



NZQA accredited and registered provider

## Engine Principles

# PRACTICE PAPER ONLY

**Test Paper One / Time allowed 90 mins**

To be completed by the student

**Student Name** \_\_\_\_\_ **Date** \_\_ / \_\_ /2021

**School/Provider** \_\_\_\_\_

To be completed by the School Invigilator/Coordinator/Tutor

**I confirm that this assessment was completed by the student named above as a closed book exercise under exam conditions**

**Invigilator Name** \_\_\_\_\_

**Invigilator Sign** \_\_\_\_\_

**Assessed By** \_\_\_\_\_

**Date** \_\_ / \_\_ / 2021

**Assessor's  
Stamp**

**Assessors Note: Materials relate to unit standard 30477**

# SAMPLE ASSESSMENT INSTRUCTIONS

## PLEASE MAKE SURE TO READ AND SIGN THIS SECTION

### ASSESSMENT INSTRUCTIONS

- Before starting this assessment you should have achieved a mark of at least 80% for your workbook.
- Use a black or blue ball point pen. (do not use pencil)
- Write your full name on the cover page.
- This is a closed book assessment, so you cannot bring any reference material in, or seek help from anyone else.
- You need to answer all the questions.
- Read the questions carefully, and give detailed answers when asked to.
- You must complete the assessment under exam conditions.
- To achieve the unit standard you must show competency for each outcome.

Complete the following by circling Yes or No as appropriate:

Are you ready to be assessed? **Yes** **No**

Have the assessment instructions these been explained to you? **Yes** **No**

Do you understand the assessment instructions? **Yes** **No**

Have you all the materials/resources that you need for this assessment? **Yes** **No**

Please sign to acknowledge that you have read these instructions and are ready to be assessed.

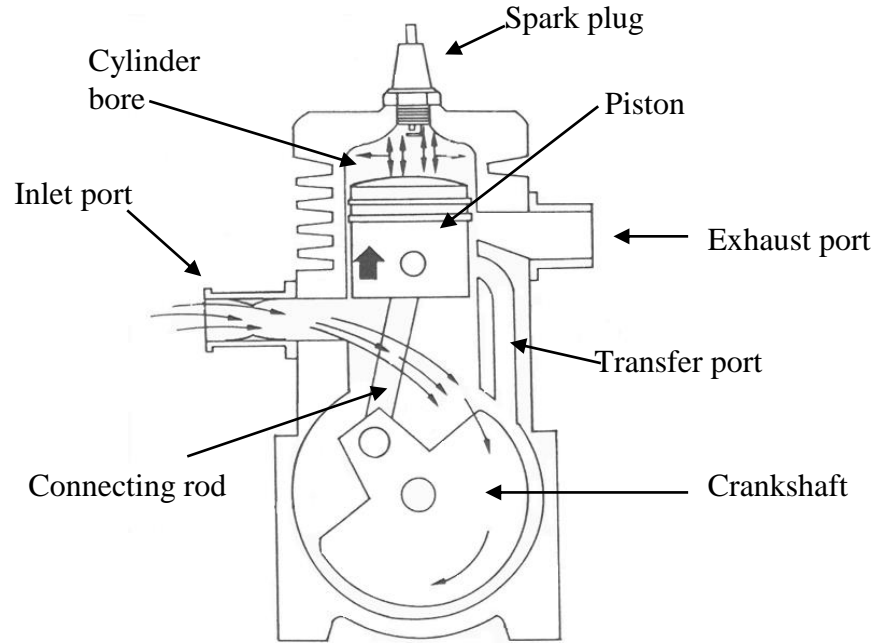
Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**You must complete the assessment instructions on Page 2 before starting this assessment!**

**ELEMENT ONE**

Demonstrate knowledge of spark ignition engine operation.

