

Beyond the Grade

An examination of why we grade and how to implement a grade-less program in a secondary mathematics classroom

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Beyond the Grade: For Teachers

There are conversations in schools, classrooms, hallways and staff rooms that are worrisome regarding our current state of mathematics.

- “I have a 90% in math, so I know what I am talking about, well I have a 57% and I don’t care because I don’t even try”
- “What kind of math student is Andrew? He has a 62%”
- “What is Ms. S like as a teacher, she gave me an 80% so pretty good”

These three statements reduce our students to numbers. Students define their mathematics knowledge ironically in terms of numbers and use the numbers to have power over each other. The reduction of students and teachers to numbers leaves several to question: what do grades really reflect; what is the purpose of grading; and is there another way to provide communication of learning without the damaging effects of grades?

What has been found is that grading (marks throughout the term) create an environment that is unsupported and stifles learning (Stiggins, 2007). The intense competition for grades creates a negative environment for students. To stop the damaging effects of grading, the focus needs to be returned to a form of communication to students as to how they are doing in relation themselves and the outcomes prescribed in the Saskatchewan curriculum, the WNCP principles and in relation to the NCTM standards. A solution must allow student to engage critically in learning while still communicating to students, parents and the Ministry of Education about the student’s abilities.

When there is no grade, only feedback, a student is willing to make changes and explore new ideas (Lipnevich and Smith, 2009). If we want to focus on learning, grading inhibits this process. It is the feedback and the focus on learning that allows students to enjoy and become involved in their mathematics. According to Hattie and Timperley (2007), feedback must be specific, meaningful, and link the student's current understandings to their goals. Specific feedback assists the individual student in moving forward to meet or exceed a specific outcome and to promote learning. Feedback occurs between teacher and student only, whereas communication may involve others (E.g. parents, caregivers, administration, or ministry). The goal of communication is to merely inform a student or other parties about the student's status on an assignment, activity, test or course.

In order to provide suitable feedback, teachers need to provide activities and projects that will allow students to demonstrate their learning, to meet their goals, and to be pushed further beyond their goals (NCTM, 1995). Beyond a student's goal, there needs to be a move to developing an understanding and critical examination of mathematics. It is not only important for students to achieve outcomes but for students to reflect on their own learning (Saskatchewan Curriculum, 2011). When students are involved in the grading process, it allows for the students to be truly reflective of their learning and to question their understanding in regards to the outcomes (Kohn, 1993). This process is not only an excellent learning experience, but it allows students to take ownership of their learning. A mutually allocated grade allows teachers to step back and focus on the student's education rather than taking the role of the giver and taker of marks.

Beyond the Grade: Literature Review

It is only by trying that such things can be found out. To refuse to try, to stick blindly to tradition, because the search for truth involves experimentation in the region of the unknown, is to refuse the only step which can introduce rational conviction to education

- John Dewey (2001)

Introduction

There are conversations in schools, classrooms, hallways and staff rooms that are worrisome regarding our current state of mathematics.

- “I have a 90% in math, so I know what I am talking about, well I have a 57% and I don’t care because I don’t even try”
- “What kind of math student is Andrew? He has a 62%”
- “What is Ms. S like as a teacher, she gave me an 80% so pretty good”

These statements reduce our students to numbers. Students define their mathematics knowledge ironically in terms of numbers and use the numbers to have power over each other. The discussion between the two students is not over a math question or math content, rather it is the use of percents to equivocate power. What did these grades actually tell about the students’ ability to think critically about mathematics?

Teachers are also defining students by numbers. There is no description as to their strengths, weaknesses, personality, or interests; rather, a number which is intended to communicate *something* about the students. Can one’s knowledge and ability in mathematics be reduced to a single number?

In the final dialogue, listed above, there is an assumption that grades are given and taken away by teachers. To the student, the grade seemed arbitrary and had been placed on the student, as opposed to something she achieved or earned. That student did not associate that grade to be a reflection of her understanding. Rather, their grade reflected the teacher's ability. The grade represented a measure of how well the teacher taught the content in question. Why is the student not seeing the mark as something she has earned?

The reduction of students and teachers to numbers leaves several to question: what do grades really reflect? What is the purpose of grading? And is there another way to provide communication of learning without the damaging effects of grades? These questions will be the focus of this program. This will renew several reasons (e.g. control, sorting of students and communication) grading began and continues on today.

Grades have continued because in part many teachers do not question why they grade and they believe that it is a form of communication to the students regarding where they stand in the course. With a grade, the idea of communication is lost when a grade is formed by a mixture (averaging) of work completed by students in September, less desirable behaviors a student possess, and a relational quality of how students do against one another. The focus needs to be returned to a form of communication to students concerning how they are doing in relation to: themselves and the outcomes prescribed in the Saskatchewan curriculum, the WNCP principles and in relation to the NCTM standards.

When grading becomes a mixture of subjective judgments to compare students, there will likely be negative effects associated with grading, such as competition, math

anxiety, and a loss of intrinsic motivation for students (Kohn, 1992). The solution is to have a system where students are compared to themselves and how well they are meeting their outcomes. This system must employ feedback, outcome reference standards and, finally, a mutually allocated grade. Worthy of note, the features mentioned above are already identified as structures of the current mathematics education system, according to Saskatchewan Curriculum. As such, the concept of not grading and the process by which to assess the meeting of outcomes should not be a great leap for current teachers.

Why We Grade

Grading has become so ingrained in our education system that its removal seems uncharacteristic. But before one can ask how to remove grades or why we should remove grades, there first needs to be an examination of the reason for grading. There will be a focus on three main reasons: control, sorting students, and a form of communication. Conventionally, teachers grade; grading students has been used for over 200 years, so how can a system begin to understand the removal of something so engrained. However, a reason to continue to do something out of convention is not a valid reason. Change happens because traditions are and should be questioned.

One of the first implementations for grading was to control students (Kohn, 1993). When skills and procedures (e.g. long division, solving algebraic equations, proofs, and others) are taught, it is not perhaps all that interesting; thus, a punishment and reward system had to be established to maintain control of the students learning mundane skills and that system has been most successful is grading. However, according to Kohn (1993) when we use grading to impose control we require more and more rewards and

punishments to maintain that status quo. Grading becomes an endless process, resulting in a system that seems impossible to remove grades from.

Teachers need to grade to control or reward students for their performance in the classroom, thus students lose their intrinsic motivation for learning. When students lose their intrinsic motivation to learn and become dependent on rewards or punishments, those punishments or rewards have to continue in order to have students under control or interested in the content. Thus if one was to remove these rewards or punishments without changing the system, students would cease to be motivated as the extrinsic motivation has been removed, resulting in chaos. Therefore, the current cycle of grading becomes very hard to break.

Grades are not only used in secondary schools for controlling students, but grades are also used as a method of sorting students before they enter post-secondary institutions. Grading allows an easy method for post-secondary institutions to allow or not allow students entrance to their programs. It is the ranking system that creates winners and losers in our system that inhibits learning and focuses on only the competition of grades (Stiggins, 2007). Students become so caught up in outperforming their classmate, it becomes only about the competition and the learning takes a backseat. The students do not even care about the content itself or how well they understand the outcome. The spotlight moves to getting the best grade. It is not to say that students will never have to compete for entrance into post-secondary institutions, but primary and secondary institutions do not have to create this competition in their daily classrooms.

The last reason rearing the importance of grading to education is that grades provide communication to students in terms of how they are doing and how they may

improve. However, a grade should only ever be given at the end of an evaluation after learning has taken place (Davies, 2003). Thus, a grade should never be used, as a form of communication for learning. When we stamp and rank student, we inhibit learning and promote competition.

The Reason for Removal of Grades

The majority of teachers that do grade use averages. Teachers often use averages of grades taken from assessments over the entire course, including grades that are no longer accurate (meaning the students have later gained understanding of the objective). As well, the teacher will include behavior grades (E.g. lates, poor attendance, plagiarism, etc.). A grade, if one so chooses to use them, should be a reflection of what a student has achieved over the course in terms of meeting outcomes.

Lipnevich and Smith (2009) found that when a student receives both grades and feedback, the student was less likely to fix or improve any aspect of their assignment relating to the feedback they receive they were concerned that they would receive a lower mark. However, when there is no grade, only feedback, a student is willing to make changes and explore new ideas. In other words, if we want to focus on learning, grading inhibits this process. It is the feedback and the focus on learning that allows students to enjoy and become involved in their mathematics.

