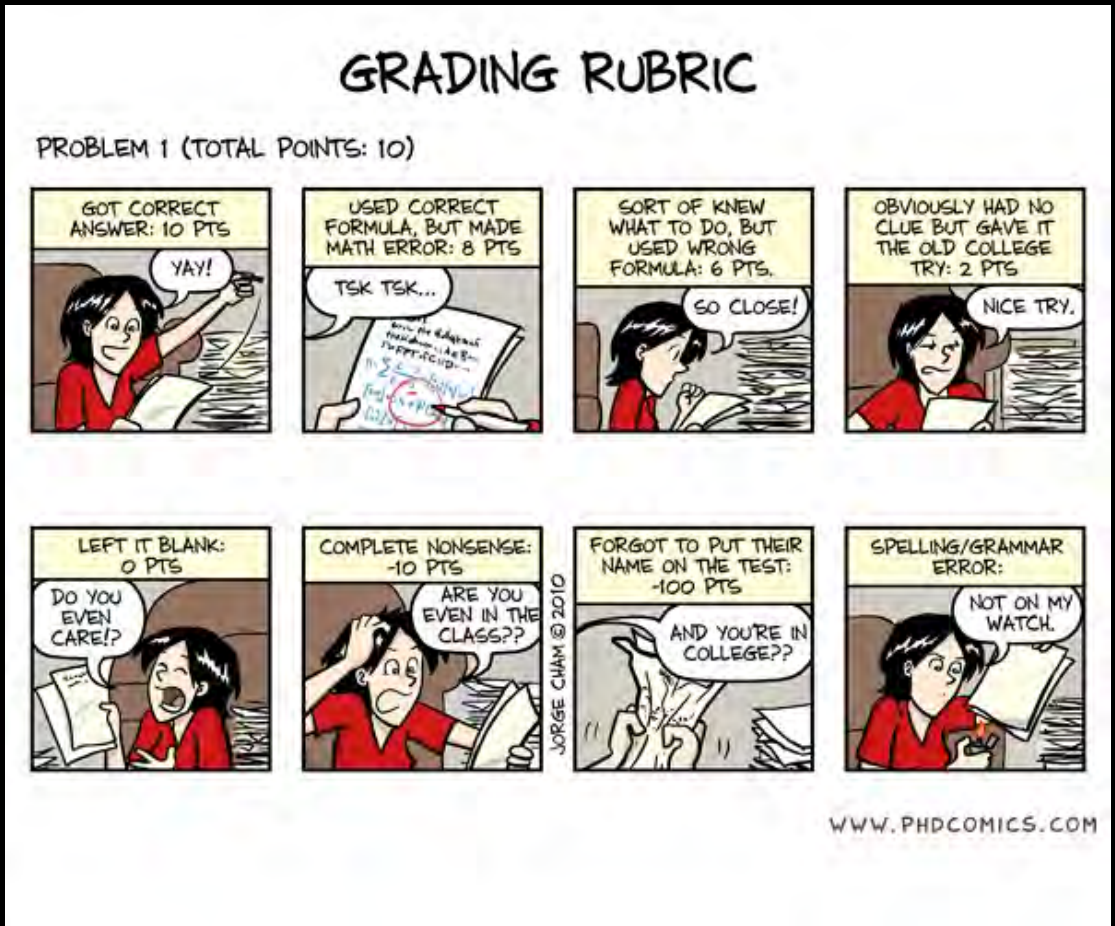
Grading: The worst part of the job!



Standards-based Grading in College Physics

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17 Oct 2024 UW IDEAS Alliance

Typical points model of grading

- What are the benefits?
- What are the problems?

Scenario A

- Adam has been averaging 70/100 on his tests, a bit lower than the average. With attendance and participation points, his final grade is a B+.

- Do you think Adam is a B+ student?

Scenario B

- Beth is getting near perfect scores on every test, but she never shows up to class. She told you that she had a really good high school class and learned it all then. With participation and attendance points, her final grade is a B+.

- Do you think Beth is a B+ student?

Scenario C

- Curtis is an engineering student who did great work on labs and projects, though his tests scores were around the B- mark. When he takes the next course in his major, the teacher is frustrated because Curtis can't do a basic skill he should have learned in your class. But he got a B+ in your class.

- How do grades tell you what a student has learned?

Summative only grading

- Typical course assessments are focused on the summative—tests, final exam
- Learning is a process
- Growth mindset
- How does summative assessment help with growth?

- Why do we put feedback on exams?

Grading Philosophies

- Norm-referenced grading: standard curve, your grade tells you where you are relative to the class
- Criterion-referenced grading: your grade is based on a predetermined set of criteria

(Your philosophy might be between these two)

An Alternative to Points: Standards-based grading (Objectives-based grading)

- Been used for years at various educational levels
- Outcomes based
- Focuses on formative assessment

My journey to SBG

- Colleague in department tried it
- Community of practice in department
- Spring 2012 and onwards
- Started easy—used colleague's list of standards/course objectives
- Adjusted every semester
- Still adjusting!

