



SCNC  
2018

**SCNC**  
SKILLS CANADA  
NATIONAL COMPETITION

**OCMT**  
OLYMPIADES CANADIENNES  
DES MÉTIERS ET  
DES TECHNOLOGIES

  
**SkillsCompétences**  
Canada  
Edmonton2018

TEST PROJECT / PROJET D'ÉPREUVE

**OUTDOOR POWER  
AND RECREATION  
EQUIPMENT**  
**MÉCANIQUE DE  
VÉHICULES LÉGERS  
ET D'ÉQUIPEMENT**

SECONDARY /  
NIVEAUX SECONDAIRE



## Lab #1 Theory Test

### INSTRUCTIONS:

- a) Print your name on the answer sheet only. **DO NOT** write on this test booklet.
- b) Mark the box corresponding to the answer of your choice on the answer sheet provided<sup>8</sup>.

1. When a small gas engine refuses to start the first check should be:
  - A. Spark plug gap setting
  - B. Crankcase oil level
  - C. Piston clearance
  - D. Level of the fuel in the tank
  
2. Air cooled engines can be recognized by:
  - A. The cooling fins on the cylinder
  - B. Large radiators
  - C. Smoking exhaust
  - D. Slower operating speeds
  
3. You have removed the spark plug and it is wet with gasoline and the engine won't start and no other checks have been made then it can be assumed that:
  - A. Flooding is the problem
  - B. A weak spark is the problem
  - C. Either flooding or a weak spark could be the problem
  - D. Neither flooding or a weak spark could be the problem
  
4. The engine starts readily but runs only a few minutes which would make you suspect the problem to be:
  - A. Poor piston and cylinder lubrication
  - B. The fuel flow from the tank to the carburetor may be slow or irregular
  - C. Spark plug is bridged with carbon
  - D. Weak or discharged condenser
  
5. Most four stroke small gas engines have a \_\_\_\_\_ type lubrication.
  - A. Wick
  - B. Splash
  - C. Full flow
  - D. Variable displacement oil pump

6. Fuels stored for a long period of time in the carburetor may contain:
  - A. Excess gum and varnish
  - B. Excess hydrocarbons
  - C. Excess lead
  - D. Calcium chloride
  
7. The lawnmower engine vibrates excessively while running and the cause may be:
  - A. Bent crankshaft
  - B. Blade out-of-balance
  - C. Bent blade
  - D. Any of the above
  
8. You check the ignition system with the ignition tester and there is no spark. The cause may be:
  - A. Sheared flywheel key
  - B. Incorrect point gap
  - C. Grounded stop switch
  - D. Any of the above
  
9. Which one of the following is **not** a type of manual starter on a small gas engine?
  - A. Rope-wind
  - B. Clutch and ratchet
  - C. Rope-rewind
  - D. Wind-up
  
10. Weak compression is normally caused from which of the following:
  - A. Worn spark plug
  - B. Worn rings
  - C. Worn breaker points
  - D. Worn connecting rod

## **Lab #2 Two Stroke Top End Measurement**

**Engine is from a 1996 Yamaha Vmax XT 600**

Do not start this lab until told that the competition is ready to start.

If there is something you don't understand, you may ask for clarification from the person in charge.

**Locate and Record the following<sup>8</sup>:**

Engine Displacement	
Torque Specs:	
Cylinder Head Nuts	
Cylinder Base Nuts	
Spark Plug	

**Using the supplied service manual<sup>5</sup>, tools and equipment:**

- Remove the cylinder heads and cylinders
- Remove the pistons from the connecting rods
- Carefully remove the top piston rings
- Measure all of the components and calculate clearances to complete the following table
- Use the supplied manual for specifications and torque specs some specs may not be in the manual
- Record all specifications, torque values, measurements, and clearances in **METRIC** and in the tables provided and include the unit of measure.
- Re-assemble the top end components following instructions in service manual,
- Torqueing all fasteners to spec.

If you have completed this lab early, please check your answers and wait quietly until everyone has finished or all the time is used.

Enter all measurements in the table on the back of this page<sup>8</sup>.  
Show calculations when possible<sup>1</sup>.

Part name	Measurement						
Piston Diameter	MAG						
	PTO						
Cylinder Bore Diameter		D1	D2	D3	D4	D5	D6
	MAG						
	PTO						
Cylinder Taper	MAG						
	PTO						
Cylinder Out of Round	MAG						
	PTO						
Piston To Cylinder Clearance	MAG						
	PTO						
Top Ring End Gap	MAG						
	PTO						
Top Ring Groove Clearance	MAG						
	PTO						

## Valve Adjustment Lab #3

Do not start this lab until told that the competition is ready to start.

If there is something you don't understand, you may ask for clarification from the person in charge.

Using the Service Manual<sup>5</sup> and the supplied tools, perform a valve clearance inspection and record the clearances you obtain. Remove the camshafts as necessary to obtain / record<sup>8</sup> the existing shim sizes. Reassemble any removed parts according to Factory Service Manual procedures.

If you have completed this lab early, please check your answers and wait quietly until everyone has finished or all the time is used.

At which point in the 4-stroke cycle is the valve clearance adjustment performed?	
Measure and record all your valve clearance <b>measurements</b> on the next page.	
Using the manual, record the valve clearance <b>specifications</b> on the next page.	
Are your measurements within the factory specification?	YES    NO
Remove the camshafts as necessary to inspect the valve shim sizes of any valves that were out of specification. Calculate the correct shim thickness required to obtain the correct clearance for all of the valves that were out of specification. Record the correct thicknesses on the next page. <b><u>DO NOT exchange the shims— Calculate ONLY</u></b>	
Re-assemble the top end according to the service manual procedure, making sure the cam timing is correct. <b>Show the judge your cam timing setting before rotating the crankshaft.</b>	
What kind of engine damage may occur if cam timing is not properly set?	
What type of valve train is this? <b>BE SPECIFIC!</b>	

<b>Intake Valves</b>	<b>Mag Side</b>	<b>PTO Side</b>
Measured Clearance	mm	mm
Factory Specification	mm	mm
Present Shim Size	mm	mm
Required Shim Size	mm	mm
<b>Exhaust Valves</b>		
Measured Clearance	mm	mm
Factory Specification	mm	mm
Present Shim Size	mm	mm
Required Shim Size	mm	mm

*Essential Skills – <sup>1</sup>Numeracy, <sup>5</sup>Reading Text, <sup>8</sup>Document Use*