Your portfolio must include the student agreement (signed) and the portfolio checklist.

<table>
<thead>
<tr>
<th>Act</th>
<th>Description</th>
<th>Generic Competences/Attributes and Disciplinary Competences</th>
<th>Activity Points</th>
<th>Earned Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sign Agreement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Diagnostic Activity</td>
<td>CG 4.1, 6.2</td>
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<tr>
<td>3</td>
<td>Knowledge Acquisition</td>
<td>CG 4.1, 5.1.2.3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Organization Activity</td>
<td>CG 4.1, 5.1.2.3</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Application Activity</td>
<td>CG 4.1, 5.1.2.3</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Metacognition</td>
<td>CG 4.2</td>
<td>15</td>
<td></td>
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<tr>
<td>7</td>
<td>Integrative Activity 1</td>
<td>CG 4.1, 4.5</td>
<td>30</td>
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<td>8</td>
<td>Lab.</td>
<td>CG 8.1</td>
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<td></td>
<td>Total</td>
<td></td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

STUDENT’S REFLECTIONS ABOUT HIS/HER WORK:
Presentation/Content/Activities

________________________________________________________________________________________

________________________________________________________________________________________

Feedback to Teacher:______________________________________________________________

Students’ Signature_________________________________________ Date:____________
PHASE 1 AGREEMENT

I ______________________________________________________ understand that my portfolio is a collection of my school work and related achievements. The contents exhibit my effort and progress as these elements relate to the goals represented in my instructional program.

I agree to accept the responsibility for creating and managing my portfolio as I complete each requirement. I will submit its content for periodic review to my instructor. In doing so, I understand that the contents of my portfolio, as well as the way in which I have presented the contents, will be evaluated for the purpose of judging my performance in school.

Student Signature: _____________________________________ Date: ____________________

Parent Signature:

I have read and understood the above portfolio agreement and have reviewed my child’s portfolio requirements.

________________________________________ Date: ____________________
### Stage 1: Cellular Reproduction

#### Diagnostic Activity
Fill in the following table.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nucleus</td>
<td></td>
</tr>
<tr>
<td>Vacuoles and vesicles</td>
<td></td>
</tr>
<tr>
<td>Lysosomes</td>
<td></td>
</tr>
<tr>
<td>Cytoskeleton</td>
<td></td>
</tr>
<tr>
<td>Centrioles</td>
<td></td>
</tr>
<tr>
<td>Ribosomes</td>
<td></td>
</tr>
<tr>
<td>Endoplasmic Reticulum</td>
<td></td>
</tr>
<tr>
<td>Golgi Apparatus</td>
<td></td>
</tr>
<tr>
<td>Chloroplasts</td>
<td></td>
</tr>
<tr>
<td>Mitochondria</td>
<td></td>
</tr>
<tr>
<td>Cell wall</td>
<td></td>
</tr>
<tr>
<td>Cell membrane</td>
<td></td>
</tr>
</tbody>
</table>
Knowledge Acquisition (10 points)

Limits to Cell Size
For Questions 1–4, write True if the statement is true. If the statement is false, change the underlined word or words to make the statement true.

1. As a cell’s size increases, its amount of DNA also increases.
2. The amount of activity in a cell is related to its volume.
3. The smaller the cell, the smaller its ratio of surface area to volume.
4. The information crisis in a cell is solved by the replication of the DNA before cell division.

5. In the visual analogy of the growing town, what does the library represent? Identify two characteristics that make it a good choice for this analogy.

Cell Division and Reproduction
For Questions 6–8, complete each statement by writing the correct word or words.

6. _________ is the formation of new individuals.
7. For single-celled organisms, cell division is a form of _________ reproduction.
8. Most multicellular organisms reproduce by _________ reproduction.
9. Use the table to compare and contrast asexual and sexual reproduction.

<table>
<thead>
<tr>
<th>Asexual and Sexual Reproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Similarities</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
10. Vascular tissue helps plants transport water against the force of gravity. Because of this, plants that lack vascular tissue do not grow very tall. How is this situation similar to the information you have learned in this lesson? Explain.

__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________

Chromosomes
For Questions 1–5, complete each statement by writing the correct word or words.

