Assessment $\&$
Crading

- 20-24 Total graded assessments all year
- 10-I2 Units during the year
- Each unit consists of 2 graded assessments
- I Summative Exam
- assessment on standards \& content
- I Summative Lab
- assessment on practices \& procedures


## Assessments

- Summative Exams are weighted at $66 \%$
- Summative Labs are weighted at $33 \%$


## Assessments

- Each unit has five levels of assessment:
- "F" level worth 0 points
- "D" level worth I points
- "C" level worth 2 points
- "B" level worth 3 points
- "A" level worth 4 points


# Example Grade Book 

|  | Unit I <br> Exam |  | Unit I <br> Lab | Unit 2 <br> Exam |  | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| Tom | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| Ben | 4 | 4 | 2 | 4 | 4 | 2 | 4 | 4 | 2 |

Notice: I double the exam grade in in each unit this places an emphasis on the exam and results in the $2 / 3$ vs I/3 weighting that I am looking for.

- All summative assessments will have clearly written expectations
- Expectations will be addressed separately later
- Summative Exams Consist of two parts:
- Ist- A 50 question multiple choice
- 5 answer choices (a-e)
- 2nd- A Free Response with 3-4 parts
- Summative Exams allow the the student to demonstrate their knowledge of biology and their critical thinking skills.


## Summative Exams

- Summative Exam's Structure (Multiple Choice):
- 30 questions (60\%) are "C" level questions
- 10 questions (20\%) are " $B$ " level questions
- 10 questions (20\%) are "A" level questions
- Summative Exam's Structure (Free Response):
- Part I (33\%) is a "C" level question
- Part II (33\%) is a "B" level question
- Part III (33\%) is a "A" level question
- Summative Exams:
- Demonstrating "C" level acquisition earns 2 points
- Represents minimum standards
- Questions are characterized as factual recall of declarative knowledge,they require the student to demonstrate knowledge of a definition, single concept or stand alone idea
- The student recalls most scientific ideas, concepts or processes. The student applies scientific understanding to solve most simple problems.
- Examples of "C" level questions

The unit(s) of measurement for an ecological footprint is (are)
a. weight of biomass per year.
b. number of species per ecosystem.
c. number of individuals per population.
d. number of people per continent.
e. area of land per person.
single definition required

## - Examples of "C" level questions

The theory of evolution is most accurately described as
a. an educated guess about how species originate.
b. one possible explanation, among several scientific alternatives, about how species have come into existence.
c. an opinion that some scientists hold about how living things change over time. an overarching explanation, supported by much evidence, for how populations change over time.
e. an idea about how acquired characteristics are passed on to subsequent generations.

> single concept recall required

## - Examples of"C" level questions

How does a non-competitive inhibitor decrease the rate of an enzyme reaction?
a. by binding at the active site of the enzyme
b. by changing the structure of the enzyme
by changing the free energy change of the reaction
d. by acting as a coenzyme for the reaction
e. by decreasing the activation energy of the reaction
single factual recall required

## - Examples of "C" level questions

Extinction is a natural phenomenon. It is estimated that $99 \%$ of all species that ever lived are now extinct. Why then do we say that we are now in a biodiversity crisis?
a. Humans are ethically responsible for protecting endangered species.
b. Scientists have finally identified most of the species on Earth and are thus able to quantify the number of species becoming extinct.
c. The current rate of extinction is as much as 1,000 times higher than at any other time in the last 100,000 years.
d. Humans have greater medical needs than at any other time in history, and many potential medicinal compounds are being lost as plant species become extinct.
e. Most biodiversity hot spots have been destroyed by recent ecological disasters.
single factual recall required


- Summative Exams:
- Defining the "C" level

41-60\%, A student who scores in this range demonstrates a knowledge of most of the low order questions, factual recall and simple problems scientific information. Although the student may have answered some higher ordered questions, it is unlikely that the bulk of their knowledge/score comes from level 3 and 4 questions.


- Summative Exams:
- Defining the "C" level

4-6 points out of a 12 point rubric, A student who scores in this range demonstrates a knowledge of most of the low order questions, factual recall and simple problems scientific information. Although the student may have answered some higher ordered questions, it is unlikely that the bulk of their knowledge/score comes from level 3 and 4 questions.

- Summative Exams:
- Demonstrating " $B$ " level acquisition earns 3 points
- Represent above average standards
- The student describes scientific ideas, concepts or processes. The student applies scientific understanding to solve complex problems in familiar situations. The student analyses scientific information by identifying parts, relationships or causes. The student shows some evidence of using scientific information in a useful way.


