



# 2016 Fall Rural Robotics Challenge

## November 5, 2016

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### Math Problems (9<sup>th</sup> – 12<sup>th</sup>)

Remember: There is more than one way to work these problems.

Each team of two completes one set of problems for their competition category. For each of the four problems below complete them on one sheet of paper each, show ALL your work including all calculations and organize your work as follows:

- a) Print the names of the team members at the top.
- b) Draw a sketch of the problem and include all the facts you are given.
- c) Show all formulas and all your work, including calculations. Step-by-step is best for the most points.
- d) Describe in words what you had to do to solve the problem.**
- e) Draw a square around the final answers. Be sure to include any units.

**Problem #1:** Find the measure of an angle such that the difference between the measures of its supplement and three times its complement is  $10^\circ$

**Problem #2:** The longer leg of a right triangle is 1m longer than the shorter leg. The hypotenuse is 1m shorter than twice the shorter leg. Find the lengths of each side of the triangle.

**Problem #3:** Zachary and Samuel are brothers who share a bedroom. By himself, Zachary can completely mess up their room in 20 minutes, while it would take Samuel only 12 minutes to do the same thing. How long would it take them to mess up their room if they worked together?

**Problem #4:** A stop sign is to be made by cutting off triangles from the corners of a square sheet of metal 32 inches on a side. What length  $x$  will leave a regular octagon? Give your answer to the nearest eighth inch.

**Problem #5:** This problem you will be given during judging. The team will have 2 minutes to decide how to approach the problem and then explain it to the judges. You are not expected to give the answer. We are interested in your approach to the problem more than the answer. Think clearly, logically, and be organized.

Team members should work together to come up with the best solutions. Teams cannot work together.

READ THE RULES CAREFULLY. YOU WILL BE JUDGED ON FOLLOWING THE RULES AND IN SHOWING ALL YOUR WORK, INCLUDING ALL CALCULATIONS. REMEMBER ONE SHEET OF PAPER FOR EACH PROBLEM. BE READY TO EXPLAIN TO THE JUDGES ONE OF THE PROBLEMS #1 - #4 THAT THE JUDGES WILL SELECT.

**THE MATH PROBLEM SHEETS MUST BE TURNED IN AT TEAM CHECK-IN. ONE SHEET FOR EACH PROBLEM. YOU SHOULD TURN IN FOUR SHEETS PER TEAMMATE. PLEASE HAVE THEM STAPLED TOGETHER.**