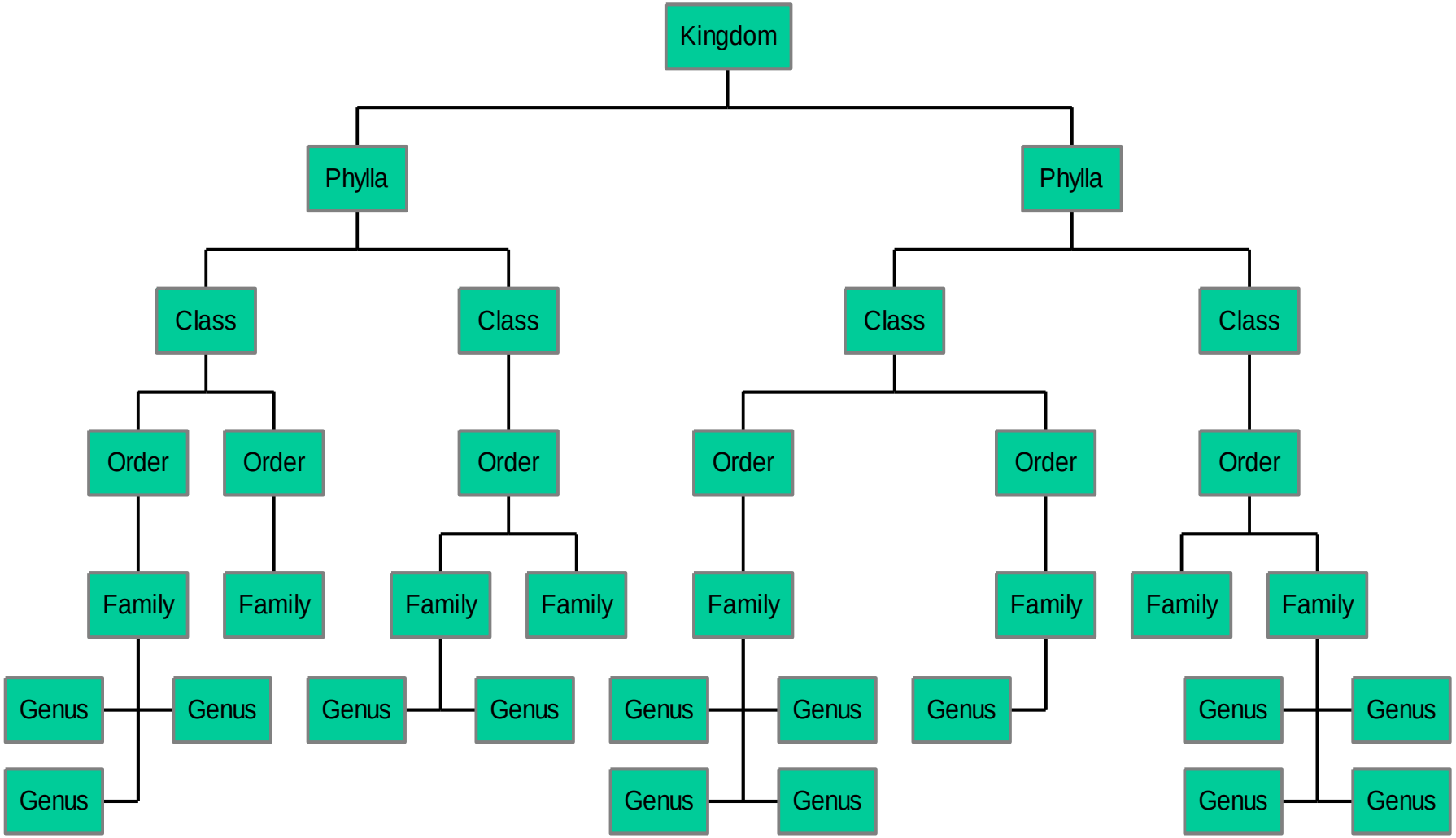
Cells are organized into. . .



- Tissues, like types of cells
- Tissue layers form organs
- Organs that work together form organ systems
- Organ systems that work together make an organism

Taxonomy-how to classify life

Biological Classification



49 Which of these classifications is most specific?

A Family

B Genus

C Phylum

D Order

The taxonomy divisions from largest to smallest are:

Kingdoms (5)

Phylla

Class

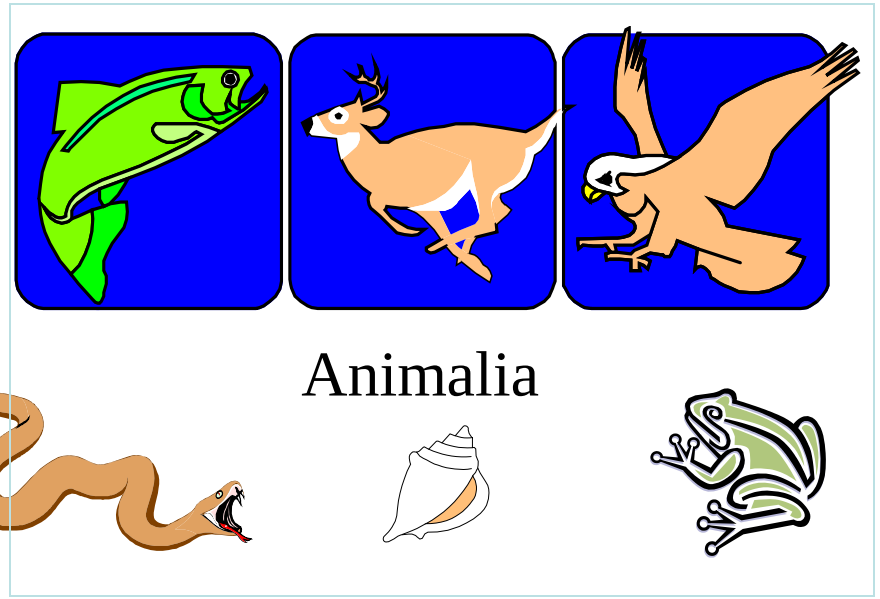
Order

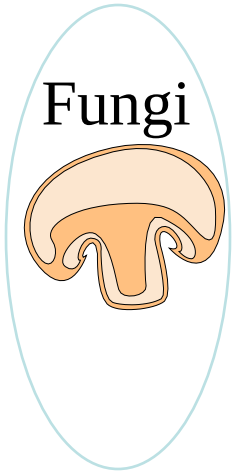
Family

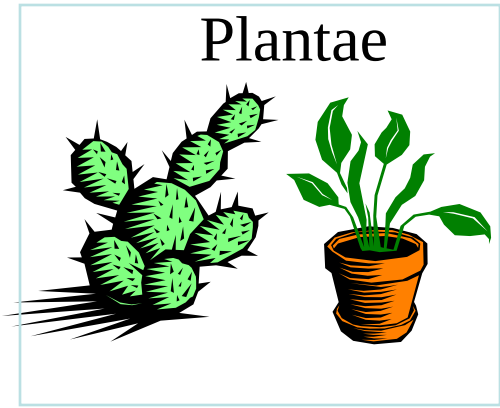
Genus

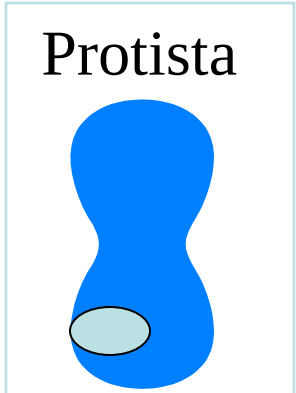
species

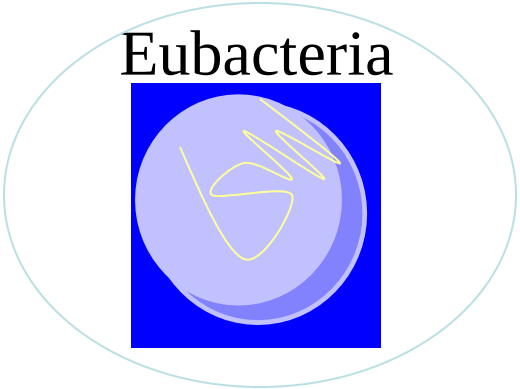
6 Kingdoms – Largest groupings of living things

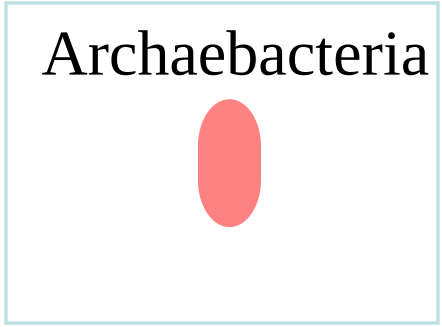












Animal Kingdom

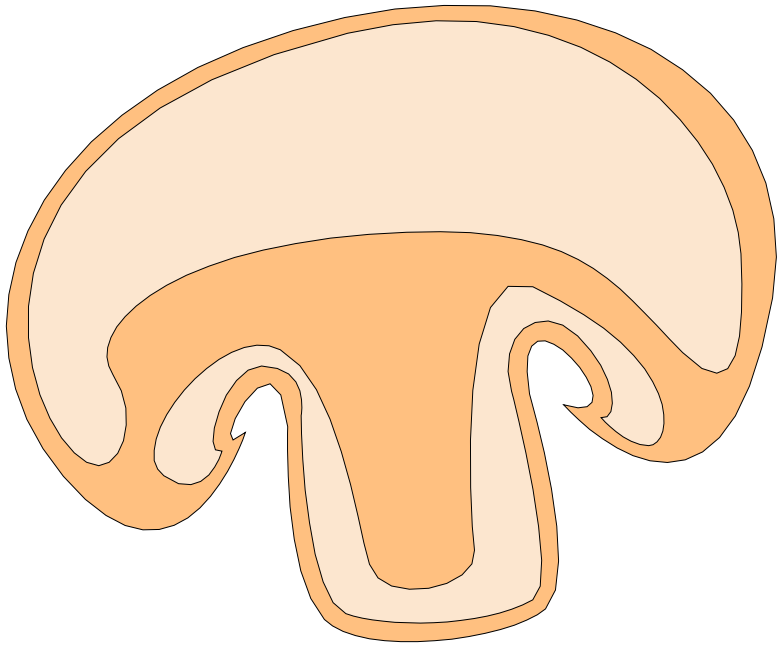
- Multicellular heterotrophic
- This kingdom includes all vertebrates (one major phylum) and invertebrates (several phyla)
- Insects, jellyfish, people are all animals

Kingdom Plantae

- Multicellular and autotrophic
- Means that all plants perform photosynthesis
- This kingdom includes mosses, ferns, conifers, and flowering plants (grasses, fruit trees, shrubs, most garden plants, most crops, wildflowers)