According to Hattie and Timperley (2007), feedback must be specific, meaningful, and link the student's current understandings to their goals. Specific feedback assists the individual student in moving forward to meet or exceed a specific outcome. Different from communication, which merely informs a student about their status on an assignment, activity, or project, feedback promotes learning and

improvement related to a specific outcome or task. When there is focus on grades (rewards/punishments), the enjoyment for the quest of knowledge is lost and is replaced with a strong competition for the best grade (Stiggins, 2007). It is this competition for grades where the enjoyment for learning is lost (Kohn, 1992), even to a point where there is a loss of focus on how each individual student is progressing on their own. The focus is on the race of who is falling behind and who is racing ahead of (Lockhart, 2008). We need to remember the goal of assessments, which is to promote learning and that is only achieved through feedback as grading inhibits that goal.

This competition leaves students in a mindset of “trying not to fail” as opposed to “trying to succeed” (Kohn, 1993). The students are preoccupied with trying not to fail the test, the assignment, or the course. This state of mind may leave students with *math anxiety*: “a feeling of anxiety, dread, nervousness, and associated bodily symptoms related to doing mathematics ... or fear regarding ‘future math-related activities’” (Gundy et al. 2006, p. 372). Math anxiety has become so common that there is a definition for it, where there is no definition for “art anxiety” (Bennett, 2012). Math anxiety is a real problem in many students, and teachers need to find methods to alleviate this anxiety towards mathematics.

Boaler et al. (2000) found when students learned how to participate cooperatively in a classroom, they became less anxious about mathematics. When students are less anxious, they are more willing to try new ideas and projects. This allows the student to become engaged in learning. In this cooperative environment, students build their sense of identity in math (Boaler et al., 2000). To Boaler et al. (2000), identity is composed of three major components: belonging to a group, a sense of achievement within that

specific group, and particular behaviors associated with being part of that specific group. To have a positive identity in math, a student needs to be a part of a group (belonging) that solves math problems with success (sense of achievement) by having the tools to solve them as a part of a group or individually (particular behaviors). However, a positive math identity cannot form when students are always under a magnifying glass being sorted and classified into their prescribed group. It is the student's identity in math that allows them to increase their confidence in math, decrease their math anxiety, and reach their full potential in mathematics.

What to Use Instead of Grades?

As discussed, the competition for grades is a negative environment for students. It creates an environment that is unsupported and stifles learning (Stiggins, 2007). A solution, then, must allow students to engage critically in learning while still communicating to students, parents and the ministry about the student's abilities. There are many key areas involved in this solution namely: effective feedback and communication, rich activities, outcome referenced standards, and mutually allocated grades.

The most critical thing to note is that students will recognize how they are performing in comparison to the outcomes and personal goals with effective communication and feedback (Stiggins, 2007). When we grade with a number or a letter, there is a comparison to the other students in the class which creates negativity and moves the focus from learning to how to get a better grade (Kohn, 1992). We need to refocus on the student and what the student can do in relation to the prescribed outcomes.

When we move to a framework that focuses on a comparison to the outcomes and individual goals, the learning trajectory becomes clear.

The method is through feedback, where teachers have conversations with students regarding criteria, standards and personal goals (Davies, 2010). As mentioned earlier, feedback is different from communication, as it allows for students to explore the possibility to attain a deep understanding and to promote learning (Davies, 2010). Whereas, communication is merely a conversation regarding how well or poorly an individual is currently performing; feedback focuses on pushing the student to improve his level of understanding. When feedback is related to specific outcomes and goals for the individual student is employed, learning is engaged and excited.

In order to provide suitable feedback, teachers need to provide activities and projects that will allow students to demonstrate their learning, to meet their goals, and to be pushed further beyond their goals (NCTM, 1995). Beyond a student's goal, there needs to be a move to developing an understanding and critical examination of mathematics. It is not only important for students to achieve outcomes but for students to reflect on their own learning (Saskatchewan Curriculum, 2011). And beyond students reflecting on their own learning, students need to relate their learning to other aspects of their life. In the inquiry method the lead comes from the student (Perressini et al, 2004). When a student is posed an open inquiry question, the rest of the learning is lead from the student. It is then, the teacher's role to find tasks with mathematical possibility and is connected to the child's world (Ball, 1993). It is the relationship between teacher and student that frames the understanding of the mathematics. It is the trust that is formed and

the cooperation from both parties that creates the understanding and the construction of the mathematical knowledge.

With a focus on outcomes and the different ways that each student can demonstrate the achievement of that outcome (e.g. conversations, video, test, or building a model), teachers can begin to shift the power to students. The goal for teachers is seeing that all students can be successful and excited about their learning. Allowing students to have power over their learning and to demonstrate learning is only effective when teachers, administrators and the ministry realize that equal learning does not always mean the same.

Current Mandates

Unfortunately, the ministry of education in the government of Saskatchewan still makes it mandatory that teachers submit grades for all students in grades 10 through 12. The final grade however, can come from a discussion between the teacher and the student being a mutually allocated grade based on an outcome (Saskatchewan Curriculum, 2011). It is not mandated that the grade provided must be a decision based solely on the opinion of the teacher. It is not a new idea to have students have input in their final grade, as the grade is a reflection of their mathematics understanding in relation to the outcomes and their personal goals (Saskatchewan Curriculum). When students are involved in the grading process, it allows for the students to be truly reflective of their learning and to question their understanding in regards to the outcomes (Kohn, 1993). This process is not only an excellent learning experience, but it allows students to take ownership of their learning. A mutually allocated grade allows teachers to step back and focus on the student's education rather than taking the role of the giver and taker of marks.

Goal of Teaching

According to Dewey (1952), “education is a fostering, a nurturing, a cultivating process – a condition of growth” (p. 10). Growth is what is key; a teacher’s job is to foster students to grow and learn and to help with the process. Whitehead (1967) states that “education is to stimulate and guide their self-development” (p. 192). Both prominent figures of education (Dewey and Whitehead) make the argument that education is to help students meet their greatest potential. Further, education is a process and not an end. Therefore, to grade a process seems absurd when we are always learning, teaching and engaging in experiences (education). From this perspective grading is not an accurate representation of the task of continual learning.

Our governing organizations of mathematics education is the National Council for the Teachers of Mathematics (NCTM), the Western and Northern Canadian Protocol (WNCP) and in Saskatchewan the Ministry of Education. The NCTM is a public voice on mathematics education to promote the highest quality of education of mathematics. It is the NCTM that guides the WNCP in terms of standards and curriculum. The WNCP is a partnership between the western provinces and the territories to have a united curriculum. Finally the WNCP directs the government of Saskatchewan’s Ministry of Education to determine the specific outcomes and goals for students in mathematics. The Saskatchewan Curriculum has defined its goal of teaching and the purpose of education.

“To have students develop the understanding and abilities necessary to be confident and competent in thinking and working mathematically in their daily activities, ongoing learning, and work experience. The K-12 mathematics program is intended to stimulate the spirit of inquiry within the context of mathematical thinking and reasoning“ (p. 8)

It is the goal of the ministry to have students be lifelong learners of mathematics

In terms of the NCTM, the goals for students are articulated as follows:

“Five goals for all students: (1) that they learn to value mathematics, (2) that they become confident in their ability to do mathematics, (3) that they become mathematical problem solvers, (4) that they learn to communicate mathematically, and (5) that they learn to reason mathematically” (NCTM, 2011)

Worthy of note, all three governing bodies of mathematics have focus on inquiry, mathematically reasoning, and ongoing learning in mathematics. Further, all these goals are possible *with the removal of grades* and a move to activities and assessments that allow students to demonstrate understanding and to explore critical thought. These goals are achievable by allowing students to take chances in solving problems or to come up with their own ideas. Allowing students to debate math concepts and attempt to solve complex problems that the students develop within their own interests. Most of all this requires a mathematics classrooms that our students will engage in, and allows students to fully actualize their mathematics identity and possibly exceed prescribed outcomes.