## - Examples of "B" level multiple choice questions

Which enzyme was used to produce the molecule in the figure below?

requires identification and recall of more than one piece of information
I. must ID illustration as plasmid
2. must recognize sticky ends
3. must recognize letters as nucleotides
4. must then that restriction enzymes can cut open plasmids in this way
a. ligase

* all this information does however come from the same unit of study
b. transcriptase
c. a restriction enzyme
d. RNA polymerase
e. DNA polymerase


## - Examples of "B" level multiple choice questions

In a bacterium that possesses antibiotic resistance and the potential to persist through very adverse conditions, such as freezing, drying, or high temperatures, DNA should be located within, or be part of, which structures?

1. nucleoid region
2. flagellum
3. endospore
4. fimbriae
5. plasmids
a. 1 only
b. 1 and 4
c. 1 and 5
d. 1,3 , and 5

2,4 , and 5

## - Examples of "B" level multiple choice questions

Which of the following is not an aspect of temperature acclimation?
a. The increase in production of certain enzymes by cells.
b. Cells may produce enzymes with different temperature optima.
c. Organisms may adjust some of the mechanisms that control internal temperature.
d. The proportion of saturated and unsaturated fats may change in cell membranes.
e. Allowing denaturation of proteins that cannot withstand extreme temperature.
here again a student would
need ko know multiple scientific berms as well as the knowledge of multiple strategies for temperature acclimation from cells bo Large organisms

## - Examples of "B" level multiple choice questions

If a cell has 8 chromosomes at metaphase of mitosis, how many chromosomes will it have during anaphase?
a. 1
b. 2
c. 4
d. 8
e. 16
here the student would need to understand the process of mitosis and use that knowledge to calculate the answer, the scenario is likely familiar

## - Example of " $B$ " level free response question

The concentration of an electrically neutral substance within a certain type of blood cell is much higher than it is in the surrounding blood plasma, yet the substance continues to move into the cell. The process by which this substance moves into the cell is called:

A osmosis
B simple diffusion
C facilitated diffusion
D active transport
(a) Explain your choice and why the other choices are not suitable.
(b) Based on the information what other trait(s) can we deduce about this "electrically neutral substance"?
(c) What common molecule might we suspect?


- Summative Exams:
- Defining the " $B$ " level

61-80\%, Twenty percent of the exam consists of questions that require level skills to answer them correctly. A student who scores in this range demonstrates the ability the use at least some scientific knowledge in meaningful ways. Obviously the closer the score is to $80 \%$ the higher the degree of confidence.



- Summative Exams:
- Defining the " $B$ " level

7-9 points out of a 12 point rubric, The student describes scientific ideas, concepts or processes. The student applies scientific understanding to solve complex problems in familiar situations. The student analyses scientific information by identifying parts, relationships or causes. The student shows some evidence of using scientific information in a useful way.

- Summative Exams:
- Demonstrating "A" level acquisition earns 4 points
- Represent above advanced standards
- The student uses scientific ideas, concepts and processes in a useful way or to construct explanations. The student applies scientific understanding to solve complex problems in unfamiliar situations. The student analyses and evaluates scientific information and makes judgements supported by scientific understandings.


## - Examples of "A" level multiple choice questions

Typically, mutations that modify the active site of an enzyme are more likely to be harmful than mutations that affect other parts of the enzyme. A hypothetical enzyme consists of four domains (A-D), and the amino acid sequences of these four domains have been determined in five related species. Given the proportion of amino acid homologies among the five species at each of the four domains, which domain probably contains the active site?

|  | Percentage of <br> Domain |
| :---: | :---: |
| Homologous Amino | Acids |
| A | $38 \%$ |
| B | $8 \%$ |
| C | $78 \%$ |
| D | $45 \%$ |

a. A
b.
B.
C.
D
e. E
the scenario is likely unfamiliar, the student must understand what active sites, enzymes, mutations, protein structure and domains, amino acid
homologies and analyze the data and then use their judgement to make the most reasonable selection

## - Examples of "A" level multiple choice questions

A previously unknown organism has been discovered. It contains long cells with excitable membranes that scientists suspect are used for rapid information transfer. The membrane of the cell is permeable only to ion X , which carries a negative charge. Active transport pumps in the membrane move X into the cell while simultaneously moving ion Y , also carrying a negative charge, out of the cell.

Which of the following is true about the establishment of the resting membrane potential in this cell?
a. The resting potential of this cell will be zero.
b. The resting potential of this cell will be negative.
c. A negative resting potential is directly produced by the pump moving a negative charge into the cell.
d. A negative resting potential is directly produced by the diffusion of $\mathrm{Y}^{-}$into the cell.
e. A positive resting potential is directly produced by the diffusion of $\mathrm{X}^{-}$out of the cell.