11. Cells carry genetic information in packages of DNA called ________.

12. Most ________ have only one circular strand of DNA.

13. In eukaryotic cells, the genetic structure consists of DNA and a tightly wound protein, which together form a substance called ________.

14. The beadlike structures formed by DNA wrapped around ________ molecules are called nucleosomes.

15. ________ make possible the precise separation of DNA during cell division.

The Cell Cycle

16. What is the name of the type of cell division that occurs in the prokaryotic cell cycle?

__________________________________________________________

17. What happens during interphase?

__________________________________________________________

__________________________________________________________

18. Complete the cell cycle diagram by writing the correct name of a phase on each line.
19. In eukaryotic cells, what happens in the $G_1$ phase that differs from the $G_2$ phase?

20. In eukaryotic cells, what are the two main stages of cell division?

**Mitosis**

21. During prophase, when cell chromosomes become visible, what are the duplicated strands of DNA called? What is the name for the area in which these duplicated strands are joined?

22. What structures are spindle fibers attached to that help pull the paired chromosomes apart?

For Questions 23–26, match the description of the event with the phase of mitosis in which it occurs. Each phase may be used more than once.

<table>
<thead>
<tr>
<th>Event</th>
<th>Phase of Mitosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. The chromosomes separate and begin to move to opposite sides of the cell.</td>
<td></td>
</tr>
<tr>
<td>24. The chromosomes become visible. The centrioles take up positions on opposite sides of the nucleus.</td>
<td></td>
</tr>
<tr>
<td>25. A nuclear envelope re-forms around each cluster of chromosomes. The nucleolus becomes visible in each daughter nucleus.</td>
<td></td>
</tr>
<tr>
<td>26. The chromosomes line up across the center of the cell.</td>
<td></td>
</tr>
</tbody>
</table>
27. The four circles below represent the nucleus of a cell going through mitosis. Draw four chromosomes as they go through each phase. Label each phase and describe what is happening to the DNA.

28. What is cytokinesis?

________________________________________________________________________________________

________________________________________________________________________________________

29. Use the Venn diagram to compare and contrast cytokinesis in animal cells with cytokinesis in plant cells.

<table>
<thead>
<tr>
<th>Cytokinesis</th>
<th>Plant Cell</th>
<th>Both</th>
<th>Animal Cell</th>
</tr>
</thead>
</table>


30. During certain stages of their life cycle, some cells repeatedly undergo mitosis but do not undergo cytokinesis. What would you expect to see if you looked at such cells, or a tissue made up of such cells, under a microscope? Explain your answer.

RUBRIC FOR KNOWLEDGE ACQUISITION ACTIVITY STAGE 1 GENETICS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>0 FAIR</th>
<th>5</th>
<th>8 GOOD</th>
<th>10 EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answers</td>
<td>4 questions or more unanswered or incorrect</td>
<td>3 questions (or more) unanswered or incorrect</td>
<td>2 questions (or more) unanswered or incorrect</td>
<td>All questions answered and correct</td>
</tr>
</tbody>
</table>

♦ Organization and Hierarchization (15 points)
Fill in the following table with the description of the phases of **mitosis** and make a drawing with 4 chromosomes per phase.

<table>
<thead>
<tr>
<th>Phase and drawing</th>
<th>Description of phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERPHASE: (IN between dividing)</td>
<td></td>
</tr>
<tr>
<td>PROPHASE: (First dividing phase)</td>
<td></td>
</tr>
<tr>
<td>METAPHASE (MIDDLE)</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>ANAPHASE (APART)</td>
<td></td>
</tr>
<tr>
<td>TELOPHASE (TWO NUCLEI)</td>
<td></td>
</tr>
<tr>
<td>CYTOKINESIS (Cytoplasm splits)</td>
<td></td>
</tr>
</tbody>
</table>
Fill in the following table with the description of the phases of **meiosis** and make a drawing with 2 chromosomes.