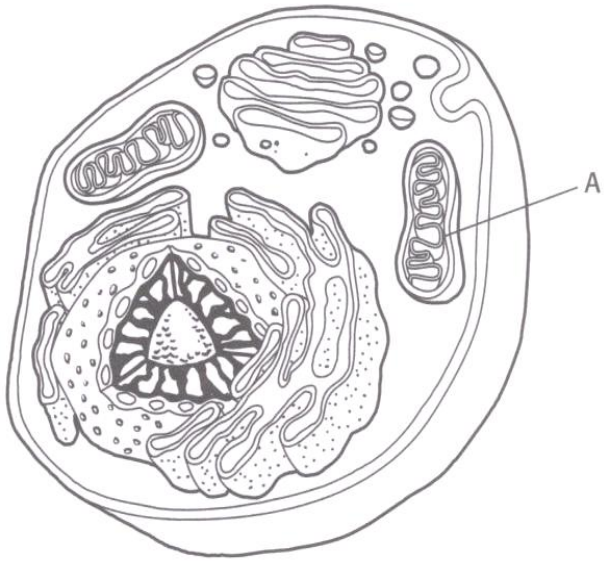
Kingdom Fungi

- Multicellular and some single-cells
- Most of these organisms are decomposers
- Includes mushrooms, yeasts and infections like athlete's foot



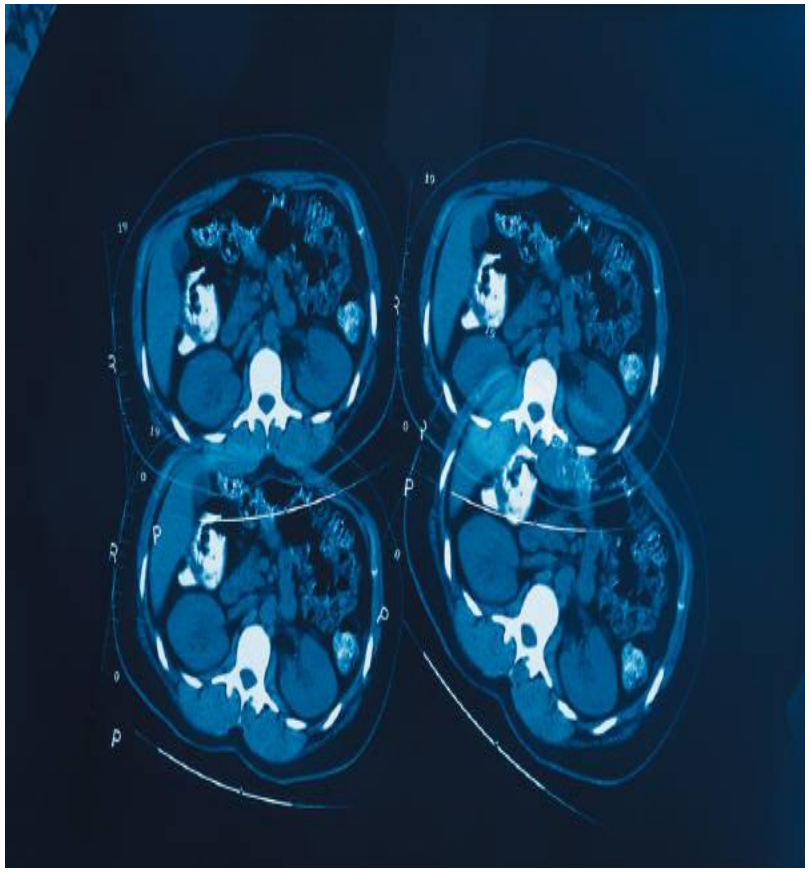
Kingdoms of Single Cells

Kingdom Protista: largest source of food and oxygen for the entire planet. Includes plankton, amoeba, and ciliates. Described as ***Unicellular Eukaryotes***



Prokaryotic Kingdom- Cells without membraned organelles

- ***Kingdom Bacteria***: ***Unicellular Prokaryotes which are often decomposers***
- ***Kingdom Archeobacteria***: ***Unicellular Prokaryotes from extreme environments***.



8 Some bacteria benefit mammals by helping with —

F growth

G defense

H digestion

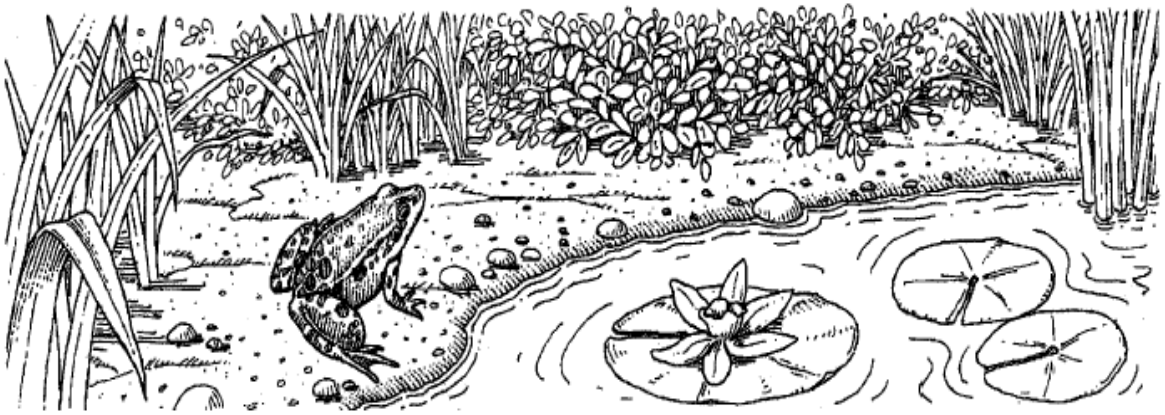
J respiration

- Kingdom Bacteria has beneficial and harmful members
- The best answer here is H, since digestion systems of mammals contain bacteria.
- Bacteria found in the respiratory system usually result in illness, which would trigger the defenses, not help them.

Binomial Classification

- Living things are given a two-part scientific name. This 2-part name is also the species name. The first part is the Genus which is capitalized, and the second, which is the species, part of the scientific name is never capitalized.
- Scientific names are used because the same plant or animal in different places may have different common names.
- Your scientific name is *Homo sapiens*

12 The bullfrog, *Rana catesbeiana*, is most closely related to the —



F spotted chorus frog, *Pseudacris clarki*

G Asian flying frog, *Polypedates leucomystax*

H northern leopard frog, *Rana pipiens*

J African bullfrog, *Pyxicephalus adspersus*

Related in biological terms means family, genus, species.

F spotted chorus frog, *Pseudacris clarki*

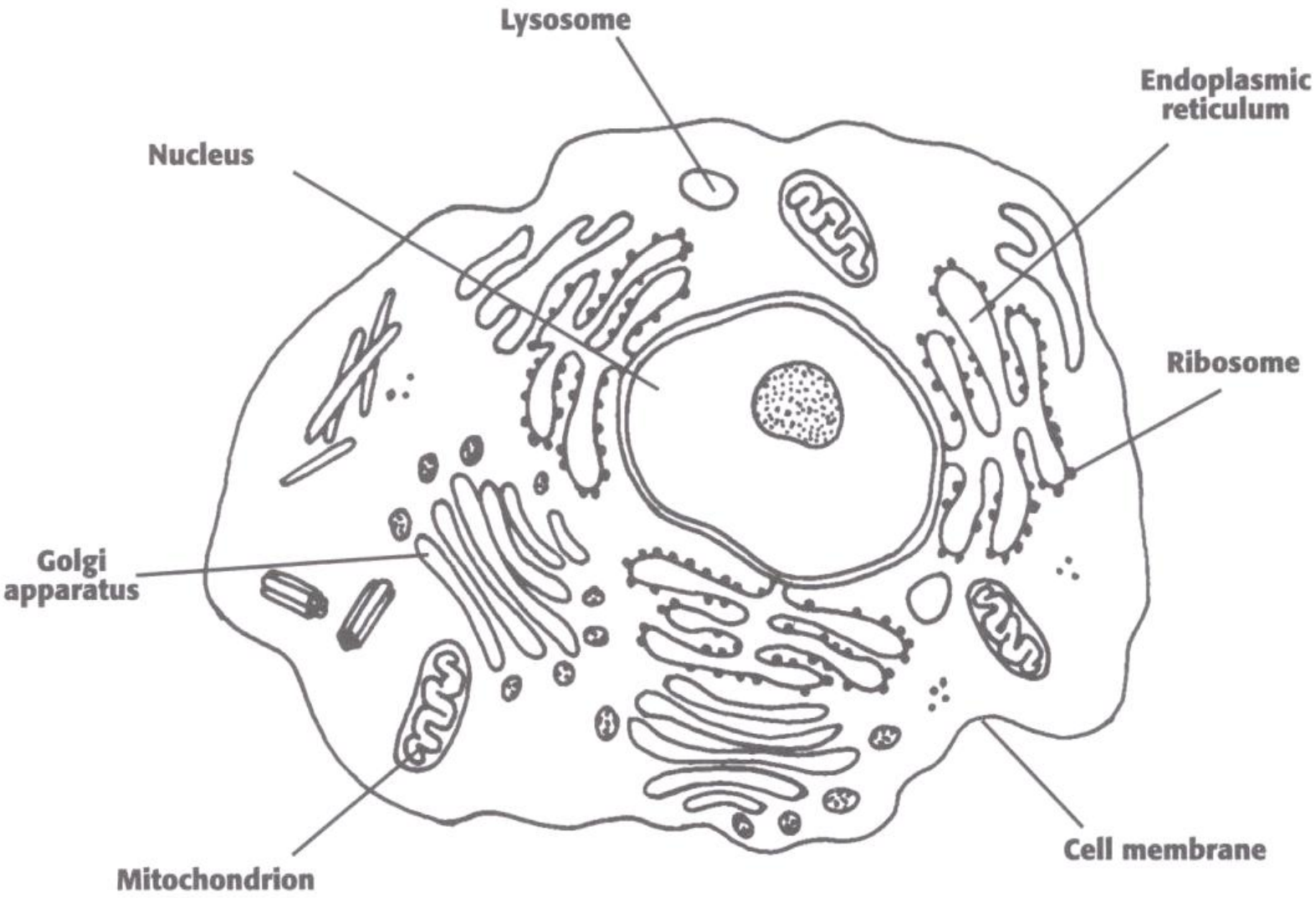
G Asian flying frog, *Polypedates leucomystax*

H northern leopard frog, *Rana pipiens*

J African bullfrog, *Pyxicephalus adspersus*

- Genus is always a capital letter, species is lower case.
- Most closely related would be in the same genus, *Rana.*
- *ANSWER?*
- *H*

