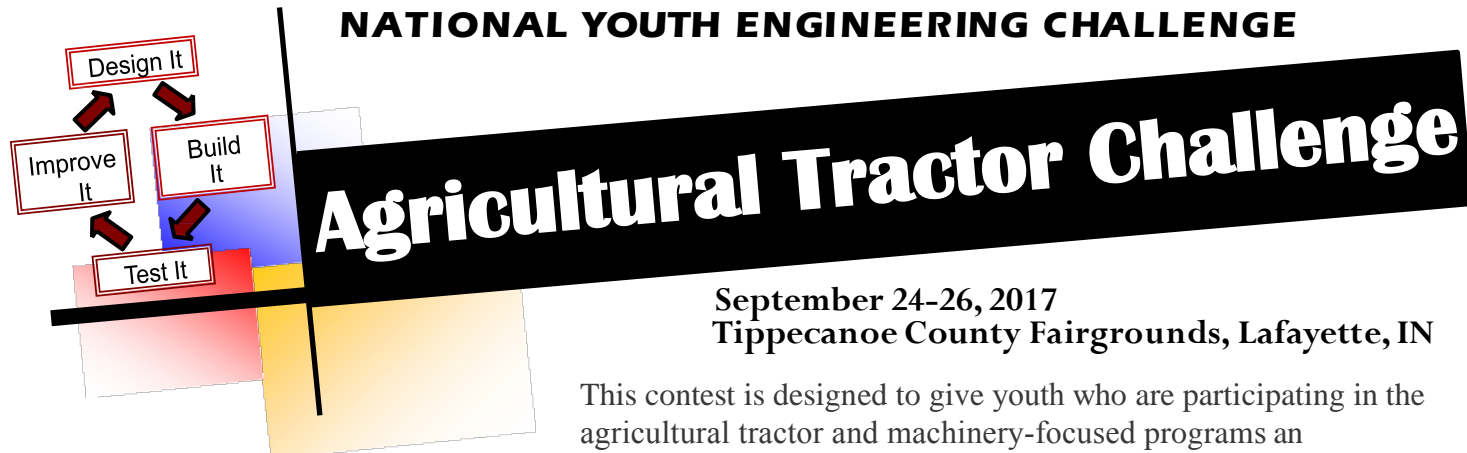


## NATIONAL YOUTH ENGINEERING CHALLENGE



# Agricultural Tractor Challenge

September 24-26, 2017

Tippecanoe County Fairgrounds, Lafayette, IN

This contest is designed to give youth who are participating in the agricultural tractor and machinery-focused programs an opportunity to demonstrate their knowledge of tractor maintenance and skill in operation, and to compete with other youth in so doing. Safety will be stressed through the contest.

This contest will include (time limits as shown):

1. Written examination (*20 minutes*)
2. Parts Identification (*10 minutes*)
3. Tractor Safety
4. Two-Wheel Driving Event (*8 minutes*)
5. Four-Wheel Driving Event (*8 minutes*)

The contest is designed to be a practical demonstration and an attempt has been made to simulate actual farm operation conditions.

Designated judges will preside over the event and their decisions will be final.

### Tractor Selection

New or late model tractors in the 30-60 hp range will be provided. They will be as similar as possible.

### Practice Period

A practice period will be provided at which time the dealers or other persons may give instructions in correct and safe operation of the tractor and for the contestant to acquire the “feel of the tractor.” Practice must be limited to not more than four minutes so as not to monopolize the tractor. The contestant will not drive through any part of the contest course.