<table>
<thead>
<tr>
<th>Phase and drawing</th>
<th>Description of phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPHASE I</td>
<td></td>
</tr>
<tr>
<td>METAPHASE I</td>
<td></td>
</tr>
<tr>
<td>ANAPHASE I</td>
<td></td>
</tr>
<tr>
<td>TELOPHASE I AND CYTOKINESIS</td>
<td></td>
</tr>
<tr>
<td>PROPHASE II</td>
<td></td>
</tr>
<tr>
<td>METAPHASE II</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---</td>
</tr>
<tr>
<td>ANAPHASE II</td>
<td></td>
</tr>
<tr>
<td>TELOPHASE II AND CYTOKINESIS</td>
<td></td>
</tr>
</tbody>
</table>
## Rubrics for Organization Activity Stage 1 Genetics 2014

<table>
<thead>
<tr>
<th>Criteria</th>
<th>0 FAIR</th>
<th>1 GOOD</th>
<th>2 GOOD</th>
<th>3 EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawings in mitosis</td>
<td>No drawings or just pasted images</td>
<td>Drawings not clearly defined or incomplete or two errors detected</td>
<td>Drawing is clear although at least one error</td>
<td>In all phases the drawing is clearly presented</td>
</tr>
<tr>
<td>Drawings in meiosis</td>
<td>No drawings or just pasted images</td>
<td>Drawings not clearly defined or incomplete or two errors detected</td>
<td>Drawing is clear although at least one error</td>
<td>In all phases the drawing is clearly presented</td>
</tr>
<tr>
<td>Descriptions in Mitosis</td>
<td>Three or more phases with mistakes or limited information</td>
<td>Two phases with mistakes or limited information</td>
<td>At least one phase with mistakes or limited information</td>
<td>Descriptions of phases are complete</td>
</tr>
<tr>
<td>Descriptions in Mitosis</td>
<td>Three or more phases with mistakes or limited information</td>
<td>Two phases with mistakes or limited information</td>
<td>At least one phase with mistakes or limited information</td>
<td>Descriptions of phases are complete</td>
</tr>
<tr>
<td>Presentation</td>
<td>Not clear handwriting and not colored drawings</td>
<td>*****</td>
<td>Not very clear handwriting or not colored drawings</td>
<td>Handwriting clear and clean and drawings are colored</td>
</tr>
</tbody>
</table>
Application Activity (25 points)

1- In teams of 5 make a PPT presentation about cancer.

2- Your teacher will assign you one of the following topics (on cancer):
   a. Skin
   b. Colon
   c. Breast
   d. Brain
   e. Bone
   f. Lungs
   g. Prostate

3- Your presentation should include the following:
   a. First slide team information, group, CIDEB logo and teacher’s name.
   b. Menu including the following topics (hyperlinks to go and return):
   c. General Information on the disease. The name of the slide GENERAL INFORMATION.
   d. Importance to prevent this illness. The name of the slide PREVENTION.
   e. Statistics of how many people suffer this illness in Mexico. The name of the slide STATISTICS.
   f. Factors that trigger this illness. The name of the slide FACTORS.
   g. Treatment. The name of the slide TREATMENT.
   h. Each of the slides must have at least an image relevant to the topic.

4- All team mates should understand the topic and absolutely NO reading of the slides.
# RUBRICS FOR APPLICATION ACTIVITY STAGE 1 GENETICS 2014

<table>
<thead>
<tr>
<th>Criteria</th>
<th>0 FAIR</th>
<th>1</th>
<th>3 GOOD</th>
<th>5 EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECHNICAL</td>
<td>No menu and no first slide with basic information.</td>
<td>No menu or no first slide including information. Or two or more hyperlinks failed.</td>
<td>First slide missing information or at least a hyperlink failed or not present.</td>
<td>First slide includes the required information and menu includes the topics required and hyperlinks work.</td>
</tr>
<tr>
<td>PREVENTION</td>
<td>No prevention and general information slides included.</td>
<td>Both slides included but information is limited or no image included.</td>
<td>Only one of those slides included or one is very limited with information.</td>
<td>A slide on general information is included and a slide on prevention.</td>
</tr>
<tr>
<td>STATISTICS</td>
<td>No slide on statistics or not complete.</td>
<td><strong>No image or graph included</strong></td>
<td>Content is limited or not real.</td>
<td>The contents of this slide are complete.</td>
</tr>
<tr>
<td>FACTORS</td>
<td>No factors or slide, included</td>
<td>Limited factors mentioned or no image included.</td>
<td>It mentions only, the factors that trigger that illness.</td>
<td>Explains clearly the factors that trigger that illness.</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>A slide for treatment not included.</td>
<td>Includes treatment but it is not clearly defined and no image included.</td>
<td>Includes treatment but it is not clearly defined.</td>
<td>Treatment is explained and defined in detail.</td>
</tr>
</tbody>
</table>

* Metacognition (15 points)

10.1 Cell Growth, Division, and Reproduction

Understand Key Concepts

1. The rate at which materials enter and leave the cell depends on the cell’s
   a. volume. c. speciation.
   b. weight. d. surface area.
2. In order for a cell to divide successfully, the cell must first
a. duplicate its genetic information.
b. decrease its volume.
c. increase its number of chromosomes.
d. decrease its number of organelles.