Eukaryotic Cells

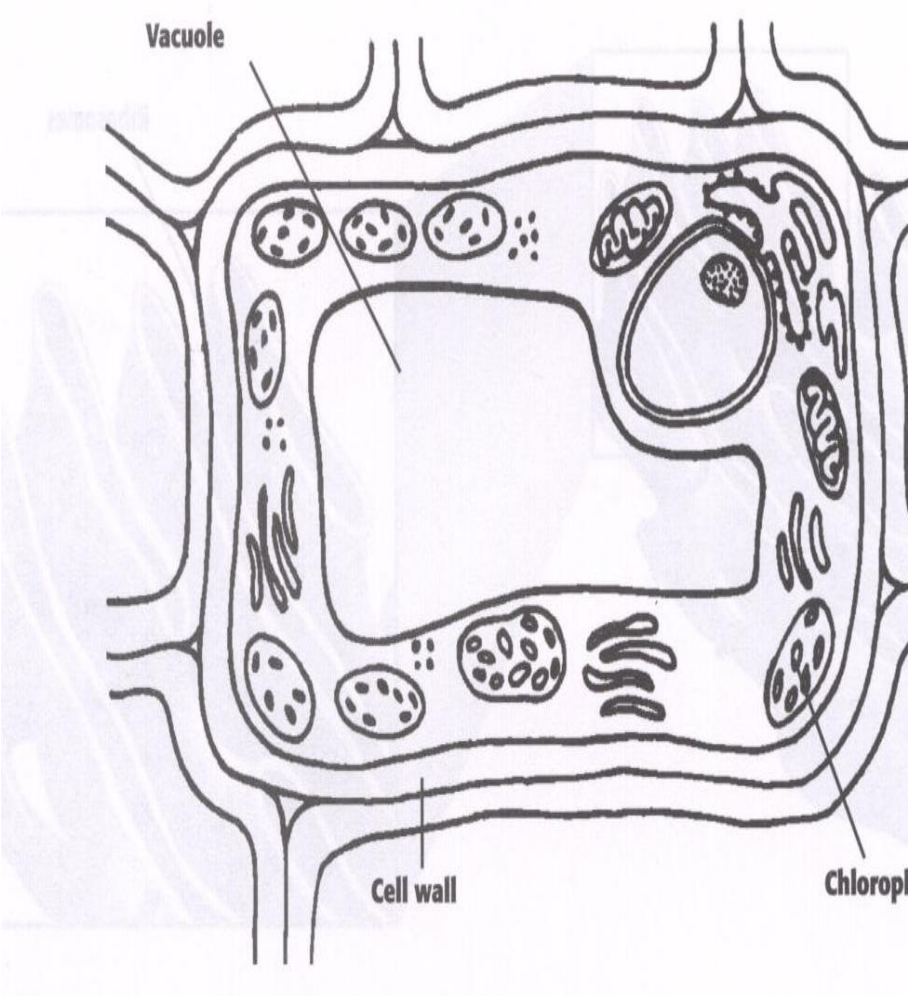


Cell Part	Function
Cell membrane	Controls what enters and leaves the cell
Nuclear membrane	Controls what enters and leaves the nucleus
Nucleus	Control center of the cell
Chromosomes	Genetic information in the nucleus
Endoplasmic Reticulum	Transport system in cell
Ribosome	Organelle makes proteins
Golgi Body	Organelle packages proteins
Vacuole	Stores water and/or waste
Lysosome	Breaks down old cell parts
Mitochondria	Organelle for cellular respiration – provides energy

Plant Cells have, and Animal Cells don't

- Chloroplasts – organelle responsible for photosynthesis
- Cell Walls – a structure outside of the membrane to provide support
- Very large vacuoles to store extra water

This is a typical plant cell



- It contains a cell wall, chloroplasts, a very large vacuole.
- Why do plants need large vacuoles?

•ANSWER: This is where food and water are stored.

52 Compared to annual rings of trees that have experienced years of sufficient rainfall, the annual rings of trees that have experienced a dry period will —

F be softer

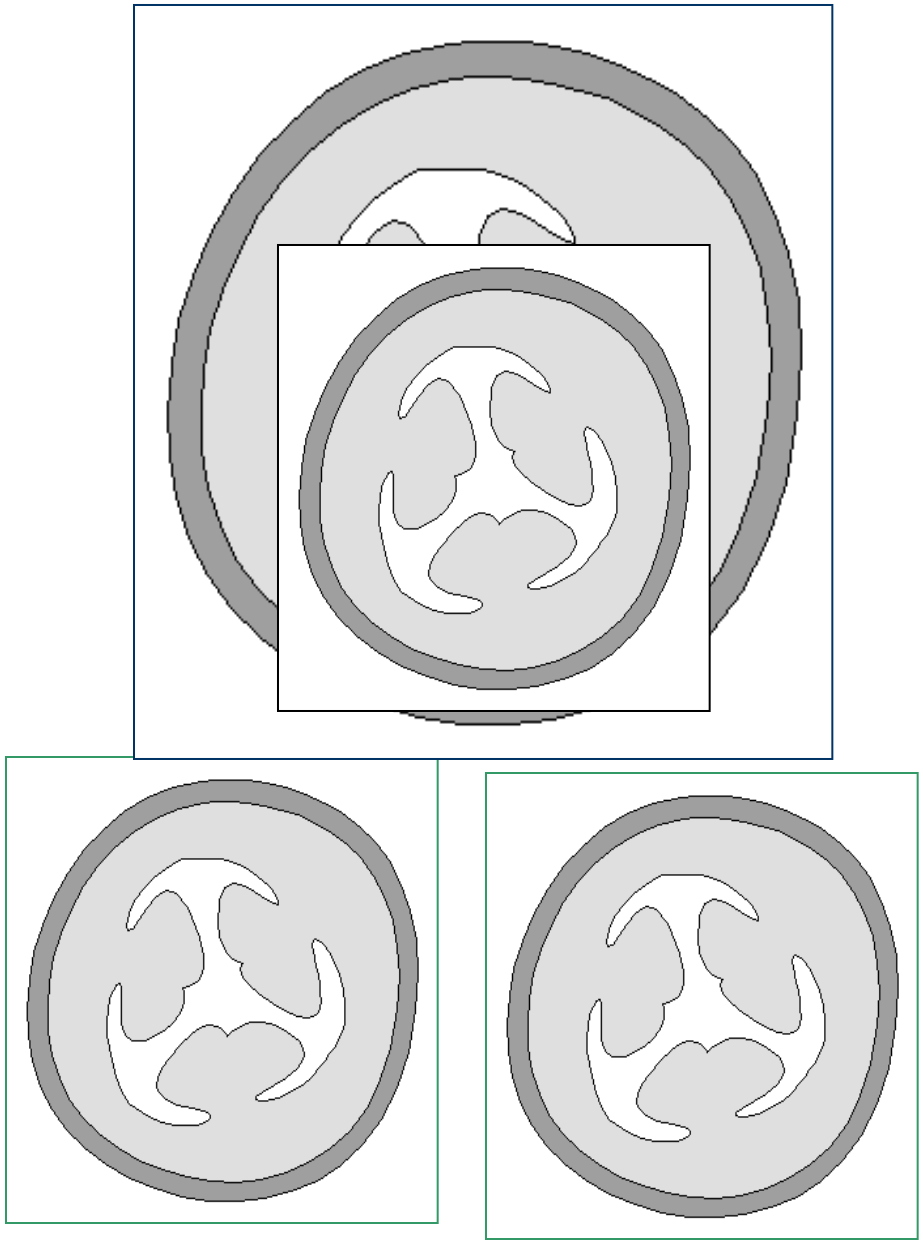
G grow at a faster rate

H be thinner

J photosynthesize at a faster rate

These would indicate more water, not less

Cell Reproduction



- **The Cell Cycle** is the life cycle of a cell. It has two parts. **Mitosis** is the process of cell division and **Interphase** is the process of growing and functioning.
- During mitosis the cell separates into two new identical sister cells.

26 If a cat has 38 chromosomes in each of its body cells, how many chromosomes will be in each daughter cell after mitosis?

- **F** 11
- **G** 19
- **H** 38
- **J** 76

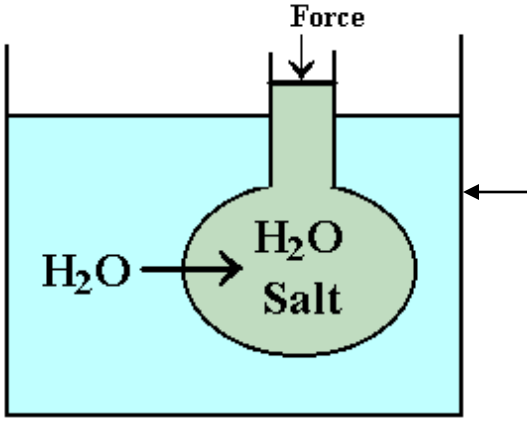
H

Mitosis is the normal division of any body cell, so the chromosomes replicate exactly and then separate into two identical cells. So the answer is

When cells reproduce out of control

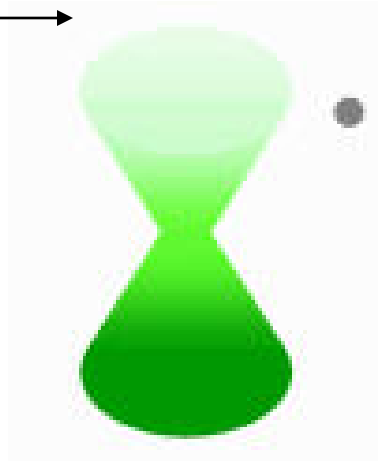
- Tumors are formed. This is what is called cancer.
- It may or may not be malignant (kind that spreads).

Transporting into Cells -



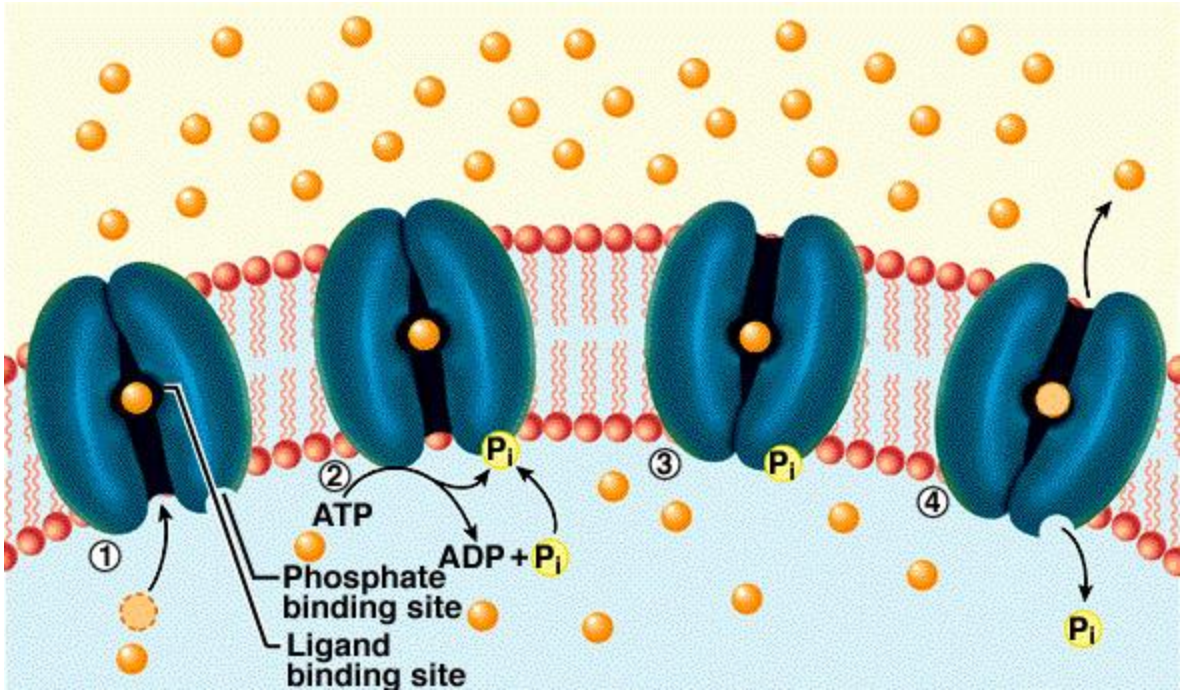
Diffusion →

← Osmosis is the diffusion of H_2O



- Passive movement from an area of high concentration to an area of low concentration is diffusion.
- The diffusion of water is called osmosis.

