Minneapolis Conference 2010

OBTA for Indiana: Lance Brand

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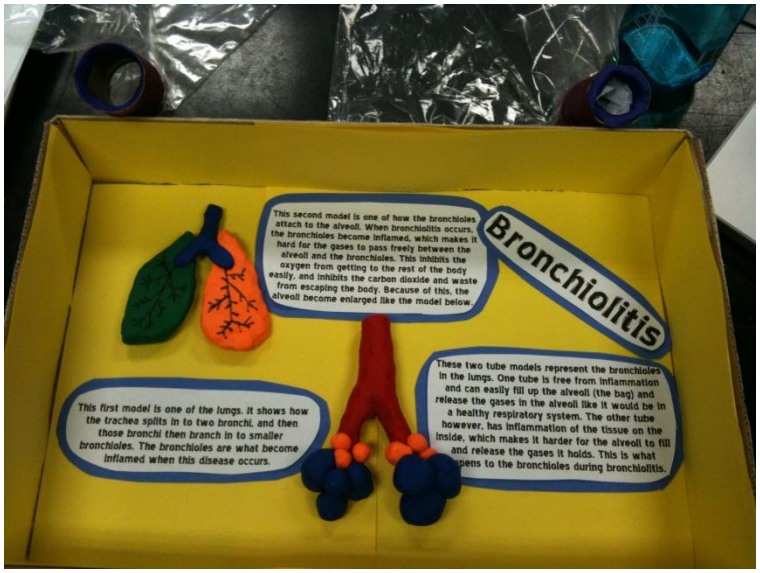
Project #1: Modeling Life Science with Shadow Boxes



Basic idea:

- 3D Models represent a disease, disorder, biological or physiological process from a list created or by approval of the teacher focus on a particular topic of study. Ex. Endocrine, respiratory, digestive, nervous, cellular respiration….
- The model must be limited to the inside of a paper box lid.
- A key and typed paragraph description must be provided.
- Scored using a rubric focusing on accuracy, creativity, effectiveness of visual message, message, & visual appeal.