What it looks like for me

- No points, no attendance checked, no participation grades
- No homework collected
- Grades based solely on quizzes (assessments)
- Assessments directly tied to course objectives/standards
- Students have three tries per assessment
- Assessments weekly
- No final exam

Reassessing

- Pros:
  - Students have motivation to go back and learn material
  - Three tries allows almost every student to pass
- Cons:
  - Can be lots of grading
  - Need many versions of assessments
- What other pros & cons can you think of?

Grading

- Simplified scheme, no points
  - High Pass
  - Pass
  - Minor Error
  - Major Error
  - Insufficient/Incomplete

- Very fast; minimal feedback

Student Responsibility

- Students are responsible for their own learning, keeping track of what they need, what grade they are earning
  - They step up!
- Do homework as needed, do practice as needed
- Some students are comfortable skipping classes and showing up to assessments only

The Good Parts

- Student feedback is positive about the grading system
- I feel like students are more motivated
- Definitely puts the responsibility of learning on the student
- No keeping track of attendance or participation
- No graded homework
- No arguing about 87 vs. 88 on a test
- Start hard and they have a chance to improve without hurting their grade

The Bad Parts

- Students really like points; they understand how they are doing and they understand how to make the system work to their advantage
- Can be a lot of grading (though FAST)
- Takes time to implement
- Requires proctors or your time
- Might be uncomfortable at first

Unexpected Benefits

- No disability accommodations for tests
- Accrediting agencies ❤️❤️❤️ it!
- Other teachers use proctoring room too
- Students read feedback!

Is SBG Right for You?

- Criteria-based or norm-based grading?
- Clear set of objectives?
- Resource availability?
- Other issues?

Next topic?

- Weekly schedule
- Example objectives
- Reassessing details
- Sample quiz question
- Grading scheme
- Gradebook
- How to start
- Examples (High Pass, Pass (OK), self-reflection)
- Effect on grades
- Practice/study materials
- Resources

- (Closing slide)

Schedule

- Thursday: start content (projectile motion concepts)
- Friday: projectile motion concepts and start problem solving [homework/practice available on D2L]
- Monday: lab on projectile motion
- Tuesday: practice problem solving [more practice on D2L]
- Wednesday: practice (1 hour) and assess (1 hour) on projectile motion
- Thursday: hand back assessment
- Friday through Thursday: Students re-assess up to two more times if necessary

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The Details—Objectives

- Used old tests to determine what I really was assessing/testing for
- Decided which objectives were absolutely essential to pass the class (to get a C)
- Other objectives help improve grade above C
  - Ended up with C-level and A-level objectives

The Details—Objectives

Projectile Motion

(C) I can solve problems involving objects experiencing projectile motion with horizontal launch *in a clear and understandable manner*.

(A) I can solve problems involving objects experiencing projectile motion with angled launch *in a clear and understandable manner*.

Balanced Forces

(C) I can draw a properly labeled force diagram showing all forces acting on an object.

(C) I can relate balanced/unbalanced forces to an object's constant/changing motion.

The Details—Objectives

Lab Standards

(C) I can communicate clearly in complete sentences.

(C) I include all necessary information in a lab report.

(C) I use correct physics in my labs.

(C) I understand the errors associated with experimental design.

Science Communication

(C) I can communicate clearly about science topics.

(C) I can apply scientific principles to science writing.

Learning

(C) I actively and respectfully participate in this course.

(C) I have shown commitment to learning physics and I take responsibility for my learning.

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The Details—Reassessing

- Google form for students to sign up
- I print at end of day for next day
- Different version for each day or each student
- Open lab for retakes
- Student workers as proctors
- Available 10-20 hours a week
- Students show up, give name, get assessment
- Picked up at end of day for grading

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The Details—Example Assessment Question

Assessment #8D for Forces

Name: _____

Objectives being assessed:

9 I can solve problems using Newton's 2nd Law ($F_{net} = ma$).

10 I can solve force problems that involve solving kinematics too.

9: ____

10: ____

Black Widow slides a set of handcuffs up a ramp to Iron Man. The cuffs leave her hand at 0.89 m/s, and after sliding up the ramp a distance, they have slowed to 0.12 m/s. The ramp is at 8° and the coefficient of friction between the cuffs and the ramp is 0.16. How far have the cuffs traveled?