1. Study the diagram and answer the question that follows below.



**When the piston is moving up [as shown in the diagram above of a 2 stroke SI engine], explain what is happening.**

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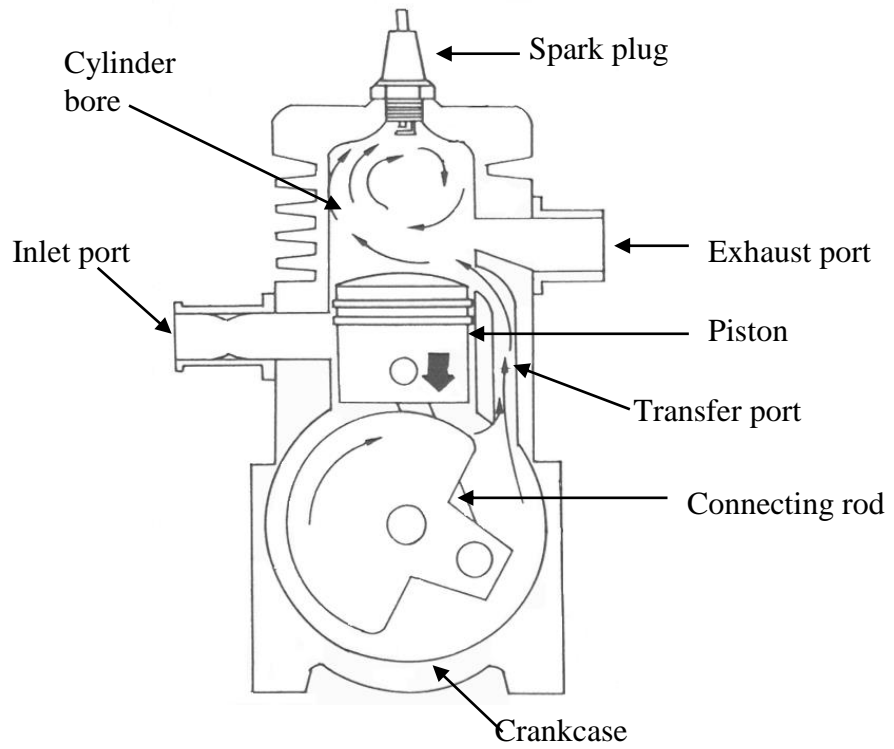
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2. Study the diagram and answer the question that follows below.



When the piston is moving down [as shown in the diagram above of a 2 stroke SI engine], explain what is happening.

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**3. Using the following descriptions to identify the two stroke engine ports.**

It is through this port that the air-fuel mixture enters the crankcase. The port is opened and closed by the movement of the piston skirt.

Engine port: \_\_\_\_\_

This is a passage way between the crankcase and the cylinder. The air-fuel mixture is transferred from the crankcase to the cylinder when the movement of the piston uncovers the transfer port.

Engine port: \_\_\_\_\_

This port is nearest to Top Dead Centre (T.D.C.) and is uncovered as the piston descends, allowing the burnt gases to leave the cylinder.

Engine port: \_\_\_\_\_

**4. List the four strokes of a four stroke engine.**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

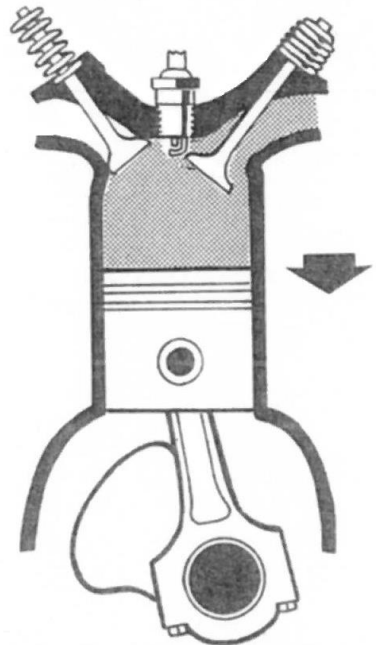
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6. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: \_\_\_\_\_