Teachers can start the revolution from grades to grade-less for students. This transformation requires teachers to continually reflect on their practice. Through continuous reflection on the profession to be better teachers, teachers can begin to examine and ask the questions as to why teachers perform the practices they currently enforce (Kilpatrick, 1997). Teachers can reflect and move to a system that encourages students to value their learning (Marsh, et al. 2000), to seek out new possibilities, to engage learning, and to promote a love of mathematics. Without asking questions and reflecting, change is not possible. Individual teachers can drive change and make a

difference, by reminding the students and all individuals that “Mathematics is an art” (Lockhart, p. 3, 2008) and an art worth exploring.

Beyond the Grade: Process to Program Implementation

Introduction

The remainder of this program will be spent describing one method to implement a grade-less program into a secondary school environment. It will include processes that worked regarding: how to approach administration, parents, and students, examples of assessments, feedback, rubrics, report cards, and a variety of other aspects that will help make other implementations seamless for teachers. There is also a section of black line masters of rubrics, conferencing notes, notes home, as well as a section called question and answer of responses that I have had in regards to questions teachers, parents, students, and the public has had relating to a grade-less program. It is the hope that these program aspects will give you an idea of what a grade-less program looks like and to help iron out some of the obstacle that I have already dealt with. I would like to reinforce that it is not the only way to approach a grade-less program, but it has been an approach that gave me great success. My hope is that you read it and perhaps try some of it or all of it to move in the pathway of becoming grade-less with a focus on learning and engaging in mathematics.

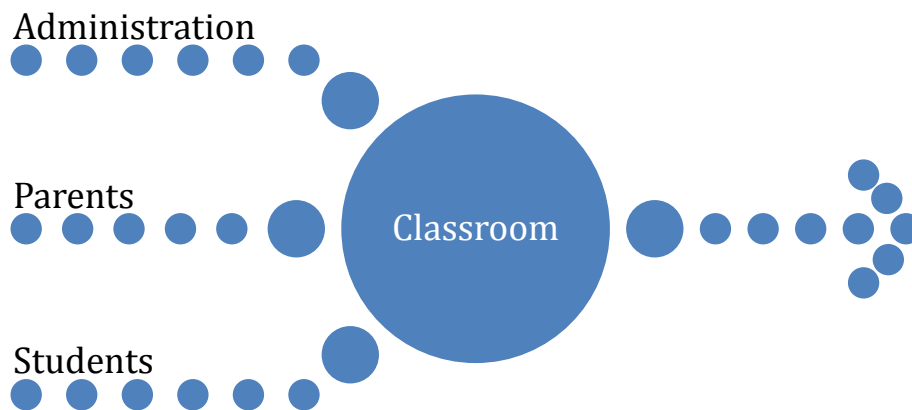


Figure 1a: flow chart demonstrating the three key areas that influence the grade-less classroom

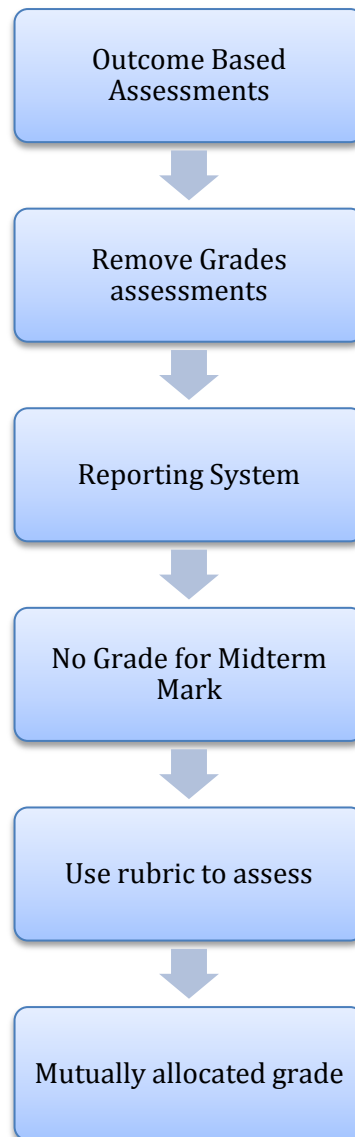
Administration

Figure 1b: flow chart showing the sequence of events involving administration

This section is devoted to how to start a grade-less program, which begins with an interest in becoming grade-less and reading the background information relating to a grade-less program. Once that footwork has been completed the next step is to get ready

to approach administration in the form of your principal or superintendent. This section will look at all portions of this program that involve administration along the way.

Pre-Administration

The first step, even before approaching administration, is to begin by adding feedback to assessments along with your graded papers. Figure 1.c. is an example of feedback that may be used on student work.

You need to pay close attention to your units. You often forget them at the end and throughout your calculations. If you kept your units throughout the operations would make sense and you would not need to apply the units at the end - as they would cross off. Crossing off units is also a method of checking your answer - as when you are finished (crossing off units) the unit you are left with (if correct) will be assurance that you performed the calculation correctly.

Figure 1.c: What student feedback could look like

There still are checkmarks plus there is feedback to push students beyond the outcome or to help them meet the intended curriculum outcome. This addition of feedback starts to become the focus for students, creating less emphasis on the grade in the classroom.

Another step before speaking with administration is to include the outcome and indicator beside each question on the assessment of the student (figure 1.d).

Chapter 4 Unit Test Name: _____

Part 1: Copy and Complete the Table (10.2.d, 10.2.e, 10.2.f, 10.2.m, 10.2.n)

Question	Decimal Form	Entire Radical	Mixed Radical	Exponential Form
1				$2^{\frac{1}{3}}$
2		$\sqrt[3]{16}$		
3			$3\sqrt{3}$	
4				$16^{-\frac{3}{4}}$
5			$4\sqrt[3]{5}$	
6		$\sqrt[4]{192}$		

Part 2: Short Answer

1. For the following determine if they are irrational or rational, and then order them from smallest to largest. (10.2.a, 10.2.d)

- a. $\sqrt[4]{81}$
- b. $\sqrt[2]{27}$
- c. 2
- d. $\sqrt[3]{16}$
- e. $(32)^{\frac{1}{5}}$
- f. $\sqrt{36}$

2. Simplify the following using only positive exponents (10.2.i, 10.2.k)

- a. $(p^{-2}p^{-1})^2(pq^{\frac{1}{2}})^2$

Indicators for grade 10 foundations and pre-calculus, so students are aware of which indicators are fulfilled by each question.

Figure 1.d: A mathematics 10 foundations and pre-calculus test with the indicators.

This step demonstrates the teacher’s focus on curricular outcomes and demonstrating the focus to learning and to assist students in meeting those specific outcomes. This step also shows how your assessments are varied in types of questions (E.g. Bloom’s Taxonomy) with the allowance for all students to be successful at some aspect of the assessment as well as allowing those students to push beyond and exceed outcomes in complex questions that involved higher thought processes.



New Version

Figure 1.e new version of Bloom’s Taxonomy

(http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm)

The final step prior to approaching administration is to start to assess students using a report card rubric (figure 1.f.).

Math 20 Foundations Rubric			Name:
Project:			
FM20.1 Demonstrate understanding of the mathematics involved in an historical event or an area of interest.			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can interpret the data using statistical method (if applicable). Can identify an controversial issues and present multiple sides of the issue with supporting data. Can organize and create a presentation of findings and conclusions of exceptional standards	Can develop a rubric for assessment of the research and presentation. Can collect primary and secondary data related to the topic. Can assess the accuracy, reliably and relevance of the data. Can organize and create a presentation of findings and conclusions	Can develop a rubric for assessment of the research and presentation with assistance. Can collect primary and secondary data related to the topic. Can organize and create a presentation of findings and conclusions with assistance or missing aspects	Can collect primary and secondary data related to the topic
Comment:			
Unit 1: Inductive and Deductive Reasoning			
FM20.2 Demonstrate understanding of inductive and deductive reasoning including: • analyzing conjectures • analyzing spatial puzzles and games • providing conjectures • solving problems. Note: It is intended that: • proofs NOT be limited to the two column proof style • analysis and conjectures related to spatial puzzles and games be incorporated throughout the course.			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can prove algebraic number relationships using deductive reasoning. Can prove conjectures using deductive reasoning. Can analyse an rgument for its validity. Can identify errors in proofs that lead to incorrect conclusions. Can solve situational problems involving reasoning. Can create a variation on a game or a strategy to win	Can make conjectures by observing patterns and identifying properties and justify the reasoning. Can provide examples of how inductive reasoning may lead to false conclusions. Can identify situations that involve inductive and deductive reasoning. Can explain strategies for winning a game	Can make conjectures by observing patterns and identifying properties and justify the reasoning. Can identify situations that involve inductive and deductive reasoning	Can identify situations that involve inductive and deductive reasoning
Comment:			

Figure 1.f. An example of my mathematics 20 foundations report card rubric.