### References

— “Safe Operation of Agricultural Equipment”

Hobar Publications - Finney Company  
1-800-846-7027  
[www.finney-hobar.com](http://www.finney-hobar.com)

— “Hydraulics”

— “Engines”

— “Tractors”

John Deere Publishing  
800-522-7448

[http://www.deere.com/en\\_US/services\\_and\\_support/manuals/john-deere-publishing.page](http://www.deere.com/en_US/services_and_support/manuals/john-deere-publishing.page)

— Indiana 4-H Tractor Curriculum

Level A -- "Starting Up: Getting to Know your Tractor (4-H 961

Level B --"Tractor Operations: Gearing Up for Safety (4-H 962)

Level C --"Moving Out: Learning about your Tractor and Farm Machinery" (4-H 963)

Level D --"Learning More: Learning about Agricultural Tractors & Equipment" (4-H 964)

The Education Store - Purdue University  
<https://mdc.itap.purdue.edu/>  
1-888-398-4636

It is the policy of the Cooperative Extension Service that all persons shall have equal opportunity and access to the programs, services, activities and facilities without regard to race, color, sex, religion, national origin, age, marital status, parental status, sexual orientation, disability or status as a veteran.

**NATIONAL YOUTH TRACTOR OPERATOR'S CONTEST**

<u>EVENTS</u>	<u>SCORE</u>
I. Written Examination Parts	_____
II Identification Safety	_____
III. Driving: Two-Wheel	_____
IV. Driving: Four-Wheel	_____
Total Penalty Points (Low score wins)	_____

**Event No. I. Written Examination**

Will consist of questions pertaining to the tractor operation, maintenance and safety.

Questions may be true-false, multiple choice, and/or completion types taken from the project literature and related references.

*Rules:*

1. Twenty penalty points will be given for each question answered incorrectly.
2. Time limit 20 minutes

*Scoring:* Questions missed \_\_\_\_\_ x 20 = \_\_\_\_\_ Total Penalty Points

**Event No. II. Parts Identification**

Will consist of 20 parts that must be identified.

*Rules:*

1. Each part to be identified will be numbered.
2. A time limit of 10 minutes is recommended.

*Scoring:* Parts missed \_\_\_\_\_ x 20 = \_\_\_\_\_ Total Penalty Points

### Event No. II Tractor Parts Identification

Parts to be identified have numbers attached to them. Select the most correct part name from this list. Write the corresponding number beside the name.

- |  |  |
|--|--|
| <p>_____ Air Intake, Engine</p> <p>_____ Alternator</p> <p>_____ Ammeter/Indicator Light</p> <p>_____ Axle Carrier, Rear</p> <p>_____ Battery</p> <p>_____ Bearing, Ball</p> <p>_____ Bearing, Crankshaft</p> <p>_____ Bearing, Roller</p> <p>_____ Brake Pedal</p> <p>_____ Camshaft</p> <p>_____ Clutch Pedal</p> <p>_____ Clutch Plate</p> <p>_____ Clutch Pressure Plate</p> <p>_____ Connecting Rod</p> <p>_____ Crankshaft</p> <p>_____ Diesel Fuel Tank</p> <p>_____ Dipstick, Crankcase Oil Level</p> <p>_____ Drawbar</p> <p>_____ Engine Stop Control</p> <p>_____ Exhaust Manifold</p> <p>_____ Fan</p> <p>_____ Fan Belt</p> <p>_____ Flywheel, Engine</p> <p>_____ Fuel Tank Cap</p> <p>_____ Fuel Filter</p> <p>_____ Fuel Injector Pump</p> <p>_____ Fuel Injector</p> <p>_____ Fuel Pump</p> <p>_____ Fuel Tank</p> <p>_____ Governor</p> <p>_____ Head Gasket, Engine</p> <p>_____ Hydraulic Hose</p> <p>_____ Hydraulic Reservoir</p> <p>_____ Hydraulic Valve Control</p> <p>_____ Intake Manifold</p> <p>_____ Muffler</p> | <p>_____ Oil Drain Plug, Crankcase</p> <p>_____ Oil Filler Cap, Crankcase</p> <p>_____ Oil Filter, Crankcase</p> <p>_____ Oil Pan, Crankcase</p> <p>_____ Oil Pressure Gauge/Indicator Light, Engine</p> <p>_____ Oil Pump Screen</p> <p>_____ Parking Brake Control</p> <p>_____ Piston</p> <p>_____ Piston Rings</p> <p>_____ Piston Wrist Pin</p> <p>_____ P. T. O. Shield</p> <p>_____ Radiator</p> <p>_____ Radiator Cap</p> <p>_____ Seal, Grease/Oil</p> <p>_____ Starter</p> <p>_____ Steering Tie Rod</p> <p>_____ Tachometer</p> <p>_____ Temperature Gauge/Indicator Light Coolant</p> <p>_____ Thermostat</p> <p>_____ Throttle</p> <p>_____ Throttle Rod</p> <p>_____ Tire Valve Stem</p> <p>_____ Valve, Engine</p> <p>_____ Valve Cover, Engine</p> <p>_____ Valve Cover, Gasket</p> <p>_____ Valve Push Rod</p> <p>_____ Valve Rocker Arm</p> <p>_____ Valve Spring</p> <p>_____ Warning Light, Rear</p> <p>_____ Water Hose</p> <p>_____ Water Pump</p> <p>_____ Weight Carrier</p> <p>_____ Weights, Front</p> <p>_____ Weights, Wheel</p> |
|--|--|

