



# MINI ENGINEERING QUIZ ANSWERS

### Apprentice (Level 1)

**1 What do the letters AC and DC stand for?**

AC stands for Alternating Current. DC stands for Direct Current.

**2 Which two units are used to measure engine power?**

PS rating (the metric equivalent of the old unit of horsepower) and kilowatts (kW) are used to measure engine power.

**3 What are the four 'strokes' in the four-stroke cycle of an engine?**

The four 'strokes' in the four-stroke cycle of an engine are: induction stroke, compression stroke, power stroke and exhaust stroke.

**4 Engine speed is measured in revolutions per minute. Which part of the engine is revolving?**

Each revolution is one turn of the crankshaft.

**5 Name two advantages of using Computer Aided Design (CAD).**

The advantages of CAD include:

- the ability to producing very accurate designs
- drawings can be created in 2D or 3D and rotated
- other computer programmes can be linked to the design software.

**6 Which factor determines the speed of windscreen wipers controlled by a rain sensor?**

The factor that determines the speed of windscreen wipers controlled by a rain sensor is the amount of rainfall.

**7 What are the three main stages of the design process?**

The three main stages of the design process are:

- creating a product design specification
- creating a mock-up
- creating a prototype.

**8 What were the two major influences on the development of car electronics?**

The two major influences on the development of car electronics were the increasing popularity and affordability of family cars, and the development of technology for the space race.



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### 9 What is an alloy?

An alloy is a material containing a mixture of two or more metals. An alloy metal can be used to provide increased strength or a lighter weight material.

### 10 Name three things in a car that are controlled by electronic systems?

Electronic systems control a number of functions in the car, including: headlights, the automatic lights-on system, power management, electronic brakeforce distribution and the rain sensor.

## Technician (Level 2)

### 11 Why has MINI developed MINIMALISM?

MINIMALISM technologies maximise the efficiency of the internal-combustion engine, so they reduce harmful emissions given off from the car and save the driver money on fuel.

### 12 What is ergonomics?

Ergonomics is the science of designing objects and environments that are ideally suited to the needs of people.

### 13 What is the purpose of servicing a car?

The purpose of servicing a car is to inspect and maintain it to make sure it continues to run smoothly and efficiently.

### 14 How does automatic headlight control make driving safer?

Automatic headlight control turns the low-beam headlights on when conditions are bad and it is difficult to see.

### 15 What is the difference between inspection and maintenance during a car's service?

Inspections involve visually checking and examining the condition of a vehicle, whereas maintenance is more to do with carrying out measures to maintain the functioning of the vehicle.



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### Master Technician (Level 3)

#### 16 How can different materials have an effect on the design of a car?

The answer could explain how different materials have different properties and a designer will choose materials depending on how he/she wants the car to look and perform. For example, carbon fibre is very strong and lightweight, making it ideally suited for reinforcing parts of the car.

#### 17 What developments in car design and manufacture might engineers work on in the future?

The answer could mention the need for cars to become even more fuel efficient and reduce the use of petrol or diesel, which gives off the greenhouse gas carbon dioxide (CO<sub>2</sub>) when it is burnt in a combustion engine. Designing cars that use less fuel and are more environmentally friendly are two of the most important areas that engineering are working on. You might like to use the internet to research alternative fuel sources such as hydrogen, solar power and biofuel, as well as hybrid engines.

#### 18 Why is it important to reduce CO<sub>2</sub> emissions from car engines?

CO<sub>2</sub> is a greenhouse gas that is contributing to climate change. You might like to use the internet to research the impact of climate change.

#### 19 How have car engines changed over the last 100 years?

You could mention how engines have become cleaner, use lighter materials, generate more power and are more fuel efficient.

#### 20 Why do you think engineering is important to the way we live?

Engineering has an impact on every aspect of our lives. For example, without engineers we wouldn't have clean water piped directly to our homes, MP3 players, televisions or cars. You might like to research other things that engineers are involved in, such as designing buildings or the role of engineering in helping to protect the environment, improving travel, health or manufacturing.