Annotated 6 - 8 Science Work Samples

Scoring Criteria

| PERFORMANCE INDICATOR | BEGINNING | DEVELOPING | PROFICIENT | EXPANDING |
|--|---|---|---|---|
| #3 Life Sciences - Structure, Function, and Information Processing: A Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. (MS-LS1-1) | Use a tool (e.g. Microscopes, diagrams, visuals) to observe living things. | Make and record observations using various tools (e.g. Microscopes, diagrams, visuals) to identify a cell. | Conduct an investigation using various tools (e.g. Microscopes, diagrams, visuals) to collect evidence that living things are made of cell(s). | Analyze and draw conclusions based on evidence from observation to determine whether a given sample represents a single celled or multicellular organism. |
| #3 Life Sciences - Structure, Function, and Information Processing: D Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. (MS-LS1-2) | Identify types and structures (organelles) of a cell given a model. | Create a model to identify cell structures and functions. | Develop and use a model to identify parts of a cell, describe the function of a cell as a whole, and explain how parts of a cell contribute to the function. | Create an analogy that relates cellular structures and functions to another type of system (e.g. school, stadium, mall, family, etc.). |
| Communication: 2 Communicate understanding and interpretation of information. | Identify or list some information from a source. | Select relevant information for the purpose. Summarize information gathered. | Select and analyze relevant information. Integrate relevant information into an argument, presentation, written text, or other work of communication to support a point or interpretation. | Evaluate the information gathered to determine which source is the best source. Analyze and integrate well-chosen and abundant information into a work of communication to support an original point or interpretation. |

| Problem Solving and Critical Thinking: 2 Identify, collect and analyze relevant information. | Find information in sources provided and describe the information/data gathered. | List resources relevant to the plan or process of approach, identify simple patterns and trends in information/data, and determine whether information is sufficient or if more is needed. | Identify relevant information/data from resources and analyze patterns and trends to identify relationships. | Identify information/data crucial to the problem and identify and prioritize patterns and trends in information/data most relevant to the problem. |
|--|---|--|---|--|
| Research: 5 Use evidence and reasoning to justify claims or conclusions. | Identify evidence to support a claim. | Use reasoning to explain how evidence supports claim or conclusion. | Support claims or conclusions with evidence and reasoning. | Integrate evidence and reasoning to support claims or conclusions. |

Given the time constraints of the scoring session, the team was unable to award scores for the scoring criteria for Communication: 2, Problem Solving and Critical Thinking: 2, and Research: 5.

Student Work Sample #1 (page 1 of 2)

Collect Data and Provide Evidence:

| Image of samples | Match the image to slide. | Use your background knowledge to provide evidence if the sample is living. |
|------------------|--|---|
| | Specimen: Mammal Compact Bone Magnification of Image: 400x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The Mammal Compact Bone is a multicellular organism. All living things are made up of one or more cells. Cells always have distinct patterns indicating that it is a single cell. I can see different cells all throughout this structure, therefore it must be living. I know this because I can see patterns of circles with dotted lines circling around it. These seem to be individual cells. I believe that the small, inner circle of the cell is the nucleus, the medium-toned orange area is the cytoplasm, and the outer edge is the cell membrane. I know this organism is multicellular because all of the cells are close together or touching, and when a living thing is multicellular, the cells are not far away or isolated from each other. I also know that in a mammal, the bone is made up of many cells that help do a single job, therefore the Mammal Compact Bone is from an organism that is multicellular. |
| | Specimen: Oral Smear Magnification of Image: 400x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: I claim that an Oral Smear is an organism that is multicellular. The circles are not all exactly the same, but they are similar. I can prove this claim by stating that I know this specimen is living because each small circle has a dark, thin outer layer, a dark blue circle in the center, and a medium tone middle throughout the inside. These three distinct structures look like a cell membrane, cytoplasm, and a nucleus. I think the Oral Smear is multicellular because all the little structures are close together, as if they're doing the same job together. The word 'oral' means that it has to do with communication, or a mouth. I know the cells in a mouth are doing the same job, and they are multicellular, so I conclude that an Oral |