Once again this requires the student to apply scientific understanding lo solve complex problems in unfamiliar situations. The
student analyze and evaluate scientific
information and make judgements supported
by scientific understandings.

## - Examples of "A" level multiple choice questions

Blood entering a capillary bed of a vertebrate was measured for the pressures exerted by various factors.

|  | Arterial End of <br> Capillary Bed | Cerous End of <br> Capillary Bed |
| :--- | :---: | :---: |
| Hydrostatic pressure | 8 mm Hg | 14 mm Hg |
| Osmotic pressure | 26 mm Hg | 26 mm Hg |
| $\mathrm{Po}_{2}$ | 100 mm Hg | 42 mm Hg |
| $\mathrm{PcO}_{2}$ | 40 mm Hg | 46 mm Hg |

For this capillary bed, which of the following statements is correct?
a. The pH is lower on the arterial side than on the venous side.
b. Oxygen is taken up by the erythrocytes within the capillaries.
c. The osmotic pressure remains constant due to carbon dioxide compensation.
d. The hydrostatic pressure declines from the arterial side to the venous side because oxygen is lost.
e. Fluids will leave the capillaries on the arterial side of the bed and re-enter on the venous side.

And again this requires the student to apply scientific understanding to solve complex problems in unfamiliar situations. The student analyze and evaluate scientific information and make judgements supported by scientific understandings.

## - Example of "A" level free response question

Membranes are essential components of all cells.
(a) Identify THREE macromolecules that are components of the plasma membrane in a eukaryotic cell and discuss the structure and function of each.
(b) Explain how membranes participate in THREE of the following biological processes:

- Muscle contraction
- Fertilization of an egg
- Chemiosmotic production of ATP
- Intercellular signaling

- Summative Exams:
- Defining the "A" level

81-100\% Twenty percent of the exam consists of challenging higher order questions, a student who scores in this range demonstrates the ability the use scientific knowledge in meaningful ways. These students show the ability to solve complex problems, some of which may have be unfamiliar to them.

 Response Exams

- Summative Exams:
- Defining the "A" level

10-12 points out of a 12 point rubric, The student uses scientific ideas, concepts and processes in a useful way or to construct explanations. The student applies scientific understanding to solve complex problems in unfamiliar situations. The student analyses and evaluates scientific information and makes judgements supported by scientific understandings.

- Summative Exams: Multiple Choice
- It is not ever expected that students score in this range, and less likely given the fact that I allow retakes but in those cases...
- Demonstrating "D" level acquisition earns I point

21-40\%, Sixty percent of the exam consists of low order questions, factual recall and simple problems. A score in this range can not be explained by guessing alone, the student demonstrates a knowledge of some scientific information.

## A side Note: D's \& F's

- Summative Exams: Free Response
- Defining the "D" level

1-3 points out of a 12 point rubric, The student recalls some scientific ideas, concepts or processes. The student can apply scientific understanding to solve simple problems.

- Summative Exams: Multiple Choice
- It is extremely rare that students score in this range, and less likely given the fact that I allow retakes but in those cases...
- Failing to demonstrate any knowledge acquisition results in a zero points
$0-20 \%$, Random guessing might statistically explain up to twenty percent on a multiple choice exam with five answer choices. As a result I have no confidence or a lack evidence of any learned knowledge.


## A side Nole: D's \& F's

- Summative Exams: Free Response - "F" level worth 0 points

0 points out of a 12 point rubric, The student does not reach a standard described by any of the descriptors on the rubric.

## Let us now turn our attention

 to...Lab Assessments

## Lab Assessment

- All lab based assessments are pass/fail
- Summative Labs:
- Demonstrating "C" level acquisition earns 2 points
- Successful completion of the prescribed Web Lab and its associated questions.


## Lab Assessment

- All lab based assessments are pass/fail
- Summative Labs:
- Demonstrating "B" level acquisition earns 3 points
- Successful completion of the prescribed Wet Lab in class, and its associated questions.


## Lab Assessment

- All lab based assessments are pass/fail
- Summative Labs:
- Demonstrating "A" level acquisition earns 4 points
- Successful completion of the Wet Lab in class, its associated questions and a formal lab report.
- OR...
- Alteration of Wet Lab (designing your own lab from question to conclusion) in class, including lab report. (must be pre-approved by teacher)


## College Board's Viewpoint

| LEVEL OF INQUIRY | QUESTION | PROCEDURE | SOLUTION |
| :---: | :---: | :---: | :---: |
| Confirmation | Teacher provided | Teacher provided | Teacher provided |
| Structured | Teacher provided | Teacher provided | Student generated |
| Guided | Teacher provided | Student generated | Student generated |
| Open | Student generated | Student generated | Student generated |

- Confirmation: Students confirm a principle through an activity in which the results are known in advance.
- Structured: Students investigate a teacher-presented question through a prescribed procedure.
- Guided: Students investigate a teacher-presented question using student-designed/ selected procedures.
- Open Inquiry: Students investigate topic-related questions that are formulated through student-designed/selected procedures.