This rubric along with the grade shows a clear link to curricular outcomes and indicators. As well, it demonstrates how a grade can be replaced with descriptions of indicators in a way to meet, exceed or approach outcomes. This step will help students as well as administrators how moving to a grade-less program can be seamless.

Administration

It is these beginning portions that will build the teacher's case for the removal of grades from formative assessments. Now with the evidence that there is effective feedback, evidence of learning, link to the curriculum and an effective method to communicate learning, one may approach administration through a conversation or a meeting. This meeting should be kept light with the goal to not include a grade on the midterm report card. Instead to include the report card rubric with comments to communicate to parents/guardians their child's level of success or places for improvement. This goal, no mark on midterm report card, should not be difficult to attain, as school divisions or the ministry of education does not mandate a midterm grade. A midterm grade has just been customary, but not required.

Post-Administration Contact

The next step is to demonstrate to administration, over the next few months, how the report card rubric will be transferred into a final grade and to have the discussion of mutually allocated grade. During this one conversation or several interactions the teacher will want to reiterate that the Saskatchewan Curriculum issued by the Ministry of Education is a supporter of mutually allocated grades between teachers and students. The mutually allocated grade can take on many forms, for the most part they will include a conversation with the student where the student will provide their evidence of learning

through a portfolio and the teacher will bring report card rubrics and assessments to mutually agree to a grade that will represent the student's achievement of outcomes over the course of the study in a particular subject. And, this mutually allocated grade, will be the final grade submitted to administration, the division, and the ministry of education all of which is mandated by the ministry of education.

Parents

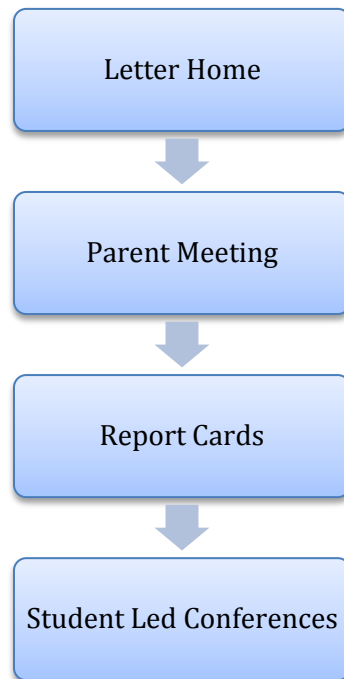


Figure 2.a: Flow chart regarding the communication in relation to parents

This section is devoted to parents, in terms of communication, informing, alleviating concerns, and decoding report cards. Communication towards parents/guardians should begin at the start of the semester, with a letter (figure 2.b)

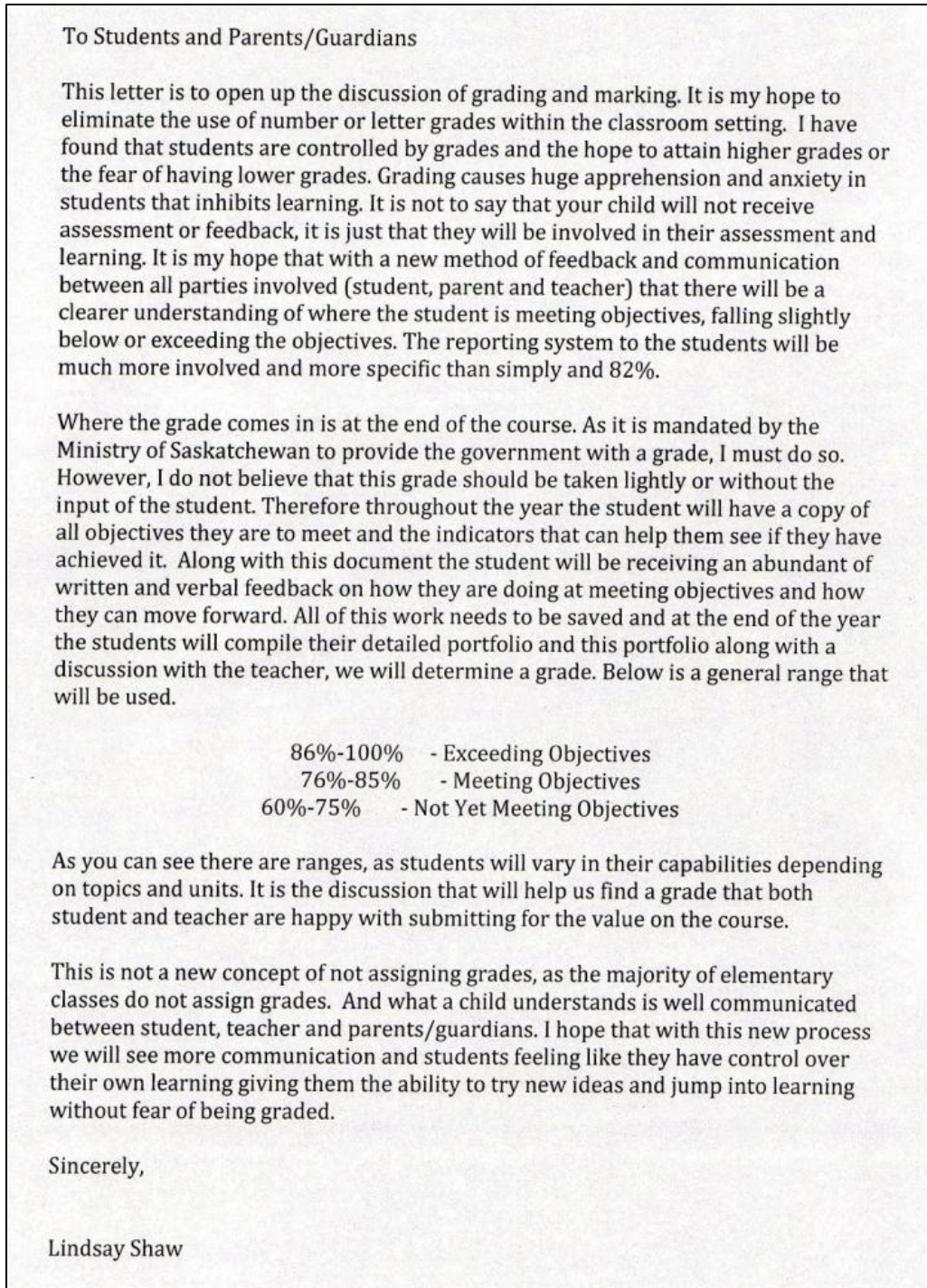


Figure 2.b: A copy of the letter to parents/guardians/students

This letter is an information letter regarding the changes to the report card, the new method of determining marks, and the introduction of student led conferences. The

intention of this letter is to open up the discussion regarding grade-less. Following the letter about half way through the first term (about a month in) I hold an information session for parents and students to attend. The session is intended for parents to ask questions, if they have any, regarding the process. At this time I share with them examples of student work, assessment rubrics, assignment checklists, and portfolio forms. These examples are to demonstrate to the parents how the process still involves assessment, just more feedback and descriptors to encourage deeper thought and engagement with the outcome.

The first form of communication towards parents, regarding their child's progress, usually is in the form of a report card. And in grade-less this is the same as well, the only difference is that instead of seeing an 82%, the parents will receive a rubric for each course that their child takes with me showing the student's achievements of outcomes and comments to both the student and parent as to where they did well and where they could push further. I find that parents really like having detailed description as to what their child can do well, specific areas where they could improve, and how they can push further.

Conferences

One new aspect that I included for my students was the introduction of student led conferences. Student led conferences differ from parent teacher conferences, as the students have the opportunity to share with their parents their successes and their places of improvement. This is also the opportunity to discuss the student's goals for the remainder of the course/year with the parents present. It is an excellent experience for

student to take the lead over their learning. I feel it is important to have parents involved in their child's learning and to keep the lines of communication open.

