SPECIALIZED CELLS
NAME SOME TYPE OF ANIMAL CELL IN THE HUMAN BODY?
WHY MULTICELLULAR ORGANISMS CAN’T LIVE WITH ONE TYPE OF CELL.

• MOST CELLS CANNOT SURVIVE ON THEIR OWN, SO THEY JOIN TOGETHER TO FUNCTION AS MULTICELLULAR ORGANISMS.

• CELLS CAN BECOME SPECIALIZED TO PERFORM DIFFERENT FUNCTIONS IN THE BODY.

• THESE CELLS HAVE DIFFERENT STRUCTURES AND FUNCTIONS BUT AS THEY WORK TOGETHER SO THAT THE ORGANISM CAN FUNCTION AS A WHOLE.
EXAMPLE OF UNI-CELLULAR ORGANISMS

Diatoms
Amoeba
Euglena
Paramecium
Vorticella
PLACE CELL ORGANIZATION IN ORDER.
INTRO: PLACE CELL ORGANIZATION IN ORDER.
SPECIALIZED CELLS

- 50 – 75 TRILLION CELLS IN YOUR BODY

- 220 SPECIALIZED CELLS
  - HEART
  - NERVE
  - BLOOD
  - SPERM
  - ETC.

- WHY DIFFERENT?
SPECIALIZED CELL

• A CELL THAT HAS A PARTICULAR STRUCTURE AND PERFORMS A SPECIFIC FUNCTION

• EACH TYPE HAS UNIQUE SHAPE, SIZE AND FEATURES ALLOWING IT TO DO ITS JOB ACCURATELY
Ciliated cells line the windpipe. Cilia are rows of fine hair which sway to and fro. They sweep a covering layer of mucus which traps bacteria, viruses and other particles, into the back of the mouth.

Skin cells cover the body and help to protect internal organs from damage.

Fat cells store fat which insulates the body and is also a source of energy.

Nerve cells transmit messages in the form of nerve impulses.

Bone cells produce bone which supports the body and helps to protect internal organs from damage.

White blood cells help to protect the body against disease.

Red blood cells transport oxygen around the body.

Smooth muscle cells contract rhythmically, helping to move blood through blood vessels, e.g., arteries.

The female sex cell, called the ovum (egg), is fertilised when a sperm fuses with it.

The male sex cells, called sperm, swim to the egg where one of them fertilises it.
Pollen grains contain the male sex cell.

Leaf cut to show different cells:
The upper and lower surface of the leaf are each covered by a single layer of cells.

Column-shaped palisade cells lie beneath the upper surface; they are packed with chloroplasts.

Guard cell:
Pores, called stomata (pl.), perforate the lower surface of the leaf. Each stoma (sing.) has sausage-shaped guard cells on either side.

Stomatal pore:

Xylem cells form tubes which transport water to all parts of the plant.

Root hair cell absorbs water from the soil.

Phloem cells form tubes which transport food to all parts of the plant.
• The cells in animals are not all identical.
• They perform specific functions, such as delivering oxygen and fighting disease, moving the skeleton, storing energy or coordinating the whole body.
- Plant cells also have a variety of specialized cells. Cells in the leaf of a tree have a different structure and function from the cells in the trunk.
EXAMPLE:
TRACHEA CILIA
(DON’T COPY INTO NOTES)

• **SPECIALIZED CELLS** HAVE PHYSICAL AND CHEMICAL DIFFERENCES THAT ALLOW EACH TYPE TO PERFORM ONE JOB VERY WELL.

• THESE CELLS HELP KEEP DIRT OUT OF THE LUNGS.
  - THE ORANGE GOBLET CELLS SECRETE MUCUS
  - THE HAIR-LIKE EXTENSIONS (CALLED CILIA) MOVE THE MUCUS ALONG THE TRACHEA TO REMOVE INHALED DUST AND DIRT.
EXAMPLES:

1. RED BLOOD CELL
   - ROUND EDGES TO TRAVEL IN BLOOD VESSELS EASIER
   - NO NUCLEUS = MORE ROOM TO CARRY O₂ AND CO₂
2. NERVE CELL

- Long, skinny arms to send messages quickly over long distances
3. EAR CELLS

- HAVE CILIA – TINY HAIRS ON INNER EAR CELLS THAT PICK UP VIBRATIONS IN THE AIR AND SEND SIGNAL TO BRAIN.
4. MUSCLE CELL

– Long, skinny cells that lengthen and shorten to move muscles
STEM CELLS

- UNSPECIALIZED CELLS THAT DIVIDE QUICKLY AND DO NOT HAVE A PARTICULAR FUNCTION YET.
SPECIALIZED CELLS

Stem Cell Possibilities

A stem cell can become any one of the 220 different cells in the body.
• **ONLY STEM CELLS** CAN DIFFERENTIATE INTO MANY CELL TYPES.
WHERE ARE STEM CELLS?