## Differentiaked Assessment

- Students will sit for their summative assessments on the dates given by teacher
- However, students who wish to work ahead may do so with teacher approval
- This also applies to web based labs (class based labs depend on materials and time)
- Students may retake assessments or re-do labs as many times as they like (in theory)
- The retake may take place at anytime (in theory)
- I only say "in theory" because the demands of this course and others may make it difficult for a student to retake a past unit assessment while the next unit has started
- The more realistic approach has students retake past units at the end of the year when time permits itself and has more efficacy since students are usually reviewing and preparing for the AP exam already
- Web based labs are easily redone however is possible that wet labs are not due to lab time and materials
- Students may choose their own form of assessment however this will occur on a case by case basis and its approval is entirely at the discretion of the teacher.
- The bottom line is this...it is the responsibility of the student to demonstrate what they know and what they can do, if they have a way to do this aside from what I have offered then I will accept this alternative assessment
- All assessments will have clearly written expectations
- Exam expectations include a written description for every question on a test
- The expectation states what the student needs to know and/or what they must be able to do in order to answer the question correctly
- Expectations are written from IB action verbs
- All action verbs are clearly defined

| Level 1 | Definition |
| :--- | :--- |
| Define | Give the precise, <br> concise meaning of a <br> word |
| State | Give a specific name or <br> other brief answer |
| List | Give a sequence of <br> names or brief answers. |
| Measure | Find a quantity and <br> state it using a number <br> and SI unit. |
| Draw | Represent by means of <br> a pencil line. Add <br> labels. |

## "C" Level

## - Expectations are written from IB action verbs

## - All action verbs are clearly defined

## "C" Level

STATE the functions of the Calvin cycle
STATE the functions of the Citric Acid cycle
STATE living organisms can convert energy from and into different forms
STATE the location of the light reactions
STATE the location of the Calvin Cycle
STATE the locations of glycolysis, citric acid cycle and oxidative phosphorylation (E.T.C.)
STATE the 1st and 2nd laws of thermodynamics
DEFINE polymers and monomers
DEFINE oxidation and reduction
DEFINE entropy
DEFINE photons
DEFINE coenzymes and cofactors
DEFINE dehydrogenase
DEFINE chemical equilibrium
DEFINE starch
LIST the reactants and products of glycolysis
LIST the reactants and products of the citric acid cycle
LIST the reactants and products of oxidative phosphorylation
LIST reactants and products of the light reactions
LIST reactants and products of the Calvin Cycle
LIST factors that effect enzymes and consequently the rate of reactions
IDENTIFY oxygen independent pathway(s) that produce ATP
IDENTIFY the $\Delta \mathbf{G}(+/-)$ for endergonic and exergonic reactions
IDENTIFY the energy source behind oxidative phosphorylation

| Level 2 | Definition |
| :--- | :--- |
| Outline | Give a brief account or <br> summary |
| Describe | Give a detailed account <br> including all relevant info |
| Calculate | Find an answer using math. <br> Show your work. |
| Identify | Find an answer from a <br> number of possibilities. |
| Apply | Use an idea, equation, <br> principle, theory or law in <br> a new situation. |
| Compare | Give an account of <br> similarities/differences <br> b/w 2 or more items <br> referring to both <br> throughout. Can use a <br> table. |
| Annotate | Add brief notes to a <br> diagram, drawing, graph. |

## "B" Level

OUTLINE the role of PGAL, RUBP, NADPH and PEP carboxylase in photosynthesis
OUTLINE the active site of an enzyme
OUTLINE the structures of the chloroplast and the mitochondria
OUTLINE the reaction center (photosystem)
OUTLINE the role of phosphorylation in cells
OUTLINE cooperativity
OUTLINE energy coupling
OUTLINE pH and the pH scale
OUTLINE the role of NADH and NAD+ in cell respiration
OUTLINE the role of antenna pigment molecules
OUTLINE allosteric regulation
OUTLINE the role of oxygen in aerobic respiration
OUTLINE the relationship(s) between light reactions and the Calvin cycle
OUTLINE ATP production in an anaerobic cell/bacteria
ANALYZE a metabolic pathway and IDENTIFY substrates, enzymes, products, inhibitors/activators
ANALYZE a graph (free energy versus progress of reaction) LABEL all parts of the graph
ANALYZE an action spectrum graph
ANALYZE graphs showing rates of reactions vs pH and temperature
ANALYZE a series of reactions in glycolysis and OUTLINE what took place at each
DESCRIBE the sequence of electron flow in aerobic respiration
DESCRIBE feedback regulation in metabolic pathways
DESCRIBE chemiosmosis
DESCRIBE substrate level phosphorylation
COMPARE anabolic and catabolic pathways
COMPARE photosystem I and photosystem II
COMPARE cyclic and noncyclic electron flow
COMPARE oxidation and reduction reactions
COMPARE noncompetitive and competitive inhibition

