



November Monthly Math Challenge Middle School Level

Instructions: TEAMS coaches submit student answers to the question(s) below using the submission link on the TEAMS website. All submissions must be made during the month of November. Those submissions with correct answers will be entered into a drawing for a \$25 Visa gift card, which will be sent to the student in care of the TEAMS coach.

Question 1:

Approximately 56,000 bridges in the United States were rated as “structurally deficient” in the American Society of Civil Engineering’s last Infrastructure Report Card (2016). If 3200 “structurally deficient” bridges are remediated each year to reduce risk and then delisted, but each year 131 new additions are made to the “structurally deficient” bridge list, how many bridges will remain on Infrastructure Report Card in 2030?

Question 2:

Design codes often specify the use of factors of safety. For structural design, one way of calculating the FOS is to use the following equation:

$$FOS = \frac{\text{failure load } \left(\frac{lb}{ft^2}\right)}{\text{allowable load } \left(\frac{lb}{ft^2}\right)}$$

If a pedestrian bridge is designed to accommodate a total allowable load of 200 lb/ft² with a FOS of 3, what is the failure load (in lb/ft²) of the bridge?