

Appendix F: 2021 – 2022 Uniform Grading Procedures and Challenge Process

Exam Terms and Notation

Two expressions have been used extensively throughout this years' problem sets.

“... can be written as $a\sqrt{b}$ where b is square-free. Determine the value of $a + b$ ”

For b to be “square-free”, it cannot have factors which are square numbers (other than 1). For example, as in the past, an answer of $\sqrt{12}$ would be unacceptable and students would have had to convert it to $2\sqrt{3}$ to receive credit. This year the student must still convert but the student must submit the answer 5 to receive credit. (N.B. If \sqrt{b} cannot be simplified, the problem would state “... can be written as \sqrt{b} , where b is square-free.” And the answer to submit would be b)

“... can be written as $\frac{p}{q}$, where p and q are relatively prime integers. Determine the value of $p + q$.”

For example, as in the past, an answer of $\frac{6}{8}$ would be unacceptable and students would need to simplify it to $\frac{3}{4}$ to receive credit. This year the student must submit the answer 7 to receive credit.

There is area of caution with this type of fraction formatting of which all students should be made fully aware:

Negative Rational Answers

*Although we all know that $-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}$ in order to create a unique answer, all students should be made aware that for this competition, the negative sign **MUST** be assigned to the numerator and **NOT** to the denominator.*

So if the answer is $-\frac{3}{5}$ the student must submit the answer 2 to receive credit and if the answer is $-\frac{5}{3}$, the student must submit the answer -2 to receive credit.

Definitions of terms

Angles: Angle measurements written with the degree symbol ($^{\circ}$) will be in degrees. All other angle measurements will be assumed to be in radians. This applies to both printed exams and student solutions.

Note: All attempts will be made in problem writing involving trigonometric expressions to provide students with as much clarity as needed in the context of the problems with regard to range of expected solutions.

Area: The area of a region will be denoted by the use of the word “Area”, followed by the name of the figure in square brackets. For example: $Area[\triangle ABC]$ or $Area[\text{Circle } P]$

Bases: Number bases will be indicated by a subscript at the end of the number. For example, 632_4 indicates the number 632 in base 4, or $6(4^2) + 3(4^1) + 2(4^0)$.

Ceiling Function: Also known as the “least integer function,” this shall be denoted by $\lceil x \rceil$, defined as the least integer greater than or equal to x

Combinations: The number of combinations of r items chosen from a group of n items shall be denoted using binomial coefficient notation: $\binom{n}{r}$

Diagrams: ... are not necessarily drawn to scale. Only specifically given lengths, angle measurements (etc.) should be trusted

Digits: When some digits of a number are unknown, underlines will be used to denote individual digits. For example, $A\underline{13}B$ represents the four-digit number with A in the thousands place and B in the units place, *not* the product of A , 13, and B .

Floor function: Also known as the “greatest integer function,” this shall be denoted by $\lfloor x \rfloor$, defined as the greatest integer less than or equal to x

Lattice points: Points whose coordinates are all integers.

Logarithms: The notation “log” shall denote a base-10 logarithm and “ln” shall denote the natural logarithm or base- e logarithm. Other logarithm bases will be indicated using subscripts.

Ordered pairs: When a problem calls for an ordered pair, such as (a, b) , the solution must be given in precisely that form, including the parentheses and the comma. The same applies for other ordered n -tuples.

Permutations: The number of permutations of r items chosen from a group of n items shall be denoted using subscripts: ${}_n P_r$

Polygons: If a polygon is named $MATH$, it is understood that the vertices M , A , T , and H occur in this adjacent order around the polygon, either clockwise or counterclockwise.

Triangles: If a triangle is named ABC , the sides opposite the vertices A , B , C (unless otherwise labeled in the problem) will have lengths denoted by a , b , and c respectively.

Grading Conventions:

It should always be remembered that the League desires to give credit to students on the basis of what they understand mathematically. The ideal would be to avoid withholding credit when a student has simply failed to observe some legalism. That being said, individual and team scores need to be compared across the League's many Divisions, with awards, scholarships, and appearances in the State Tournament dependent upon these comparisons. Therefore, it is essential that fundamental grading practices be as uniform as possible.

The following rules attempt to form a common grading foundation:

Partial credit: Unless specific instructions are given to the contrary in the official solutions, no partial credit should be given on any individual or team question.

Form of an answer: All answers for the 2021 – 2022 season will be integers

Units: Unless a problem obviously calls for attention to units (as when an answer requests both feet and inches, meters and centimeters, etc.), students should not be penalized for omitting units in their answers

Release of solutions and Challenges in 2021 – 2022 season

Since the tests will be online this year, and given the increased ease of sharing solutions, it was decided that solutions will be released the morning after all schools are finished with the meet. Students will have one day after the release of solutions to examine their submissions and decide whether they should challenge the results.

Challenges: If the official solutions contain an error, and it is discovered prior to the meet, all efforts will be made to alert the Division coordinators and coaches as to the correct answer. Coaches would then use the corrected answer to judge a response as acceptable or not.

If the official solutions contain an error, or if students believe their electronic submission has been graded incorrectly, or if the student had a unique interpretation of the question which resulted in a different answer, the students must submit a challenge to their coach no later than noon of the day ***following*** the release of the solutions.

Challenges submitted usually fall in these categories –challenges of grading mistake by the coach (the student actually got it right but the coach mistakenly marked it wrong), challenges of whether the response is an acceptable form of the answer, or challenges caused by a unique interpretation of the question resulting in a different answer.

The challenges should be handled in this manner:

1. Challenges of mistakes made by the coach should be *fixed by the coach*.
2. Challenges of whether the response is an acceptable form of the answer should not occur as all answers are integers in the 2021 – 2022 season. No other answer should be deemed acceptable. However, the student can challenge and the challenge *should be sent to the League office*.
3. Challenges as to a different answer due to a unique interpretation of the question *should be sent to the League office*.

Process for submitting a challenge to the League office:

All coaches in the Division should be made aware of the challenge. A short explanation as to the reason for the challenge, should be emailed to mathleague@augsborg.edu and to all schools in the Division by noon on the day following the release of the solutions. The student should write the explanation but may need a coach's assistance. The League will make every effort to rule on the challenge within 2 – 3 days. Schools in the Division will be notified as to the final ruling. Scores will be adjusted as necessary.

Only students who challenge a solution can be awarded points. If a student does not make a challenge, yet that student's answer is judged to be correct, that student who did not challenge will NOT be awarded the point(s) for a correct solution. Therefore, it is wiser to challenge than not.

Given this challenge process, and to insure the most uniformity, Coaches should mark answers correct only if the student answer matches the answer provided in the League answer key.

Ambiguities in the stated rules will undoubtedly arise, and grading experience will serve to resolve those ambiguities. League coaches, and particularly Division Coordinators, should monitor the League Notes on the MSHSML website through the season to watch for grading-related clarifications and other postings. As grading patterns arise, suggestions for further modification and improvement of these guidelines will be welcomed by the League Director, and review of such suggestions will be undertaken at the annual Board meeting(s).