What is Active Transport?



Energy is used to move selected molecules into a cell, even if they are at a low concentration.

34 When a sea urchin egg is removed from the ocean and placed in freshwater, the egg swells and bursts. Which of these causes water to enter the egg?

F Coagulation — Means to clump together – Incorrect

G Sodium pump — Sodium is not being moved – Incorrect

H Active transport — The egg would not use energy to do this since it kills the cell.

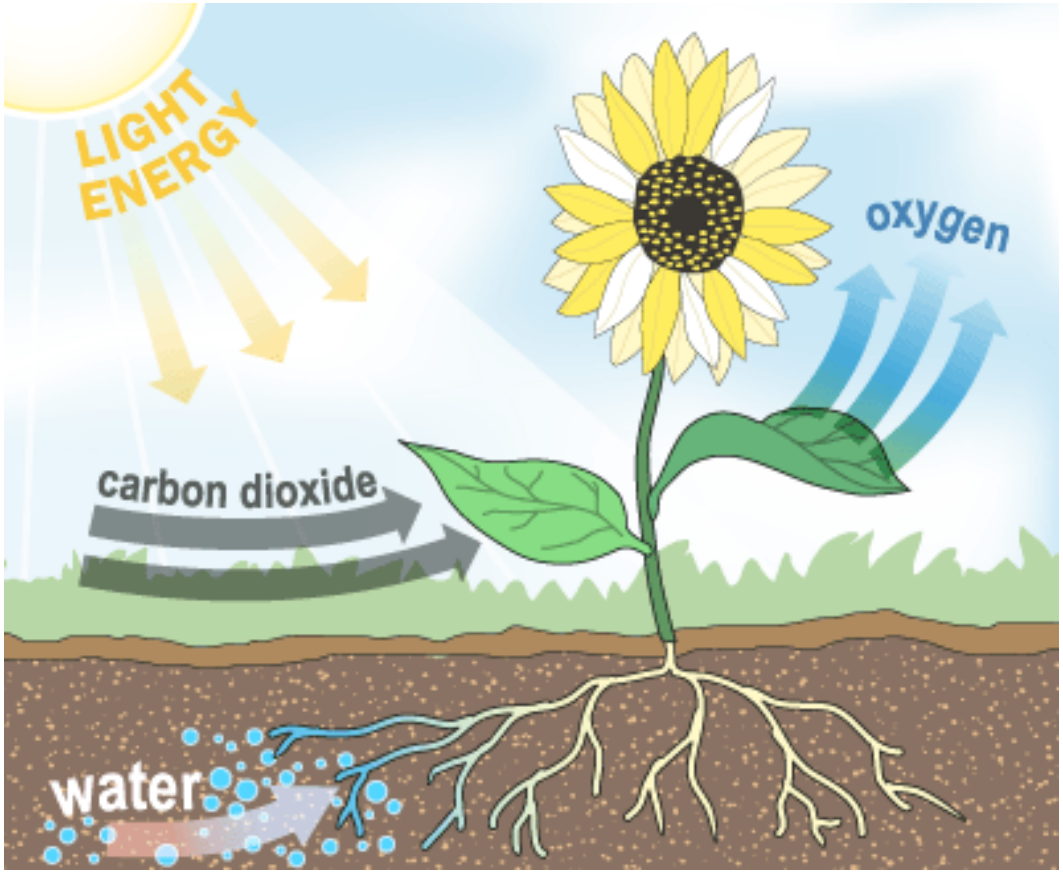
J Osmosis

This is the movement of water from an area of high concentration (the fresh water) to low concentration (inside the Salt Water Urchin Egg)

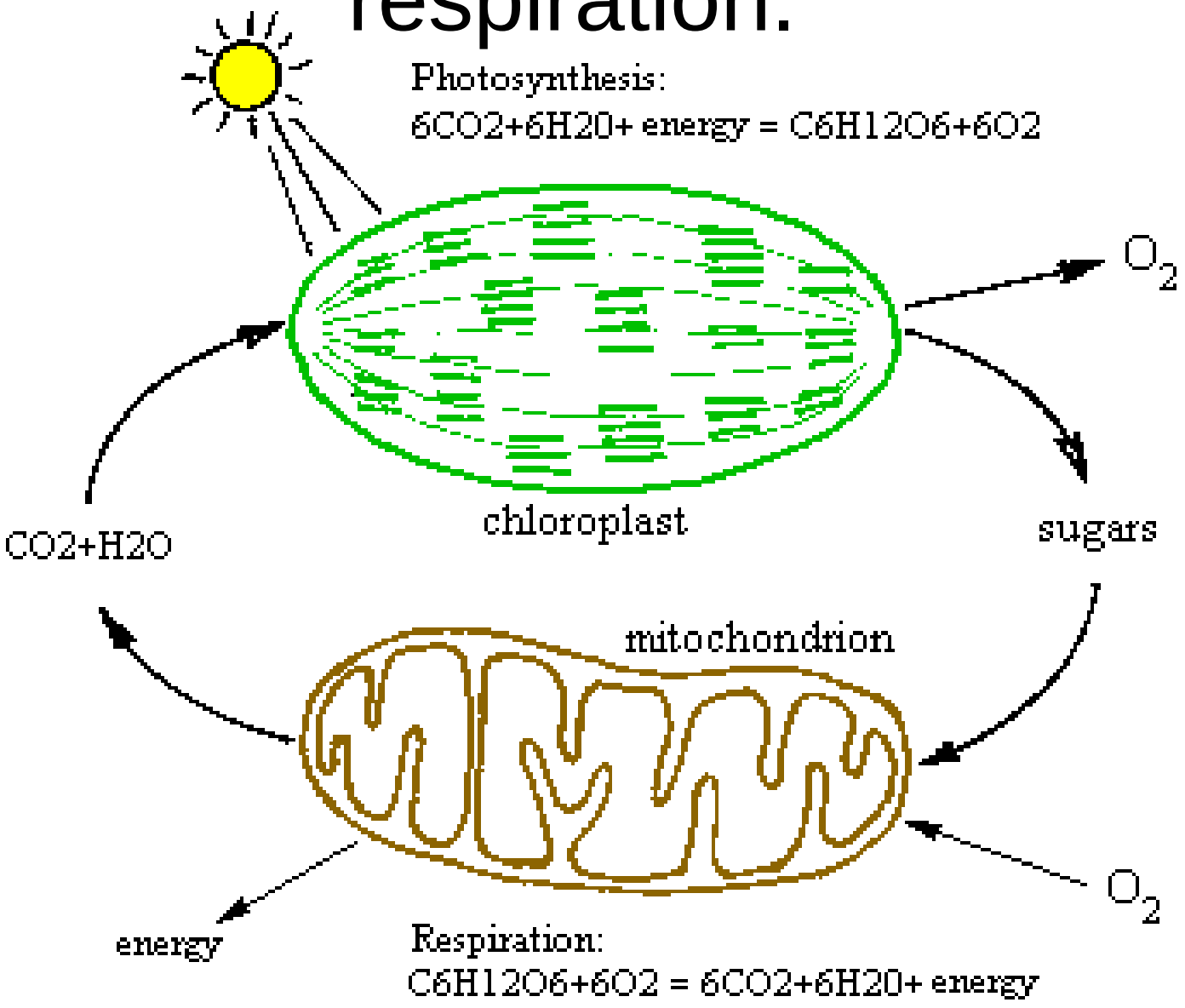
$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

Carbon dioxide Plus Water Produces Glucose And Oxygen

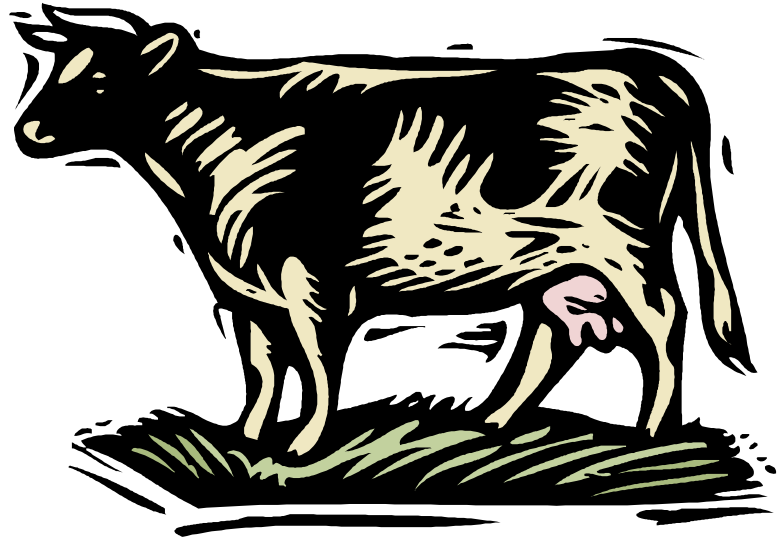
This is photosynthesis



Plants do photosynthesis and cellular respiration.

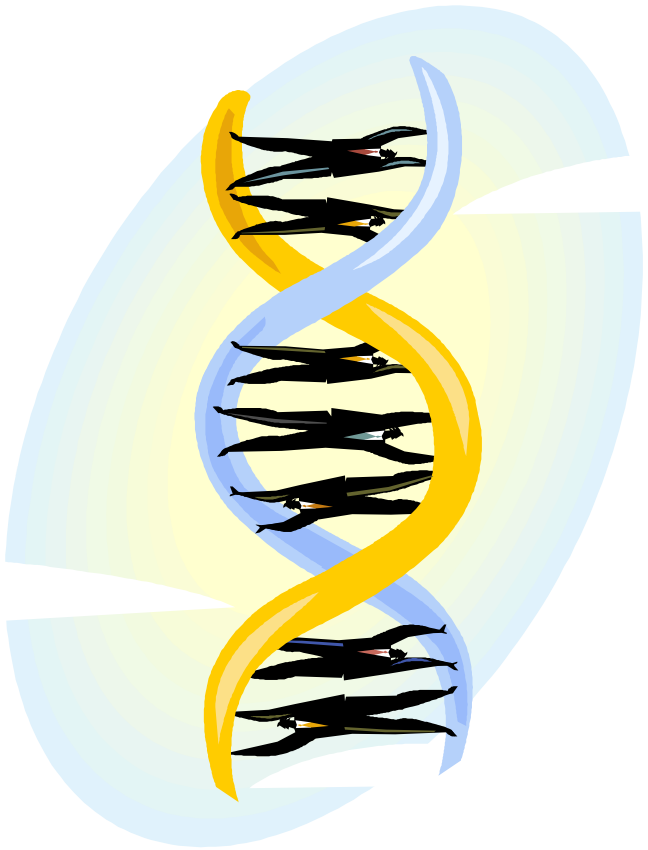


Cellular Respiration



- $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
- Occurs in mitochondria of all living things

