DIFFERENTIATED GEOMETRY (2017-18)

Instructor: David Hartman, Ph.D.
Email: david.hartman@district145.org
Website: https://drdhartman.com/

Welcome to Diff Geometry! You are about to begin an exciting course (and only in its second year at WHS), but also one that is different from what you experienced in Algebra 1-2 as well as one that will be much more rigorous than the "regular" geometry course offered at WHS. Algebra 1-2 was a more procedural-based course where there was often a distinct procedure that could be followed step-by-step. While I tried to push multiple perspectives in my Algebra 1-2 classes, most students still liked to use that "one" way to solve a problem. Geometry, on the other hand, is more of a problem-solving based course. This means there are often multiple ways to solve a problem, and each problem may feel different than the preceding one. In geometry you are given tools, then asked to select the appropriate tools to solve the problem. Problem solving can be challenging at the beginning of the year and you may initially find it more challenging than Algebra 1-2. Your thinking skills will be pushed early and often in this course. Several factors affect your success in Diff Geometry, including:

- Your Algebra 1-2 skills
- Your ability to justify, explain, and defend your reasoning. (You will hear me use the phrase, "convince yourself…convince a friend…and convince a skeptic.)
- Your willingness to persevere when a solution is not immediately obvious. (You will hear me use the phrase "productive struggle" as we move through the course).
- Your willingness to study the vocabulary and theorems (learning the new tools).
- Your willingness to ask questions. Questions show a desire to truly understand concepts and help clarify ideas.
- Your willingness to come in for help, *even if you have never needed to do this before!*
- Your willingness to COMPLETE THE HOMEWORK. Practice counts and makes a huge difference both in terms of your grade and your understanding.
- Your willingness to think outside the box and consider alternate perspectives.

To capture my philosophy in teaching Diff Geometry, I use four simple words, "Just Think About It." I will say this phrase often. I want my students to simply think. And yes, that is hard to do sometimes!

It is my desire for you to be successful and I am here to help as well as promote peer collaboration. Students who work hard on assignments and are engaged in class activities will succeed. You should not be afraid to make mistakes; it is a part of learning. If you find yourself struggling:

- Utilize peer support during class.
- Utilize peer support before school, whether in the commons or in pod 2000.
- Utilize peer support at home (call or facetime your fellow peers).
- Come in to my room before/after school. (Please know that I do have meetings and other commitments on some days.)
- Send me an email.

Leadership: Mr. Ricenbaw shared a vision with me two years ago. I have spent a considerable amount of time reflecting on it: "<u>Helping kids to better help themselves…everyday!</u>" Learning geometry, how to reason and prove, and further develop problem-solving skills are all equally important goals of this course. In addition, building your capacity as a math leader in and out of my classroom is just as important. In my classroom, I want you to become part of a collaborative learning team. I don't want to be the only teacher in the room. I want you to help your fellow peers learn. I want to equip you with skills related to helping each other learn. Out of the classroom, I want you to use these math leadership skills by helping any and all of your peers. Being in Diff Geometry, it's clear that you are one of the strongest math students at WHS. Some of you have worked very hard to get to this point; others have found that math just comes pretty easy to them. In pushing you to broaden your capacity as a math leader, I want you to help your peers learn math. Mr. Ricenbaw's vision has prompted me to come up with my own vision:.

Upon the completion of Diff Geometry, you will enter Algebra 3-4 next year. There will not be a Differentiated section. Rather, every single class will be comprised of a mix of 10th-12th grade students, some who have excelled in math in the past and others who have not. In fact, some will be in the class who really struggled with the basics of Algebra 1-2. To provide better access to learning Algebra 3-4 for all, I will expect YOU from day one to enter the class and be a math leader. Your role will be just as important as a section leader in band, a captain on a sports team, or an officer position in a club. The bottom line: I want you to use your "math leadership" skills to help others learn math.

If my vision can become enacted, we will go a long way in "<u>Helping kids to better help themselves…everyday!</u>" I do have a vision for transforming learning at WHS. I want long-term, sustainable growth. It begins now! It begins with you!