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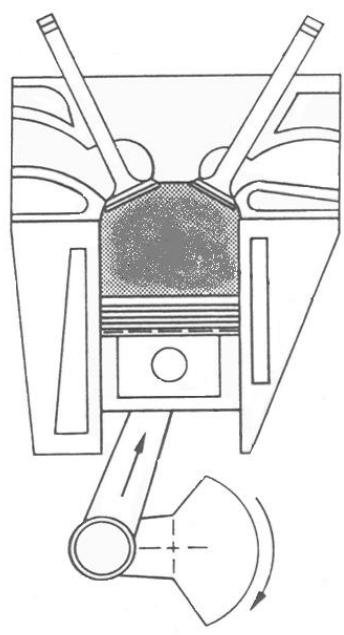
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7. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: \_\_\_\_\_

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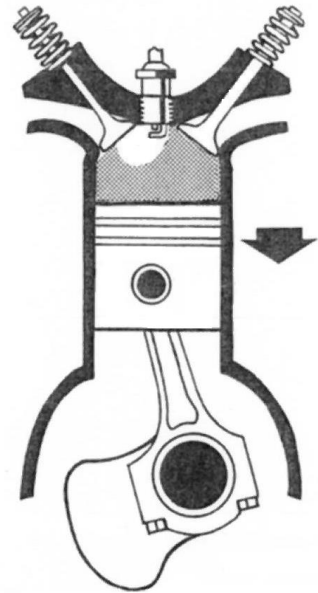
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8. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: \_\_\_\_\_

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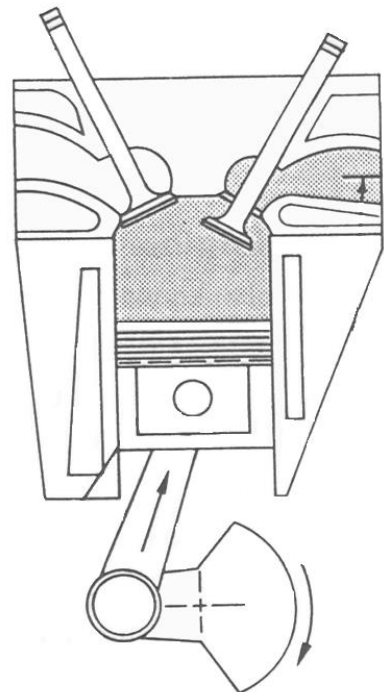
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9 Which ONE of the following statements is true? Please tick the appropriate box.

In a four stroke cycle the crankshaft rotates faster than the camshaft

In a four stroke cycle the crankshaft and camshaft rotate at the same speed.

In a four stroke cycle the camshaft rotates faster than the crankshaft

10. Match up the engine component with its description: For example

**A – Camshaft = 6 – Opens the valves**

A	Camshaft	<b>A6</b>	1	Converts linear motion of pistons to rotary motion
B	Carburettor		2	Contains the cylinder bore, oil galleries and cooling system chambers
C	Connecting rod		3	Uses a set of star shaped rotors in a housing to pressurise the oil
D	Crankshaft		4	Forms a moveable gas tight plunger in the cylinder
E	Cylinder block		5	Contains the inlet passage, the exhaust passage and the combustion chamber
F	Cylinder head		<b>6</b>	Opens the valves
G	Flywheel		7	Provides a seal between the piston and the wall of the cylinder
H	Piston		8	Links the crankshaft to the piston
I	Piston rings		9	Mixes air and fuel and delivers mixture to the engine
J	Pressure relief valve		10	Consists of a spring and plunger valve
K	Rotary oil pump		11	Absorbs energy during the power stroke for use to carry the engine over the non power strokes



## **ELEMENT TWO**

Demonstrate knowledge of compression ignition engine operation.

- 1. Using the following descriptions to identify the two stroke CI engine cycles.**

The downward moving piston increases the volume of the combustion chamber, enabling the supercharger to blow air through the open inlet port and into the cylinder.