Students

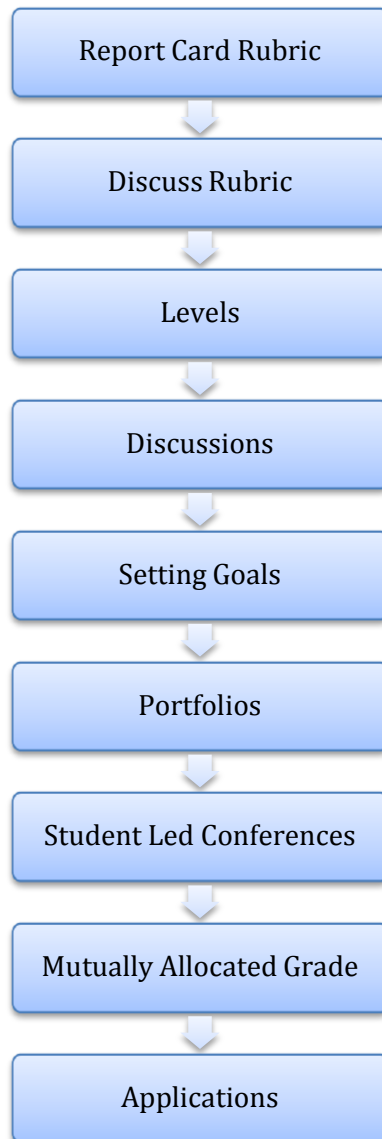
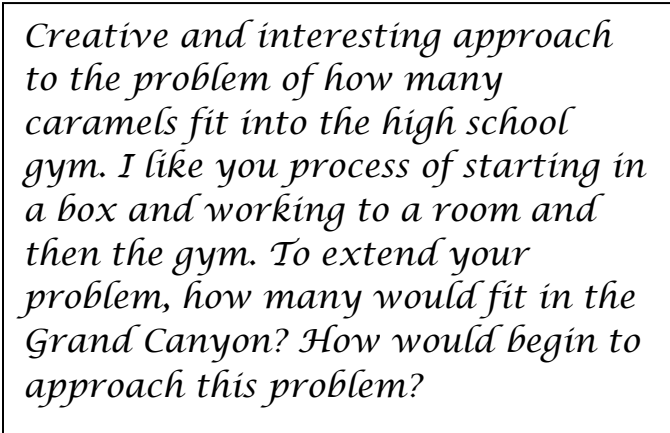


Figure 3.a: Flow chart focusing on the student aspects of a grade-less program

The communication between student and teacher is much more involved with a grade-less program. For my students the communication begins with a discussion of grades and what they mean. The purpose of this discussion is to allow students have a voice regarding grades, assessments, report cards, conferences, and mutually allocated grades. We discuss all aspects that will be new to them and other aspects that they have been surrounded by since grade school. It is during this discussion that I give them a copy of their report card rubric so they can see the outcomes, indicators, and the descriptions to exceed outcomes, meet outcomes, and to approach outcomes. It is left open for students to come and see me to ask questions during class or during breaks.

Once students understand their meeting of outcomes it is reinforced through feedback. The students received feedback (figure 3.b), in the form of written and verbal, on assignments, in the classroom, on tests, projects, etc.



Creative and interesting approach to the problem of how many caramels fit into the high school gym. I like you process of starting in a box and working to a room and then the gym. To extend your problem, how many would fit in the Grand Canyon? How would begin to approach this problem?

Figure 3.b: General feedback for students

Students are always pushed further to think about where they could improve or dig deeper, and they always have the opportunity to demonstrate that growth.

Approximately a month into class students perform a self-assessment (figure 3.c) assessing their strengths, places of improvement and possible goal(s) for the rest of the course.

Student <u>Julie</u> Term <u>3</u>	
Subject <u>Math 10 foundations</u> Date <u>March 23, 2012</u>	
Strengths/Accomplishments <ul style="list-style-type: none"> • I write well • Good at trigonometry • I get my assignments done on time • Work well independently 	Work Samples to show <ul style="list-style-type: none"> • Project on how many Caramels can fit in the gym • My daily work assignments
Areas needing improvement <ul style="list-style-type: none"> • Need to work on working in groups • Need to ask for help when I need it 	A goal for next term <ul style="list-style-type: none"> • Ask Ms. Shaw and others for help when I need it

Figure 3.c: An example of what a grade 10 student's self-assessment might look like (adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.)

These goals can be subject specific or school general. These goals are handed into me so I can focus students learning in the path of their goal, so I keep students on track and finally I keep them on file so we can discuss them further at student led conferences with their parents. It is also at this time that students begin adding to their portfolios. The student's portfolio is to demonstrate their work focused in some areas and student

decided in others (figure 3.d). Their portfolio is merely a tool to help stream the conversations (goal setting, mutually allocated grade, and student led conferences) and to focus both teacher and student in relation to the outcomes and goals.

Subject: Math 9

Name: Betty

Select Samples the show...	Your Sample
<input type="checkbox"/> a strength <ul style="list-style-type: none"> Applying math to the real world 	<ul style="list-style-type: none"> Designing a floor plan for my room (used scales with objects in my room)
<input type="checkbox"/> improvement <ul style="list-style-type: none"> Showing my work 	<ul style="list-style-type: none"> Corrections to my tests are much improved
<input type="checkbox"/> successful collaboration <ul style="list-style-type: none"> Work well in groups with others 	<ul style="list-style-type: none"> Fitness project – survey, questionnaire, experiment, etc.
<input type="checkbox"/> originality <ul style="list-style-type: none"> Art – symmetry flags 	<ul style="list-style-type: none"> Geometry flags (needed to have line symmetry and rotational symmetry)
<input type="checkbox"/> other <ul style="list-style-type: none"> Looking at linear relations and science 	<ul style="list-style-type: none"> Looked at velocity, displacement, etc. with our cars we made and graphed the numbers we got

Figure 3.d: An example of what a table of contents for a grade 9's portfolio for mathematics might look like (adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.)

Instead of a grade at report card time, students will receive their report card rubric indicating where they are meeting, exceeding or approaching outcomes in each course. Along with the rubric there are also comments added to give a full picture of the student's ability and areas of improvement specific to the outcome. The report card rubric (figure 1.d) along with the portfolios and goals will be used as the focus for their students led conferences that take place right after the reports cards have been given out.

Student Led Conferences:

Students led conferences, as the name indicates, are led completely by the student. The goal is to have the students explain their learning in the course, as well to inform parents of their goals for the course. It is my job to make notes (figure. 3.e) and to question as to how I can help the students in any way.

Teacher Summary Sheet – Conferences	
Student : <u>John</u>	Term: <u>3</u>
Subject: <u>Math 20 Foundations</u>	Date : <u>March 28, 2012</u>
Areas of Strengths <ul style="list-style-type: none"> • <i>Applying the sine and cosine laws</i> • <i>Applying formulas</i> • <i>Using pictures to show understanding</i> 	Areas needing improvement <ul style="list-style-type: none"> • <i>Deductive and inductive reasoning and understanding the difference</i> • <i>Applying reasoning skills with use of algebra</i>
Possible Goal(s) <ul style="list-style-type: none"> • <i>Use reasoning skills in all areas of math</i> • <i>Break down the problems on my own</i> 	Additional Notes <ul style="list-style-type: none"> • <i>Give feedback in the way of reasoning skills - to help guide problem solving skills</i> • <i>Stop at table regularly to assist with breaking down problems</i>

Figure 3.e: An example of what a summary sheet with students might look like (adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.)

The students led conferences are necessary to the students learning and growth in the course, it also allows them to take ownership of their learning.

Mutually Allocated Grade:

The final component of student's interactions of a grade-less course is a mutually allocated grade. This is a conference that takes place between the teacher and the students. The student brings their completed portfolio and is prepared to discuss a grade at the completion of learning in the specific course (figure 3.d). The job of the teacher is to bring a completed report card rubric as well as the ranges of marks (figure 3.f and 3.g).