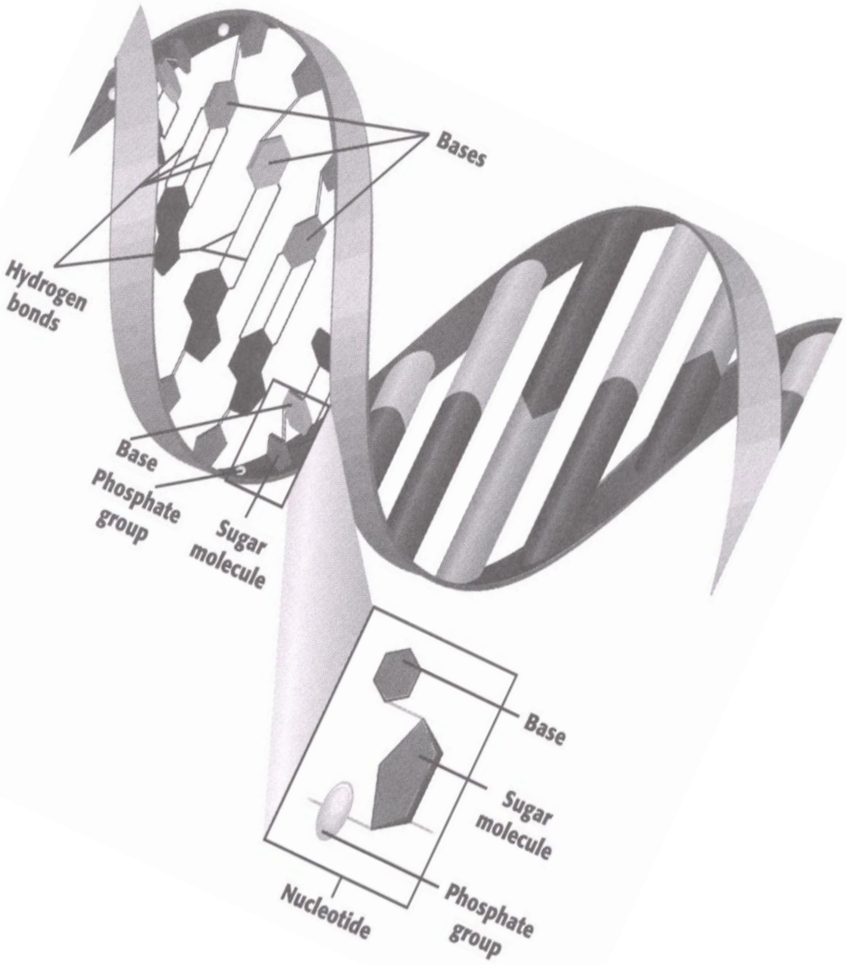
Genetic Code



- All of the information to make a new organism is contained in the chromosomes of the cell.
- Chromosomes are made of tightly coiled DNA or Deoxyribonucleic Acid.
- Chromosomes contain genes each of which codes for a single protein. There are hundreds to thousands of genes on each chromosome.

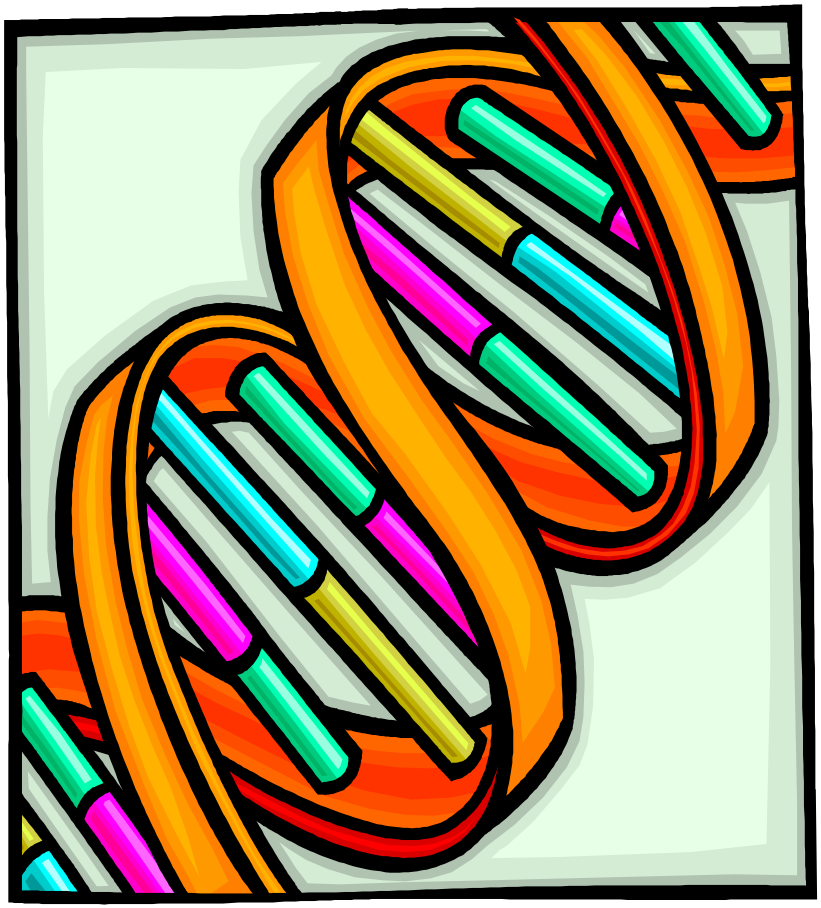
DNA

- DNA is formed of nucleotides, which have 3 parts; a sugar, a phosphate and a nitrogen base make up a nucleotide.
- The 4 different nitrogen bases of DNA are Adenine, Thymine, Cytosine and Guanir. They pair to form the rungs of the ladder.
- The process of copying DNA is called ***Replication***



The Stuff of Life

- The structure of DNA is called a double helix, or twisted ladder
- The base Guanine always pairs to Cytosine. Adenine pairs to Thymine.
- Mutations are caused when these pairings are not made.



38 In DNA, which of the following determines the traits of an organism?

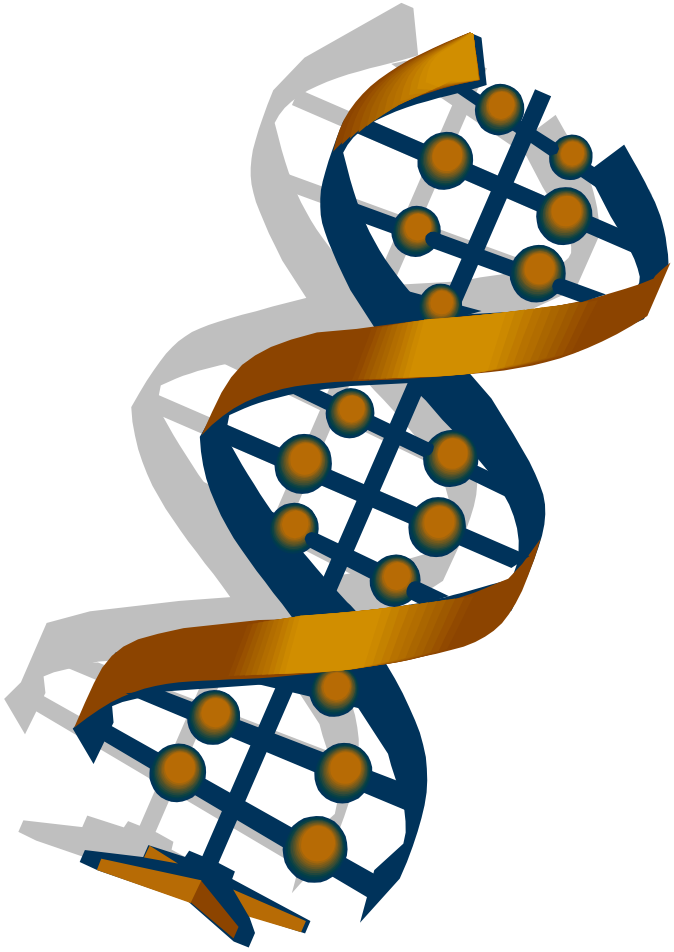
F Amount of adenine

This is only one of

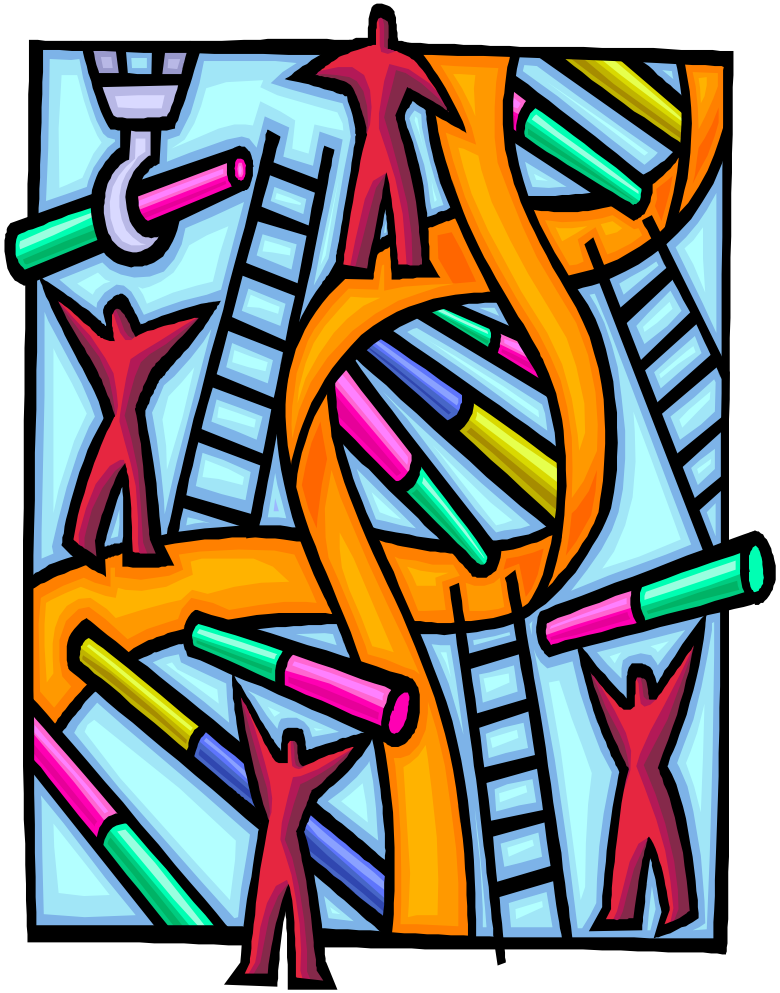
Every nitrogen base is attached to a sugar, so this is not correct.

for anything by itself.

Hydrogen bonds strength does not change enough to code for trait changes.



Transcription . . .



- Transcription is when messenger RNA reads the DNA in the nucleus and then leaves the nucleus to take the information to the ribosome.
- The DNA then wraps back up until next time.