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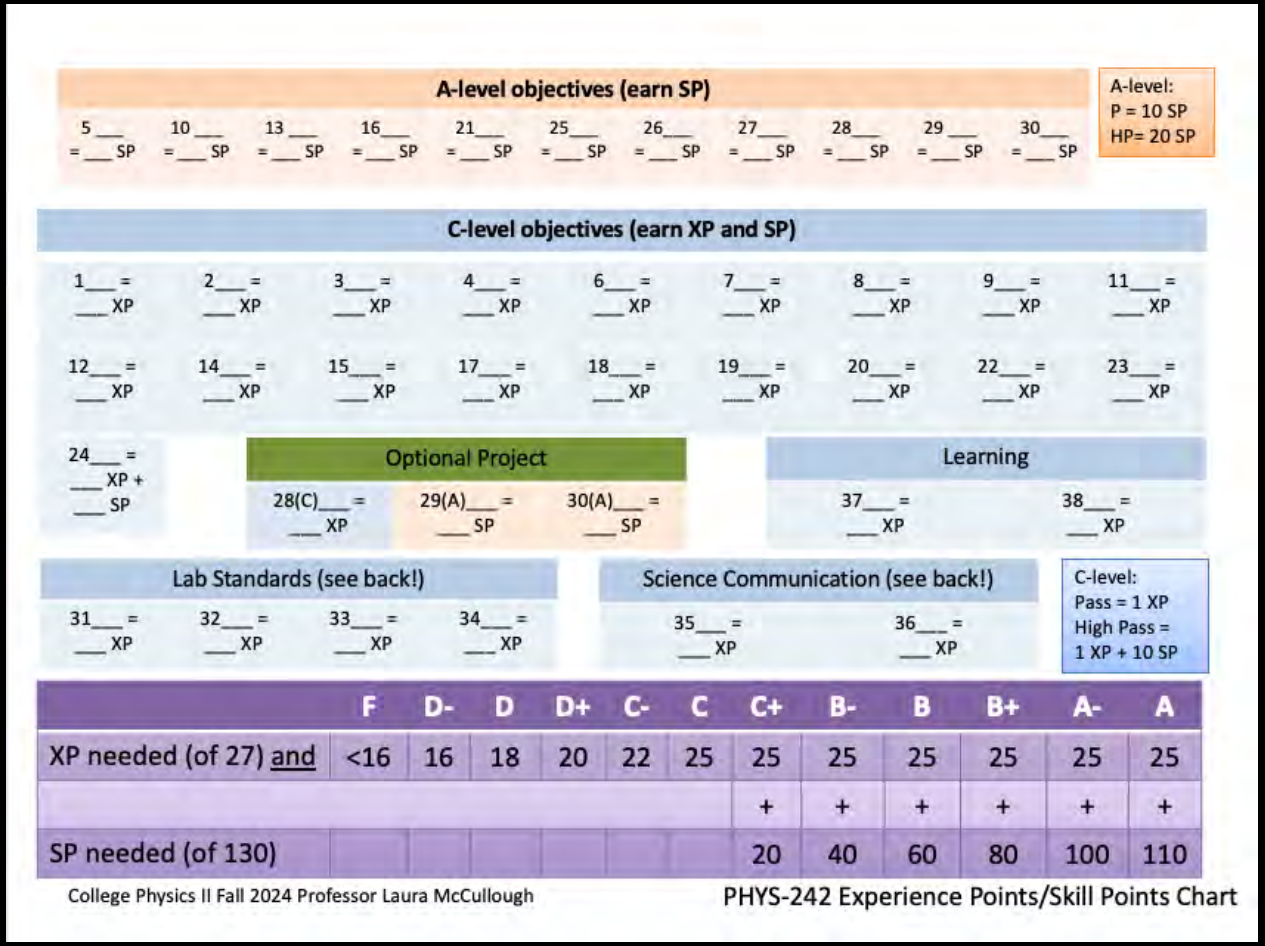
The Details--Gradescheme

- Different for each course
- Based on objectives
  - C-level objectives
  - A-level objectives
- Pass on C-level earns *experience points* towards "C"
- High pass or A-level earns *skill points* towards "A"
- Number of XP and SP needed carefully calculated
  - All pass, no high pass → "B"
  - All high pass on C-level, no A-level → "B"

Details: Gradescheme



	F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A
XP needed (of 27) and	<16	16	18	20	22	25	25	25	25	25	25	25
							+	+	+	+	+	+
SP needed (of 130)							20	40	60	80	100	110

College Physics II Fall 2024 Professor Laura McCullough

PHYS-242 Experience Points/Skill Points Chart

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Details: Gradebook

5	I can solve problems involving objects experiencing projectile motion with horizontal launch.														
6	I can solve problems involving objects experiencing projectile motion with angled launch.														
	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6
Student 1	3							3	3	2	3	3			
Student 2															
Student 3	4	4													
Student 4	2	3	5	5				2	1	3	5	5			
Student 5	1	1						1	1						
Student 6	5	5						5	5						
Student 7	4	4	5	5				5	5						
Student 8	1	1						2	2						
Student 9	3	5						5	5						
Student 10	5	5						3	3	5	3				
Student 11	4	2						5	1						
Student 12	5							4	3						
Student 13	4	4						2	4						
Student 14	5	3						5							
Student 15	5	2						3	1	5	3				
Student 16	5	5						3	3						