Unit 1: Unit Pricing and Currency Exchange

WA10.10 Apply proportional reasoning to solve problems involving unit pricing and currency exchange			
<i>About a 65% in this unit.</i>			
Objective	Objective Met	Approaching Objective	Not Met
Can create and solve problems involving best buy and sales. Can use proportional reasoning to compare products. Can develop and use strategies to convert currency.	Can create and solve problems involving best buy and sales. Can determine unit prices in order to compare products. Can easily convert currency.	Can determine best buy and sales and unit prices, but has difficulty when converting currency.	Can determine best buy most of the time, but cannot perform unit pricing or currency conversion

Comment: *You have demonstrated the understanding of sales and unit pricing; however you struggle at times with converting currency*

Unit 2: Earning an Income

WA10.11 Demonstrate understanding of income including: - Wages, salary, contracts, commissions, piecework, self-employment			
<i>Around an 80% in this unit.</i>			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can describe the different methods to earn an income, and can read and interpret information off of a pay stub. You can also effectively determine CPP, EI and provincial and federal income tax for a given claim code. And you can research and create situational questions relating to income (project)	Can describe the different methods to earn an income, and can read and interpret information off of a pay stub. Can research a situation relating to income, but occasionally stumbles when calculating CPP, EI and income taxes	Can describe the different methods to earn an income. However you have difficulty interpreting a pay stub and difficulties determining CPP, EI and Income taxes.	Can understand the different methods to earn an income and can read a pay stub to gather minimal information.

Comment: *You are able to easily read and interpret a pay stub and you have a clear understanding of pay deductions. You need to think beyond prescribed content and explore new methods of earning an income to become exceeding*

Figure 3.f: An example of my math 10 WA card rubric and the comments and grading process might look like

Grading Criteria	
90-100 Exceptional	<p>A superior performance with consistent strong evidence of</p> <ul style="list-style-type: none"> ▸ a comprehensive, incisive grasp of the subject matter; ▸ an ability to make insightful critical evaluation of the material given; ▸ an exceptional capacity for original, creative and/or logical thinking; ▸ an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.
80-90 Excellent	<p>An excellent performance with strong evidence of</p> <ul style="list-style-type: none"> ▸ a comprehensive grasp of the subject matter; ▸ an ability to make sound critical evaluation of the material given; ▸ a very good capacity for original, creative and/or logical thinking; ▸ an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.
70-79 Good	<p>A good performance with evidence of</p> <ul style="list-style-type: none"> ▸ a substantial knowledge of the subject matter; ▸ a good understanding of the relevant issues ▸ some capacity for original, creative and/or logical thinking; ▸ a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.
60-69 Satisfactory	<p>A generally satisfactory and intellectually adequate performance with evidence of</p> <ul style="list-style-type: none"> ▸ an acceptable basic grasp of the subject material; ▸ a fair understanding of the relevant issues; ▸ an ability to develop solutions to moderately difficult problems related to the subject material; ▸ a moderate ability to examine the material in a critical and analytical manner.
50-59 Minimal Pass	<p>A barely acceptable performance with evidence of</p> <ul style="list-style-type: none"> ▸ a familiarity with the subject material; ▸ some evidence that analytical skills have been developed; ▸ some understanding of relevant issues; ▸ attempts to solve moderately difficult problems and to examine the material in a critical and analytical manner which are only partially successful.
<50 Failure	<p>An unacceptable performance</p>

Figure 3.g: Grading criteria used to help the student and teacher set the final grade for the course (Adapted from: <http://students.usask.ca/current/academics/grades/grading-system.php>)

At the completion of the discussion both teacher and student should approve and feel comfortable with the grade submitted to the school and Ministry of Education.

The work listed above seems daunting at the onset of idea, but the work is not more than we already put into our students. The only addition is a discussion with our students to mutually agree to a grade, all other aspects we already do to some degree with our students. What I have found is that the payoff on my students' learning is more than I initially expected when making the move to grade-less. I have found that students want to continue to learn and make alterations to assignments until learning is to their satisfaction. Moreover, students not only make corrections to their previous assignments, I have found students try all the questions and make their attempts in new and unique ways to demonstrate their understanding as they have nothing to lose (marks anyways). To make the task of going grade-less seem less intimidating the next section is a list of black line masters (templates) of rubrics, conversations, letters, portfolio starters, goal setting, etc. for you to use and apply in your classroom.

Beyond the Grade: Black line Masters

Setting Goals

Student _____		Term _____	
Subject _____		Date _____	
Strengths/Accomplishments		Work Samples to show	
Areas needing improvement		A goal for next term	

*adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.

3-Way Conferencing Sheet

Teacher Summary Sheet - Conferences	
Student _____	Term _____
Subject _____	Date _____
Areas of Strengths	Areas needing improvement
	Additional Notes
Possible Goal(s)	

*adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.

Letter

To Students and Parents/Guardians

This letter is to open up the discussion of grading and marking. It is my hope to eliminate the use of number or letter grades within the classroom setting. I have found that students are controlled by grades, either the hope to attain higher grades or the fear of having lower grades. Grading causes increased apprehension and anxiety in students that inhibits learning. It is not to say that your child will not receive assessment or feedback, it is just that they will play a larger role in their assessment and learning. It is my hope that with a new method of feedback and communication between all parties involved (student, parent and teacher) that there will be a clearer understanding of where the student is meeting objectives, falling slightly below or exceeding the objectives. The reporting system to the students will be much more involved and more specific than simply an 82%.

Where the grade comes in is at the end of the course. As it is mandated by the Ministry of Saskatchewan to provide the government with a grade, I must do so. However, I do not believe that this grade should be taken lightly or without the input of the student. Therefore throughout the year the student will have a copy of all objectives they are to meet and the indicators that can help them see if they have achieved it. Along with this document the student will be receiving an abundant of written and verbal feedback on how they are doing at meeting objectives and how they can move forward. All of this work needs to be saved and at the end of the year the students will compile their detailed portfolio and this portfolio along with a discussion with the teacher, we will determine a grade. Below is a general range that will be used.

86%-100% - Exceeding Objectives
76%-85% - Meeting Objectives
60%-75% - Not Yet Meeting Objectives

As you can see there are ranges, as students will vary in their capabilities depending on topics and units. It is the discussion that will help us find a grade that both student and teacher are happy with submitting for the value on the course.

This is not a new concept of grading, as the majority of elementary classes do not assign grades. What a child understands is well communicated between student, teacher and parents/guardians. I hope that with this new process we will see more communication and students feeling like they have control over their own learning giving them the ability to try new ideas and jump into learning without fear of being graded.

Sincerely,

Lindsay Shaw

Portfolio

Subject: _____

Name: _____

Table of Contents for: _____

Select Samples the show...	Your Sample
<input type="checkbox"/> a strength	
<input type="checkbox"/> improvement	
<input type="checkbox"/> successful collaboration	
<input type="checkbox"/> originality	
<input type="checkbox"/> other	

*adapted from Anne Davies: Knowing what counts: conferencing and reporting 2nd Ed.

Assignment sheets

Math 20F								
Outcome	Assignment	Samantha Baines	Alexander Messam	Taylor Parads	Everett Schneider	Kaitlyn Selinger	Jerrett Skinner	Brian Wegner
Unit 1: Inductive and Deductive Reasoning								
FM 20.2 Demonstrate understanding of inductive and deductive reasoning including	puzzle			*		*		*
	Mid Chapter review	*	*	*	*	*	*	*
	Darts	*			*	*		
	Test							
Unit 2: Proportional Reasoning								
FM20.3 Expand and Demonstrate understanding of proportional reasoning related to:								
Unit 3: Triangles								
FM20.4 Demonstrate understanding of properties of angles and triangles including								
Unit 4: Triangles: Acute and Oblique								
FM20.5 Demonstrate understanding of the cosine law and sine law (including the ambiguous case)								
Unit 5: Linear Equations								
FM20.8 Demonstrate understanding of systems of linear inequalities in two variables.								
Unit 6: Quadratic Functions and Equations								
FM20.9 Demonstrate an understanding of the characteristics of quadratic functions								
Unit 7: Statistical Reasoning								
FM20.6 Demonstrate an understanding of normal distribution, including standard deviation and z-scores.								
General								
FM 20.1 Demonstrate understanding of the mathematics involved in a historical event or an area of interest								

The assignment checklist above is a Microsoft Excel file that I made with each unit and their corresponding outcome. In the assignment column I write the specific assignment that I will be using for assessment for the students. And then in the following columns are student's names and checked off if they have handed it in to me or not.

