



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.

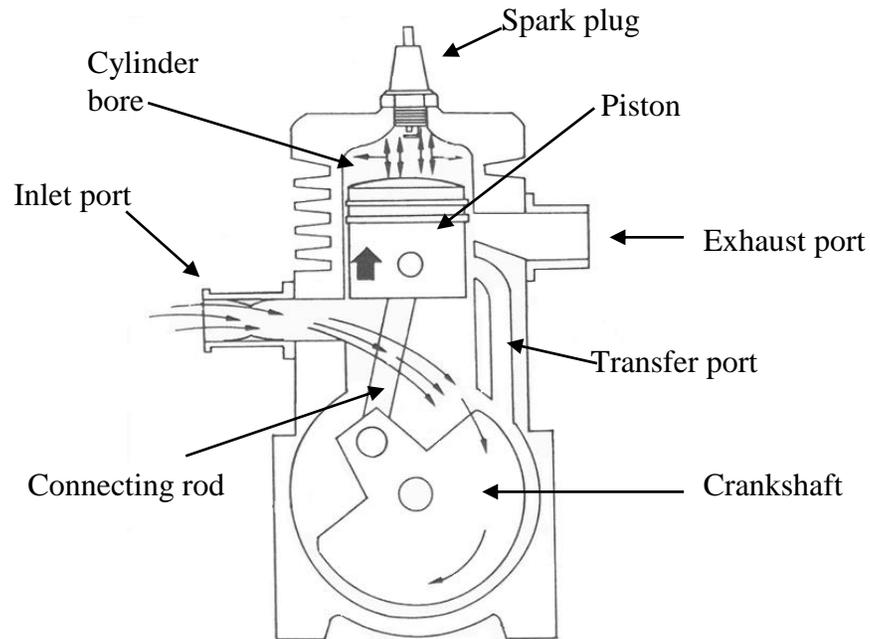
Student Signature: _____ Date: _____

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

ELEMENT ONE

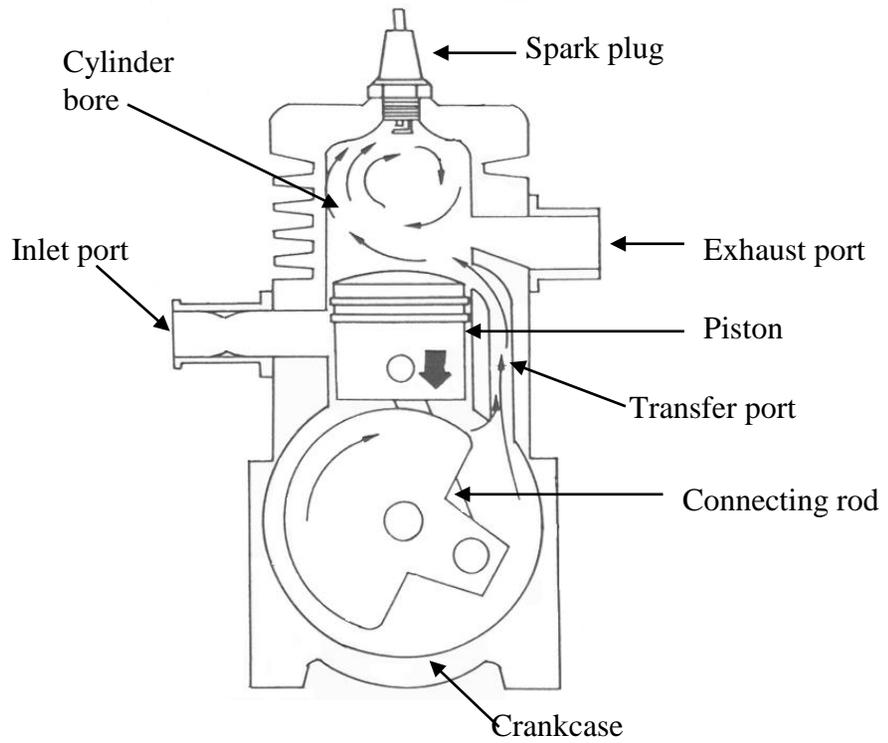
Demonstrate knowledge of spark ignition engine operation.

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.

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.