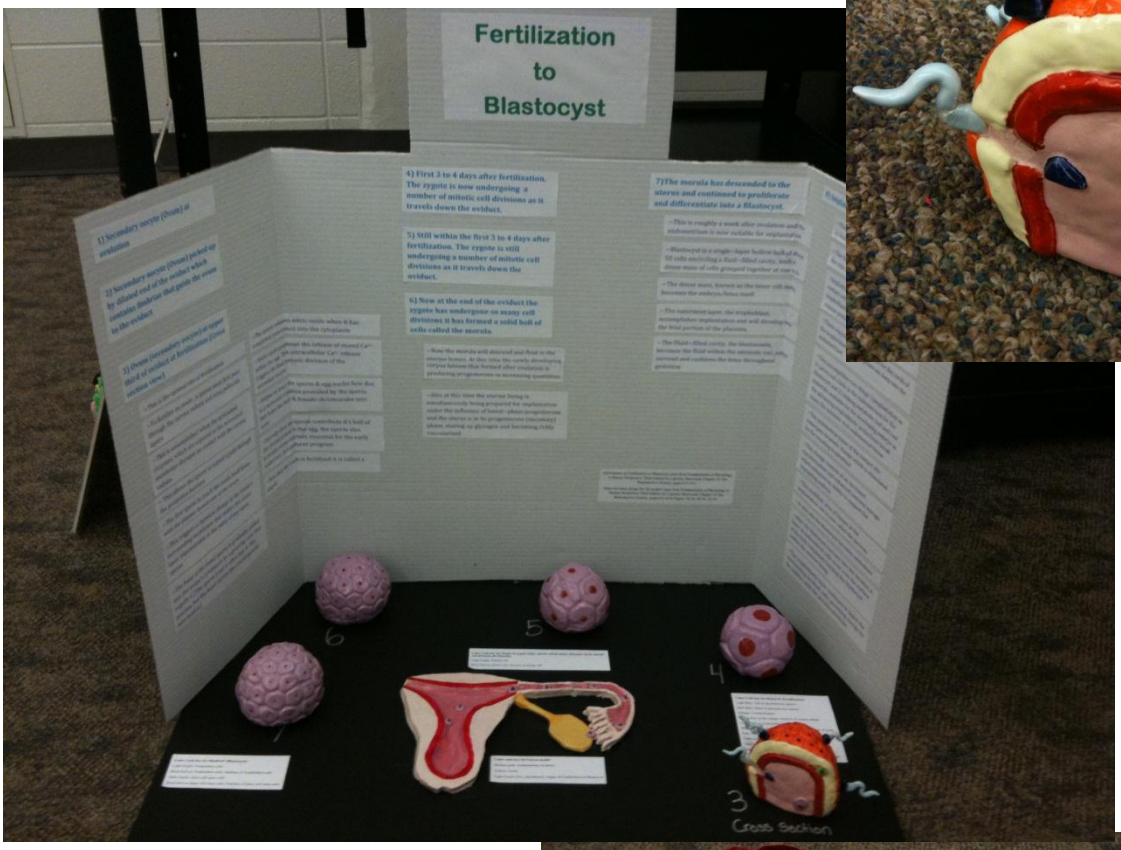
Project #2: Physiology Models

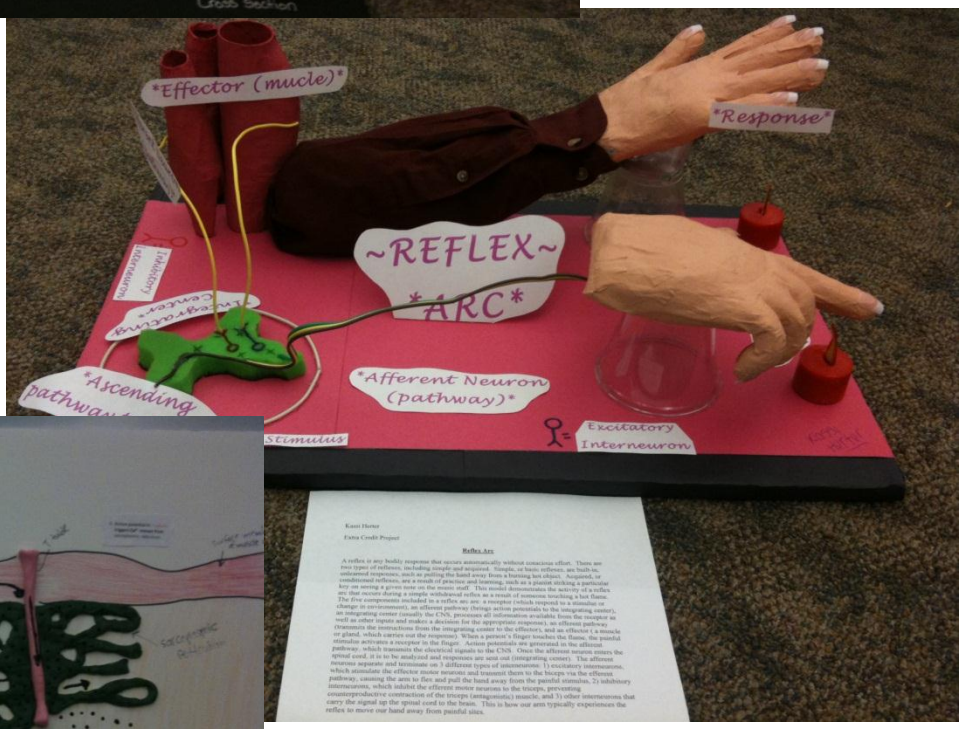
Model criteria:

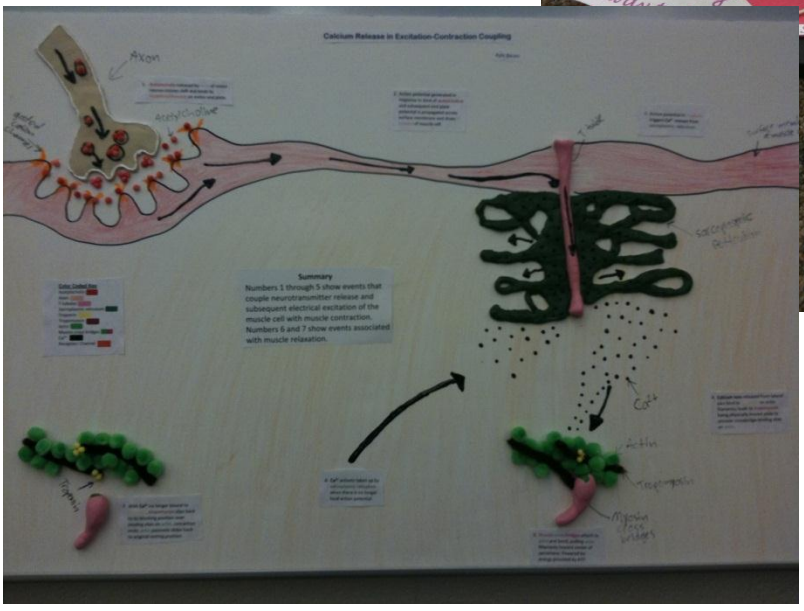
1. **Choose one of the physiological model options below**
2. **Build a creative multicolor 3D model which accurately depicts all the stages of the physiological process.**
3. **Create a color coded key which labels all the components or your physiological process and attach it to your model. Have your full name clearly displayed on your project!**
4. **Word process a summary paragraph of the physiological process and imbed it into your model.**