Details: Gradebook

	c LAB26	c LAB27	c LAB28	c SC29	c SC30	c 1	c 2	a 3	4	a 5	6	a 7	8	a 9	c 10	11	a 12	c 13	a 14	a 15	a 16	17	c 18	c 19	a 20	c 21	c 22	c 23	a 24	c 25	Final grade XP	SP
Student 1	4.0	2.3	4.0	2.4	2	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 2	1.3	1.3	1.3	0.8	0.6	3	3	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 3	4.0	3.7	4.0	1.6	1.4	4	3	4	4	4	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 4	3.7	2.7	3.7	2.4	1.8	4	3	5	5	5	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 5	1.0	1.3	1.3	1.6	1.2	3	3	0	0	1	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 6	3.7	2.0	3.0	2.4	2.2	4	4	5	5	5	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 7	4.0	3.0	3.7	2.4	2	4	4	5	5	5	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 8	3.3	3.0	3.0	2.2	2.2	4	4	4	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 9	3.7	3.7	4.0	2.4	2.2	4	4	5	5	5	5	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 10	4.0	2.7	2.7	2.4	1.8	4	4	5	5	5	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 11	4.0	3.3	4.0	0.8	0.6	4	3	3	3	4	5	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 12	4.0	2.7	2.7	2	1.6	4	4	5	5	5	4	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 13	3.7	2.7	3.3	2	1.8	4	3	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 14	2.7	2.3	3.0	1.4	1.4	4	3	5	4	5	5	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 15	3.7	4.0	3.7	2.4	2.4	4	4	5	3	5	5	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Student 16	3.3	2.7	4.0	0.6	0.4	4	4	5	4	5	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Average score	3.6	3.0	3.4	1.9	1.8	3.8	3.7	4.4	4.0	4.4	4.3	2.6	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
# passing	17	6	17	0	0	44	35	40	35	42	40	12	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% passing	35.4	12.5	35.4	0.0	0.0	90	71	82	71	85.7	81.6	24.5	42.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

SN grading | Roster | Names | Labs | SC | CV CA | Proj | BF | UBF | Circular | Spring | BT | CE | Mom | Summary