Parts Missed \_\_\_\_\_ x 20 = \_\_\_\_\_ Penalty Points

**Event No. III — Tractor Safety**

**Procedure:** Each contestant will be scored on safety throughout the contest.

**Scoring:**

Starting Safely

- |   |                      |   |    |       |
|---|----------------------|---|----|-------|
| 1. Failure to check transmission for neutral or park position   | <input type="text"/> | x | 25 | _____ |
| 2. Failure to disengage clutch while starting engine  | <input type="text"/> | x | 50 | _____ |
| 3. Failure to check P. T. O. for disengagement prior to starting engine.* (May be scored once on the two-wheel and once on the four-wheel event.) | <input type="text"/> | x | 50 | _____ |

Driving Safely

- |   |                      |   |     |       |
|---|----------------------|---|-----|-------|
| 1. Failure to engage clutch gently.   | <input type="text"/> | x | 50  | _____ |
| 2. Skidding or spinning tractor wheels (Scuffing of inside wheel on turning does not count as skid; skid of the front tractor wheel will not count until the skid equals or is greater than the width of the tire.) | <input type="text"/> | x | 50  | _____ |
| 3. Sliding or skidding implement wheels   | <input type="text"/> | x | 100 | _____ |
| 4. Turning too short and fouling implement (includes jack left down)  | <input type="text"/> | x | 50  | _____ |
| 5. Operation of tractor at unsafe speed or engine at excessive rpm  | <input type="text"/> | x | 100 | _____ |
| 6. Moving tractor with brake set  | <input type="text"/> | x | 10  | _____ |

Mounting and Dismounting Safely

- |  |                      |   |     |       |
|--|----------------------|---|-----|-------|
| 1. Failure to set both brakes before dismounting (transmission set in park or locked position counts as brakes locked) | <input type="text"/> | x | 50  | _____ |
| 2. Failure to bring tractor to complete stop before dismounting  | <input type="text"/> | x | 100 | _____ |

Other Safety (Score for each offense.)

- |                                  |                      |   |     |       |
|----------------------------------|----------------------|---|-----|-------|
| 1. Extra riders                  | <input type="text"/> | x | 100 | _____ |
| 2. Seat belt on tractor not used | <input type="text"/> | x | 50  | _____ |
| 3. Running over post             | <input type="text"/> | x | 100 | _____ |
| 4. Other                         | <input type="text"/> | x |     | _____ |

**TOTAL PENALTY POINTS, EVENT III** \_\_\_\_\_

\* Physically move levers, etc. so that the judges can observe checking for correct position.

**Event No. IV — Two-Wheel Driving Event**  
(See course outline.)

**Procedure**

1. Three scorers should be available — one for timing and two for measuring and observing operation.
2. The contestants start and warm-up tractor and on signal from official drive tractor to starting line (rear wheels on line).
3. Time starts when tractor moves forward.
4. Drive to implement shed, spot drawbar, and attach implement (a two-wheel implement with 8 x 12 foot frame will be used).
5. Pull out and back implement down alley.
6. Draw the implement through gates 1 and 2, around the end, and back through 3 and 4.
7. Line up implement and back into shed.
8. Unhitch, return tractor to stopping line, and stop engine (time stops when engine fan stops).