| Level 3 | Definition |
| :--- | :--- |
| Suggest | Propose a hypothesis or <br> other possible answer. |
| Discuss | Give an account including a <br> range of arguments, <br> assessments of the relative <br> importance of various <br> factors or comparison of <br> alternative hypo's |
| Explain | Give a clear account <br> including causes, reasons or <br> mechanisms. |
| Deduce | Reach a conclusion from <br> information given. |
| Predict | Given an expected result. <br> EvaluateAssess the implications and <br> limitations. |
| Design | Produce a plan, object, <br> simulation or model. |
| Determine | Find the only possible <br> answer. |
| Analyze | Interpret data to reach a <br> conclusion. |

## "A" Level

EXPLAIN the relationship between cell respiration and photosynthesis
EXPLAIN the adaptations found in CAM plants
EXPLAIN ADP and ATP's role in allosteric inhibition/regulation
EXPLAIN how pigments result in colors (that we see/detect)
EXPLAIN why glycolysis is likely a very old process
EXPLAIN why starch in water at room temperature does not easily decompose
EXPLAIN the importance of ATP in cell metabolism
PREDICT the results from changing a component of Theodor W. Engelmann's famous experiment
PREDICT consequence(s) puncturing the cristae or thylakoid membranes
PREDICT the number of turns in the citric acid cycle needed to produce a given sugar
PREDICT the number of $\mathrm{CO}_{2}$ molecules liberated in the Citric Acid cycle from a given sugar
DISCUSS the 1st and 2nd laws of thermodynamics relative to living organisms
SUGGEST a solution(s) for competitive inhibition
SUGGEST why action spectra might vary

- No Fluff Grades (homework, projects, quizzes etc)
- What knowledge of biology can you demonstrate
- What critical thinking skills can you demonstrate
- What lab skills can you demonstrate

|  | Unit I <br> Exam |  | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| Tom | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| Ben | 4 | 4 | 2 | 4 | 4 | 2 | 4 | 4 | 2 |

- Grades are calculated by MODE or *MEDIAN but not the MEAN
- No 90-I00 = A, 80-89 = B etc... Grade Scale

Erade Calculakions (1se quarter)

|  | Unit I <br> Exam |  | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | $\mathbf{2}$ | $\mathbf{2}$ | $\mathbf{4}$ | $\mathbf{3}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{3}$ | $\mathbf{3}$ | $\mathbf{4}$ |
| Tom | $\mathbf{2}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{3}$ | $\mathbf{3}$ | $\mathbf{2}$ | $\mathbf{2}$ | $\mathbf{2}$ | $\mathbf{2}$ |
| Ben | $\mathbf{4}$ | $\mathbf{4}$ | $\mathbf{2}$ | $\mathbf{4}$ | $\mathbf{4}$ | $\mathbf{2}$ | $\mathbf{4}$ | $\mathbf{4}$ | $\mathbf{2}$ |

Minimum Standards

- Students must complete at least 3 units in the first quarter (exams \& labs)
- failure to do so results in an "l" in the first quarter
- Students must complete 10 units by the end of the year (exams \& labs)
- failure to do so results in an " $I$ " for the entire year (Lona kerm)
- Student's grades cumulate over the year, they follow them each and every quarter
- Ist quarter grades calculated with 2nd quarter, 3rd quarter grades calculated with Ist and 2nd
- The fourth quarter grade is calculated with quarters I-3
- Semester exams are calculated based upon the student's current grade

Grade Calculations
example

| Ist | Unit I <br> Exam |  | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |

Ist Quarter = B

| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam |  | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| IF...2nd | Unit 4 <br> Exam | Unit 4 4 <br> Lab | Unit 5 <br> Exam | Unit 5 <br> Lab | Unit 6 <br> Exam |  | Unit 6 <br> Lab |  |  |
| Amy | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 3 |

2nd Quarter = A
Semester Exam = A

| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |


| IF...2nd | Unit 4 <br> Exam |  | Unit 4 <br> Lab | Unit 5 <br> Exam |  | Unit 5 <br> Lab | Unit 6 <br> Exam | Unit 6 <br> Lab |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 |