Translation . . . Code into words

- mRNA takes the code from the nucleus to the Ribosome where it pairs with Transfer RNA to put Amino Acids into chains called proteins.
- mRNA pairs to tRNA in the ribosomes This protein building is called TRANSLATION.

What does this chart represent?

Codon Chart

Second Position

First Position (5′)	U	C	A	G	Third Position (3′)
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	Stop	Stop	A
	Leucine	Serine	Stop	Tryptophan	G
C					
A					
G	Valine	Alanine	Aspartic acid	Glycine	U
	Valine	Alanine	Aspartic acid	Glycine	C
	Valine	Alanine	Glutamic acid	Glycine	A
	Valine	Alanine	Glutamic acid	Glycine	G

It says codons, and has U instead of T, so it must be mRNA.

$^{5'}$AGAUCGAGU$^{3'}$ → $^{5'}$A*C*AUCGAGU$^{3'}$

Amino Acid Composition of Cytochrome c in Some Organisms

Amino Acid	Organism Q	Organism R	Organism S	Organism T
Alanine	10%	10%	10%	10%
Arginine	4%	4%	4%	4%
Aspartic acid	6%	6%	6%	6%
Cysteine	6%	6%	6%	4%
Glutamic acid	12%	12%	8%	8%
Glycine	4%	2%	4%	4%
Valine	2%	1%	4%	6%

53 The table shows a comparison of some amino acids found in cytochrome c. The two organisms in the table that are most closely related are —

A Q and T

B R and S

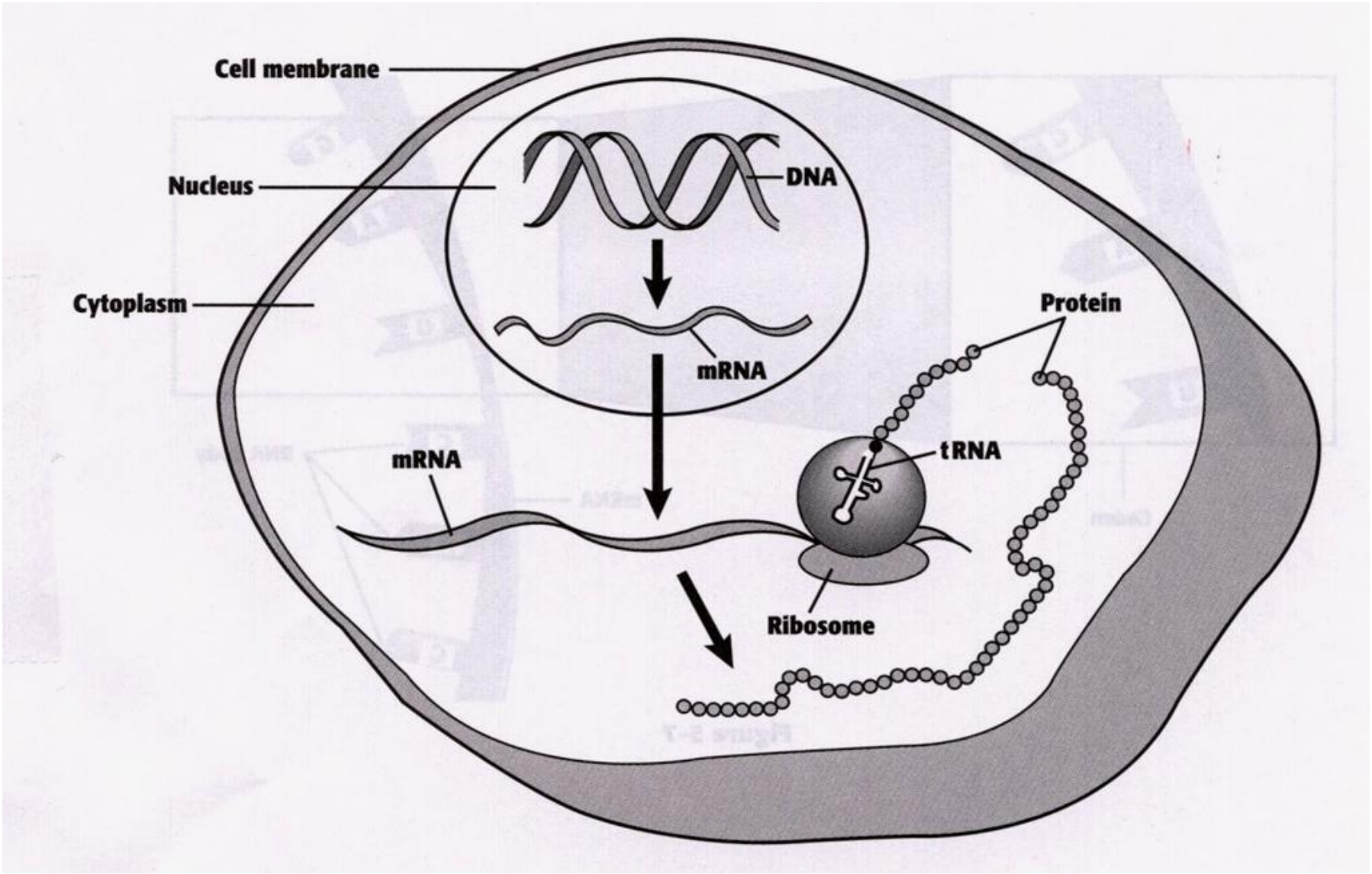
C Q and R

D Q and S

To be closely related means the amino acid composition should be almost the same, since that is what the DNA is coding.

- Between Q and T, only 4 levels are the same – ✓Not A
- Between R and S only 4 levels are the same – ✓Not B
- Between Q and S 5 of the levels are the same, but – ✓Not D
- Between Q and R 5 of the levels are the same and differ in the other 2 by a smaller percent. Answer: ✓C

Transcription and Translation



What is the DNA base pair rule?

24 If the template of a strand of DNA is 5′ AGATGCATC 3′, the complementary strand will be —

F 3′ TCTACGTAG 5′

G 5′ CTACGTAGA 3′

H 3′ AGATGCATC 5′

J 5′ AGACGTCTA 3′

In DNA A to T and T to A, C to G and G to C

5′ AGATGCATC 3‘

TCTACGTAG

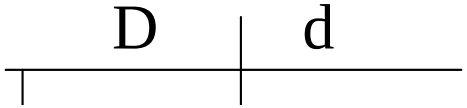
- Base pair each letter by the above rule.
- So the answer is:
- F

Genetics – How traits are inherited

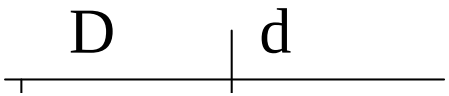
- Father of Genetics is Gregor Mendel, he experimented with pea plants.
- Dominant traits always are visible, and are represented by capital letters.
- Recessive traits are hidden unless both alleles are the recessive one (Homozygous)
- At least one pair of alleles determines the trait in genetic inheritance.

Punnett Squares

Heterzygous &
Homozygous Recessive



Heterzygous &
Heterozygous



Homozygous Dominant
& Heterozygous

Homozygous Recessive &
Homozygous Dominant

Phenotype is what you see

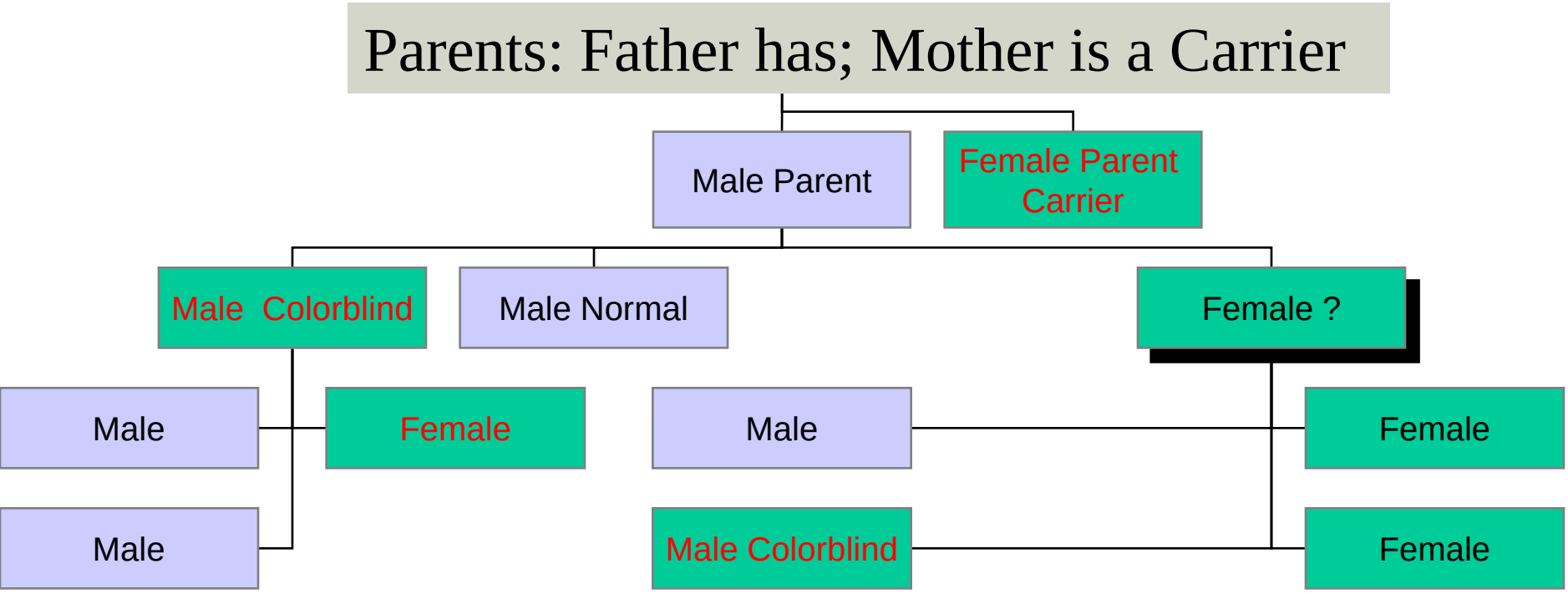
- Phenotype refers to what is visible – the dominant trait or the recessive trait.
- How do you know the phenotype?
- LOOK!!

Genotype – actual combination of alleles

- Only 3 possibilities
- BB = Homozygous Dominant
- Bb = Heterozygous
- bb = Homozygous recessive
- Must look at inheritance pattern to find out.

