LEVEL 1 PROGRAMS
BRIDGE BUILDING

PURPOSE
To design and fabricate a truss bridge given specifications for width and span.

CLOTHING REQUIREMENT
Appropriate school attire or official SkillsUSA dress.

ELIGIBILITY
Open to all Technology Division AZ SkillsUSA members. THIS IS AN INDIVIDUAL OR TEAM EVENT. MAXIMUM TEAM SIZE IS TWO MEMBERS.

EQUIPMENT AND MATERIALS
1. Supplied by the Technical Committee:
   a. Tables and chairs for judges.
   b. Tables and chairs for contestants.
   c. A stop watch or time clock for the time keeper.

2. Supplied by the Contestants:
   a. All construction materials which should consist of Balsa Wood 1/8" with a 20 foot maximum for each bridge and cyanoacrylate glue (optional excellerator).
   b. Construction tools:
      1. Grid paper
      2. Cutting board
      4. Cutting tools
      5. Straight pins
      6. Ruler
      7. Tape
      8. Calculator (optional)
      9. Wax paper

NOTE: All materials and construction tools must be provided by participating schools.

SCOPE OF CONTEST
1. Time Limitations
   a. A two-hour time period will be allowed for the design and construction of the bridge. All contestants must be on time and in place at the assigned location.

2. Specific Regulations
   a. All work must be done in specified area.
   b. All work must be completed in the two hour time period.
   c. Pins or tape may be used in the construction of the bridge, but must be removed by the end of the two hour time period.

3. Contest Rules
   a. The object of the competition will be to determine which bridge has the greatest EFFICIENCY.

   b. The exact span of the bridge will be posted at the beginning of the competition. The posted specification will be within the following limits:

   Span 8" Minimum 18" Maximum
   Width 2" Minimum 3 ¼" Maximum

Revised 10/04
LEVEL 1 PROGRAMS
BRIDGE BUILDING

c. The bridge will be tested by destructive means. A 6" test block will be placed on the road bed of the
bridge and loaded from the bottom. The bridge shall be constructed in such a manner that will allow
for a test block to pass through the sides, top and bottom of the bridge.

d. When constructing the bridge, the bottom center elements should be placed in such a way that will
allow a 5/8" rod to pass through the bottom of the bridge to the test block.

e. Criteria for Judging:

1. Bridge efficiency shall be determined by the following formula:

\[ \text{Bridge Efficiency} = \frac{\text{Load lbs.} \times 454 \text{ g/lbs.}}{\text{Mass of Structure (g)}} \]

2. Bridge efficiency shall be scored by the top bridge scoring 40 points. The rest of the scores
will be based on a percentage of the top score. For example: Top Bridge Efficiency = 1550.
Second place Bridge Efficiency = 1250. \( \frac{1250}{1550} = 80.6\% \). That percentage is multiplied by
40 points possible = 32.2 points. By using this method of scoring, outstanding teams are
rewarded for their design and construction. All bridges tested will receive points for Bridge
Efficiency.

3. Bridge Construction shall be judged on:
   - Bridge is symmetrical left and right of center line
   - Bridge is symmetrical between front truss and back
   - Members are cut evenly and sharply
   - Members do not stick up above and below the top and bottom chords

4. Bridge Design Drawing will be judged on how well it matches the finished bridge.

Revised 10/04
f. Wood pieces may be bonded together with cement only at the joints, and may not be laminated together in a parallel fashion. If two strips are placed parallel to each other, they must be at least the thickness of the wood apart from each other. Splitting or laminating is not allowed.

g. Allowable joints are shown below.

h. Definitions: See diagram for explanation of Bridge length, span, superstructure and substructure.
## Bridge Building Rating Form

**ITEM** | **PTS**
---|---
Efficiency Calculation (contestant must be able to calculate this number) | 10
Efficiency Percentage of Top Bridge | %
Bridge Efficiency | 40
Quality of Construction | 30
Drawing | 20
TOTAL | 100

---

TEAR OFF HERE AND GIVE TO JUDGE

Contestant Number __________

Bridge mass ________________ grams

Load weight ________________ lbs.

Load weight ________________ grams

Bridge Efficiency __________