

Qualification Framework written examination

Unit 4: Weights and Measures

May 2025

Guidance for this examination

Please ensure that you indicate clearly at the top of the answer booklet, the law viewpoint from which you will be answering: English, Scottish or Welsh.

The examiners may expect candidates to show knowledge of legislation which is in place but not in force (i.e. has been enacted) and regulations which have been made but are not yet in force, if they are directly relevant to the subject-matter of the examination.

Examination structure

There are two sections to the examination paper:

Section A Consists of six questions.
Candidates should attempt to answer three questions.
Total allocation of marks is 30 marks.
Suggested time allocation is 30 minutes.

Section B Consists of four questions.
Candidates should attempt to answer two questions.
Total allocation of marks is 70 marks.
Suggested time allocation is 90 minutes.

Total time allowed – two hours (plus ten minutes' reading time).

Note:

The Weights and Measures paper is a **closed book**; no materials are permitted to be taken into the examination room.

The examination paper has (5) pages, including this front sheet.

Section A

Candidates should attempt to answer three questions.

Each question carries ten marks.

Total: 30 marks.

1. Distinguish between a multi-range and a multi-interval non-automatic weighing instrument.
(10 marks)
2. Distinguish between the actual scale interval (d) and the verification scale interval (e).
(10 marks)
3. Briefly explain what a volumetric water meter is and how it works.
(10 marks)
4. Using an example, explain what an extended displaying device is.
(10 marks)
5. Briefly explain what a defective package is and how you would calculate the minimum acceptable contents.
(10 marks)
6. Identify what WELMEC is and briefly explain its structure, giving four examples of WELMEC Working Groups.
(10 marks)

Section A total of 30 marks.

End of Section A.

Section B
Candidates should attempt to answer two questions.
Each question carries 35 marks.
Total: 70 marks.

7. Answer all parts of the question.

You are an Inspector of Weights and Measures and are undertaking a project looking at Non-Automatic Weighing Instruments in the industrial sector. Your authority does not own a weighbridge test unit and needs to hire one from a local weighbridge unit hire company. The test unit is composed of 20 x 1 tonne weights and 2 x 200kg weights. You are inspecting a weighbridge of 50 tonnes with division sizes of 20kg. The instrument has an automatic zero setting device.

- (a) With reference to the Weights and Measures Act 1985 and subsidiary legislation, explain how you would decide if you can use the test standards. (5 marks)
- (b) Why would the weighbridge test unit have 2 x 200kg test loads? (5 marks)

You decide to inspect the weighbridge. Your department has a policy that inspections of Non-Automatic Weighing Instruments will follow the same procedure as initial conformity assessment.

- (c) Outline the metrological tests you would apply when undertaking this inspection. (15 marks)

You discover that the instrument has an error of 100kg at 36 tonnes.

- (d) With reference to the Non-Automatic Weighing Instruments Regulations, explain what actions you could take. See table 7, below. (5 marks)

Table 7

| Maximum permissible errors | For loads, m , expressed in verification scale intervals, e | | | |
|----------------------------|---|-----------------------------|---------------------------|-----------------------|
| | Class I | Class II | Class III | Class IIII |
| $\pm 0,5 e$ | $0 \leq m \leq 50\,000$ | $0 \leq m \leq 5\,000$ | $0 \leq m \leq 500$ | $0 \leq m \leq 50$ |
| $\pm 1,0 e$ | $50\,000 < m \leq 200\,000$ | $5\,000 < m \leq 20\,000$ | $500 < m \leq 2\,000$ | $50 < m \leq 200$ |
| $\pm 1,5 e$ | $200\,000 < m$ | $20\,000 < m \leq 100\,000$ | $2\,000 < m \leq 10\,000$ | $200 < m \leq 1\,000$ |

- (e) The owner of the weighbridge calls in a weighbridge repair company and it becomes apparent that a load cell has broken and must be replaced. The weighbridge repair company does not have an identical load cell and would like to replace it with one from a different manufacturer, but an identical technical specification. Is this permissible? (5 marks)
- (Total: 35 marks)

Section B continues over the page.

8. Answer all parts of the question.

You have received a call from the landlord of a public house in your area. Many of his customers are complaining to him that he is giving short measure beer and cider. He has telephoned you for advice on his obligations on selling all types of intoxicating liquor for consumption in his pub.

- (a) Outline the advice you would give to the landlord.
(10 marks)
 - (b) The landlord is nervous of the complaints from his customers regarding potential short measure beer and cider. With detailed reference to the relevant weights and measures regulations, appeal cases and guidance, explain the requirements in relation to the sale of beer and cider in his pub.
(7 marks)
 - (c) With reference to the Measuring Instruments Regulations 2016, explain the different types of capacity serving measure that could be used. Which type would you advise the landlord to use if he wishes to serve a full pint of beer or cider?
(7 marks)
 - (d) What conformity assessment and other marks would you expect to see on the capacity serving measure that the landlord uses?
(6 marks)
 - (e) Explain whether you would permit the landlord to use a conformity assessed brim measure marked with a crown symbol for selling beer and cider in the pub.
(5 marks)
- (Total: 35 marks)

9. Answer all parts of the question

You are carrying out an inspection at a local petrol station. It is a hot, sunny day and the temperature gauge in your car shows 26° C.

- (a) Explain the legislation that governs the units of measure that must be used when selling liquid fuel.
(5 marks)
 - (b) The headwork of the petrol pump is marked with the phrase "*litres at 15° centigrade*". What are the implications for both the customer and the trader with regard to the quantity of the fuel delivered, if the STA is not operational on the day you visit? Contrast this with the situation if the STA is working.
(5 marks)
 - (c) Explain in detail the relevant guidance notes relating to the conformity assessment of liquid fuel measuring instruments with standard temperature accounting.
(10 marks)
 - (d) You decide to test the liquid fuel measuring instrument to see if it complies with the accuracy requirements of schedule 1 and 1F of the Measuring Instrument Regulations 2016. Explain in detail the requirements that would apply to the steel working standard capacity measures that you would use, the physical tests you would undertake and what errors you would apply when testing the liquid fuel measuring instrument
(15 marks)
- (Total: 35 marks)

Section B continues over the page.

10. Answer all parts of the question.

You go to a local builders' merchant that packs sand and ballast in a wide range of sizes - from 10kg, 25kg to 250kg and 500kg. The 500kg and 250kg bags are open and the 25kg and 10kg bags are sealed. All of the bags are packed on site and none of them have any weight markings.

- (a) With detailed reference to weights and measures legislation, explain whether the packages should be marked with weight. (7 marks)
- (b) With reference to the relevant regulations, explain the rules that the packer should meet. (7 marks)

The builders' merchant explains that he had intended to pack the larger packages with a nominal quantity of 25kg and the smaller ones with the nominal quantity of 10kg. You weigh all the packages. The 25kg packages are all more than 100g below the nominal weight and the 10kg packages are all more than 80g below the nominal weight.

- (c) Could you undertake a reference test in these circumstances? Explain your reasoning. (5 marks)
- (d) The packaging of the sand and ballast is predominantly white, and the colour of the weight marking will be grey. Comment on whether you think this colour choice would be acceptable. (5 marks)
- (e) Is it likely that the packages would meet the packers' rules? Explain your answer in terms of the Packaged Goods Regulations. (5 marks)
- (f) What is a desiccating product and why is it important with regard to the packing of sand and ballast? (6 marks)

(Total: 35 marks)

Section B total of 70 marks

End of Section B.

END OF EXAM PAPER.