2nd Quarter = C
Semester Exam $=\mathrm{C}$

| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| IF...2nd | Unit 4 <br> Exam | Unit 4 <br> Lab | Unit 5 <br> Exam |  |  | Unit 5 <br> Lab | Unit 6 <br> Exam | Unit 6 <br> Lab |  |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |

2nd Quarter = B
Semester Exam = B

| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | Unit 2 Lab |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab | Unit 6 Exam |  | Unit 6 Lab |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| IF...3rd | Unit 7 Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | $\begin{gathered} \text { Unit } 8 \\ \text { Lab } \end{gathered}$ | Unit 9 Exam |  | $\begin{array}{\|c} \hline \text { Unit } 9 \\ \text { Lab } \end{array}$ |
| Amy | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 2 |


| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | $\begin{gathered} \text { Unit } 2 \\ \text { Lab } \end{gathered}$ |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab |  |  | Unit 6 Lab |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| IF...3rd | Unit 7 Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | Unit 8 Lab |  |  | Unit 9 Lab |
| Amy | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |


| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | Unit 2 Lab |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab |  |  | Unit 6 Lab |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| 3rd | Unit 7 Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | $\begin{gathered} \text { Unit } 8 \\ \text { Lab } \end{gathered}$ |  |  | Unit 9 Lab |
| Amy | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |
| IF...4th | Unit IO Exam |  | $\begin{gathered} \text { Unit } \\ \text { IO Lab } \end{gathered}$ | Unit II Exam |  | Unit <br> II Lab |  |  |  |
| Amy | 2 | 2 | 2 | 2 | 2 | 2 |  |  |  |

4th Quarter $=C$ and $C$ for Final Exam

| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | Unit 2 Lab |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab | Unit 6 Exam |  | Unit 6 Lab |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| 3rd | Unit 7 <br> Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | Unit 8 Lab | Unit 9 Exam |  | $\begin{array}{\|c} \hline \text { Unit } 9 \\ \text { Lab } \end{array}$ |
| Amy | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |
| IF...4th | Unit IO Exam |  | $\begin{gathered} \text { Unit } \\ \text { IO Lab } \end{gathered}$ | Unit II Exam |  | $\begin{gathered} \text { Unit } \\ \text { II Lab } \end{gathered}$ |  |  |  |
| Amy | 2 | 2 | 2 | 2 | 2 | 2 |  |  |  |
| HOWEVER... |  |  | Amy could do another unit or redo past units to keep her $B$ |  |  |  |  |  |  |


| Ist | Unit I Exam |  | Unit I Lab |  |  | Unit 2 Lab |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab |  |  | Unit 6 Lab |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| 3rd | Unit 7 Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | Unit 8 Lab |  |  | Unit 9 Lab |
| Amy | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |
| IF...4th | Unit 10 Exam |  | $\begin{array}{\|c\|} \hline \text { Unit I0 } \\ \text { Lab } \end{array}$ |  |  |  |  |  |  |
| Amy | 2 | 2 | 3 |  |  |  |  |  |  |


| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam |  | Unit 2 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 <br> Exam |  | Unit 4 4 <br> Lab | Unit 5 <br> Exam | Unit 5 <br> Lab | Unit 6 <br> Exam |  | Unit 6 <br> Lab |  |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| 3rd | Unit 7 <br> Exam |  | Unit 7 <br> Lab | Unit 8 <br> Exam | Unit 8 <br> Lab | Unit 9 <br> Exam | Unit 9 <br> Lab |  |  |
| Amy | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |


| IF...4th | Unit I0 <br> Exam |  | Unit I0 <br> Lab |
| :---: | :---: | :---: | :---: |
| Amy | 4 | 4 | 4 | Amy still receives a $B$. She finished strong but the mode of work demonstrates a level of $B$ acquisition over the course of the year. She could still receive an "A" but she would have to earn more 4's in Units II and I2 and or retake assessments an earn 4's on those retakes. To earn an " $A$ " in the second semester her portfolio of her overall work must be at the "A" level.