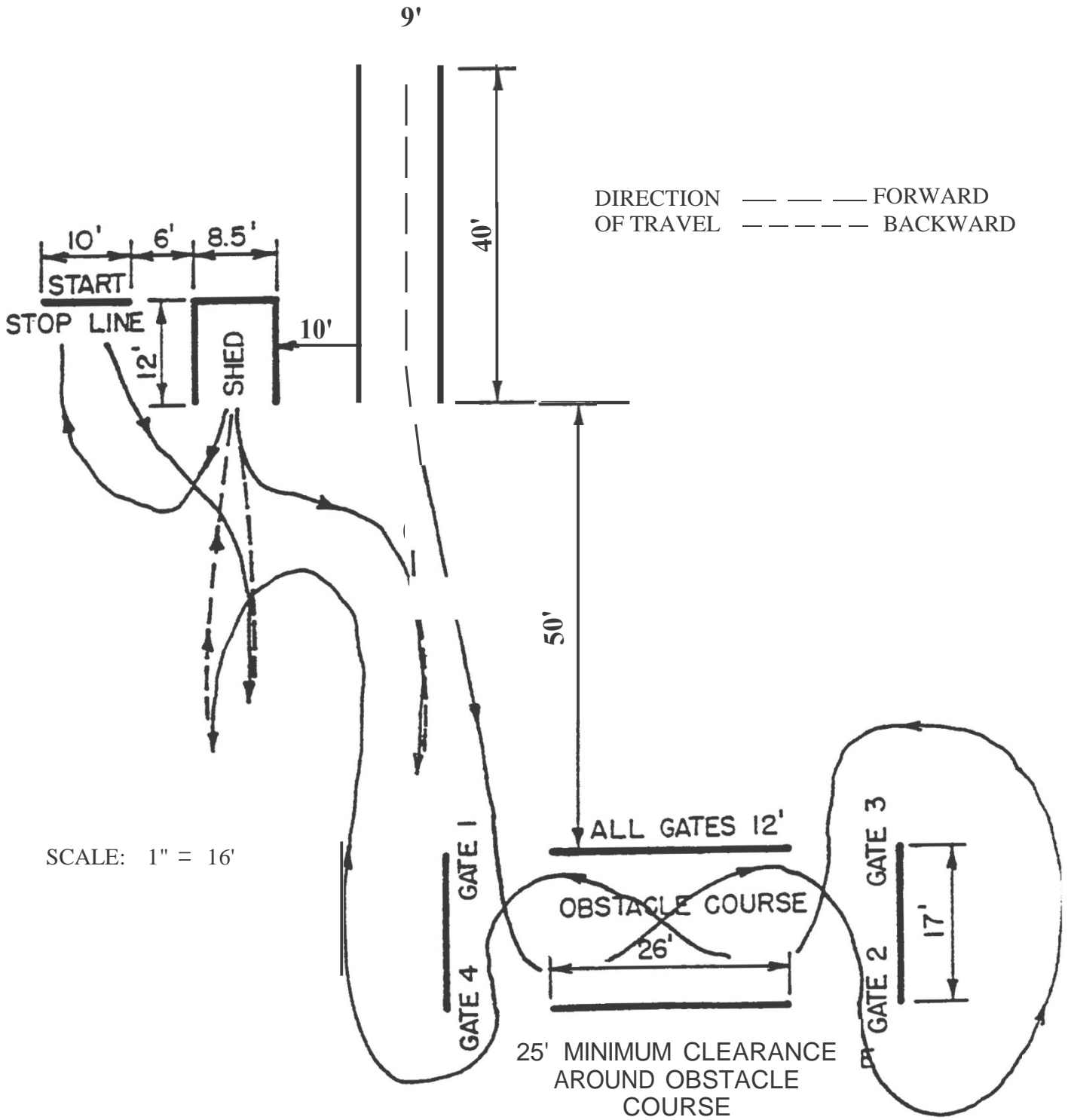
**Rules**

1. No assistance will be allowed in spotting. The tongue will be on the ground or on jack. The operator will make hitch without moving implement forward more than one foot. The operator will dismount to insert and remove hitch pin.
2. Whenever dismounting tractor, both brakes must be set or the gear shift lever must be in the park position.
3. Riding clutch — Using excessive throttle and controlling ground speed with clutch. May be scored once in each of: shed, alley, and obstacle courses.
4. Time begins when tractor moves forward at starting line and stops when contestant reaches stopping line and the engine fan stops.