Grading:

100% - 94%	A
93% - 86%	B
85% - 78%	C
77% - 70%	D
69% - 0%	F

Breakdown: 80% Summative *("of" learning…demonstrating what you have learned)*

> 70%: tests, projects, and test corrections

> 10%: semester final exam.

20% Formative *("for" learning…the process along the way)*

> approx. 10%: quizzes, projects, reflections on test corrections

> approx. 10%: homework

Tests: Tests are purposely designed to include some problems where you must apply what you have learned in class in a slightly different situation. In the future you will be asked to do similar problem solving when you take the ACT/SAT test, and this approach to instruction will help prepare you for future success. I will make sure you know in advance all the necessary elements/ideas, but you will need to determine an appropriate approach and apply it to solve

problems. It is expected that all summative tests will be completed in one class period. I will use my professional judgment concerning providing individual students additional time to complete tests. Please know that I rarely grant additional time. Please be prepared and work efficiently during exams. You can meet with me individually to discuss your testing habits and options.

Projects: There will be a few chapter projects assigned in conjunction with chapter tests as well as in lieu of chapter tests. These projects, which you will complete outside of class, will afford you time to put together your best effort towards demonstrating an understanding of the concepts found in the chapter.

Test Corrections: You will have the opportunity to work through test corrections to earn as much as 50% of the missed points back on chapter test*. (*Note: to prevent "leapfrogging" and recognize those who earned an "A" on the original test, the highest possible grade a student, who did not earn an "A" on the original test, can earn is a 94% through the test correction process.) Those who earn an "A" or "B" on the test are not required to work through the test correction (yet they can). Those who earn below a "C" or lower on the test are strongly advised to work through the test correction process. The test correction process includes self-reflection, item analyses, correcting missed problems, explaining each error, and then offering even more reflection! Note: ALL students, regardless of the score earned, must complete the first test correction.

Semester Final: This exam will be a multiple choice.

Quizzes: There will be a mix of traditional in-class quizzes, pop quizzes, partner quizzes, homework quizzes, take-home quizzes, etc. to gauge your level of understanding throughout the quarter. There will be no retakes on quizzes.

Homework: You will have an assignment almost every night. Putting forth effort on each problem is more important than getting every problem correct. I, and your fellow peers, will help you with the ones you did not understand, but you need to try every problem so you know what your questions are. Homework will be graded a variety of ways, including turning it in, self-grading, peer grading, posting a solution/work on the board, or a mere completion grade. There will be times only a couple problems will be graded out of the entire assignment. Note: several assignments will include the answers in the back of the book. I am more concerned with the work and reasoning behind those answers. There may even by times where I post all of the answers on my website; I am looking for you to go deeper than the answers! Please know that merely copying the answers from the back of the book will not count as a grade. You need to use the homework as an opportunity to practice and figure out what you are "C" confident in, "S" shaky on, or need to "R" relearn.

Late to Class? You must either have a pass from a teacher or a tardy slip from the office. You are expected to arrive to class on time and begin the activity of the day AT the bell.

Missing Class: You are expected to attend all classes and the entirety of ALL classes. Recognizing that "life happens," you should be aware that the class does move on even if you are not in class! When you are gone, (a) check my website to find out if there is an assignment posted and (b) contact a peer in the class to find out what you missed. Send me an email if you need clarification.

Making up work: If you are gone for a <u>school-related activity</u> (e.g., sports, clubs, meetings, etc.), you are expected to make up the work BEFORE you miss.

Read the above sentence again.

Further, you should make arrangements for making up a quiz or test BEFORE you miss.

Read the above sentence again.

<u>There will be a deduction if you are not proactive regarding school-related absences.</u> You cannot come into class following a school-related activity and ask me, "Did we do anything yesterday?" <u>Also, if you missed a review day due to a school-related activity, you will still be expected to take the exam on the day you return.</u>

If you are gone for an illness or parent excused reason, you will have TWO days to make up what missed (e.g., assignment, quiz, test). I will expect you to make up quizzes and tests before/after school or during lunch. You will need to initiate this conversation with me.