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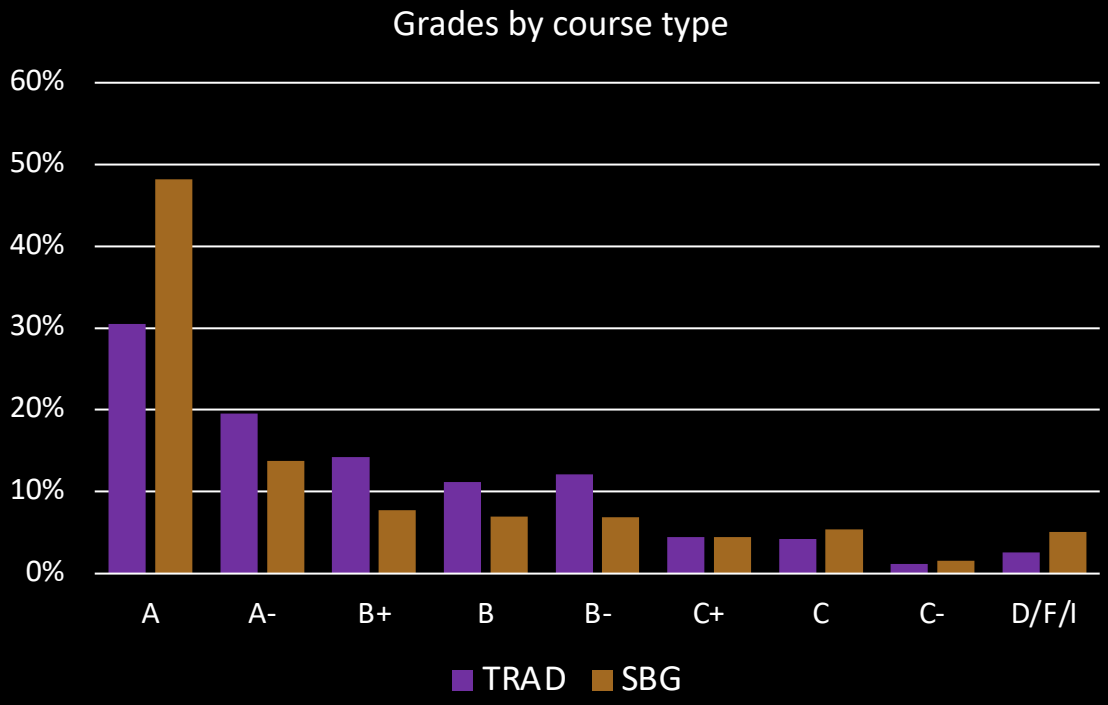
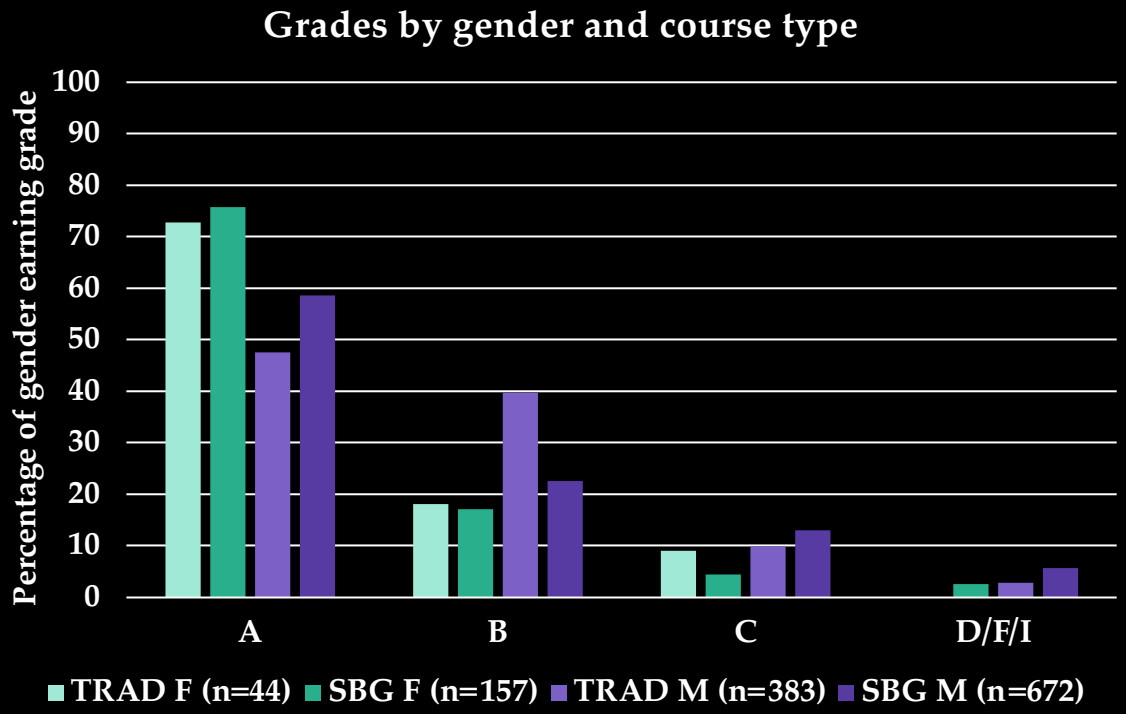
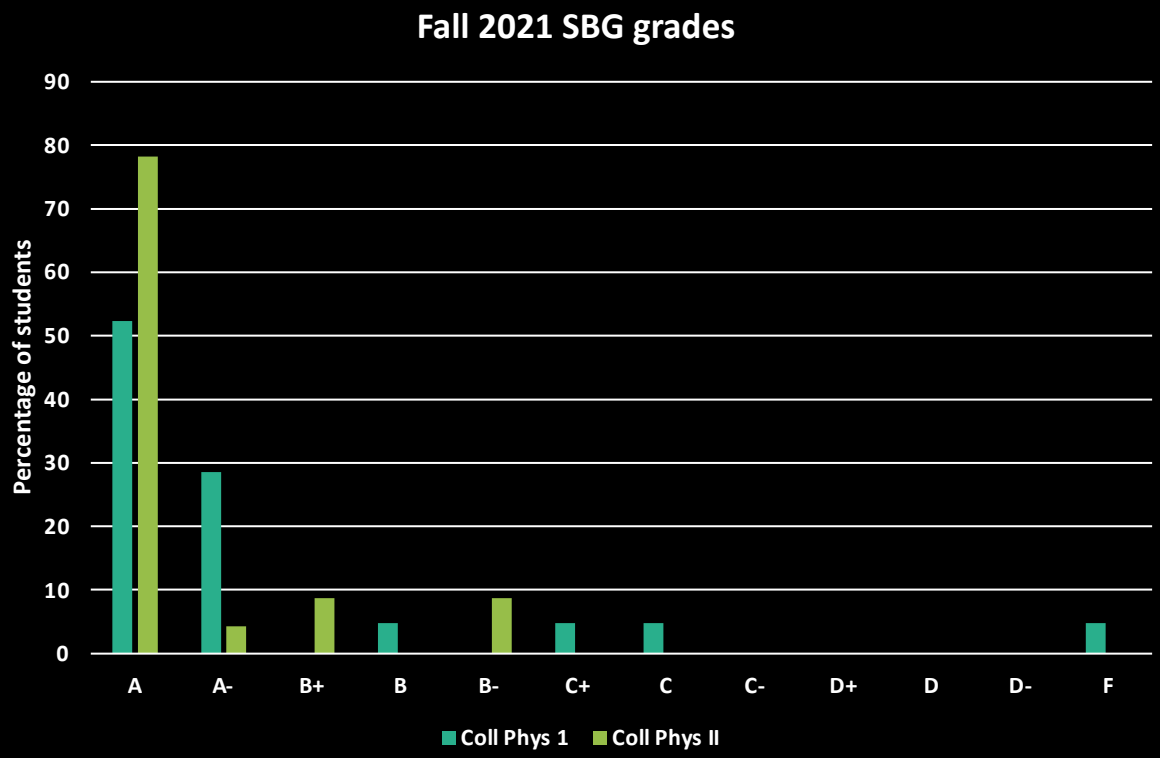
The Details: Effect on Grades