**Scoring**

	Penalty Points		Score	
1. Number of complete changes of direction other than necessary in travel	[ ]	x	10	[ ]
2. Markers or lines _____ Touches	[ ]	x	40	[ ]
Stakes knocked over or lines crossed	[ ]	x	50	[ ]
3. Tractor Operation _____ Stalled	[ ]	x	10	[ ]
Grated gears	[ ]	x	10	[ ]
Riding clutch (Note rule 3.)	[ ]	x	10	[ ]
4. Measurement in the shed (nearest 1/2 inch)				
a. Inches off center at front	[ ]	x	10	[ ]
b. Inches off center at rear	[ ]	x	10	[ ]
c. Inches greater than one from center-rear post (within 1 inch is perfect)	[ ]	x	10	[ ]
5. a. Time ( _____ minutes _____ seconds = _____ total seconds)	[ ]	x	1/5	[ ]
b. Time in excess of 8 minutes, 100 points	[ ]			[ ]
<b>TOTAL PENALTY POINTS, EVENT IV</b>				[ ]

# TWO WHEEL DRIVING COURSE



**Event No. V — Four-Wheel Driving Event**

(See course outline.)

**Procedure**

1. Three scorers should be available — one for timing and recording scores and two for measuring and observing operation.
2. The contestants start and warm-up tractor and on signal from official drive tractor to starting line (rear wheels on line).
3. Time starts when tractor moves forward.
4. Drive to implement shed, spot drawbar, and attach implement (a four-wheel wagon with 8 x 14 foot frame will be used).
5. Pull out to the left, go through the two gates, and back wagon into the shed. The tractor and wagon tongue (but no part of the 8' x 14' frame) may cross the 20' start-stop line without penalty.
6. Unhitch, return tractor to stopping line, and stop engine (time stops when engine fan stops).