Phones: For non-college level courses, I do not allow phones to be out. Please turn off your phone and store it for the entire class period. If there is an activity where I want you to access your phone, I will instruct you to get your phone out. Should your phone become visible during class or be sitting on your lap or make sounds/vibrations, I will simply ask for it. You will be able to get your phone back at the end of the school day. Should this interruption repeat itself, administration would become the next step. Note: you cannot use your phone as your calculator. You need a separate calculator for class!

Classroom Rules: # S.O.A.R.

S – Safety (this is #1)
O – Opportunity (for you to learn and me to teach!)
A – Attendance (be here and on time)
R – Respect &
　　　Responsibility (these two are big in life)

Textbooks: We will be using books that were new last year: *Big Ideas Math; Geometry: A Bridge to Success, 2015 edition.* To be good stewards, most of the assignments this year will come directly from the book. The book is also a great a resource for you to use as you learn geometry in addition to the overabundance of online support on the web (including my own website). My goal is to save the "paper" I plan use for in-class activities, tests, and test correction documents. Thus, I will not assign as many worksheets as I have in the past. SINCE the textbooks are new, I will also expect a good "**paper sack**" book cover to protect the book at all times! This is not an option. You will be responsible to keeping this book in great condition! Also know these books cost over $100.00. Students are accountable for the replacement cost should it be lost or damaged! (Note: There may be times you have access to the online book as well.)

Calculator: While any basic scientific calculator that includes square root is sufficient for this course, a <u>graphing</u> calculator is preferred. Most students will likely be using a graphing calculator in future high school and (most definitely) in college math classes. Now is a good time to CONSIDER learning "how" to use it! The best on the market is in the family of the TI-84+ graphing calculators. (If you do purchase one, please bring me the 'points' on the package!) Note: I am NOT saying you have to go out and buy an expensive calculator. I just want to consider your future ☺ Also, the back-to-school time of the year is a GREAT time of the year to invest as the price is much cheaper (check out Walmart, etc.)

Weekly Updates: I like to periodically send out an overall update on how things are going in class as well as upcoming events (i.e., tests). For this first one, clearly I'm using "paper!" For future updates, I plan to send out an **email** update on most Fridays of the school year. (The email will be generated from powerschool; it automatically sends it to a parent email(s) that has/have been provided to District 145.)

Course Requirements:

* Spiral notebook for notes (which can be used on some quizzes and tests.)
* Separate spiral notebook for homework assignments out of the book.
* Folder with your name on it (which tests and test corrections will go in.)
* 3-ring binder (for handouts, worksheet, quizzes, etc.)
* 3-hole punched, lined notebook paper in the binder.
* Scientific or graphing calculator (one in the family of the TI-84+)
* Plenty of pencils and erasers (as well as a few pens)

Problem Scoring:

Grading (on a 5 point scale)			
Code*	Gradebook Value		Code Explanation (WHS Grading)
5	A (100%)	Mathematically Sound	College Preparation Proficiency
4	B (91%)	Minor Error(s)	College Preparation
3	C (81%)	Gray Area--some Major *minor* error(s) or some Minor *major* error(s)	Graduation (Basic) Proficiency
2	F (68%)	Major Error(s)	Just Below Basic Proficiency
1	F (50%)	Minimal Progress	Below Basic Proficiency
0	F (0%)	Nothing of Mathematical Value / Blank / Missing	

Generic Rubric: At each course level I teach and for each problem I assign, I seek to assess your <u>content knowledge and problem solving</u> as well as the <u>justification</u> of the solution provided by you. In assigning scores to your work, I hold this image for scores based on a your overall percentage of progress toward a correct answer with sufficient justification.
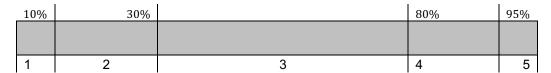
10%	30%		80%	95%
1	2	3	4	5

Image of Scores based on Percentage of Work's Correctness & Completeness

Level 5 – A correct answer. The solution is correct and the work shown is sufficient to demonstrate the answer is correct. The justification is satisfactory given your grade level (and course) and the explanation requested. Any errors or shortcomings in the correctness or completeness of the justification are so minor that in comparison with the quality of the solution, it is appropriate to ignore them.