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. _____

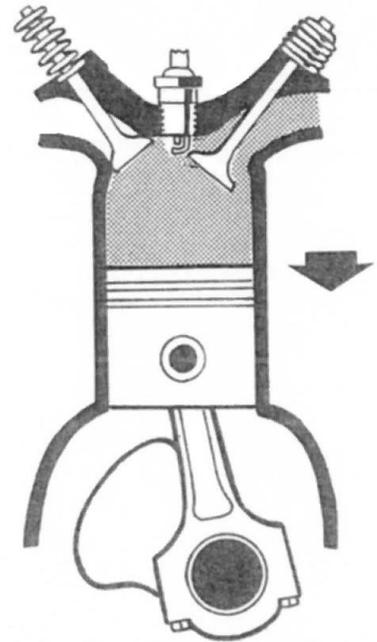
2. _____

3. _____

4. _____

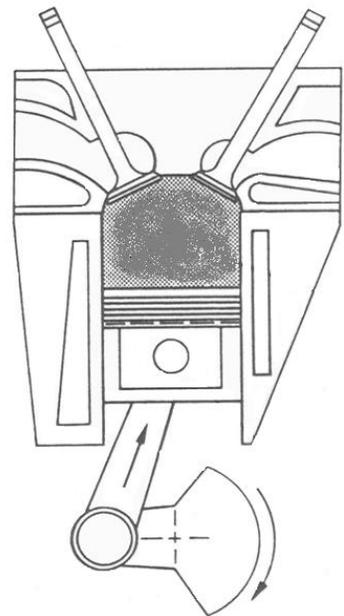
5. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: _____



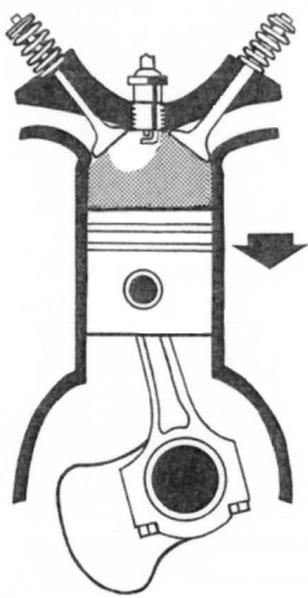
6. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: _____



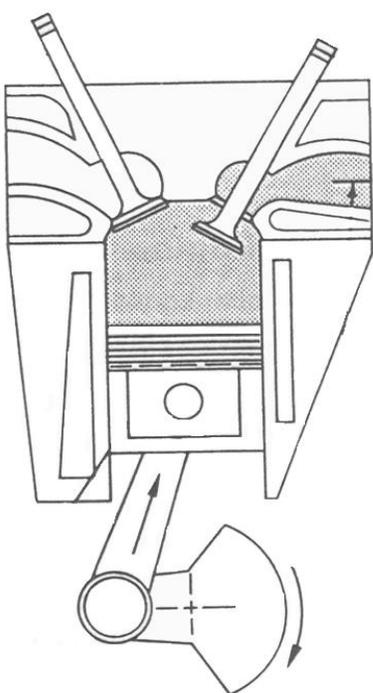
7. Identify the stroke shown in the diagram of a four stroke petrol engine and explain what happens during this stroke.

Stroke: _____



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

Stroke: _____



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	A6	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		6	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.

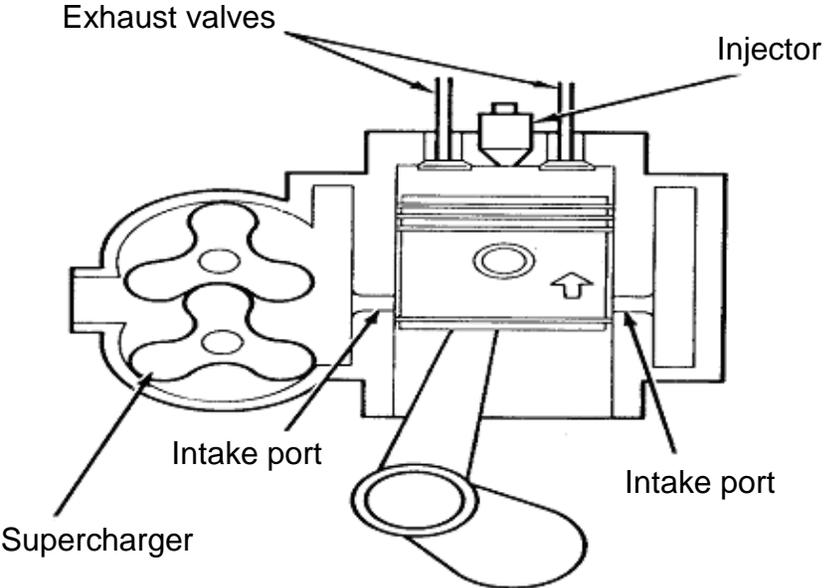
Diesel is injected into the cylinder and is ignited. The pressure of the combustion gases drives the piston downwards in the cylinder and by means of the connecting rod produces a rotary motion of the crankshaft.

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.



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

Intake Stroke :

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

Compression Stroke:

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

Power Stroke:

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

Exhaust Stroke :

ELEMENT THREE

Demonstrate knowledge of engine capacity and performance ratings.

1. Explain the term Torque.

b. Explain the term power.

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).

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

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

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

5. Explain the term swept volume.

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

FINISHED? CHECK THAT YOU HAVE ATTEMPTED ALL QUESTIONS!



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