1. Fertilised egg
2. Blastocyst (5 days old)
3. Inner cell mass
4. Stem cells

Diagram showing the differentiation of stem cells into various cell types:
- Liver
- Brain
- CNS stem cells
- Bone marrow
- Skeletal muscle
- Bone
- Blood vessel
- Blood cell
- Fat cell
- Cardiac muscle
- Neuron
- Glial cell
CORD BLOOD CELL BANKING?

• THE BLOOD FOUND IN AN UMBILICAL CORD IMMEDIATELY AFTER THE BIRTH OF A CHILD IS A RICH SOURCE OF STEM CELLS.

• THESE STEM CELLS CAN DEVELOP INTO VARIOUS KINDS OF BLOOD CELLS.

• THE BLOOD COLLECTED FROM THE CORD CAN BE BANKED (OR STORED) IN THE EVENT IT IS NEEDED LATER IN THE CHILD’S OR A SIBLING’S LIFE.
HOW CAN STEM CELLS BE USED?

• FOR DISEASES SUCH AS LEUKEMIA, STEM CELLS COLLECTED FROM HEALTHY BLOOD CAN BE INJECTED INTO A PATIENT’S BLOOD AFTER THE DISEASED CELLS HAVE BEEN KILLED.

• THE HEALTHY CELLS THEN GROW IN THE PATIENT’S BONE MARROW AND PRODUCE HEALTHY, CANCER-FREE BLOOD CELLS.

• [http://www.dnalc.org/resources/animations/stemcells.html](http://www.dnalc.org/resources/animations/stemcells.html)

• [http://youtu.be/O5r-T6ANKto](http://youtu.be/O5r-T6ANKto)
Dallas Weins lost his face when he walked into power lines. He is the first person in America to receive a full face transplant.
WHEN CELLS GROUP TOGETHER TO PERFORM A FUNCTION THEY FORM A?

TISSUE
PLANT TISSUE

- EPIDERMAL TISSUE
- PHOTOSYNTHETIC TISSUE
- PACKING TISSUE (PARENCHYMA CELLS)
- TRANSPORT/VASCULAR TISSUE (XYLEM AND PHLOEM)
- SUPPORTIVE OR STRENGTHENING TISSUE (COLLENCHYMA AND SCLERENCYMA)
ANIMAL TISSUE

Types of Animal Tissue:
- Adipose tissue
- Cartilage tissue
- Connective tissue
- Muscle tissue
- Nervous tissue
- Epithelial tissue
- Bone tissue
- Blood
CLOSURE

• 1. BONE IS A TYPE OF _______________
• 2. TENDONS AND LIGAMENTS ARE EXAMPLES OF _______________
• 3. THE HEART IS MADE OF _______________
• 4. ______________ IS THE ONLY TISSUE THAT IS IN A LIQUID FORM
• 5. ______________ TISSUE FORMS PROTECTIVE LAYER AROUND YOUR LIVER AND ORGANS.
• 6. ARE SUPPORTIVE AND STRENGTHENING TISSUE IN PLANTS ______________ AND ______________.
• 7. GUARD CELLS ARE PART OF AN ______________ TISSUE.
TO DO NOW:

• DRAW 2 DIFFERENT TYPES OF CELLS THAT YOU FIND UNDER THE MICROSCOPE.
**DO:**

- B. Smart
- Sept. 6, 2009
- **Human Epithelial Cell**
  -湿 mount

  - nucleus
  - cytoplasm
  - cell membrane

**Name and Date**
- upper right corner

**Underlined Title**
- name of specimen
- type of preparation

**Unlined white paper**

**Labels**
- neat column to the right
- straight horizontal lines
- lowercase letters

**Drawing**
- neat, large
- pencil only
- stipple dark areas

**DON'T:**

- lined paper
- sloppy writing
- Poor Title
- inappropriate
- not underlined

- Incorrect Labels
- misspelled
- insignificant
- arrows used

- Messy Drawing
- shaded
- inked
TO DO NOW:
• DRAW 2 DIFFERENT TYPES OF CELLS THAT YOU FIND UNDER THE MICROSCOPE.

TO FOCUS MICROSCOPE:
• START ON SMALLEST POWER LENS, FOCUS IN ON CELL.
• GO TO MEDIUM POWER AND FOCUS
• GO TO HIGH POWER AND FOCUS IF POSSIBLE.