

# Design & Technology

## AQA A-Level

# Quality control

### Materials required for questions

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- Pencil
- Rubber
- Calculator

### Instructions

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- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

### Advice

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- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

# Good luck!

**Q1.** What is the main purpose of quality control during manufacturing?

- A** To reduce design time
- B** To monitor and test products to ensure they meet tolerances
- C** To speed up advertising

**Q2.** What is a 'go-no go' gauge used for?

- A** Measuring the electrical resistance of a circuit
- B** Testing whether a part fits within a specific tolerance range
- C** Scanning product labels for shipping

**Q3.** What is a benefit of using digital vernier callipers or micrometers in quality control?

- A** They increase the product size
- B** They provide quick and precise measurements
- C** They make the product cheaper

**Q4.** Which of the following is an example of non-destructive testing?

- A** Cutting open a component to inspect it
- B** X-ray or ultrasound testing to find internal defects
- C** Scrapping a batch to test random samples

**Q5.** The image shows a carbonated drinks bottle.



Identify and explain **three** specific dimensional quality control checks needed to ensure the carbonated drinks bottle can be filled and sealed correctly **(6 marks)**

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**Q8.** For a specific application, give two reasons why a go no-go gauge would be used **(3 marks)**

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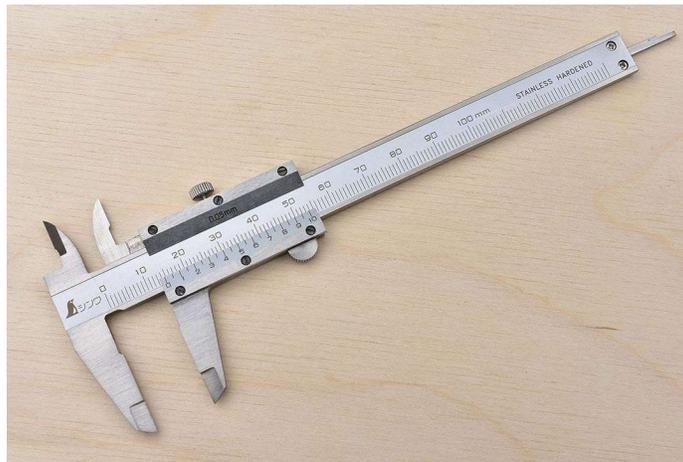
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**Q9.** Name the measuring device shown below and give a specific Quality Control application for it **(2 marks)**



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## Answers

Q1. B

Q2. B

Q3. B

Q4. B

Q5.

- The volume of the bottle must be checked to allow the designated volume for that container with appropriate gap below lid to allow for gas expansion.
- The ability of the bottle to stand vertically unaided to prevent falling on filling line etc.
- The neck diameter must be checked to make sure the screw on lid will fit and a seal can be produced to prevent CO2 leakage.
- The thickness of the polymer must be checked to ensure the bottle can withstand the pressures associated with carbonated drinks without fracture.
- The height of the bottle must be checked to ensure that it fits on the production line (or is the correct height for the filling nozzle on the production line).
- The length/depth of the screw will need to be checked to ensure that there is enough length/depth for the bottle top to fit and seal correctly.
- The pitch of the screw thread must be checked to match the screw top lid to be attached

Q6.

- can be done on objects without contact, increasing hygiene
- can be done from distance on objects that may be hot after forming
- can be directly compared with 3D CAD files through a direct computer link
- works to extreme level of accuracy and can measure multiple different measurements rapidly
- an expensive but important method for QC in industries with tight dimensional tolerances
- non-destructive testing method
- results can be fed back into the production line, identifying and feeding back issues instantly.

**Q7.**

- X-ray testing is an NDT (Non-Destructive Testing) method used to test products that can then be sold rather than recycled etc.
- X-ray testing allows the operator to visualise internal defects within a welded joint.
- A welded bridge structure is produced on a one-off basis meaning NDT testing is ideal.

**Q8.**

1 mark for a specific application

Example situations: hole diameter, component height, component width etc.

Max 2 marks for explaining why a go no-go gauge would be used in the specific application

1 mark per reason:

- Checking a dimension is within a tolerance range
- The accurate use of a go no-go gauge requires little training.
- A go no-go gauge is quicker than a digital device such as a Vernier caliper.
- A go no-go gauge requires infrequent recalibration.

**Q9.**

1 mark for recognition as a Vernier caliper / caliper

1 mark for a specific Quality Control application

Example applications:

- Checking or measuring the dimensional accuracy of an internal diameter.
- Checking or measuring the dimensional accuracy of an external diameter.
- Checking or measuring the dimensional accuracy of the depth of a blind hole.