| | | Smear is from a multicellular organism. |
|-----|--|---|
| | Specimen: Human Blood Smear Magnification of Image: 100x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: This specimen is a Human Blood Smear, and it is a living thing that is multicellular. Each tiny circle seems to be a cell, and these cells may not be touching, but this organism is multicellular because all the cells are grouped together. In human blood, the blood cells are traveling, so the cannot be stuck together. So, even though all of these cells are not touching, they are still in the same group, meaning this is from a multicellular organism. Inside the cells, I can see very microscopic, dark circles that I presume to be the nucleus inside of each cell. The cell membrane of this organism is hard to see, but it is there. I also think that the light purple inside of each cell is the cytoplasm. my evidence demonstrates reasons why the Human Blood Smear comes from a multicellular organism. |
| • • | Specimen: Paramecium Magnification of Image: 100X Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The photograph shows Paramecium, which is a unicellular organism. In each Paramecium, I can see a thin outline that I see as the cell membrane. I also see the cytoplasm, or the light purple inside area. Finally, I see a dark purple circle in the middle that I know is the nucleus. I know this organism is unicellular because each cell is its own organism. They are not working together, and each of them has cilia-like structures circling the outside that will help them move around. I know that a Paramecium is a living thing that is made up of one cell. |

#3 Life Sciences - Structure, Function, and Information Processing: A - *Expanding* - Student analyzes and draws conclusions based on evidence gained through their observations.

Student Work Sample #2 (page 1 of 1)

Collect Data and Provide Evidence:

| Image of samples | Match the image to slide. | Use your background knowledge to provide evidence if the sample is living. |
|------------------|--|--|
| | Specimen: Compact Mammal Magnification of Image: 10x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The Compact Mammal bone is living because there are cells in the bone, the specimen is multi-cellular because you can see the cells working together as one. |
| | Specimen: Oral Smear Magnification of Image: 40x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The oral smear is living because it is part of the cheek, the cheek is a living part of a human being, because it is made up of cells. |
| | Specimen: Human blood smear Magnification of Image: 40x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The human blood smear is living because, there are multiple cells inside of the smear, the reason that the cells aren't fixed together is because each cell needs to transport to a different part of the body. |



#3 Life Sciences - Structure, Function, and Information Processing: A -*Proficient* - The student collects evidence to indicate that living things are made of cells.

Student Work Sample #3 (page 1 of 1)

Collect Data and Provide Evidence:

| Image of samples | Match the image to slide. | Use your background knowledge to provide evidence if the sample is living. |
|------------------|--|---|
| | Specimen: Mammal Compact boner Magnification of Image: 400x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The specim came from a living mammal so it makes it living. It has other cells on the <u>specimin</u> . |
| | Specimen: Human strat squamous epithelium Magnification of Image: 400x Living or Nonliving Unicellular or Multicellular | Evidence to your claim: This specimen is living because it came from a living being. It is <u>mulicellular</u> because it has multiple cells. |
| | Specimen: Human blood smear Wrights Magnification of Image: 100 Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: It came from a living being <u>wich</u> make it living it is multicellular because there is more than one cell |
| - | Specimen: Paramecium Magnification of Image: 100X Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: It came from a pond and has more than one cell |

#3 Life Sciences - Structure, Function, and Information Processing: A - *Developing* - Recorded observations accurately and is beginning to make a connection between observation and how it provided evidence of living.