Grades by Gender



<Whoa>


Fall 2021 SBG grades
Percentage of students
90
80
70
60
50
40
30
20
10
0
A
A-
B+
B
B-
C+
C
C-
D+
D
D-
F
Coll Phys 1
Coll Phys II

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How Could You Start?

- Step one: develop set of objectives based on current class
  - Decide if all objectives are equal or if you want levels
  - Determine what needs to be known for passing/"C" grade
- Step two: determine resources (current/needed)
  - Grading help?
  - Proctor room and proctors?
- Step three: given your resources and your philosophy, how many retakes? Timeframe for retakes?

Moving Towards SBG

- Step four: develop grading scheme
  - Ease of understanding how grade is earned
  - Ease of calculating grade
  - Ease of keeping track of grades
  - Level of feedback given
- Step five: write an assessment designed for one or more objectives
- Step six: get colleagues to look at your plan***
- Step seven: make (frantic, last-minute) changes

Moving Towards SBG

- Step eight: set low expectations for the first run
- Step nine: give it a try!
- Step ten: tweak, adjust, retry
- Step eleven: repeat step ten

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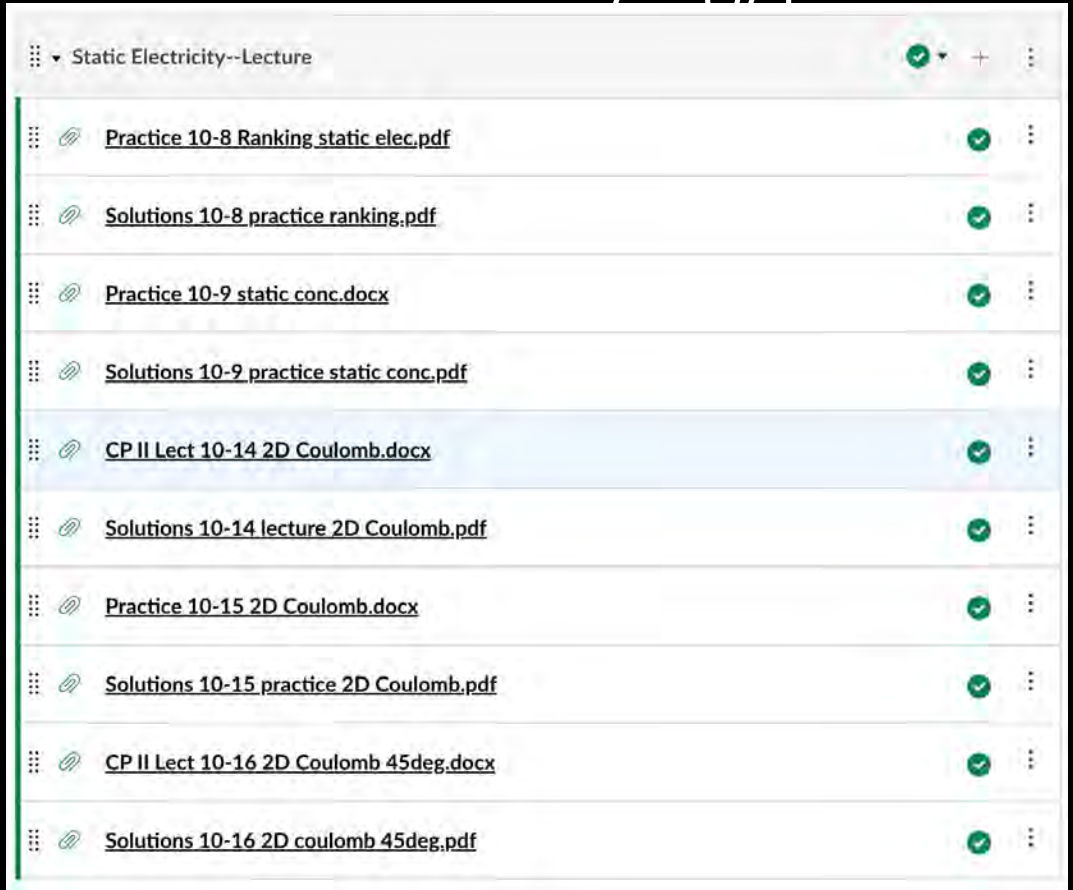
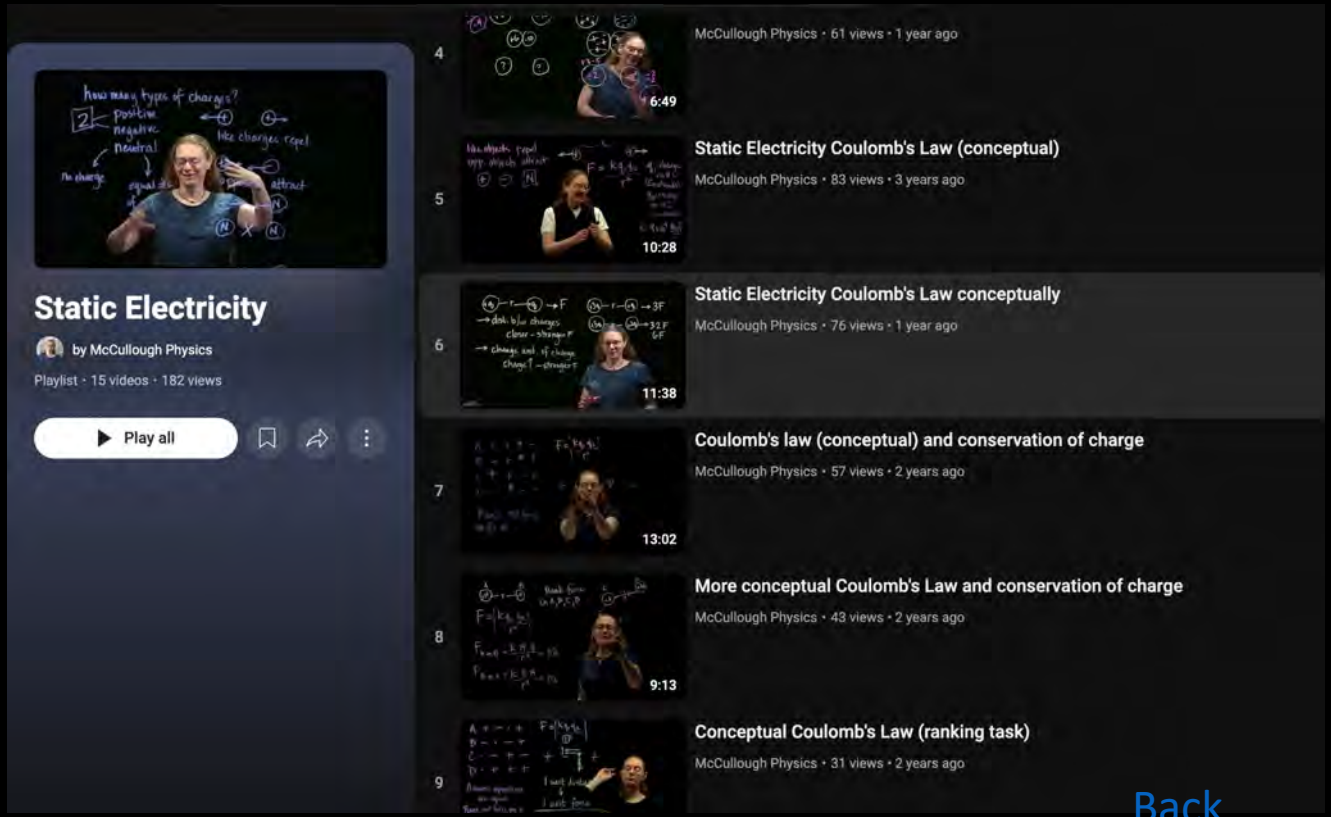
Resources for studying/practicing



Resources for studying/practicing



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Resources on Standards-Based Grading

- Laura McCullough: McCulloughL@uwstout.edu
- https://www.chemedx.org/article/standards-based-grading-chemistry-classroom
- http://mctownsley.net/top-10-standards-based-grading-articles/

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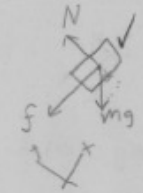
High pass

8: HP

Black Widow slides a set of handcuffs up a ramp to Iron Man. The cuffs leave her hand at 0.89 m/s, and after sliding up the ramp a distance, they have slowed to 0.12 m/s. The ramp is at 8° and the coefficient of friction between the cuffs and the ramp is 0.16. How far have the cuffs traveled?