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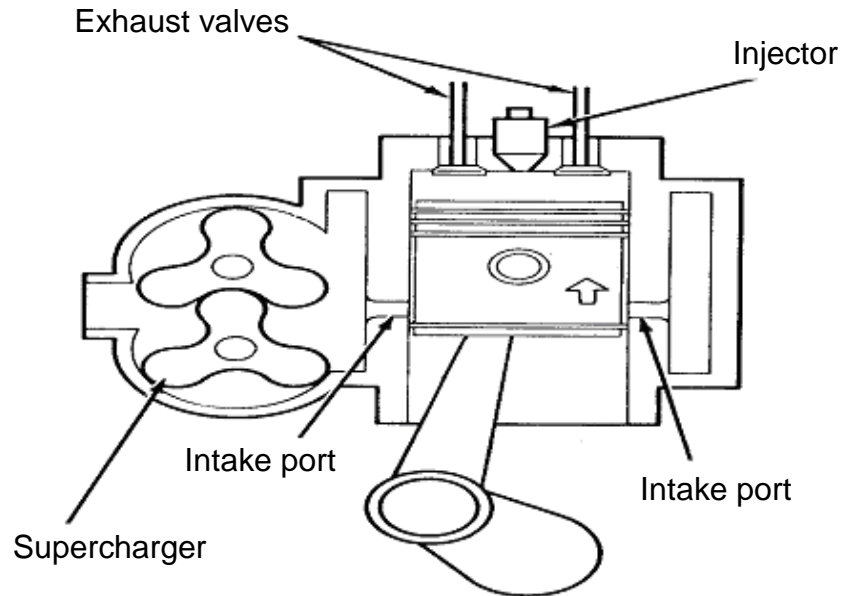
Diesel is injected into the cylinder and is ignited. The pressure of the combustion gases drives the piston downwards in the cylinder and by means of the connecting rod produces a rotary motion of the crankshaft.

**Stroke:** \_\_\_\_\_

During this stroke the exhaust valves are open. The piston is moving down. The inlet port is open and the exhaust gases are being scavenged out the open exhaust valves

**Stroke:** \_\_\_\_\_

2. In the diagram of the two stroke diesel engine shown explain what takes place when the piston is on the upward stroke.



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- 3. Explain what happens during the intake stroke of a diesel four stroke engine and what is taking place during this stroke**

Intake Stroke :

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- 4. Explain what happens during the compression stroke of a diesel four stroke engine and what is taking place during this stroke.**

Compression Stroke:

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5. **Explain what happens during the power stroke of a diesel four stroke engine and what is taking place during this stroke**

Power Stroke:

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6. **Explain what happens during the exhaust stroke of a diesel four stroke engine and what is taking place during this stroke**

Exhaust Stroke :

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**ELEMENT THREE**

Demonstrate knowledge of engine capacity and performance ratings.

**1. Explain the term Torque.**

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**b. Explain the term power.**

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**2. Fill in the gaps below complete the following sentences.**

Engines with high \_\_\_\_\_ will reach maximum acceleration faster from a lower RPM when the accelerator is applied. These engines are ideally suited for towing and carrying loads.

Engines with high \_\_\_\_\_ can carry more weight for further distances over a period of time. These engines are ideally suited to travelling at high speeds.

3a. Provide TWO ways in which torque can be rated (measured).

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3b. Provide TWO ways in which power can be rated (measured).

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4. Using the formula provided calculate the engine capacity of the following 4 cylinder engine:

Answers in cubic centimetres (cc) or litres (l)

Bore: 7.0cm

Stroke: 7.5cm

Cylinders: 4

Capacity =  $\frac{\text{bore}^2 \times 3.14}{4} \times \text{stroke} \times \text{No. cylinders}$

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5. Explain the term swept volume.

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**6. Explain the advantages of high compression engines over low compression engines.**

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**FINISHED? CHECK THAT YOU HAVE ATTEMPTED ALL QUESTIONS!**



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