Q-Core Assessment Report
Course: M133, Geometry and Measurement for K-8 Teachers
Semester: Spring 2018
Supervisor: Megan Wickstrom
Assessment by (2 Faculty Members): Megan Wickstrom and John Lund

Number of students in the course: 65 students in 3 sections. Of the 65 students, 59 completed the final exam.

Number of students assessed (at least 6): 59

Problems on the final exam were used to determine if the learning outcomes were demonstrated at an acceptable or unacceptable level. Below, we describe each learning outcome and corresponding signature problem. All signature problems can be found in their entirety at the end of the document.

Learning Outcome 1: *Interpret and draw inferences from mathematical or statistical models represented as formulas, graphs or tables.*

In question 2 on the final exam, students were provided with a table of data from a probabilistic situation (drawing fish from a tub at random) and asked to describe how they might calculate an estimate of what is in the tub. In part B of the question, students were given more data related to the situation and asked if their estimates would change and why.

- Total number of assignments assessed: 59
- Number of student assignments demonstrating the learning outcome at an acceptable level, as defined in the *Q-core Rationale and Assessment Plan*: 51
- Proportion of assignments rated as "acceptable": 51/59
- Is this over the specified threshold of 2/3? Yes, 86% of students were able to provide accurate estimates of what might be in the tub based on the data collected and also were able to describe how estimates may change given more data.
- Comments and ideas for improving the process of assessment: Almost all of the students were successful at interpreting data related to a probabilistic situation. In the future, we may want to further assess students' ideas about theoretical probability in relation to empirical probability as it is related and an important topic.

Learning Outcome 2: *Represent mathematical or statistical information numerically and visually.*

In question 1 on the final exam, students were asked to describe both visually and numerically how to calculate the area of a right triangle in two different ways.

- Total number of assignments assessed: 59
- Number of student assignments demonstrating the learning outcome at an acceptable level, as defined in the *Q-core Rationale and Assessment Plan*: 49
- Proportion of assignments rated as "acceptable": 49/59
- Is this over the specified threshold of 2/3? Yes, 83% of students were able to describe visually and numerically how to calculate the area of a right triangle in two different ways.
- Comments and ideas for improving the process of assessment: Most of the students were able to describe both visually and numerically how to calculate the area of a triangle. Describing how to derive formulas visually and numerically is an important aspect of M133 because it shows the ability to describe the "why" behind common mathematical formulas. In future assessments, the difficulty of the problem could be increased to explore other 2-D and 3-D formulas.

Learning Outcome 3: *Employ quantitative methods such as arithmetic, algebra, geometry, or statistical inference to solve problems.*

In question 3 on the final exam, students were given two application problems to solve. In part A, students were asked to calculate the volume of a rectangular prism (swimming pool) in cubic feet and convert this measurement to cubic yards. In part B, students were asked to calculate the surface area of the rectangular prism (swimming pool) excluding the top face of the prism given the context of the problem.

- Total number of assignments assessed: 59
- Number of student assignments demonstrating the learning outcome at an acceptable level, as defined in the *Q-core Rationale and Assessment Plan*: 40
- Proportion of assignments rated as "acceptable":40/59
- Is this over the specified threshold of 2/3? Yes, 68% of students were able to find the volume of the swimming pool in cubic yards and also determine the surface area.
- Comments and ideas for improving the process of assessment: Both 3-dimensional calculations (surface area and volume) as well as conversions have been areas in which students have found difficulty in the past which may explain why the percentage acceptable (68%) was lower than the other two problems. We

are continually working to find ways to help students better understand these important topics. It is important in future assessments to provide similar tasks.

Learning Outcome 1 Question:

In a classroom, there are 200 plastic fish in a tub. The tub is hidden from the students' view. The students go fishing, each time picking a random fish from the tube, recording its color, and throwing it back into the tub.

A. Here are the results after drawing 10 fish from the tub. Describe how to calculate an estimate of the number of each color of fish in the tub and explain why your method of calculation makes sense in a way that a middle school student might understand.

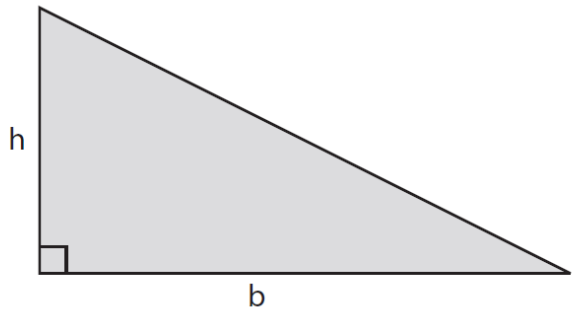
Red
Red
Green
Blue
Red
Green
Red
Red
Blue
Red

B. Here are the results after drawing 50 fish from the tub. Describe how your original estimates might change and why. Is your best estimate necessarily accurate, why or why not?

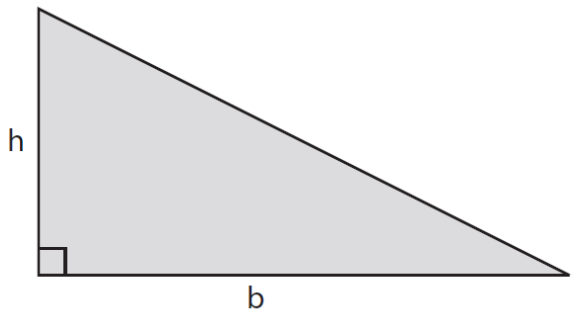
Red	Purple	Green	Red	Red
Red	Red	Red	Green	Green
Green	Red	Blue	Blue	Purple
Blue	Green	Blue	Red	Blue
Red	Red	Red	Green	Blue
Red	Blue	Blue	Red	Red
Red	Blue	Purple	Green	Red
Green	Green	Red	Red	Red
Green	Green	Green	Green	Green
Red	Red	Red	Red	Red

Learning Outcome 2 Question:

Use the area formula for rectangles and principles about area that we have studied to find and explain two different formulas for the area of the right triangle below in terms of the base and height. (Your two formulas should look different even though they will be equivalent. In each case, your explanation should fit with your drawing and the way you write the formula)



Explanation 1:



Explanation 2:

Learning Outcome 3 Question:

a. Imagine you are building a pool in your backyard that measures 20 feet long, 14 feet wide, and 5 feet deep (it is a rectangular prism). If the construction company has dump trucks that hold 15 cubic yards, how many dump truck loads will they need to haul away the dirt they dug out to make your pool? (Explain what you did and why.)

b. If the construction company needs to provide a plastic liner for the hole, how much liner should they purchase? (Explain what you did and why)