3. The process that increases genetic diversity within a population is
a. asexual reproduction.  c. cell division.
b. sexual reproduction.  d. binary fission.

4. Describe what is meant by each of the following terms: cell volume, cell surface area, ratio of surface area to volume.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

5. Describe asexual and sexual reproduction as survival strategies.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

Think Critically

6. Calculate Calculate the ratio of surface area to volume of an imaginary cubic cell measuring 4 mm long on each side.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

7. Form a Hypothesis In a changing environment, which organisms have an advantage—those that reproduce asexually or those that reproduce sexually? Explain your answer.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
10.2 The Process of Cell Division
Understand Key Concepts

8. Sister chromatids are attached to each other at an area called the
   a. centriole.          c. centromere.
   b. spindle.           d. chromosome.

9. If a cell has 12 chromosomes, how many chromosomes will each of its daughter cells have after mitosis and cytokinesis?
   a. 4   b. 6   c. 12   d. 24

10. Which of the illustrations below best represents metaphase of mitosis?

11. In plant cells, what forms midway between the divided nuclei during cytokinesis?
   a. nuclear membrane   c. cell membrane
   b. centromere         d. cell plate

12. Describe how a eukaryotic cell’s chromosomes change as a cell prepares to divide.

13. What is the relationship between interphase and cell division?

14. List the following stages of mitosis in the correct sequence, and describe what happens during each stage: anaphase, metaphase, prophase, and telophase.
Think Critically

15. Compare and Contrast How is the process of cell division in prokaryotes different from cell division in eukaryotes?

16. Form a Hypothesis Some cells have several nuclei within their cytoplasm. Considering the events in a typical cell cycle, which phase of the cell cycle is not operating when such cells form?

17. Compare and Contrast Describe the differences between cell division in an animal cell and cell division in a plant cell.

18. Relate Cause and Effect The nerve cells in the human nervous system seldom undergo mitosis. Based on this information, explain why complete recovery from injuries to the nervous system usually does not occur.

19. Apply Concepts A scientist treats cells with a chemical that prevents DNA synthesis. In which stage of the cell cycle will these cells remain?
20. Interpret Visuals The diagram shows a phase of mitosis. Use the diagram to answer the following questions.

![Diagram of mitosis]

a. Identify the phase of mitosis shown in the diagram.
b. Is this a plant or animal cell? How do you know?
c. The four chromosomes shown in the center of this cell each have two connected strands. Explain how the two strands on the same chromosome compare with regard to the genetic information they carry. In your answer, be sure to explain why this is important to the cell.

11.4 Meiosis
Understand Key Concepts
19. The illustration below represents what stage of meiosis?
   a. prophase I
   b. anaphase II
   c. telophase I
   d. metaphase I

![Diagram of meiosis]

20. Unlike mitosis, meiosis in male mammals results in the formation of
   a. one haploid gamete.
   b. three diploid gametes.
   c. four diploid gametes.
   d. four haploid gametes.

21. A gene map shows
   a. the number of possible alleles for a gene.
   b. the relative locations of genes on a chromosome.
   c. where chromosomes are in a cell.
   d. how crossing-over occurs.

22. Suppose that an organism has the diploid number \(2N = 8\). How many chromosomes do this organism’s gametes contain?
23. Describe the process of meiosis.

24. Explain why chromosomes, not individual genes, assort independently.

Think Critically
25. Compare and Contrast Compare the phases of meiosis I with the phases of meiosis II in terms of number and arrangement of the chromosomes.

10.3 Regulating the Cell Cycle
Understand Key Concepts
21. The timing in the cell cycle in eukaryotic cells is believed to be controlled by a group of closely related proteins known as
   a. chromatids.   c. centromeres.
   b. cyclins.  d. centrioles.

