

Pre A.P. Calculus (also AAT)

With an emphasis on thinking and problem solving skills

2019-2020

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Website(s): [google.classroom.com](https://www.google.com/classroom) / www.scubamoose.weebly.com / flippedmath.com

The Course

The Pre A.P. PreCalculus (PAPCal) course is a yearlong course that is designed to challenge the highly motivated learner of mathematics. The PAPCal / AAT course is essentially condensing one year of Advanced Algebra (Algebra-2) and one year of Pre-calculus into a single academic school year. The students in PAPCal at HeLa will be challenged by both the amount of content to be mastered and the level of critical thinking and problem solving which is required. So as to not scaremonger, let it be said challenge in learning can and should be the root of having fun while learning. So while challenge is the reality for PAPCal, having fun while learning will be the emphasis.

Benefits and Challenges of PAPCAL / AAT for the student

Benefits (in no particular order and definitely not an exhaustive list)

- Students will be advanced in the curriculum by one year compared with the traditional sequence. This allows students access to more of the challenging math courses at HeLa in their future years (Calculus AB, Calculus BC and Statistics)
- Students will be working in a classroom with other students who have all opted for the more challenging course option
- The thinking and problem solving skills required for PAPCal are modeled after the requirements for success in the math department's Advanced Placement coursework offered at HeLa (and thus, those required by STEM fields in universities and colleges).

Challenges

- Students will learn two years of curriculum in one year. (read: course may feel very fast for some)
 - Students will be expected to do mathematics practice on a daily basis (class only meets three times a week)
 - Students will, at times, be expected to do independent study (often on review topics and/or basic skills but occasionally prior to a new lesson as well)
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Student Expectations to be successful in PAPCAL / AAT

Students will be prepared to learn each class. Student should be prepared:

- With materials and supplies.
- With assignments completed *on-time*. This year's assignments will be composed almost entirely of guided notes to be completed prior to class so the assignment and FRQ's can be completed during class.
- For Quizzes and Tests. There is a timeliness component ingrained into the course grade earned.
(*the next items cannot be emphasized enough*)
- To make mistakes and learn from them
- To make more mistakes and to continue learning from them
- To explore, to ask questions of the peers, to be questioned by their peers, to demand justification, to be required to justify, to struggle, to adapt and to grow as learners of mathematics and as people (instructor included ☺)
- To think critically
- To be challenged

Your grade in PAPCAL / AAT.:

Semester Units and Topics and Assessment types follow on the next 4 pages.

Alg-2/PreCalc topics to learned/mastered during this school year (1st semester)

Unit	Topic	Content
Unit 1a – Modeling with Linear Functions	1	Scatter Plots– Interpolating
	2	Scatter Plots – Outliers, Correlation and Causation
	3	Scatter Plots to Regression Lines – Creating and Interpreting
	4	Scatter Plots to Regression Lines – Interpolating, Extrapolating and Reasonable Domains
	5	Scatter Plots to Regression Lines – Residuals, Residual Plots and the Coefficient of Determination
	6	Linears Unit Test – Topics 1-5
Unit 1b – Modeling w/linear functions	7	Modeling with Linear Functions Short Problems Test (SPT)
	8	Modeling with Linear Functions Free Response Question (FRQ)
Unit 2a – Modeling with Quadratic and Parametric Functions	9	Different Forms (Graph \leftrightarrow Equations)
	10	Algebraic Manipulations to convert (standard to factored AND standard to Vertex form)
	11	Quadratics modeling Projectile motion Requires Calculator skills (calc OK) OR quadratic formula use (No Calc)
	12	Non-real zeroes – Complex Numbers
	13	Parametric Functions -eliminating the parameter -equations to graphs
	14	Parametrics modeling Projectile motion Requires Calculator skills (calc OK) OR quadratic formula use (No Calc)
	15	Quadratics Unit Test (topics 9-14)
Unit 2b – Modeling w/ Quads and Parametric	16	Quadratics and Parametrics SPT
	17	Quadratics and Parametrics FRQ
Unit 3a – Functions	18	Function Transformations
	19	6 Types of Functions (identification with graphs / equations / Table of Values)
	20	Piecewise functions and continuity
	21	Unusual functions (domain, algebraic solving, graphing, ect...)
	22	Systems of Functions
	23	Composite Functions (w/domain work)
	24	'Functions' Unit Test (topics 18-22)
Unit 3b – Functions	25	Functions SPT
	26	Functions FRQ
Unit 4a – Modeling with Polynomials	27	Polynomial Functions (graph \leftrightarrow Factored Form)
	28	Standard Form \leftrightarrow Factored Form
	29	Polynomial Functions Behavior (piecewise and introduction to limits)
	30	Polynomial functions (with multiplicities and complex roots)
	31	Polynomials Unit Test (topics 27-30)
Unit 4b – Modeling with Polynomial	32	Polynomials SPT
	33	Polynomials FRQ