Level 4 – Errors are minor. There is much of value in your solution and justification that merits the assessment that the solution is close to being correct and the justification appropriate. The work does include some minor errors (in the solution or the logic of the justification) or is incomplete in some way that results in the work falling short of being a completely correct answer.

Level 3 – Major errors. Some part of the solution or justification offers work that demonstrates that you have reasonable knowledge of the mathematics that needs to be used to solve the problem or to provide a justification, but at the same time the work (solution or justification) has major errors or (in the case of the justification) is missing.

Level 2 – Minimal progress in solving the problem (and justifying the answer). Answers (solution and justification) are incorrect but the work provided indicates that you have some understanding of the mathematics needed to solve the problem or explain your work. The work clearly falls short of offering evidence that "you have reasonable knowledge of the mathematics that needs to be used to solve the problem or provide a justification."

Level 1 – No mathematical work of value is included. The work provided offers no evidence that you have an understanding of the mathematical work needed to solve the problem and explain a solution. Numbers may be written or a diagram drawn, but no important part of the work is correct.

Level 0 – Problem was not attempted / is missing.

Note: Your **justification** should be consistent with the wording in the problem.

- Show all work; (No explicit explanation is needed as your work should justify your answer.)
- Show how you found your answer. Be more explicit...use words, diagrams, etc.
- How do you know this (i.e., your answer) is correct? Without a doubt use words, etc.
- Explain your reasoning. Ditto.
- Justify your answer. Ditto but start to be more formal.
- Prove that your answer is correct. Be formal whether 2-column, paragraph, flowchart.

Semester 1

WHS Diff Geometry—Semester 1—Concepts and Skills—Tentative and Subject to Change!	WHS Section	2017-18 Date
Transformations, Dilations, and Similarity Transformations		
Draw translations; draw translations in the coordinate plane.	4.1	
Draw reflections; draw reflections in the coordinate plane.	4.2	
Draw rotations; draw rotations in the coordinate plane.	4.3	
Draw dilations; draw dilations in a coordinate plane.	4.5	
Identify similarity transformations, and verify similarity after a similarity transformation.	4.6	
Chapter 4 has a summative project.		
Understand Basic Concepts, Linear Relationships, and Angle Relationships		
Identify and model points, lines, and planes.	1.1	
Measure segments.	1.2	
Introduction to postulates	1.2	
Find distance between points (include pythag perspective). Find midpoint of a segment. (Both patty paper & compass)	1.3	
Measure, classify, and use congruent angles and bisectors. (Both copy an angle and bisect an angle with compass)	1.5	
Identify and use special pairs of angles.	1.6	
Chapter 1 has a summative test.		
Logic, Inductive Reasoning, Deductive Reasoning, and Proof		
Analyze conditional statements. Write converse, inverse, and contrapositive statements.	2.1	
Use inductive reasoning, make & test conjectures, and find counter examples.	2.2	
Use deductive reasoning and laws of logic.	2.2	
Point, line, and plane postulates.	2.3	
Algebraic proofs. (Give a bank of properties; use strips of paper and then skeleton proof for 2-column)	2.4	
Feromax proofs F1-F6	Post 2.4	
Segment and angle proofs.	2.5	
Angle proofs (Give bank of postulates; strips of paper & skeleton proof for 2-column; introduce flowchart & paragraph)	2.6	
Chapter 2 has a summative test.		
"Euclid The Game" Computer Activities		
Angle Relationships with Parallel (and Perpendicular) Lines		
Identify relationships between lines or planes. Identify parallel and perpendicular lines. Name angle pairs formed by two lines and transversals.	3.1	
Use theorems to determine relationships between pairs of angles given parallel lines and transversals. (Consider using geogebra to investigate)	3.2 & 3.3	
Feromax proofs F7-F13; F24-F26 (include diagram for F13 and F24-F26)	3.2 & 3.3	
Theorems with perpendicular lines (be brief)	3.4	
Slopes & equations of parallel/perpendicular lines….review (Optional…2016-17 used Flashback Fridays)	*(3.5)*	
Chapter 3 has a summative test.		
Triangles and Congruence; Equilateral and Isosceles Triangles		
Classify triangles and find angle measures; Angle theorems (tear off "corners"; proof ext. angle thm)	5.1	
Relating side and angle measures in triangles; triangle inequality theorem	6.5b	
Congruent polygons; corresponding parts; find angle measures (possible intro to anglegs)	5.2	
Equilateral and Isosceles Triangles (anglegs)	5.4	
Prove triangles are congruent. (generic sense…an introduction)		
Use SAS and SSS to prove triangles congruent. (anglegs)	5.3 & 5.5	
Use AAS and ASA to prove triangles congruent. (anglegs)	5.6	
Feromax proofs F27-F30; F36-F37; CHALLENGE F39 (include diagram for F29 and F39)	Post 5.6	
Chapter 5 has a summative test.		
Triangle Exploration/Extension—This unit is subject to change or subject to be moved…not enough time? Move to 2nd semester		
Proof & Problem Solving after test: Using congruent triangles.	5.7	
GeoGebra exploration to investigate perpendicular bisectors (circumcenter), angle bisectors (incenter), medians (centroid), and altitudes (Start by cutting out triangle and balancing on pencil…then technology)	6.1, 6.2, 6.3	
GeoGebra exploration to investigate the midsegment of a triangle	6.4	
No formal assessment; likely a project.		
Similar Triangles (Proportional Relationships)		
Similar polygons; use scale factor to solve problems. (Connect back to dilation.)	8.1	
Prove triangles are similar. (Generic sense…an introduction)		
Use AA to prove triangles similar. (Shadow outside to determine height of flagpole/tree)	8.2	
Use SSS and SAS to prove triangles similar.	8.3	
Proportionality theorems. (Use geogebra)	8.4	
Feromax proofs F32-F35 (include diagrams for all F32-F35)		
Chapter 8 has a summative test.		