Student Work Sample #4 (page 1 of 1)

Collect Data and Provide Evidence:

| Image of samples | Match the image to slide. | Use your background knowledge to provide evidence if the sample is living. |
|------------------|--|---|
| | Specimen:Mammal Compact bone Ground c.s. Magnification of Image: 40x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The Mammal Compact bone Ground looks like it is smooth and like silk, it was two holes in the middle, <u>i think</u> that it's non-living and a multicellular and i think that the magnification is 40x. |
| | Specimen:oral <u>smear w.m.</u> Magnification of Image: 400x Living or <mark>Nonliving</mark> Unicellular or Multicellular | Evidence to support your claim: The Oral smear w.m. looks like it is smooth, and i think that it's non-living and that it's unicellular because they don't reach any other cells and i think that the magnification is 400x. |
| | Specimen:Human blood smear Magnification of Image: 40x Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The human blood smear looks like it's soft with a few bumps, I think it's living and multicellular because it's the cells are reaching each other and i think that the magnification is 40x. |
| - | Specimen: Paramecium Magnification of Image: 100X Living or Nonliving Unicellular or Multicellular | Evidence to support your claim: The paramecium looks like it's smooth and they aren't all the same shape and i think that it's living and it is unicellular because the cells can't reach each other and it is at 100x. |

#3 Life Sciences - Structure, Function, and Information Processing: A - *Beginning* - There is evidence the student uses the microscope. ("I think the magnification is 40x.")

Front view Purple Blue Dontrives -Cell Body Pink- Avon Terminal creen Nucleas (cell) y error Axon beads

Student Work Sample #5 (page 2 of 4)

Example:

| Organelle/Part | Function | Comparing to a School |
|--------------------------|--|---|
| Endoplasmic Reticulum | Pathways in the cytoplasm through which materials in the cell move | This is similar to the hallways of the school because we use the hallways to get from one place to another the same way that materials are transported from one place to another in the cell. |

| Organelle/Part | Function | Comparing to a Factory |
|--------------------------|---|--|
| Endoplasmic Reticulum | Pathways in the cytoplasm that gives materials a way to get around the cell using its 'road-like' indents and tubes | Conveyor belt A conveyor belt moves boxes, toves, whatever the company is making it can move. It brings it to certain areas like the Product Scanner in the whole cell. |
| Gogoli Apparatus | Packages Materials to send them to the area it needs to be like the Endoplasmic Reticulum. | Packaging Area Takes materials to package them up for easier travel on the 'conveyor belt' to the Product Scanner and through other things as well. |
| Dendrites | These parts of the cell take the information coming through the cell and allows it to pass along to the rest off the cell | Gate A gate on a highway will only let people who paid them to continue. Though you have to pay in a gate, in the Dendrites, you have to be checked to continue on forward through the cell. |
| Axons | Axons help move along the signal to the cell it is targeting, or that certain part of the body. | Computer A computer is able to 'email' to another part of the building, so can a Axon. And Axon moves the 'email' along, just like a computer, to the targeted part of the building, or cell. |
| Nucleus | The nucleus is in charge of the cell, it controls it, and | Boss The CEO, or the boss, is always in charge |

0-10

Student Work Sample #5 (page 3 of 4)

| | makes it run smoothly. It also holds all of the DNA data inside the cabinets. | of the office building. It controls what it does, what happens, and some other things. The nucleus does the exact same thing as a CEO. |
|---------------|--|--|
| Soma | The soma or a cell body is where signals coming from the dendrites, join and are passed on. The soma and nucleus are similar because they don't play an active role in moving the signal, they help maintain the cell. | Manager The soma and nucleus are alike in many ways, so they would be high ranks since they help maintain the cell and keep it going. The soma is basically an assistant to the nucleus, and is second to highest. |
| Axon Hillock | They are found at the end of the cell body, (Soma) and they control the shots of the neuron, If a certain maneuver happens to the signal, the Axon Hillock will fire the signal down the axon. This is called a action potential | Product Scanner The Axon Hillock is close to a product scanner. It scans or finds the object it needs and chooses which path it will need to take to get to a needed destination. It will find the destination and send it there with no hesitation. |
| Mitochondria | The mitochondria holds and produces energy for the cell to keep working. It allows the cell to maintain energy and keep moving. | Energy room Holds all the energy for the company and allows it to have power. If the 'Energy room' loses power the whole building will too. |
| Cell membrane | The cell membrane will only allow certain resources to pass in and out. Nothing off the list can get in | Walls, Windows, and Doors to Factory Only allows certain materials into the building. Almost similar to have to have a keycard in order to get into the building, or key. It also won't allow any materials that don't have the key to the building. |
| Cytoplasm | The cytoplasm is like a fluid that is inside the cell. It allows the parts to breathe and move | Factory Floor Floor to cell, floor to the factory. Same purpose as in the cell, and in the floor. |
| Lysosomes | Takes all unwanted, rotten, unusable, not-needed materials and takes care of them in the dumpsters | Janatory Offices Cleans up the Factory, wipes all the gunk off everything, throws unneeded items and throws them out for the company. |

