

OCR A-Level

Physical Testing of Products – Functionality, Accuracy & Performance (8.2a)

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- 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

- 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. Testing a product for functionality primarily determines whether it:

- A** Looks aesthetically pleasing to the target market
- B** Performs its intended tasks correctly and reliably
- C** Is made from sustainable materials

Q2. Which type of test would be used to verify that a measuring instrument, like a digital calliper, provides correct readings?

- A** Performance test
- B** Accuracy test
- C** Durability test

Q3. Performance testing of a new vacuum cleaner might include evaluating its:

- A** Colour options and retail packaging
- B** Suction power, noise level, and energy consumption
- C** Cost of raw materials

Q4. A product that passes accuracy testing has been verified to:

- A** Operate within specified tolerances and produce consistent, correct results
- B** Be the cheapest option available on the market
- C** Have the fastest production time

Q5. The image below shows a stainless steel frying pan.



Describe one physical test that the frying pan would undergo to test performance. **(2 marks)**

Q6. Give two reasons why X-ray testing would be a suitable post-production test for a welded bridge structure. **(2 marks)**

Q7. Quality control and efficiency are key issues in modern manufacturing. Discuss the use of computer-aided testing within quality control systems for a high volume manufacturer. **(9 marks)**

Answers

Q1. B

Q2. B

Q3. B

Q4. A

Q5.

Possible physical testing methods may include:

- The materials could be tested to determine the rate of corrosion when exposed to sun and rain (1). Materials could be exposed to different weather conditions/tested for a change in toughness (1).
- Durability analysis of the racket (1) to test the wear rate of the strings/handle.
- Function testing through destructive testing (1) to assess how the tennis racket will perform in normal use. (1)
- User trials (1) could be used to evaluate the performance/feel of the racket, when in use (1)
- Any other valid suggestion.

Q6.

Give two reasons why X-ray testing would be a suitable postproduction test for a welded bridge structure.

1 mark per relevant point.

Indicative content:

- 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.

Award any other valid responses.

Q7.

Candidates might refer to the following in their responses:

- Allows for sampling

- Utilises coordinate measuring machines (CMM)
- Incorporates optical character recognition and barcode readers
- Can incorporate ultrasound scanning
- Use of measuring probes
- Can give immediate feedback on errors
- Efficiency of checking process
- Levels of accuracy
- Cost efficient method of quality control in mass production
- Automated production of QC records / QC data can be stored and reviewed
- Allows computerised adjustments to be made
- Uses feedback systems
- Removes human error
- Can operate in hazardous environments / improves safety
- Can continuously check quality without rest breaks / can run 24/7
- Can check several aspects simultaneously
- Can include failure mode and effects analysis (FMEA)
- Links to statistical process control (SPC)
- Laser scanning system can build 3D image to compare with ideal CAD model
- Unable to cope with unexpected issues / problem solving so human intervention is often necessary
- Set-up costs
- Staff require training
- Machines need to be maintained / calibrated
- Impacts on production flow
- Impacts on employment
- Destructive and non-destructive testing