Semester 2

WHS Diff Geometry—Semester 2—Concepts and Skills—Tentative and Subject to Change!	WHS Section	2017-18 Date
Triangle Exploration/Extension—This unit is subject to change or subject to be moved…still not enough time? Subject to be cut		
Proof & Problem Solving after test: Using congruent triangles.	5.7	
GeoGebra exploration to investigate perpendicular bisectors (circumcenter), angle bisectors (incenter), medians (centroid), and altitudes (Start by cutting out triangle and balancing on pencil…then technology)	6.1, 6.2, 6.3	
GeoGebra exploration to investigate the midsegment of a triangle	6.4	
No formal assessment; likely a project.		
Special Right Triangle Properties; Right Triangle Trig		
Simplify radicals (supplement as needed)	9.0	
Use the Pythagorean theorem and its converse.	9.1	
Use properties of 30-60-90º and 45-45-90º triangles.	9.2	
Investigating similar right triangles	9.3	
Find and use trig ratios in right triangles. (Sin-Cos-Tan)	9.4 & 9.5	
Solve problems using trig (including angles of elevation and depression)	9.4 & 9.5	
Completely "solve" a right triangle	9.6	
Chapter 9 has a summative test.		
Properties of Parallelograms as well as Rectangles, Rhombi, Squares, and Trapezoids		
Quadrilateral naming and classification	7.0	
Recognize and apply properties of sides, angles, and diagonals of parallelograms	7.2	
Ways to prove a quadrilateral is a parallelogram	7.3	
(Not essential if time is limited…give brief overview if needed) Recognize and apply the properties of rectangles, squares, and rhombi as well as trapezoids and kites	7.4 & 7.5	
Feromax proofs F31; F16-F23; F38 (include diagrams for F20, F22-F23, F38)		
Chapter 7 has a summative test.		
Using Perimeter and Area Formulas of Geometric Figures and find Surface Area		
Identify and name polygons. Interior and exterior angle theorems	7.1	
Review finding area perimeter and area of triangles, parallelograms, and trapezoids (supp. materials; include trig)		
Review finding areas of rhombi and kites	11.3	
Find areas of regular polygons (use trig)	11.3	
Polyhedra; Euler's theorem; Identifying and naming 3-D figures (supp. materials in addition to 11.4)	11.4	
Describing cross sections and solids of revolution	11.4	
Chapter 11a has a summative test and the start of a project		
Surface Area and Volume		
Dan Meyer's Cabinet Sticky Note problem		
NCTM net activity (cube)		
Explore nets of three-dimensional figures. (geo-solids)		
Review the basics of finding surface area (11.0 and supp. materials)	11.0	
Find surface area of prisms, cylinders, pyramids, cones (11.7), spheres (11.8) (orange activity). (supp. materials)	(11.7; 11.8)	
Find volumes of prisms and cylinders. (geo-solids)	11.5	
Find volumes of pyramids and cones (geo-solids) (Rice)	11.6 & 11.7	
Find the volume of spheres. (Playdoh transparency activity)	11.8	
Chapter 11b has a summative test and the second part of the project		
Finding the value of circular "parts"; Angle and Segment Relationship in Circles		
Independent study (and with peers) to learn chapter 10…capstone to the course		
Identify and use part of circles; intersecting circles; tangent theorems	10.1	
Identify central angles, major and minor arcs, semicircles and their **measures**.	10.2	
Find circumference and arc **length**	11.1	
Areas of circles and sectors	11.2	
Major quiz-test A		
Use chord relationships	10.3	
Find measures of inscribed angles. Find measures of angles of inscribed polygons.	10.4	
Find measures of angles formed by lines intersecting on, inside and outside a circle.	10.5	
Find measures of segments that intersect inside and outside a circle.	10.6	
Major quiz-test B		
Write equations of circles. Graph circles on the coordinate plane.	10.7	
Minor quiz-test C		
Chapter 10 will be assessed with the "quiz-tests."		