Pedigree shows the Family Tree

Colorblindness Inheritance

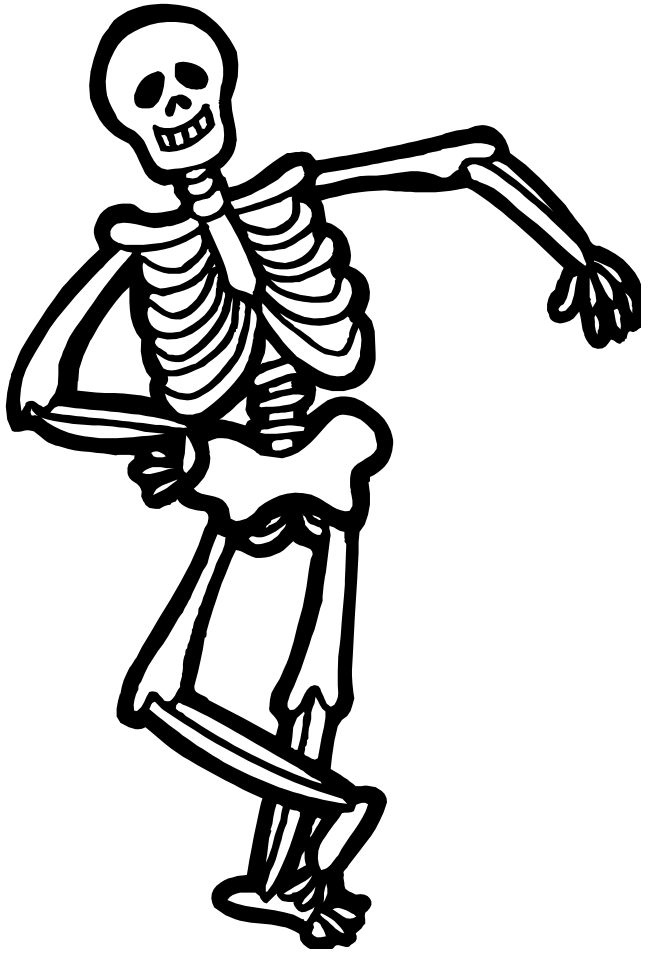


Homeostasis

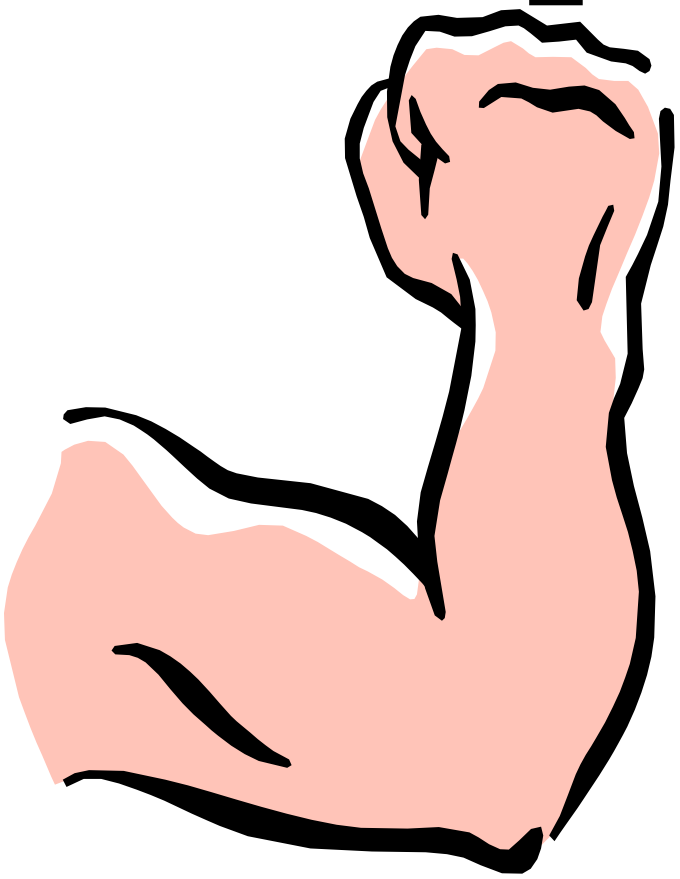
- This is the maintenance of the normal operating conditions of an organism.
- Control of body temperature, pulse rate, blood pressure, blood sugar, urine output, digestive absorption, metabolism rate, growth rate and hormone levels all need to be maintained.

Structural System - 1

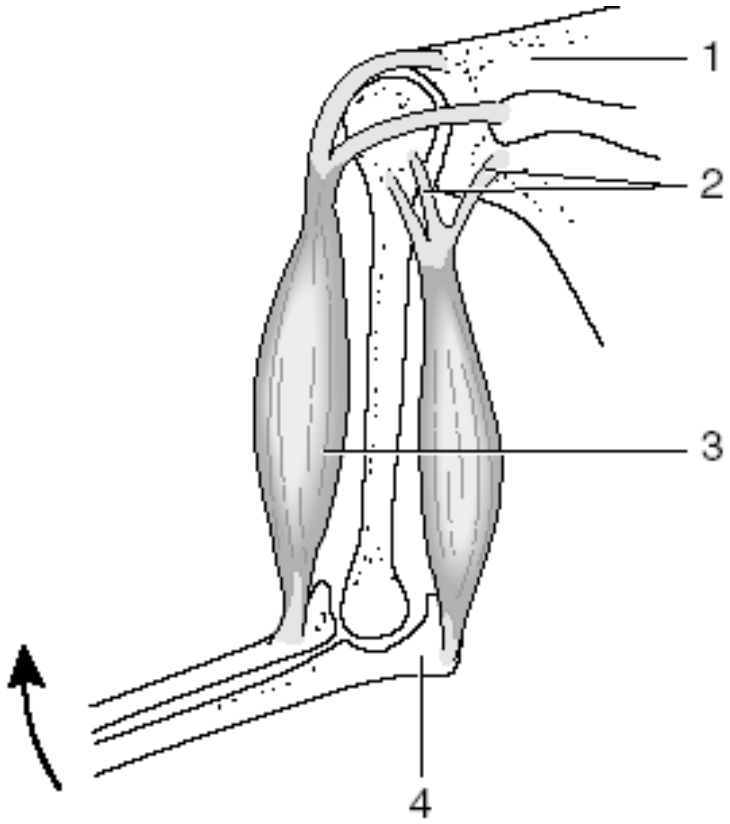
- Bones are to
  - Support & structure
  - Make blood cells
  - Allow movement
  - Muscle attachments
  - Ligaments hold joints together



Structural System – 2



- 3 types of muscles
  - Smooth, involuntary
  - Striated, voluntary
  - Cardiac, heart muscle somewhat like both above
- Allow for movement
- Attached by tendons above and below joints



17 Which structure in the upper arm is responsible for raising the lower arm?

A 1

B 2

C 3

D 4

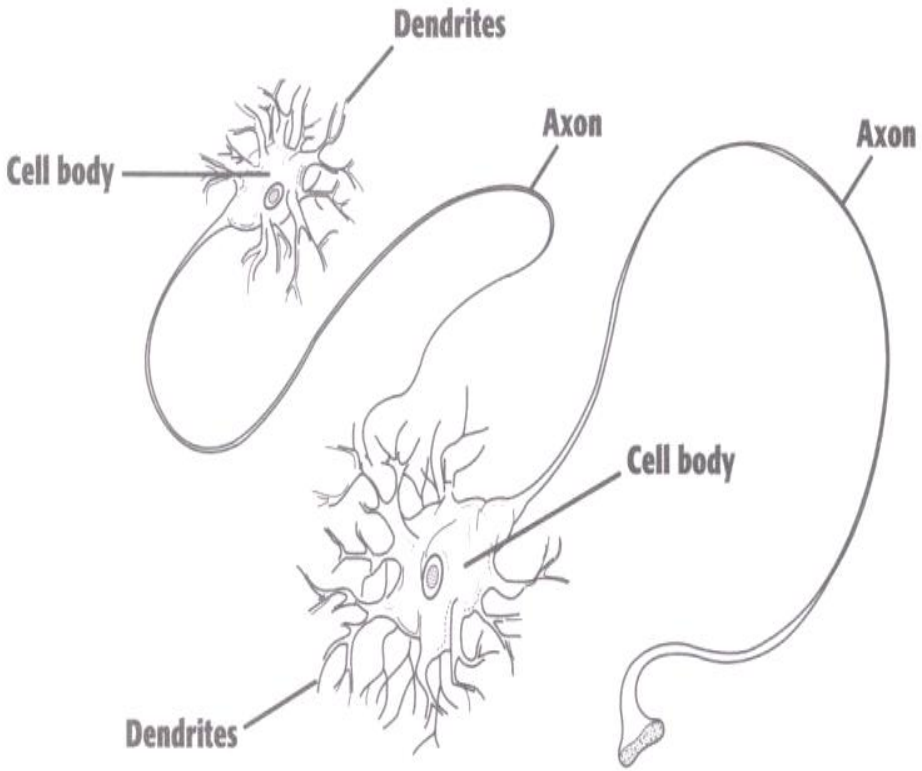
In order to raise it, it must be attached, so its not 1 or 2.

4 is a bone not a muscle, so its answer:

Nervous System - 1

- Consists of brain and spinal chord
  - Voluntary, you control and choose
  - Involuntary, allows parts to keep functioning without you knowing
- Nerve cells send and receive information .
  .

Nervous System - 2



Nerve cells have 3 parts

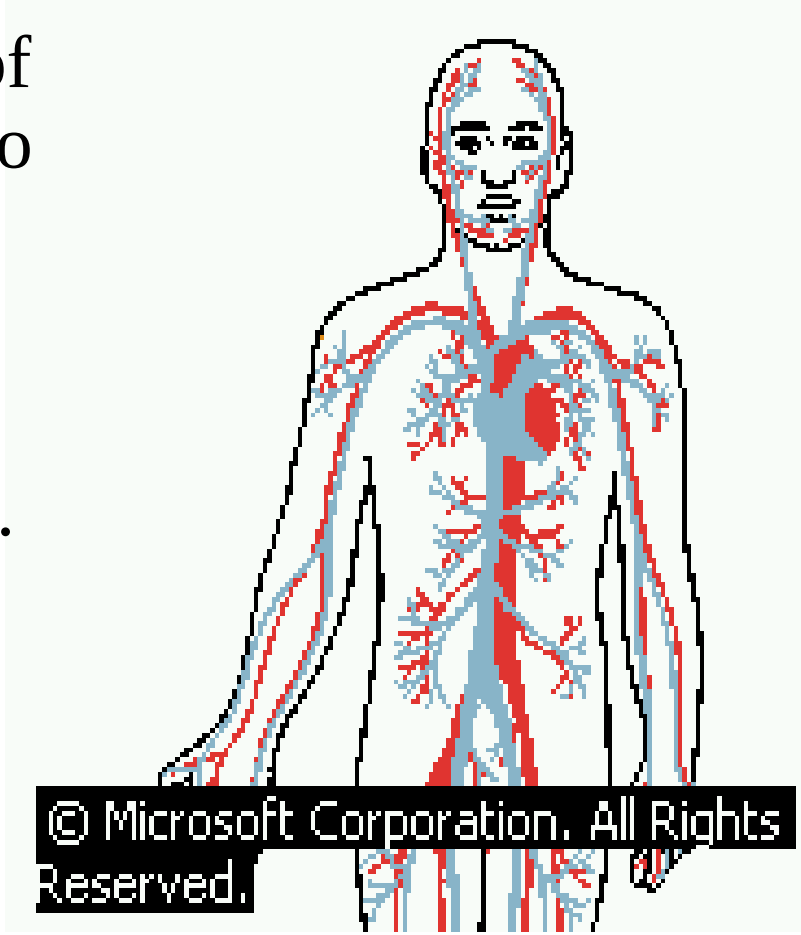
- Axon – Sends signal
- Cell Body – controls cell functions
- Dendrite – Receives signal from another
- Synapse – space between cells

Nervous System - 3

- Involuntary is controlled by the medulla oblongata of the brain.
- This is how you keep breathing while sleeping and digest food without thinking about it.