4th Quarter $=B$ and $B$ for Final Exam

## What does an "A" student look like

- Course Grade:
- The mode or *median of at least 10 unit grades (30 scores) is 4
- Exam Assessments:
- The student met and exceeded "C" and "B" level standards
- The student has scored $80 \%$ or better on summative assessments
- Lab Assessments:
- The student has altered a "cookbook" and made it their own


## What does an "A" student look like

## They know... \& They can do...

- An "A"student...
- acquires more knowledge
- retains knowledge for longer
- can connect pieces of knowledge from a variety of topics together to explain novel problems
- "can work with knowledge in use it purposefully in new situations" Rick Wormeli


## What does an "A" skudent look like

## Behavior

- An "A"student...
- manages their time
- is independent
- is adaptive
- is creative
- is persistent
- is determined
- is respectful
- empathetic
- kind
- is deliberate in thought and action
- resourceful
- has intrinsic motivation
- loves learning


## What does an "B" student look like

- Course Grade:
- The mode or *median of at least 10 unit grades is 3
- Exam Assessments:
- The student met and exceeded "C"level standards
- The student has scored $60-79 \%$ on assessments
- Lab Assessments:
- The student has successfully carried out a wet lab as directed


## What does an "B" student look like They know... \& They can do...

- A "B" student...
- acquires only prescribed knowledge
- retains knowledge longer throughout a unit but has trouble carrying the knowledge throughout the year
- ability to connect pieces of knowledge is limited by the number of pieces or by the variety of knowledge needed to solve novel problems
- comprehends the knowledge in a unit but is limited in their ability extend the knowledge to solve novel problems


## What does an "B" student look like

## Behavior

- A "B" student...
- is deliberate in thought and action
- is independent
- is respectful \& kind
- is persistent
- is determined
- enjoy learning
- A "B" student needs to develop one or more of these traits
- adaptability
- empathy
- managing their time
- resourcefulness
- creativity
- see \& make connections


## What does an "C" student look like

- Course Grade:
- The mode or *median of at least 10 unit grades is 2
- Exam Assessments:
- The student scores between $40-59 \%$ on assessments
- Lab Assessments:
- The student has successfully carried out a web lab

What does an "C" student look like They know... \& They can do...

- A "C" student...
- can recall just enough prescribed knowledge
- retains knowledge for only short periods of time
- struggles in comprehension of multi faceted mechanisms
- struggles to explain knowledge in their own words
- lacks the ability to connect pieces of knowledge needed to solve novel problems


## What does an "C" student look like

## Behavior

- A "C" student...
- is respectful \& kind
- is persistent
- is determined
- needs direction
- requires motivation
- learns because they have to
- A "C" student needs to develop one or more of the traits below
- adaptability
- empathy
- managing their time
- resourcefulness
- creativity
- memorization
- making connections

What does an "D"

## student look like"

- Course Grade
- A student completes the minimum number units
- Exam Assessment
- A student scores between 20-39\% on assessments
- Lab Assessment
- A student who completes a web lab or wet lab but does not meet passing standards


## What does an "F" student look like"

- Course Grade
- A student who failed to complete the minimum number units
- Exam Assessment
- A student who fails to earn a $20 \%$ on assessments
- Lab Assessment
- A student who fails to complete or attempt a web lab or wet lab.
- Assessments for learning
- Lots of them
- Take place in class
- Carry no grade
- Kept in student file

$$
\begin{aligned}
& \text { Formalive } \\
& \text { Assessments }
\end{aligned}
$$

- Assesses strengths \& weaknesses
- Helps students to decide direction, pace, readiness
- Helps teacher to coach individual needs
- Is evidence for student independence and work ethic


# 2014 ADDENDUM 

Philosophically I could argue that any grade and/or grading practice is flawed from the start. Unfortunately they remain a vital cog in education today. I can not create a perfect grading system, but I can improve upon that which has been given to me. I suppose it should be expected that someone would look to exploit my new grading policy. First let me say that a flaw was evident as the year progressed, fortunately it will be an easy fix. Second let me say that overall I was very pleased with its inauguration. Grades were more meaningful, descriptive and accurate. Grade ambiguity was lessened, as a result I felt more confident about the grades reflecting student abilities and their level of achievement. Furthermore the correlation between student grades and their AP exam scores were strong.

In the following slides I will address the address a couple of issues that came up last year regarding grades and explain my solution to those issues. For those of you not interested in dissecting the problem and the subsequent justification of my solutions let me cut to the chase. From this point forward I reserve the right the calculate grades using the median in lieu of the mode under specific circumstances outlined in next slides.