<u>Dr. Hartman's Final "6" Comments:</u>

There are some very important things that I need to share with you regarding my life as well as your students' opportunity in my class.

1. My oldest child started 10th grade this fall at Waverly High School; my youngest started 7th grade at the middle school. While I am so excited for both of them, I am nervous like any parent. Lauren and Brianna mean the world to me! I want both to have a <u>safe</u> and <u>meaningful</u> experience each and every day. I expect nothing less than the best from their schools, the staff members that will work with them, and their fellow classmates. I know you love your children as much as I love mine. You expect the best for them at school at all times. I keep this in mind everyday.

2. WHS is still a bit new to me! I left my 20-year career in Lincoln Public Schools (including 13 years at Lincoln Southwest and a position as department chair) to invest into District 145 two years ago. While I have spent more time and energy investing into students the past two years than any previous year in my career, I loved every minute of it. It is a privilege for me to work with your student! Please continue to offer grace and patience as I continue to adjust!

3. The best way to reach me is via email: David.Hartman@District145.org. Again, I try to send out updates, kind of like a class newsletter, every week or so. I will not, however, "push" grades. I am asking you that you periodically review your student's grade on PowerSchool.

4. Some of your children are involved in a lot! Balance seems to be a challenge (and goal) for most teenagers. From sports and clubs to work and family time, keeping a healthy balance is a necessity for all of us! Being a husband, father, teacher, department chair, student council co-sponsor, quiz bowl sponsor, and NWU statistics instructor, I also struggle with balance every week. I understand when your child feels a bit overwhelmed during various times of a course.

5. My **WEBSITE**: drdhartman.com I usually post assignments daily. This is helpful for students, especially when they miss class. My website also gives you the opportunity to know what we are doing in class. I encourage you to take the time to bookmark my website; also spend some time getting to know more about my personal and professional background.

6. Videos: I use my iPad from time-to-time to create "help" videos. My goal is to have a help video for every review assignment handed out. I go through each and every problem on the review…sometimes I even offer more than one approach. There are times I create a "help" video for a concept that students struggle with. There are also times that I create a "lesson" video, created during the time I am actually teaching. I have made these in the past when large numbers of students are absent or the content is just of that "critical" type. These videos have helped so many students in the past. Students will find the links to my videos on the assignment log on the website. (There are even times when a student emails me…asking for help…I use my iPad to create a video that I can send back to that student within a matter of minutes!)

Thank-you for taking the time to read this,

Dr. Hartman