Grading Criteria

90-100 Exceptional	<p>A superior performance with consistent strong evidence of</p> <ul style="list-style-type: none"> • a comprehensive, incisive grasp of the subject matter; • an ability to make insightful critical evaluation of the material given; • an exceptional capacity for original, creative and/or logical thinking; • an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.
80-90 Excellent	<p>An excellent performance with strong evidence of</p> <ul style="list-style-type: none"> • a comprehensive grasp of the subject matter; • an ability to make sound critical evaluation of the material given; • a very good capacity for original, creative and/or logical thinking; • an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.
70-79 Good	<p>A good performance with evidence of</p> <ul style="list-style-type: none"> • a substantial knowledge of the subject matter; • a good understanding of the relevant issues • some capacity for original, creative and/or logical thinking; • a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.
60-69 Satisfactory	<p>A generally satisfactory and intellectually adequate performance with evidence of</p> <ul style="list-style-type: none"> • an acceptable basic grasp of the subject material; • a fair understanding of the relevant issues; • an ability to develop solutions to moderately difficult problems related to the subject material; • a moderate ability to examine the material in a critical and analytical manner.

50-59 Minimal Pass	A barely acceptable performance with evidence of <ul style="list-style-type: none">• a familiarity with the subject material;• some evidence that analytical skills have been developed;• some understanding of relevant issues;• attempts to solve moderately difficult problems and to examine the material in a critical and analytical manner which are only partially successful.
<50 Failure	An unacceptable performance

*adapted from <http://students.usask.ca/current/academics/grades/grading-system.php>

Outcome based report cards – below is mathematics 20 foundations**Project:**

FM20.1 Demonstrate understanding of the mathematics involved in an historical event or an area of interest.			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can interpret the data using statistical method (if applicable). Can identify any controversial issues and present multiple sides of the issue with supporting data. Can organize and create a presentation of findings and conclusions of exceptional standards	Can develop a rubric for assessment of the research and presentation. Can collect primary and secondary data related to the topic. Can assess the accuracy, reliability and relevance of the data. Can organize and create a presentation of findings and conclusions	Can develop a rubric for assessment of the research and presentation with assistance. Can collect primary and secondary data related to the topic. Can organize and create a presentation of findings and conclusions with assistance or missing aspects	Can collect primary and secondary data related to the topic

Comment:

Unit 1: Inductive and Deductive Reasoning

FM20.2 Demonstrate understanding of inductive and deductive reasoning including: • analyzing conjectures • analyzing spatial puzzles and games • providing conjectures • solving problems. <i>Note: It is intended that: • proofs NOT be limited to the two column proof style • analysis and conjectures related to spatial puzzles and games be incorporated throughout the course.</i>			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can prove algebraic number relationships using deductive reasoning. Can prove conjectures using deductive reasoning. Can analyse an argument for its validity. Can identify errors in proofs that lead to incorrect conclusions. Can solve situational problems involving reasoning. Can create a variation on a game or a strategy to win	Can make conjectures by observing patterns and identifying properties and justify the reasoning. Can provide examples of how inductive reasoning may lead to false conclusions. Can identify situations that involve inductive and deductive reasoning. Can explain strategies for winning a game	Can make conjectures by observing patterns and identifying properties and justify the reasoning. Can identify situations that involve inductive and deductive reasoning	Can identify situations that involve inductive and deductive reasoning

Comment:

Unit 2: Proportional Reasoning

FM20.3 Expand and demonstrate understanding of proportional reasoning related to: • rates • scale diagrams • scale factor • area • surface area • volume.

Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can analyze situations in which unit rates can be determined and suggest reasons why the rates would or would not be used to make decisions about the situations. Can develop and explain strategies for determining scale factors for areas, surface areas or volume. Can solve situational questions that involve manipulation of a formula for area, surface area and volume	Can identify and describe situations that involve proportional reasoning. Can explain the meaning of rate and solve situational questions that use proportional reasoning. Can solve situations relating to scale diagrams of 2-D shapes and 3-D and determine the scale factor (area, surface area and volume). Can explain the relationship between rate and slope	Can identify and describe situations that involve proportional reasoning. Can solve questions relating to scale diagrams of 2-D shapes and 3-D and determine the scale factor (surface area, volume, area)	Can solve questions relating to scale diagrams of 2-D shapes and 3-D and determine the scale factor (surface area, volume, area) with assistance

Comment:

Unit 3: Triangles

FM20.4 Demonstrate understanding of properties of angles and triangles including: • deriving proofs based on theorems and postulates about congruent triangles • solving problems. *Note: It is intended that students be allowed to explore and use different styles of proofs, including paragraph form and two-column proofs. The emphasis should be on the logic used and the communication of that logic and not on the format of the proofs themselves.*

Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can prove the relationship relating to sum of the angles in a triangle. Can generalize the rule for the relationship between the sum of interior angles and the number of sides in a polygon. Can correct errors in proofs regarding parallel lines. Can develop strategies for constructing parallel lines	Can identify and describe situations that involve parallel lines cut by transversals. Can prove relationships between pairs of angles formed by transversals and parallel lines. Can solve situational problems that involved angles, parallel lines, transversals, angles in triangles and angles in polygons.	Can identify and describe situations that involve parallel lines cut by transversals. Can prove relationships between pairs of angles formed by transversals and parallel lines. Can solve some problems with assistance	Can identify and describe situations that involve parallel lines cut by transversals.

Comment:

Unit 4: Triangles: Acute and Oblique

FM20.5 Demonstrate understanding of the cosine law and sine law (including the ambiguous case).
Note: This outcome is very similar to P20.5 from Pre-calculus 20. The difference is that in Foundations of Mathematics 20, students are expected to explain steps in a given proof for either the cosine law or the sine law, but not to generate the proof on their own.

Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can explain steps in a given proof of the sine law or cosine law. Can explain how one, 2 or no triangles could be possible given a set of measurements for a 2 side lengths and a non-included angle (ambiguous case), and can develop strategies for determining the number of possible solutions. Can solve situational questions involving triangles without a right angle.	Can identify situations that involve triangles without a right triangle, and can apply strategies to solve angles or sides of these triangles. Can draw diagrams to represent situations in which the sine law or cosine law would be used. Can explain how one, 2 or no triangles could be possible given a set of measurements for a 2 side lengths and a non-included angle (ambiguous case)	Can identify situations that involve triangles without a right triangle, and can apply strategies to solve angles or sides of these triangles	Can identify situations that involve triangles without a right triangle

Comment:

Unit 5: Linear Equations

FM20.8 Demonstrate understanding of systems of linear inequalities in two variables.

Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can write a system of linear inequalities for a given graph. Can match optimization questions and graphs of sets of linear inequalities. Can apply knowledge of graphing systems of linear inequalities and linear programming to solve optimization questions.	Can identify situations that could be described using a system of linear inequalities. Can apply strategies for graphing and solving systems of linear inequalities, including solid or broken line graphs. Can explain the meaning of the shaded region of a graphical solution.	Can identify situations that could be described using a system of linear inequalities. Can apply strategies for graphing and solving systems of linear inequalities with assistance	Can attempt to apply strategies for graphing and solving systems of linear inequalities with assistance

Comment:

Unit 6: Quadratic Functions and Equations

FM20.9 Demonstrate an understanding of the characteristics of quadratic functions of the form $y = a(x - p)^2 + q$, including: • vertex • intercepts • domain and range • axis of symmetry.			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can explain why a graph may have zero, one or 2 x-intercepts. Can explain what the domain and range tell about the situation that the quadratic function models. Can solve situational problems relating to quadratic functions.	Can determine the intercepts of the graph of a quadratic equation (factoring, graphing or the quadratic formula). Can verify the relationship among the roots, the zeros of the function and the x-intercepts of the graph. Can write a quadratic equation in factored form from zeros of a function or x-intercepts. Can determine coordinates of the vertex (max or min), axis of symmetry, domain and range. Can determine p, a, q from the vertex graphing form. And can sketch a graph	Can determine the intercepts of the graph of a quadratic equation (factoring, graphing or the quadratic formula). Can determine (some of the following): coordinates of the vertex (max or min), axis of symmetry, domain and range. Can determine p, a, q from the vertex graphing form.	Can determine (some of the following): coordinates of the vertex (max or min), axis of symmetry, domain and range. Can determine p, a, q from the vertex graphing form – with assistance

Comment:

Unit 7: Statistical Reasoning

FM20.6 Demonstrate an understanding of normal distribution, including standard deviation and z-scores.			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can explain the application of standard deviation to make decisions in situations (warranties, insurance, polls). Can explain what z-score is and apply it to normal distribution and SD.	Can explain the meaning of SD, normal distribution, mean, mode, median, symmetry, area under the curve and explain situations that involve them. Can calculate SD for a sample set. Can compare properties of 2 or more normally distributed data sets. Can determine z-scores	Can explain the meaning of SD, normal distribution, mean, mode, median, symmetry, area under the curve and explain situations that involve them.	Can explain the meaning of SD, normal distribution, mean, mode, median, symmetry, area under the curve.