22. In the cell cycle, external regulatory proteins direct cells to
   a. speed up or slow down the cell cycle.
   b. remain unchanged.
   c. proceed and then stop the cell cycle.
   d. grow uncontrollably.

23. When some cells are removed from the center of a tissue culture, will new cells replace the cells that were removed? Explain.
24. Describe the role of cyclins.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Think Critically
25. Compare and Contrast How do cancer cells differ from noncancerous cells? How are they similar?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

26. Predict A cell will usually undergo apoptosis if the cell experiences DNA damage that could lead to a tumor. Predict what may happen if a gene that controls apoptosis is damaged.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10.4 Cell Differentiation
Understand Key Concepts
27. Bone marrow cells that produce blood cells are best categorized as
a. embryonic stem cells.  
   c. pluripotent.
b. adult stem cells.  
   d. totipotent cells.

28. Which type of cell has the potential to develop into any type of cell?
   a. totipotent  
   c. multipotent 
   b. pluripotent  
   d. differentiated

29. What is a blastocyst?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

30. What is cell differentiation and how is it important to an organism’s development?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
31. Describe two ways that technology may address the ethical concerns related to stem cell research.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Think Critically
32. Relate Cause and Effect When researchers discovered how to make skin stem cells pluripotent, how did they apply their discovery to the treatment for heart attack patients?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

33. Compare and Contrast How does embryonic development and cell differentiation in C. elegans differ from how these processes work in mammals?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

RUBRICS FOR METACOGNITION STAGE 1 GENETICS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>0 FAIR</th>
<th>5</th>
<th>8 GOOD</th>
<th>10 EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answers</td>
<td>4 questions or more unanswered or incorrect</td>
<td>3 questions (or more) unanswered or incorrect</td>
<td>2 questions (or more) unanswered or incorrect</td>
<td>All questions answered and correct</td>
</tr>
</tbody>
</table>
Integrative Activity (30 points)

1- In teams of 5 class members develop the following presentation.

2- In textbooks and internet research about: stem cells and the frontiers of research.

3- Make a PPT presentation with the following sequence:
   a. Introduction of what stem cells are.
   b. Make your own timeline on the discoveries of stem cells.
   c. Application of stem cells in different fields.
   d. Importance in medicine
   e. Solve one of the following bioethics cases:
      i. The use of embryonary cells to regenerate organs.
      ii. Select embryos by the physical characteristics and not to prevent sicknesses.
      iii. Leave forgotten frozen embryos.
      iv. Use forgotten on not wanted frozen embryos for research.
      v. Test transgenic food and medication in citizens of third world country.
      vi. Paternity test without consent.
   f. Conclusion.

4- The power point presentation must have at least one slide for each of the underlied topics mentioned in letters a through f.

5- At least an image per slide.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>0 FAIR</th>
<th>1</th>
<th>3 GOOD</th>
<th>5 EXCELLENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>No introduction slide.</td>
<td></td>
<td>Introduction is not clear, or it is limited.</td>
<td>It gives general information on stem cells.</td>
</tr>
<tr>
<td>Timeline</td>
<td>No timeline slide.</td>
<td>****</td>
<td>No timeline just dates and information described.</td>
<td>Timeline showing how stem cells were discovered.</td>
</tr>
<tr>
<td>Application</td>
<td>No slide on applications of stem cells.</td>
<td>****</td>
<td>Application mentioned but not clearly described or understood.</td>
<td>The application of stem cells in different fields is described.</td>
</tr>
<tr>
<td>Importance</td>
<td>No slide on importance in medicine.</td>
<td>****</td>
<td>The importance of stem cells mentioned but not clearly described or understood.</td>
<td>The importance of stem cells in medicine is described</td>
</tr>
<tr>
<td>Case</td>
<td>No slide (s) on bioethics case.</td>
<td>****</td>
<td>The case is shown but no solution is given.</td>
<td>The bioethics case is presented and solved.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>No slide for conclusion</td>
<td>****</td>
<td>There is a conclusion, but there is no agreement with the case.</td>
<td>A conclusion is presented clearly according to the case presented.</td>
</tr>
</tbody>
</table>