| Ribosomes | Makes all the proteins needed | Constructor | | | |
|-----------|-------------------------------|-------------|--|--|--|
| | 7 of 9 | | | | |

| | to supply the cell to keep moving, almost like food for the cell | Builds all off the supply for the factory, though a ribosome makes protein, this will make all the products needed for economy in the business. |
|---------|---|--|
| Vacuole | Stores all materials that will be needed later, like water, nutrients, and some other stuff to. It stores all materials for later | Storage Rooms Holds all supplies needed for the factory, and maintains the levels of the storage. There can be multiple of these in one cell |

Student Reflection:

Use feedback provided from the group as well as the feedback you gave your teammates to reflect on your work. Think about what you did well and what you would want to change for the next time.

1. State one thing that you did well and why.

I think I did a good job with materials, because who else would use beads for a neuron? And I think using pipe cleaners was a good idea too. I like how it came out though, but I wish it looked better.

2. State one thing that you would change and why. I would take more time making the model, because I had done it in under an hour, so because of that it falls apart easily. I would also make better ways to show what parts of the neuron are which

#3 Life Sciences - Structure, Function, and Information Processing: D - *Expanding* - Student uses analogy to relate cellular structures and functions to another type of system (i.e. a factory). Significant detail is provided in description of function and comparison.

Student Work Sample #6 (page 1 of 4)



Student Work Sample #6 (page 2 of 4)



Student Work Sample #6 (page 3 of 4)

| Organelle/Part | Function | Comparing to a School |
|--------------------------|--|---|
| Endoplasmic Reticulum | Pathways in the cytoplasm through which materials in the cell move | This is similar to the hallways of the school because we use the hallways to get from one place to another the same way that materials are transported from one place to another in the cell. |

| Organelle/Part | Function | Comparing to a Hotel |
|----------------|--|--|
| Nucleus | The nucleus of a cell directs DNA and controls the cell | The nucleus is like the manager of a hotel. Just like the nucleus directs DNA and controls the information, the manager tells you about the hotel information and directs you to your room or different areas of the building. The manager controls the entire building just like the nucleus. |
| Mitochondria | The mitochondria power the cell so it can work efficiently. | The mitochondria would be the generator of a hotel. The generator powers all different appliances in a hotel, just like the mitochondria powers all of the different organelles. |
| Soma | The soma is the cell body. The cell body protects the nucleus | The soma would be the be the building as a whole, the walls and building the soma gives the building or cell structure and shape. |
| Dendrite | Dendrites are tiny, hair-like strands that project from the cell body, these strands help collect signals, so the axons can transmit them. They also protect the motor neuron, instead of a cell membrane. | Dendrites are like the vents that suck air into the pipes, Dendrites project from the cell, the same way vents are formed on the outside of the building, the vents take in air and move it through the building, and the dendrites move electrical impulses through the cell. |
| Axons | Axons are tiny, tube-like | Axons are the pipes that transport the air |