Physiology Model options:

- **Electron transport chain-** show the steps taken during the electron transport chain which lead to the production of ATP and water.
- **Action potential generation- depict** ion concentration and protein channel changes that take place in an axon to: create the -70mv resting potential, depolarization, and repolarization. This will likely be separated into 3-4 areas along the length of the axon and will show ECF & ICF changes.
- **Synapse or Neuromuscular junction model-** show all the physiological changes which take place as an action potential reaches the synaptic knob (presynaptic axon terminal) to the initiation of an action potential in the post synaptic neuron or the motor end plate of a muscle cell.
- **Reflex arc**- show all the stages of a reflex arc from stimulus to response
- **Auditory perception**- build a moving model of the three chambers of the cochlea which show how various sound waves are detected due to movement of the basilar membrane which causes hair cells to be deflected against the tectorial membrane and the basic nerve pathway which carries this information to the brain.
- **Balance**- build a working model which depicts how the semicircular canals and/or vestibular apparatus works. Be sure to label and depict the operation of all structural and functional components.
- **Muscle contraction**- create a working or static model depicting the steps necessary to bring about muscle contraction: action potential, calcium release from SR, changes to troponin and tropomyosin, interaction between actin and myosin, ATP utilization.
- **Electrical conduction system of the heart**
- **Relationship between pressure, resistance, as related to blood flow**- build a working or static model which shows what happens to flow as pressure and or resistance changes.
- **Immune system defense**- show the interaction between pathogens, macrophages, helper T cells, cytotoxic T cells, B Cells, plasma cells, and antibodies.
- **Kidney filtration, reabsorption, & secretion**- build a model which shows all the components of a nephron as well as the processes of filtration, reabsorption, and secretion.
- **Functions of the anterior and posterior pituitary as related to the Endocrine system**
- **Development of the follicle, ovulation, and formation of the corpus luteum**
- **Fertilization to Blastocyst-** show all the stages of fertilization, response of the ovum, and formation of a blastocyst.


Fertilization
to
Blastocyst
Cross Section


Effector (mucle)
Response
~REFLEX~
ARC
*Afferent Neuron
(pathway)*
Excitatory
Interneuron
Kassi Hurter
Extra Credit Project
Reflex Arc


Calcium Release in Excitation-Contraction Coupling
Axon
Summary
Numbers 1 through 5 show events that couple neurotransmitter release and subsequent electrical excitation of the muscle cell with muscle contraction. Numbers 6 and 7 show events associated with muscle relaxation.
Ca2+
Actin
Tropomyosin

Game Design & Construction:
Choose one chapter that we will address during the first semester to make a in-depth review board game. You can choose to make a high/college level review game or modify the game for grades 4-5th to teach them about their body. If you choose to make a game for the elementary students you must choose one of the following topics: whole body introduction, muscular system, skeletal system, or integumentary system. Carefully word-process at least 50-60 review questions which are at an appropriate level to our course and address all the major topics from the chapter. These questions can be multiple choice or matching. You may use textbook and internet questions for ideas, but you must write your own questions and answers. Incorporate these questions into a fun board game with clear and easy to follow directions. You may use ideas & materials from existing board games, but you must remake your own game board, games pieces, question/answer cards, and a game box... so that your game is clearly a customized review game for the body system you've chosen. Creativity, accuracy, craftsmanship, effort, originality, and the overall usefulness of the game as a review will be taken into consideration.

Children's Book or Comic Book
Create a color children's book or comic book which is at least 15 pages in length.
Projects must focus on a topic within one of the following areas: Cells, Photosynthesis, Respiration, Plants, Animals, Genetics, Evolution, Human Body, Environment. Projects must be bound (you may use a pre-bound white-page journal, or white paper bound with a project cover or plastic binding). Projects will be evaluated on how creatively, artistically, accurately, and thoroughly they incorporate biology concepts. NO BUS STOP SPECIALS!! Images in the book or comic must be of your own personal creation. If art isn't a are that your gifted in than this probably isn't a good fit for you as it will be graded on visual appearance. All content must be school appropriate, at the level we discussed in class, and modified to targeted to students in grades 1-5 in a fun and creative way.