# ISSUE \#I "The Tie" 

Prior to last years start I assumed that ties (no single mode) would be uncommon and perhaps even rare as more scores were recorded. When 2 modes would occur I decided to choose the higher of the 2 modes and give the student the benefit of doubt. In hind sight, after analyzing last years scores I found that most of time the students with 2 modes often had a majority of other scores lower than the low end mode.As a result choosing the lower mode might have been more accurate grade. That is now in the past. This year when 2 modes occur I will look at all the other grades and use them to choose one of the two modes. A student who does not like this decision may still retake any assessment in an effort to break the tie and take the decision out my hands entirely. Let's look at some examples.

| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 4 |
| 2nd | Unit 4 <br> Exam |  | Unit 4 4 <br> Lab | Unit 5 <br> Exam | Unit 5 <br> Lab | Unit 6 <br> Exam | Unit 6 <br> Lab |  |  |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| 3rd | Unit 7 <br> Exam | Unit 7 <br> Lab | Unit 8 <br> Exam | Unit 8 <br> Lab | Unit 9 <br> Exam | Unit 9 <br> Lab |  |  |  |
| Amy | 2 | 2 | 2 | 2 | 2 | I | 2 | 2 | 2 |

2 Modes: eleven 3's(B) and eleven 2 's(C)
Now I will look at other grades four 4's and one I
Since 4> I I will give student the $B$
3rd Quarter Grade = B

| Ist | Unit I <br> Exam | Unit I <br> Lab | Unit 2 <br> Exam | Unit 2 <br> Lab | Unit 3 <br> Exam | Unit 3 <br> Lab |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 2 | 3 | 3 | 1 | 3 | 3 | 4 |
| 2nd | Unit 4 <br> Exam |  | Unit 4 4 <br> Lab | Unit 5 <br> Exam | Unit 5 <br> Lab | Unit 6 <br> Exam | Unit 6 <br> Lab |  |  |
| Amy | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 1 |
| 3rd | Unit 7 <br> Exam |  | Unit 7 <br> Lab | Unit 8 <br> Exam | Unit 8 <br> Lab | Unit 9 <br> Exam | Unit 9 <br> Lab |  |  |
| Amy | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 |

2 Modes: eleven 3's(B) and eleven 2's(C)
Now I will look at other grades three I's and two 4's
Since I>4 I will give student the C 3rd Quarter Grade =C

| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | $\begin{gathered} \text { Unit } 2 \\ \text { Lab } \end{gathered}$ |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Amy | 2 | 2 | 2 | 1 |  | (3) | 1 | 1 | (3) |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab |  |  | Unit 6 Lab |
| Amy | 1 |  | 1 | 1 |  | 4 | 1 | 1 | (4) |
| 3rd | Unit 7 Exam |  | Unit 7 Lab | Unit 8 Exam |  | $\begin{array}{\|c\|} \hline \text { Unit } 8 \\ \text { Lab } \end{array}$ | Unit 9 Exam |  | Unit 9 Lab |
| Amy | 2 | 2 | 2 | 2 | 2 | (4) | 2 | 2 | 2 |

2 Modes: eleven 2's(C) and eleven I's(D)
Now I will look at other grades, all of which are above below 2
3rd Quarter Grade =C

## ISSUE \#2 <br> "The Lab Parasite"

Another problem or loophole I found involved labs. Some students would work in a lab group and contribute very little and upon informal assessment had no understanding of the lab itself. This one of the downsides of graded group work which I have eliminated altogether. Now students working in groups must take short individually graded assessments in order to earn the credit. But the problem did not stop there. Next these same students would earn a good number of 2's (C's) on their exams but never enough to exceed the I0-I2 3's they earned doing B level labs. They needed to do was get some D's and bomb a few exams and the mode was sure to stay a 3(B). This can not and will not happen again. Here is what it looked like on paper...

| Ist | Unit I Exam |  | Unit I Lab | Unit 2 Exam |  | Unit 2 Lab |  |  | Unit 3 Lab |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Joe | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| 2nd | Unit 4 Exam |  | Unit 4 Lab | Unit 5 Exam |  | Unit 5 Lab | Unit 6 Exam |  | Unit 6 Lab |
| Joe | 1 | 1 | 3 | 2 | 2 | 3 | 0 | 0 | 3 |
| 3rd | Unit 7 Exam |  | $\begin{gathered} \text { Unit } 7 \\ \text { Lab } \end{gathered}$ | Unit 8 Exam |  | Unit 8 Lab | Unit 9 Exam |  | Unit 9 Lab |
| Joe | 2 | 2 | 3 | 1 | 1 | 3 | 0 | 0 | 3 |

Nine 3's(B) Mode is a 3, student gets the B
Eight 2's(C) Student never demonstrated B level work on
Six I's (D) an meaningful assessment! This can not and Four 0's (F) will not happen this year

## ISSUE \#2 <br> "The Lab Parasite"

This problem is solved if I reserve the right to use the median to calculate grades under certain and specific circumstances like the one shown here.
3,3,3,3,3,3,3,3,3,2,2,2,2,2,2,2,2,I, I, I, I, I, I,0,0,0,0

## Median is a 2, student gets the $\mathbf{C}$

Certainly not perfect, but clearly a more accurate representation of this students abilities.