Student Work Sample #6 (page 4 of 4)

| | structures that cover the myelin sheath, the axons take the signals from the Dendrites and transmit them to the axon terminals. | from the vents. The dendrites collect the impulses and the axons transport the down the cell and Node of Ranvier. Just like the axons transmits signals, the pipes bring air all through the building to ACs. |
|----------------|---|---|
| Axon Terminals | The axon terminals are pumps at the bottom of each neuron that pump the signals to the next neuron, through the nerve synapse. The nerve synapse is the small gap between each neuron. | The axon terminals are the air conditioners in the hotel. They take the air from the pipes/axons and transport the air into the room. This reminds me of the axon terminals pumping signals onto the next neuron. |
| Myelin Sheath | The Myelin Sheath is a layer of insulating proteins and fats that are underneath the axons. They make sure the electrical impulses are traveling through the axons as quickly and efficiently as possible. There is a gap in the myelin sheath called the Node of Ranvier. | The myelin sheath would be the inner workings and electricity wires. The myelin sheath is underneath the axons/pipes and the sheath controls electricity just like the wires do. |
| Schwann Cell | The Schwann cell produces the myelin sheath underneath | The Schwann cell would be the electrician. The electrician makes sure the wires are working well and makes the electricity system. Just like how the Schwann Cell makes the Myelin Sheath and makes sure it is working well. |

Student Reflection:

Use feedback provided from the group as well as the feedback you gave your teammates to reflect on your work. Think about what you did well and what you would want to change for the next time.

State one thing that you did well and why.

a. I like my model because it may not have been the most big or bright but it easily showed the parts and organelles and it looked exactly like a picture of a motor neuron online.

State one thing that you would change and why.

b. I would change my analogies, I think they were badly spoken and generic, I also think that I may have spent a little more time on making my model look good. I feel like it's just a blue squiggle with some beads thrown in.

#3 Life Sciences - Structure, Function, and Information Processing: D - *Proficient* - Student has a model with parts labeled. Needs a more thorough description of function of parts and how they contribute to the whole.

Student Work Sample #7 (page 1 of 5)

Type of Cell: white blood cell

Take a picture of your model and place it in the boxes provided. Put your cursor in the box that you will insert the picture in. Click "Insert" on the tab above. Then Click on "IMAGE" and then on "CAMERA". Take the View asked for then insert. Your image should only show the specific view of the cell.



Student Work Sample #7 (page 2 of 5)



Student Work Sample #7 (page 3 of 5)

| Organelle/Part | Function | Comparing to a School |
|--------------------------|--|---|
| Endoplasmic Reticulum | Pathways in the cytoplasm through which materials in the cell move | This is similar to the hallways of the school because we use the hallways to get from one place to another the same way that materials are transported from one place to another in the cell. |

| Organelle/Part | Function | Comparing to an Office Building |
|---------------------|---|--|
| Nucleus | The nucleus is the most important organelle in the cell. It contains DNA and it controls what the cell does. | The Nucleus is like the boss's office of a building because the boss's office is where the decisions are made. |
| Cell membrane | The function of the cell membrane is to protect the cell from its surroundings. | The Cell membrane is like the outside walls of an office building because the walls surround the building and they protect it. |
| Lysosome | The function of the Lysosome is to remove waste. | The Lysosome is like a dumpster because it's function is to remove waste and when you throw something in a dumpster you are removing waste. |
| Nucleolus | The Nucleolus main function is to combine ribosomal RNA and proteins. | The Nucleolus is also like the cooks because they create the ribosomes. |
| Nuclear Membrane | The function of the Nuclear Membrane is to keep DNA inside the Nucleus and protect it from material in the cytoplasm. | The Nuclear Membrane is like the walls of the office because it protects the Nucleus from the material in the cytoplasm. |
| Vacuole | The function of the Vacuole is to store both inorganic and organic molecules. | The Vacuole is like a refrigerator because it stores food and nutrients. |

