

Benchmarks & Indicators

Power Mechanics

1. **Explain simple engine operation. (VI)** (January) **CS HOTS LS TI**
 - A. Identify and define the parts necessary for a simple engine. (**ws, wt**)
 - B. Illustrate how a simple engine works. (**wt**)
 - C. Explain the characteristics of gasoline. (**ws, wt**)
 - D. Explain the purpose of fuel atomization. (**ws, wt**)

2. **Identify the basic components of a small engine and describe the function of each part. (VI)** (January) **CS HOTS LS**
 - A. Define “Mechanical.” (**ws, wt**)
 - B. Define “Carburetion.” (**ws, wt**)
 - C. Define “Ignition.” (**ws, wt**)
 - D. Define “Cooling.” (**ws, wt**)
 - E. Define “Lubrication.” (**ws, wt**)

3. **Describe the characteristics of four-stroke, two-stroke, and rotary engines. (VI)** (January, February) **CS HOTS LS TI**
 - A. Explain and illustrate four-stroke cycle engine operation and explain the purpose of each stroke. (**ws, wt**)
 - B. Explain valve timing. (**ws, wt**)
 - C. Explain and illustrate two-stroke cycle engine operation and explain the purpose of each stroke. (**ws, wt**)
 - D. Define cross-scavenged and loop-scavenged. (**ws, wt**)
 - E. List the advantages and the disadvantages of a four cycle and two cycle. (**wt**)
 - F. Explain and illustrate rotary engine operation. (**ws, wt**)
 - G. Explain the benefits of a rotary engine. (**ws, wt**)
 - H. Tear down and identify the parts of a four cycle engine. (**to, pt**)
 - I. Tear down and identify the parts of a two cycle engine. (**to, pt**)

Infused Areas

CE = career education
GE = global education
CS = communication skills
HOTS = higher order thinking skills
MCGF = multicultural gender fair
LS = learning skills
TI = technology integration

Assessments

ws = worksheet
wt = written test
to = teacher observation
pt = performance test

Resources: Computer, internet, text books, worksheets, tests, 4 cycle engine, 2 cycle engine, tools, note cards.

4. Identify, explain, and perform maintenance on the various carburetor systems used on four-stroke engines. (I, II, III, V, VI) (February) CS HOTS LS

- A. Name various types of fuel that can be used in a small gas engine and list practical applications for each. **(ws, wt)**
- B. Explain the purpose of proper fuel-oil mixture in a two cycle engine. **(ws, wt)**
- C. Describe the purpose of fuel filters. **(ws, wt)**
- D. Explain fuel pump operation. **(ws, wt)**
- E. Describe the operation of a pressurized fuel system. **(ws, wt)**
- F. List and explain the principals of carburetion. **(ws, wt)**
- G. Identify the three basic types of carburetors. **(ws, wt)**
- H. List the basic functions of a carburetor. **(ws, wt)**
- I. Explain the purpose of a governor. **(ws, wt)**
- J. Adjust and maintain common governors. **(to, pt)**
- K. Complete maintenance on common carburetors. **(to, pt)**

5. Identify, explain, and perform maintenance on the various ignition systems used on four-stroke engines. (I, II, III, IV, V, VI) (February, March) CS HOTS LS

- A. List the primary purposes of the ignition system. **(ws, wt)**
- B. Identify the components in a typical magneto system and describe the function of each part. **(ws, wt)**
- C. Describe small engine ignition advance systems. **(ws, wt)**
- D. List the advantages of a solid state ignition system. **(ws, wt)**
- E. Identify the three general classifications of magneto systems and explain the operation of each. **(ws, wt)**
- F. Describe the operation of a battery ignition system. **(ws, wt)**
- G. Explain and complete the basic inspections and tests used to verify proper ignition system operation. **(to, pt)**
- H. Complete basic ignition system maintenance. **(to, pt)**

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- 6. Identify, explain, and perform maintenance on the various lubrication systems used on four-stroke engines. (I, II, III, IV, V, VI) (March) CS HOTS LS**
- A. List the functions of lubricating oil. **(ws, wt)**
 - B. Explain the operation of ejection pumps, barrel pumps, and positive displacement pumps. **(ws, wt)**
 - C. Explain the function of oil filter systems and differentiate between the three main types. **(ws, wt)**
 - D. Inspect and do maintenance on lubricating systems. **(to, pt)**
- 7. Identify, explain, and perform maintenance on the cooling system of a four-stroke engine. (I, II, III, V, VI) (March, April) CS HOTS LS**
- A. Explain how air cooling, exhaust cooling, and water cooling work to lower engine operating temperatures. **(ws, wt)**
 - B. Define the basic function of a water pump and give examples of several common types. **(ws, wt)**
 - C. Explain the function of a thermostat and a radiator. **(ws, wt)**
 - D. Inspect and do maintenance on the cooling system of a small engine. **(to, pt)**
- 8. Demonstrate how to measure engine performance. (I, II, III, V, VI) (April) CS HOTS LS**
- A. Define engine performance. **(ws, wt)**
 - B. Define and compute bore, stroke, displacement, compression ratio, force, work, power, energy, and horsepower. **(ws, wt)**
 - C. Define and calculate torque. **(ws, wt)**
- 9. Identify and demonstrate the use of tools and measuring instruments. (I, II, III, V, VI) (April) CS HOTS LS**
- A. Explain why quality tools and measuring instruments should be used when servicing small gas engines. **(ws, wt)**
 - B. Summarize the reasons that small engine components must be measured carefully. **(ws, wt)**
 - C. Demonstrate common measuring techniques. **(to, pt)**
 - D. Use common hand tools properly. **(to, pt)**

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10. Perform troubleshooting, service, and maintenance on a four-stroke engine using the tools and measuring instruments associated with small engine repair. (I, II, III, IV, V, VI) (April, May) CS HOTS LS

- A. Describe systematic troubleshooting. (ws, wt)
- B. Use service manuals to determine engine specifications and explain why this information is necessary when servicing a small engine. (ws, wt)
- C. Perform preventative maintenance on various engine systems, including the crankcase breather, air cleaner, and muffler. (to, pt)

11. Perform a four-stroke engine teardown, rebuild, and reassembly procedure. (I, II, III, IV, V, VI) May) CS HOTS LS

- A. Physically tear down, inspect, rebuild, and reassemble a four-stroke engine. (to, pt)

12. Explain the career possibilities associated with Power Mechanics. (VII) (May) CE GE CS HOTS

- A. List occupations that encompass Power Mechanics. (wt)
- B. Explain possible educational and training requirements. (wt)
- C. Explain possible skills needed for the Power Mechanics industry. (wt)

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Resources: Text books, worksheets, tests, 4 cycle engine, tools, overhaul procedure sheets.