Unit 5 – Exponential Logarithm Properties	34	Product / Quotient / Power of Power
	35	Fractional Exponents / Negative Exponents
	36	Rewriting Functions (Calculus Prep)
	37	Solving for unknown base
	38	Solving for unknown exponent (No Calc)
	39	Solving for unknown exponent (Calculator)
	40	Logarithm Properties
	41	Exp/Log Properties Unit Test (topics 34-40)
1 st Semester FRQ's Test (4 FRQ's)	The score is entered as one grade The individual FRQ's can replace the matching previously taken unit FRQ if better (students must submit the request)	
1 st Semester SPT	The score is entered as one grade This score can also be used to replace one of the SPT's in the 1 st semester (students must submit the request)	
<p>**Note** -- We will aim to take this Final prior to the official finals week. If successful, we will continue into the 2nd semester material in the month of January. Any quizzes/tests taken for Unit 6 and beyond will be entered into your 2nd semester grade.</p>		

Semester 1 Grade

Unit 0 –	1%	(consists of signed syllabus, questionnaire, etc...)
Unit 1a –	11%	(10% represents the percent this unit's SBG grade will account for the semester-1 SBG)
Unit 1b –	6%	
Unit 2a –	11%	
Unit 2b –	6%	
Unit 3a –	11%	
Unit 3b –	6%	
Unit 4a –	11%	
Unit 4b –	6%	
Unit 5 –	11%	
1 st Semester SPT–	10%	
1 st Semester FRQ –	10%	

Grades formulated:

Units

- Students will take a quiz on each topic AND a unit quiz.
- There will be no 'retakes', though a student can replace their topic quizzes in the unit if the 'end of unit quiz' is better than the *mean* score of the individual topic quiz.
- The individual unit quizzes may be grouped together on a single day. For example, for unit 1a, students will take topics 1,2 and 3 on the same quiz...though students will receive scores for each topic.

Free Response Questions (FRQ's)

- These are written (and assessed) in the model of the AP Calculus Tests (AAT is NOT an AP course)
- Students will take 1 FRQ for most units (1b, 2b, 3b and 4b for example)
- Students will also take a FRQ test at the end of the semester...this test will be entered as one score...this test will also be compared with your previous unit FRQ's as a quasi-retake.

'Short Problem' Tests (SPT's)

- These will consist of 10 of so questions that involve multiple steps in order to arrive at the solution.
- Students will take a SPT test at the end of the semester...this test will be entered as one score...this test will also be compared with your previous unit SPT's and replace up to 1 of these scores.

Alg-2/PreCalc topics to learned/mastered during this school year (2nd semester)

Unit	Topic	Content
Unit 6a – Modeling & Graphing with exponential or logarithmic functions	42	Data Tables <-> Equations
	43	Transformations of Logarithmic/exponential functions
	44	Financial Applications (introduction)
	45	Exponential growth models
	46	Exponential decay models
	47	Logarithmic function models
	48	Exponential/Logarithmic modeling Unit Test – Topics 42-47
Unit 6b – Modeling w/exponential & Logarithmic functions	49	Modeling with Exponential and Logarithmic Functions Short Problems Test (SPT)
	50	Modeling with Exponential and Logarithmic Functions Free Response Question (FRQ)
Unit 7a – Circular Trigonometry (the Unit Circle)	51	Trig Review (SohCahToa) and applications (topic 51 is geometry review)
	52	All about Angles (standard position, co-terminal, quadrants, degrees <-> radians, ect..)
	53	All about Triangles (reference triangles, common or ‘special’ right triangles)
	54	The Unit Circle
	55	Reciprocal Functions and the Unit Circle
	56	Inverse Functions and the Unit Circle
	57	Simplifying Trig Expressions
	58	Circle Trigonometry Unit Test (topics 51-57)
Unit 7b – Circular Trig & The Unit Circle	59	Circle Trigonometry SPT
	60	Circle Trigonometry FRQ
Unit 8a – Modeling and Graphing Trig Functions	61	Sine and Cosine Functions (with transformations)
	62	Secant and Cosecant Functions with asymptotes and limits (with transformations)
	63	Tangent and Cotangent Functions (with transformations)
	64	Solving Trig Functions
	65	Trigonometric Modeling part a
	66	Trigonometric Modeling part b
	67	‘Graphing and Modeling with Trigonometry’ Unit Test (topics 61-66)
Unit 8b – Modeling with Trig Functions	68	Trigonometric Modeling FRQ
Unit 9 – Properties of Trigonometry	69	Sum and Difference Properties and Exact Values
	70	Double angle and half angle properties
	71	Odd/even and co-function properties
	72	Pythagorean properties
	73	Simplifying Trig expressions / Trig Identities part A
	74	Graphing composite Trig functions (require Trig Identities)
	75	Simplifying Trig expressions / Trig Identities part B
	76	Law of Sine (and the ambiguous case) and Law of Cosines
	77	Properties of Trigonometry Test (topics 69-76)
Unit 9b - Trigonometry	78	Trigonometric Modeling and Trigonometric Properties SPT