Student Work Sample #7 (page 4 of 5)

| Mitochondrion | The main function of the <u>Mitochondrion</u> is to take in nutrients from the cell, breaks it down, and turns it into energy. | The Mitochondrion is like a recycling bin because it breaks down cells and turns them into energy. |
|---------------|--|---|
| Golgi body | The main function of the Golgi body is the modifying, sorting and packaging of proteins for secretion. | This is similar to a mailbox because they ship and receive proteins for the cell. |
| Ribosomes | The main function of the Ribosomes is to make protein. | The Ribosomes are like the cooks for the cafeteria because they make protein for the employe. |
| Smooth ER | The main function of the Smooth ER is to make products like hormones and lipids. | The Smooth ER is what the building or company is producing. |
| Rough ER | The main function of the Rough ER to be responsible for the assembly of many proteins. | The Rough ER is similar to the hallways of an office building because they assemble and like direct you where to go. |
| Cytoplasm | The main function of the cytoplasm is to determine the shape of the cell. | The Cytoplasm is similar to the walls of a building because they shape and give you an outline of where you are supposed to go. |
| Centrosome | The main purpose of the Centrosome is to organize microtubules and provide structure for the cell. | The Centrosome is like the pipes because it brings material from one place to another, and they also help shape the building. |

Student Work Sample #7 (page 5 of 5)

Student Reflection:

Use feedback provided from the group as well as the feedback you gave your teammates to reflect on your work. Think about what you did well and what you would want to change for the next time.

1. State one thing that you did well and why.

One thing that i think i did will was i used multiple different items to repersent the parts of

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my cell. I think I did this will because their was not one item that I used twice.

2. State one thing that you would change and why.

The one thing that I would change is to be more creative and detailed.

#3 Life Sciences - Structure, Function, and Information Processing: D - *Developing* - Student has a model with some parts labeled. Needs a more complete model, with detailed description of how the parts work together to contribute to the function of the cell as a whole.

Student Work Sample #8 (page 1 of 3)

Type of Cell: White blood cell

Take a picture of your model and place it in the boxes provided. Put your cursor in the box that you will insert the picture in. Click "Insert" on tab above. Then Click on "IMAGE" and than on "CAMERA". Take the View asked for then insert. Your image should only show the specific view of the cell.



Student Work Sample #8 (page 2 of 3)

Example:

| Organelle/Part | Function | Comparing to a School |
|--------------------------|--|---|
| Endoplasmic Reticulum | Pathways in the cytoplasm through which materials in the cell move | This is similar to the hallways of the school because we use the hallways to get from one place to another the same way that materials are transported from one place to another in the cell. |

| Organelle/Part | Function | Comparing to a house |
|-----------------|---|---|
| cytoplasm | Gives cells it shape and helps it move. | Cytoplasm is like air in a house because it fills up the empty spaces like cytoplasm does in a cell. |
| lysosomes | Lysosomes function is to store waste products. | It is like a trash can because it stores waste products like a trash can |
| golgi apparatus | Golgi apparatus function is to collect chemical compounds to be used in other parts of the cell or outside the cell. | Golgi apparatus is like a washer and dryer because it turns dirty clothes into clean clothes. |
| mitochondria | Mitochondria takes nutrients and converts it into energy. | Mitochondria is like a generator because they give energy to a house. |
| nucleus | Nucleus contains the cells dna and regulates cells activities. | The nucleus is like the house owners because they control what's going on in the house |
| nucleolus | synthesizes ribosomes, found in nucleus. | nucleolus is the bed where the owners sleep. |
| centrioles | Centrioles organize chromosomes during cell division | Centrioles is like a clothing rack because because clothing racks organize clothes and centrioles organize cell division. |
| peroxisomes | transfer hydrogen from compounds to oxygen to | Peroxisomes is like a toilet because it they both break down materials. |

Student Work Sample #8 (page 3 of 3)

| create hydrogen peroxide then they turn the hydrogen peroxide into water | |
|--|--|
|--|--|

Student Reflection:

Use feedback provided from the group as well as the feedback you gave your teammates to reflect on your work. Think about what you did well and what you would want to change for the next time.

- 1. State one thing that you did well and why. I think I did a good job putting the organelles in the correct place.
- 2. State one thing that you would change and why. I would have changed how I made my model because when I looked around the classroom there was a couple other students with the same design

#3 Life Sciences - Structure, Function, and Information Processing: D - *Beginning* - Model is present, but there are no connections made between the model and the completed table.