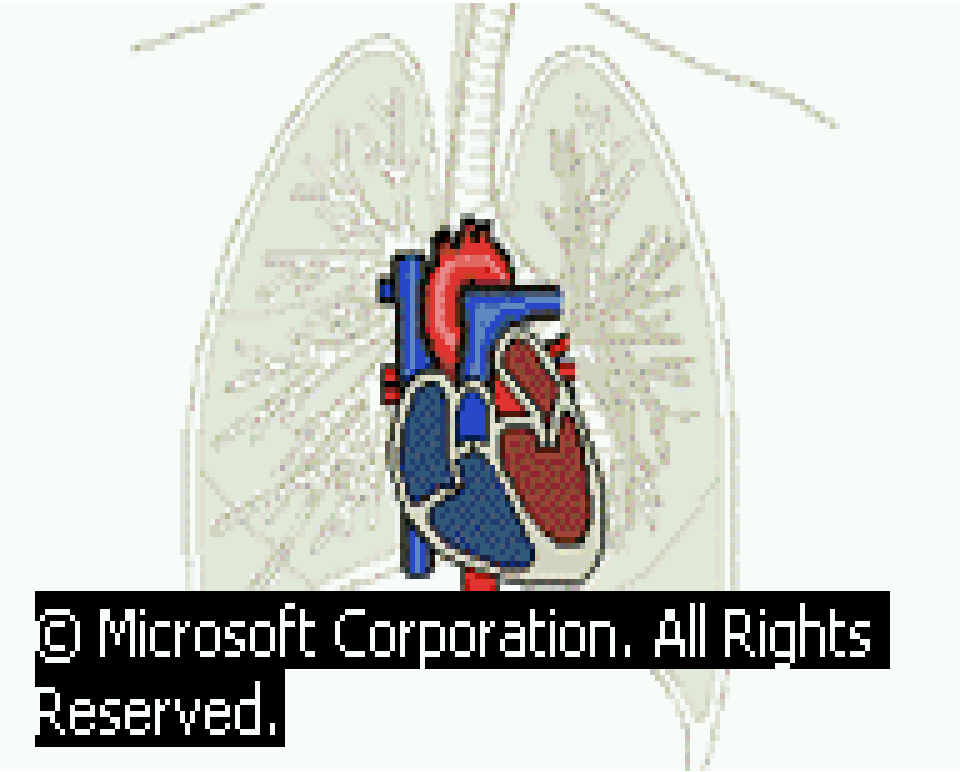
Circulatory System - 1

- This system helps to connect many other systems as it provides the transport of substances from one organ to another.
- Every cell must touch a blood vessel to take in what it needs and get rid of waste.
- Arteries carry blood away from the heart and veins carry it back to the heart.
- The heart pumps the blood



Circulatory System - 2

- The top parts of the heart receive blood – Atrium
- The bottom two are very muscular and pump the blood – Ventricles
- Two contractions, right ventricle pumps to the lungs, and the left ventricle pumps to the body and brain.



29 Nutrients from digested food move from the digestive system directly into the —

A circulatory system

B integumentary system

C excretory system

D endocrine system

Endocine system does not transport anything. So . . .

Excretory system gets rid of waste CO_2 and H_2O, not food. So . .

Integumentary system holds organs and tissues in place. So. . .

The Circulatory System carries everything to every

25 The medulla, part of the brain stem, reacts quickly to increased levels of CO_2 in the blood and stimulates a response from the —

A excretory system

B immune system

C respiratory system

D integumentary system

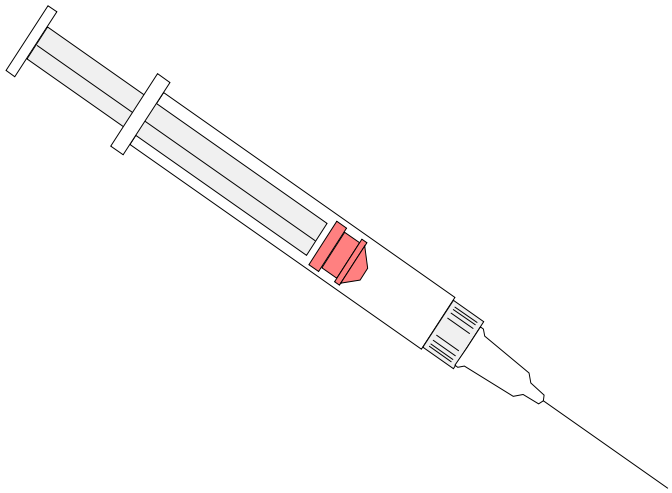
Increased respiration gets rid of excess CO_2

Immune System - 1

- Your immune system protects you from infections and illness
- 1st Order Non-specific includes skin, mucous membranes, cilia of trachea and bronchi, stomach acid, tears
- 2nd Order includes the inflammatory response (swelling, redness due to histamine release), fever, white blood cells such as phagocytes and macrophages destroying the pathogens and infected tissue cells.

Immune System - 2

- Two main types of immunity
- ACTIVE – body makes its own antibodies after being sick - permanent OR a vaccination to help your body make antibodies
- PASSIVE – injection with antibodies, or transferred from mother to unborn baby



6 Most viruses infect a specific kind of cell. Which of the following are infected by the human immunodeficiency virus (HIV)?

F Helper T cells

G Liver cells

H GABA-receptor cells

J Red blood cells

Ask yourself, which cell type deals with immunity?

F Helper T cells

G Liver cells

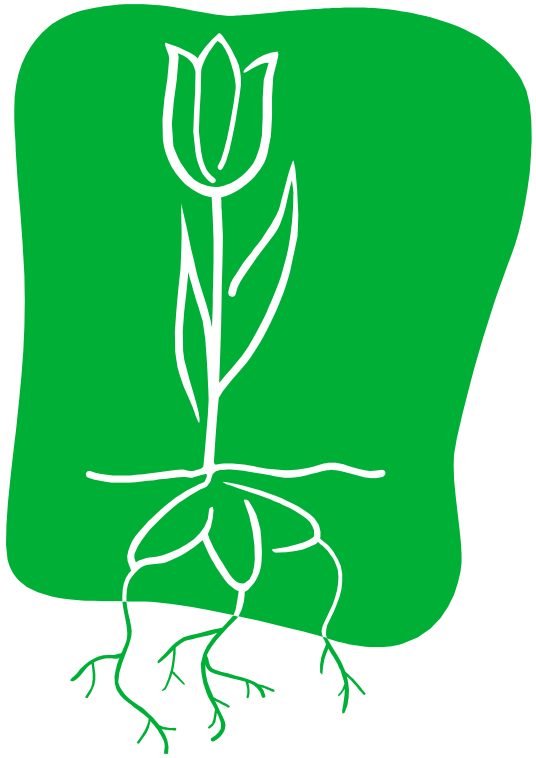
H GABA-receptor cells

J Red blood cells

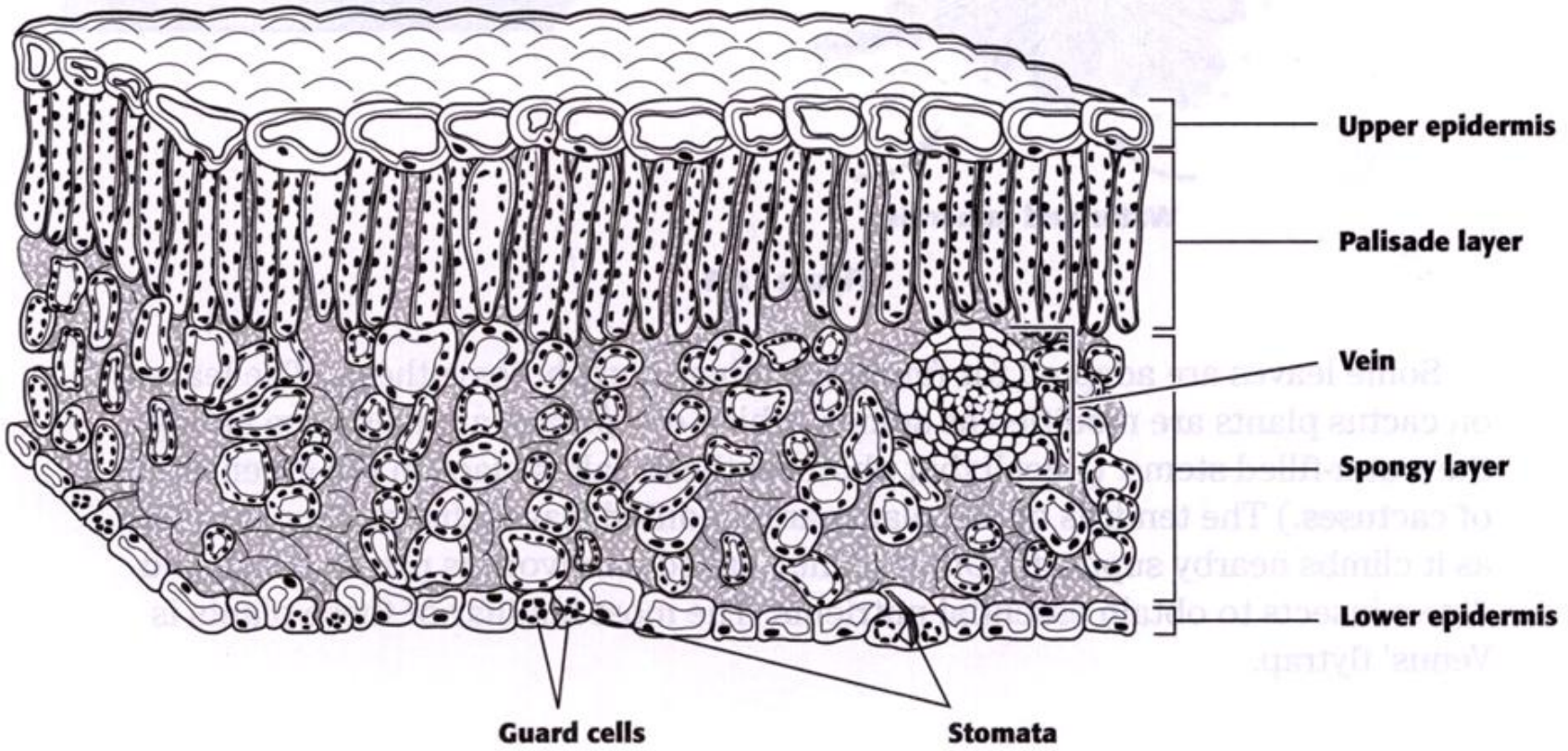
- Answer? Helper T cells.
- All the rest are body cells with specific jobs that do not relate to immunity.

Plant Systems

- There are 3 main plant systems:
- Reproductive – this is the flower structure
- Transport – this is the stem and roots and their xylem and phloem
- Energy – this is the leaf and other areas of photosynthesis.



Leaf Tissue – What happens where?



Tomorrow –
Ecology and the Environment