Unit 10a – Rational Functions & Limits	79	Multiplying / Dividing and Simplifying Rational Expressions
	80	Adding / Subtracting Rational Functions
	81	Solving Rational Equations
	82	Graphing Rational functions (asymptote form)
	83	Graphing Rational Functions (required to put into asymptote form)
	84	One sided limits, two sided limits and limits as 'x' approaches infinity – part a
	85	Graphing Rational Functions with removable discontinuities
	86	One sided limits, two sided limits and limits as 'x' approaches infinity – part b
	87	Finding the slope of a tangent line using limits
	88	Writing the equation of the tangent line
	89	Rational Functions Unit Test (topics 79-88)
Unit 10b – Rational Functions & Limits	90	Rational Functions and Limits SPT
	91	Rational Functions and Limits FRQ
2 nd Semester FRQ		The score is entered as one grade The individual FRQ's can replace the previous matching FRQ if better (students must submit the request)
2 nd Semester SPT		The score is entered as one grade This score can also be used to replace one of the SPT's in the 2 nd semester (students must submit the request)
<p>**Note** -- We will aim to take this Final prior to the official finals week. If successful, we will continue into a financial literacy unit / Project</p>		

Semester 2 Grade

Unit 6a –	11%	(10% represents the percent this unit's SBG grade will account for the semester-1 SBG)
Unit 6b –	6%	
Unit 7a –	11%	
Unit 7b –	6%	
Unit 8a –	11%	
Unit 8b –	3%	
Unit 9a –	11%	
Unit 9b –	3%	
Unit 10a –	11%	
Unit 10b –	6%	
1 st Semester SPT–	9%	
1 st Semester FRQ –	9%	
Finance Unit –	3%	

A.A.T. (HeLa) Grading Scale:

Each component above will be assessed on the Standards Based Grading Scale. The letter grade earned will be according to the H.E.L.A. schoolwide adopted grading scale (table below).

A	3.20 – 4.00	B +	2.90 – 2.99	C +	2.40 – 2.49	D +	1.90 – 1.99	F	1.49 and below
A –	3.19 – 3.00	B	2.60 – 2.89	C	2.10 – 2.39	D	1.50 – 1.89		
		B –	2.50 – 2.59	C –	2.00 – 2.09				

Note: There will be no rounding at the end of the semester and no extra credit possibilities

PAPCal / AAT
2019-2020 Signature page

I have read and understand the previous pages policies and definitions. I understand that if something is unclear it is upon the student to seek clarification prior to the occurrence of an issue during the school year.

I understand the following supplies will be needed daily:

- A pencil (student work completed in pen will not be graded)
- Lined paper free of torn spiral edges. (graph paper may be useful)
- A Ti-83+ calculator at a minimum (recommended students obtain a Ti-84+, the Ti-84+ will be the calculator used by the instructor for demonstrations and is the calculator heavily recommended for students future A.P. math coursework and A.P. Tests (Calculus and/or Statistics)
- A different colored 'grading' pen is recommended for students to identify clearly which practice questions were missed and, thus, which type of questions may need further study.
- It is recommended students have a separate 3 ring binder with 10 to 12 dividers for their math class. At a minimum a separate section in their binder for math, though it is felt this will be insufficient and impossibly difficult to organize as a reference for the final and for mastery assessments.
- **A Positive attitude**
- **A willingness to make mistakes...and learn from them! (these are the best learning opportunities)**

Students, please sign and date the following and have your parent/guardian do the same.

Student Name (printed neatly) _____

Student Signature _____

Parent/Guardian Name (please print neatly) _____

Parent/Guardian Signature _____

Date _____

******Students, your first entered score (Unit 0) will be based on your completion of and timely turn-in of the following items (this is the only time a score will be entered which is not math work).******

Five Items (to be stapled in this order) DUE: Thursday, September 5th...first score in Unit 0

1. Student information sheet (filled out by student)
2. This signed syllabus sheet (please remove this page and keep the other pages for your reference)
3. Student has signed up for REMIND [if a parent disagrees or is hesitant on this requirement, please email Mr. Hanson (prior to the due date for this packet) and this requirement will be waived.]
4. The predetermined printed page from the website (www.scubamoose.weebly.com) It is recommended that students add this website as a favorite for their browser.
5. A printed copy of predetermined sheet from [google.classroom](https://www.google.com/classroom)

Grade: 0.0 (not turned in)	1.0 (1 to 2 items turned in)	2.0 (3 items turned in)
3.0 (4 items turned in)		4.0 (all 5 items turned in)

For each 'odd' or 'all schedule' school day for which this packet is late, the score will decrease 1.0 per day. Students CAN turn in early.