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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

## Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

## Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities. Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Mark
1(a)(i)	<ul style="list-style-type: none"> <li>1.72 (mm)</li> </ul>	1
1(a)(ii)	<ul style="list-style-type: none"> <li>Use of percentage uncertainty = (half resolution / measurement) <math>\times</math> 100%</li> <li>Percentage uncertainty = 0.29 (%) e.c.f. 1(a)(i)</li> </ul> <p>Allow 1 mark only for a correct percentage calculated using the full resolution (0.01 mm)</p> <p><u>Example of calculation</u></p> <p>Percentage uncertainty = <math>(0.005 / 1.72) \times 100\% = 0.29 \%</math></p>	2
1(a)(iii)	<p><b>EITHER</b></p> <ul style="list-style-type: none"> <li>Check for zero error (on the micrometer)</li> <li>to remove <u>systematic</u> error</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>Prevent over-tightening/deformation</li> <li>By using the ratchet when closing</li> </ul>	2
1(b)	<ul style="list-style-type: none"> <li>Add the 20g mass (a distance from the pivot) <b>and</b> move the ruler to find the new balance point</li> <li><b>Or</b> move the ruler to unbalance it <b>and</b> add/move the 20g mass to find the new balance point</li> <li>Measure the distance from the pivot to the centre of gravity of the ruler <b>and</b> measure the distance from the pivot to the (centre of the) 20g mass</li> <li>Calculate the mass of the ruler using the principle of moments</li> <li>Repeat measurements of distance for different positions of the 20g mass <b>and</b> calculate the mean mass of the ruler</li> </ul> <p>Accept “centre of gravity” for balance point in MP1</p> <p>Accept additions to the diagram for MP1 &amp; MP2</p>	4
<b>Total for question 1</b>		<b>9</b>