PLACE YOUR CONTESTANT STICKER HERE.	Do not write in this box. *Judges, after this skill sheet has been scored and double checked, write the total score for this activity in the blank below.* Skill Activity Score: _____ Judges Initials: _____

2019 National Agricultural Technology & Mechanical Systems Career Development Event
Compact Engines

Materials Provided: Kohler KD 220 diesel engine and workshop manual, socket, hex socket, extension, ratchet, and Phillips screwdriver.

Scenario: The Kohler KD 420 diesel engine is used as the power source for several types of generators. This use creates the need for this engine to maintain a constant RPM level to supply enough kilowatts. This requires the routine maintenance and repair of several systems such as the compression and electrical systems. Improperly installed fuel head and valve train can cause major running issues for an engine. As well as improper or malfunctioning electrical system components such as the alternator which help recharge your battery. Use engine model KD 440 for all answers when looking up recommended specification in the workshop manual.

NOTE: BECAUSE THIS IS A SIMULATION, YOU WILL NOT TORQUE THE BOLTS. USE THE DRIVE HANDLE AND SOCKET TO TIGHTEN THE BOLTS UNTIL SNUG. DO NOT OVER TIGHTEN!!

Instructions:

1. Read each question carefully; use the resources provided to answer the questions; record your answers in the spaces provided.

2. Read the skill practicum instructions carefully; use the tools and resources provided to complete each numbered task. All measurements units should be identified for full credit.

Questions:

1. Write the engine model number on line 1 of the scantron sheet. (2 points)

2. The crank shaft orientation of this engine is (A) vertical or (B) horizontal (2 points)
   Bubble your answer on line 2 of the scantron sheet.

3. According to the specifications listed in the Kohler KD workshop manual at your station, using a 24V/9A Alternator, what are the engine RPMs required to achieve the full 9A recharging rate? (3 points)
   Bubble your answer on line 3 of the scantron sheet.
   A. 2000
   B. 2500
   C. 3000
   D. 3500

4. According to the specifications listed in the Kohler KD workshop manual at your station, what is the recommended valve/rocker arm clearance need to be adjusted to for your engine model? (3 points)
   Bubble your answer on line 4 of the scantron sheet.
   A. Self-adjusting no adjustments are needed
   B. 0.05-0.10 mm
   C. 0.10-0.15 mm
   D. 0.15-.020 mm

5. According to the specifications listed in the Kohler KD workshop manual at your station, what is the recommended torque for the rocker arm adjusting screw pin after the tappets have settled? (3 points)
Bubble your answer on line 5 of the scantron sheet.

   A. 5 Nm
   B. 10 Nm
   C. 15 Nm
   D. 20 Nm

6. According to the specifications listed in the Kohler KD workshop manual at your station, what is the compression ratio for your engine model? (3 points)
Bubble your answer on line 6 of the scantron sheet.

   A. 21:1
   B. 20.3:1
   C. 22:1
   D. 23.3:1

7. Using the materials at your station, properly reinstall the valve train and cylinder head onto your engine. **Hand tighten bolts until they are snug do not overtighten the bolts. Points will be taken off if they are overtightened!** A CDE judge will score this section on your scantron sheet.

a.	Push rods installed correctly	_____	(2 points)	Score on line 7
b.	Rocker arms installed correctly	_____	(2 points)	Score on line 8
c.	Cylinder Head Bolts installed correctly	_____	(4 points)	Score on line 9
d.	Rocker Arm Nuts rods installed correctly	_____	(2 points)	Score on line 10
e.	Rocker Arm Cover installed correctly	_____	(4 points)	Score on line 11