$x_i = 0$

$x_f =$

$v_i = .89 m/s$

$v_f = .12 m/s$

$a = -2.91$

$t =$

$\mu_s = .16$

$\theta = 8°$

F	X	Y
N	-	+N
f	-f	-
mg	$-mg\sin\theta$	$-mg\cos\theta$

$\Sigma F_X \neq 0$

$\Sigma F_Y = 0$

$N = mg\cos\theta$ ✓

$-f - mg\sin\theta = ma$ ✓

$f = \mu N$

$.12^2 = .89^2 + 2(-2.91)\Delta x$

$.014 = .79 - 5.82\Delta x$

$-\mu mg\cos\theta - mg\sin\theta = ma$

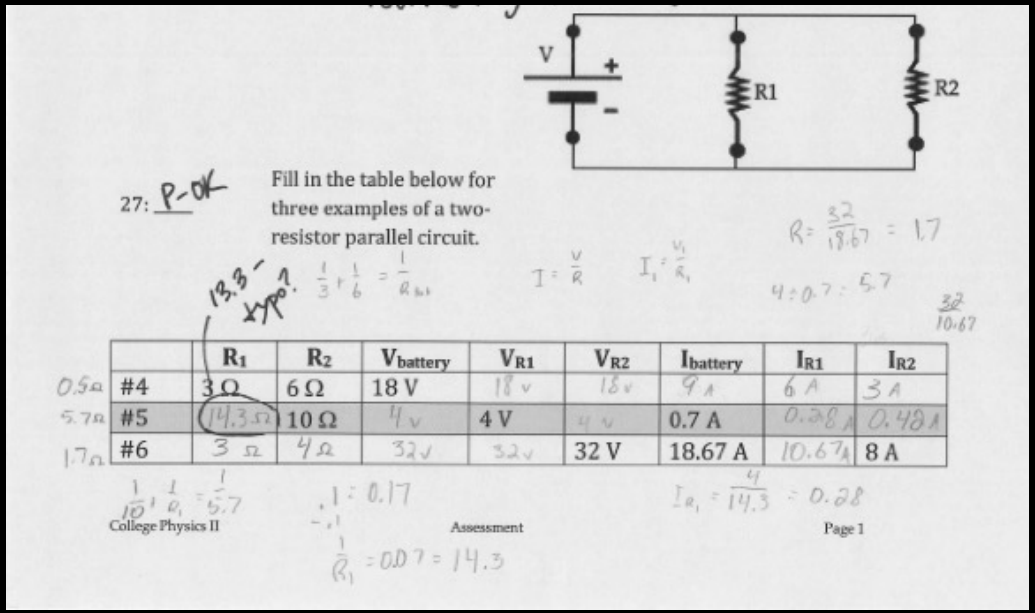
$\frac{5.82\Delta x}{5.82} = \frac{.776}{5.82}$

$\Delta x = .13m$

$a = -.16(9.8)\cos(8) - (9.8)\sin(8)$

$a = -2.91$

Pass-OK

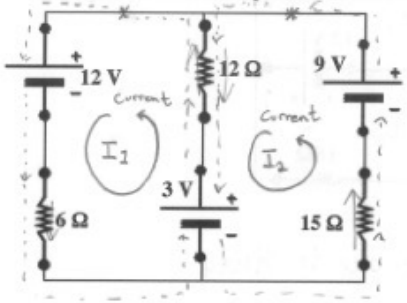


	R_1	R_2	$V_{battery}$	V_{R1}	V_{R2}	$I_{battery}$	I_{R1}	I_{R2}
#4	3 Ω	6 Ω	18 V	18 V	18 V	9 A	6 A	3 A
#5	14.3 Ω	10 Ω	4 V	4 V	4 V	0.7 A	0.28 A	0.40 A
#6	3 Ω	4 Ω	32 V	32 V	32 V	18.67 A	10.67 A	8 A

Self-reflection

29: M

What is the current in each part of this circuit?



[Left]: $-12\text{V} - 6I_1 + 3\text{V} - 12I_1 - 12I_2 = 0$

$\rightarrow -9\text{V} - 6I_1 + 12 \rightarrow 3\text{V} - 6I_1 = 0$

$\frac{6I_1}{6} = \frac{3}{6}$

$I_1 = .5\text{A}$

[Right]: $-12I_2 + 12I_1 - 3\text{V} - 15I_2 + 9\text{V} = 0$ ✓

$\rightarrow 6\text{V} - 27I_2 + 12I_1 \rightarrow 18\text{v} - 27I_2 = 0$

$\frac{27I_2}{27} = \frac{18\text{v}}{27}$

$I_2 = 2/3\,\text{A} \approx .67\,\text{A}$

[Outer]: $-12\text{v} - 6I_1 - 15I_2 + 9\text{V} = 0$

I'll need to retake this, I am definitely missing something.

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Thank you!

http://lauramccphd.com/