Comment:

FM20.7 Demonstrate understanding of the interpretation of statistical data, including: • confidence intervals • confidence levels • margin of error. <i>Note: It is intended that the focus of this outcome be on interpretation of data rather than on statistical calculations.</i>			
Objective Exceeded	Objective Met	Approaching Objective	Not Met
Can provide and critique examples from media in which confidence intervals and levels were used to support a position.	Can identify and explain the significance of the confidence interval, margin of error, or confidence level WRT statistical data and the size of random sample used. Can make inferences about a population from sample data using confidence intervals.	Can identify and explain the significance of the confidence interval, margin of error, or confidence level WRT statistical data and the size of random sample used	Can define confidence interval, margin of error, and confidence level

Comment:

Beyond the Grade: Q & A

For those individuals that are skeptical, the following are some common questions that I have received throughout my time implementing a grade-less classroom and my response to the questions. The purpose of this section is to supply you with the arguments to go grade-less.

Q: Do believe in giving test?

A: The idea that grading is the only link to assessment is irrational (Stiggins, 2007). Just like any other form of assessment, to move to grade-less merely means the removal of a mark and what is added instead is feedback. Therefore, if all that is removed is the number or letter grade, then why would one assume that tests would not be also included as a form of assessment. All regular forms of assessment are still used. However I am more aware of what I am assessing, how it is linked to the outcomes, and if it has a large enough range of types of questions. (Bloom's taxonomy).

Q: How do your students apply to post-secondary institutions?

A: By the time that students choose to apply for post-secondary institutions they have their grade 11 courses to be used for conditional acceptance as full acceptance does not happen until all grade 12 core courses or required courses have been completed. As well, many post-secondary institutions will accept my report card rubric (pg. 46) as a method for accessing conditional acceptance or not. Furthermore, the rubrics have been used as a method for determining scholarships and bursaries.

Q: It is our job to prepare students for university, and since students will be graded we (as teachers) should also grade them.

A: This logic of preparing our students for university has become entrenched in our education system. It has sustained many traditions, grading, final exams, the types of exams (multiple choice), or learning how to take notes. My response to these types questions is two fold. First, our job is not to prepare our students for university - a very small percentage attends university, let alone graduates from university. If we are going to start preparing our students for life after high school we should be trying to create critical thinkers that can solve a variety of problems and teach them math that they will take with them and use for the rest of their lives. Second, universities are changing. Many universities are now grading using descriptors, providing feedback and using rubrics, and some classes do not even give midterm grades. With the universities changing, we should examine base on your line of questioning what they are doing and keep up with the times in order to prepare them for the future.

Q: A system that only has 4 groups of descriptors is not as accurate as a percentage.

A: Accuracy is an interesting topic regarding grading. There are a few problems associated with grading and the first is averaging. The first problems is teachers commonly average student marks over an entire year giving equal weight to a concept that has already been mastered later on in the course. For example, consider converting units, students may struggle with the concept in September, but by January students are able to convert easily. Does that grade given in September still apply in January or let alone in June?

The second problem with grading is determining a percentage to begin with. Teachers often determine the weighting for each question and a certain mark that the student attained on that question (see below)

E.g.	Question 1:	$\frac{3}{4}$
	Question 2:	$\frac{1}{2}$
	Question 3:	$\frac{4}{5}$
	Question 4:	$\frac{1}{5}$
	Question 5:	$\frac{2}{6}$
	Total	$\frac{11}{22} = 50\%$

Many teachers sum the numerators then sum the denominators and divide to determine the percentage, however, this is flawed. Rather, we have a series of fractions that are being summed that should be summed correctly using common denominators, unless they are not fractions, but, then, why are they written as so.

And the final problem with grading practices is the weighting of assignments. Many teachers grade according to the depth of the concept forgetting about the link to the outcome. With a focus on outcomes, grading becomes an arbitrary expedition. What I mean is that weighting can occur between outcomes, but should not occur between assignments as in the end there could be uneven distribution of grades between outcomes. As well when only considering weighting of assignments, we forget what the student has attained by the end of the course in relation to outcomes. As a student could understand factoring by June, but that October weighted assignment still has him/her at a 53% and that grade is factored in.

Q: Don't students want a mark to know where they stand, so they can try and improve?

A: There is no link between grading and feedback. Students are very capable of reading feedback and interpreting rubrics to determine their success or short falls in relation to the outcomes. The outcomes should be the focus and who well the students conquer those outcomes. Rather, grading becomes a method to rank students and perpetuate the competition that occurs in the class. If one really cared about communicating to the student their successes and possible improvements or extensions, grading only works at inhibiting that process. With the removal of a grade, students only have the feedback to focus on and push forward to constantly improve.

Q: If you give them a grade in the end, aren't you negating everything you are working for?

A: There are three reasons that giving a grade at the end of a course does not compete with the grade-less program. The first reason is that once learning has been completed within a course and when learning is final we are no longer giving feedback, but an evaluation of what has been completed. What that means is that at the end of learning a value statement can be made in conjunction with the student as to how well they met each outcome. The second reason it is okay to give a mark is that the mark is mutually agreed upon by the student and teacher. With a conversation regarding the student's work, their portfolio, and how well they met the outcomes and their personal goals we will determine a grade; thus, the grade does not become something they give rather it is a reflection of what they have learned over the course. And finally, I have no choice whether to give

them a grade at the end or not as a grade is mandated by the Ministry of Education is the province of Saskatchewan. So even though I, philosophically, am not completely on board with giving grades, my hands are tied so I have developed a solution that will work for both student and teacher.

Q: How much is your final exam worth?

A: This is a two part question; the first is the idea of a final exam and the other is the idea of weighting. I am not a true believer in final exams for the intention that if my students were truly engaged and involved in their learning and had attained understanding at the time, then why I am testing them on the same material again? Thus, the reason for a final exam would be that I do not believe that they truly learned the material at the time we were engaged in the learning or I enjoy watching my students build anxiety over one test that will make up a large portion of their final evaluation. I am unsure of the goal of that learning experience, but most individuals that oppose this argument would say that it is to prepare them for university which I also disagree with. Many post-secondary institutions are moving away from final exams and are focusing on final assignments that integrate and expand on the course work. The second part of this question has to do with weighting of the final exam. As I do not believe that a final exam is a futile assessment of learning I would weight it as 0%. Now if you wanted to give students a final project that allowed them to integrate their course material into something that was engaging, complex and required deep thought and critical thinking I would be okay with allowing that special project to consume at the most 10% of the overall grade. But again we need to be examining how that special project fits into the outcomes of the specific course. For

instance in the Math 20 foundations course there is a special project as one of the outcomes; therefore, a project that was completed over the entire year and was an outcome itself would be reasonable to count for 10-15% of the students final grade as it is 1 of 9 outcomes.

Q: How do you determine the weighting of assignments?

A: The weighting of my assignments is similar to my rationale for weighting the final; I look at the outcomes and weight them accordingly. The key is to continually be referring to the outcomes and the student's goals for achieving the outcomes and being successful in their course. Weighting comes out "organically" from the discussion/meeting with the student. Of course it is not to say that if there are 9 outcomes that each outcome will be worth 11.1% but rather we are looking at a range of where students are working. Are they exceptional learners? Are they understanding the outcomes, but have difficulty pushing beyond? Are they close to meeting the outcome, but always need some assistance? Or are they need full assistance? These are the ranges that I work in and it is up to my student and me to determine a specific grade that will work for them and me.

Q: Could you summarize your grade-less program in a few points?

A: A grade-less program, philosophically, is a way to return to the roots of teaching. A grade-less program allows us to focus on the individual students and how they are learning and meeting their outcomes and goals in mathematics. As one of my students said, "The lack of grades gave me the opportunity to continue to push and explore without the boundaries of marks".

Beyond the Grade: References

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