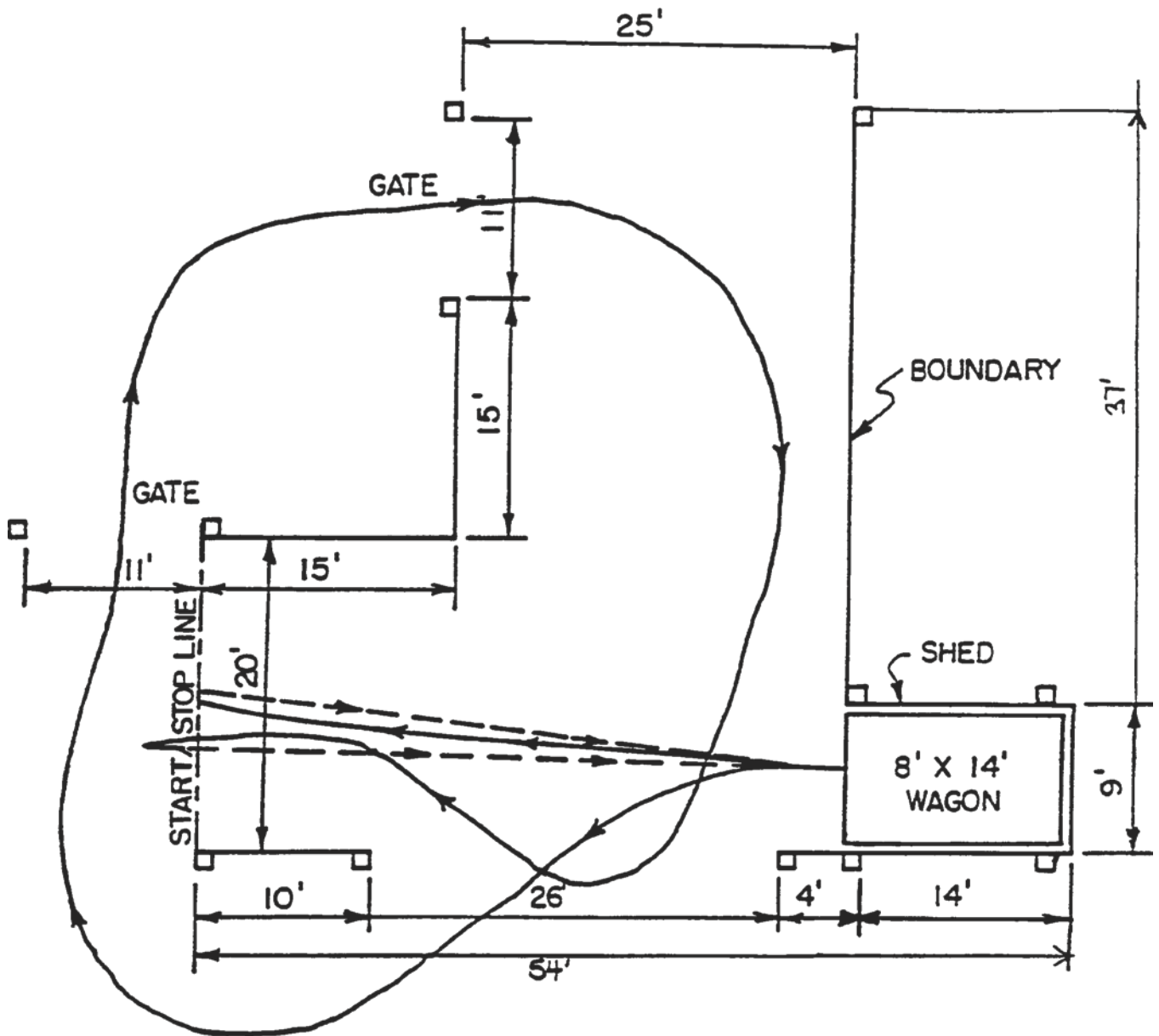
**Rules**

1. No assistance will be allowed in spotting. The tongue will be on the ground. The operator will make hitch without moving wagon forward more than one foot. The operator will dismount to insert and remove hitch pin.
2. Whenever dismounting tractor, both brakes must be set or the gear shift lever must be in the park position.
3. Riding clutch — Using excessive throttle and controlling ground speed with clutch. May be scored once in four-wheel event.
4. Time begins when tractor moves forward at starting line and stops when contestant reaches stopping line and the engine fan stops.
5. If contestant cannot get wagon in shed, measure from rear of wagon to back post of shed and score accordingly.

**Scoring**

	Penalty Points		Score
1. Number of complete changes of direction other than necessary in travel	_____	x 10	_____
2. Markers or lines _____ Touches	_____	x 40	_____
Stakes knocked over or lines crossed (Score again each time.)	_____	x 50	_____
3. Tractor Operation _____ Stalled	_____	x 10	_____
Grated gears	_____	x 10	_____
Riding clutch (Note rule 3.)	_____	x 10	_____
4. Measurement in the shed (nearest 1/2 inch)			
a. Inches off center at front	_____	x 10	_____
b. Inches off center at rear	_____	x 10	_____
c. Inches greater than one from center-rear post (within 1 inch is perfect)	_____	x 10	_____
5. a. Time ( _____ minutes _____ seconds = _____ total seconds)	_____	x 1/5	_____
b. Time in excess of 8 minutes, 100 points	_____		_____

**TOTAL PENALTY POINTS, EVENT V**



### FOUR WHEEL DRIVING COURSE

Use the 20' line for start and finish. If necessary, the outer post of the two 11' gates may be moved to adjust the "degree of difficulty." Be sure tractor and wagon can negotiate through gates and turns without fouling the implement.

DIRECTION ————— FORWARD  
 OF TRAVEL - - - - - BACKWARD