

# Mark Scheme (Results)

June 2015

NQF BTEC Level 1/Level 2 Firsts in  
Engineering

Unit 9: Interpreting and Using  
Engineering Information (21174E)

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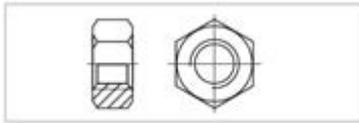
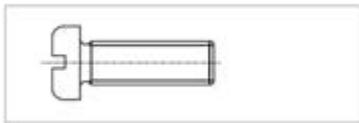
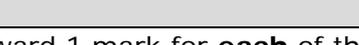
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Question Number	Answer	Mark
1 (a)	A – Isometric E – General assembly  <b>Accept no variation</b>	2

Question Number	Answer	Mark
1 (b)(i)	<p>Award 1 mark for <b>each</b> symbol matched to the correct component name.</p> <p><b>Mechanical component symbol      Name</b></p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Key</div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Clip</div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Nut</div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Spring</div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Screw</div> </div>	2

Question Number	Answer	Mark
1 (b)(ii)	<p>Award 1 mark for <b>each</b> of the following responses, up to a maximum of 2 marks</p> <ul style="list-style-type: none"> <li>• Components are easy to read/identify/understand/simpler to draw (1)</li> <li>• For consistency as they are standardised (1)</li> <li>• CAD systems contain pre-drawn symbols (1)</li> <li>• Universally/internationally recognised (1)</li> <li>• To meet BS/ISO standard (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
2 (a)	<p>Award 1 mark for any of the following responses:</p> <p>Any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• Switch off (1)</li> <li>• Switch off after use (1)</li> <li>• Isolate (1)</li> <li>• Please switch off lights (1)</li> <li>• Save energy turn off lights (1)</li> <li>• Turn off here (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept 'emergency stop'.</b></p>	1

Question Number	Answer	Mark
2 (b)	<p>Award 1 mark for <b>each</b> of the following responses, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Wear gloves/do not touch/no contact with skin (1)</li> <li>• Do not rub eyes after use (1)</li> <li>• Wash your hands after use (1)</li> <li>• Wear eye protection (1)</li> <li>• Replace lid immediately after use (1)</li> <li>• Adequate ventilation (1)</li> <li>• Product should be disposed of safely (1)</li> <li>• Containers should be used that are chemical and resistant/leak free (1)</li> <li>• Safe/secure storage (1)</li> <li>• Avoid spillages (1)</li> <li>• Material information sheet/COSHH procedures should be used (1)</li> <li>• Chemical should not be used next to naked flame (1)</li> <li>• Handle with care (1)</li> <li>• Wear overalls/apron/protective clothing (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept the term 'personal protective equipment' or 'PPE'.</b></p>	2

Question Number	Answer	Mark
2 (c)	<p>Award 1 mark for <b>each</b> of the following responses, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Emergency stop (1)</li> <li>• Emergency exit/exit (1)</li> <li>• Fire exit/escape (1)</li> <li>• First aid station/first aid (1)</li> <li>• Emergency eye wash (1)</li> <li>• Emergency telephone (1)</li> <li>• Assembly point (1)</li> <li>• Fire break glass (1)</li> <li>• Emergency shower (1)</li> </ul> <p><b>Accept any other appropriate interpretation of the above responses.</b></p>	2

Question Number	Answer	Mark
3 (a)	<p>Award 1 mark for any of the following responses:</p> <p>Any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• 13.8 (1)</li> <li>• 13.8 mm (1)</li> </ul> <p><i>Some learners may indicate the above on the table itself.</i></p> <p><b>Accept no variation</b></p>	1

Question Number	Answer	Mark
3 (b)	<p>Award <b>one</b> mark for setting up bend allowance equation with correct data (1) and <b>one</b> mark for correct answer (1)</p> <p><math>E = 25 - (6 + 2) = 17 \text{ mm}</math>  <math>M = 15 - (6 + 2) = 7 \text{ mm (1)}</math></p> <p>Total = <math>17 + 11.6 + 7 = 35.6\text{mm (1)}</math></p> <p><b>Allow error carried through.</b>  <b>Award full marks if correct answer only given.</b></p>	2

Question Number	Answer	Mark
3 (c)	<p>A linked response, award 1 mark for identifying the reason and 1 mark for an extension, up to 2 marks for <b>each</b> response, up to a maximum of 4 marks:</p> <ul style="list-style-type: none"> <li>• To ensure improved bend consistency (1) as figures used will take into account material type and size (1)</li> <li>• To remove guesswork (1) allowing an accurate test piece to be manufactured (1)</li> <li>• To allow easier design of a gauging system (1) as the chart allows standard allowances to be applied (1)</li> <li>• There is a visual representation of the bend that will be produced (1) which helps with the design for assembly purposes (1)</li> <li>• So standard drawings can be used (1) to reduce overall lead times to manufacture filing cabinets (1)</li> <li>• To allow a standard range of form tools to be sourced/used/replaced (1) which ensures expensive specialist tooling is not required (1)</li> <li>• Drawings are not normally dimensioned in this way (1) so bend radius is not always easily visible (1)</li> <li>• Complex calculations can be avoided (1) as the values are already predetermined (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Accept 'faster', 'easier' or 'more accurate' with appropriate justification for 1 mark.</b></p>	4

Question Number	Answer	Mark
4 (a) (i)	<p>Award 1 mark for any of the following responses:</p> <p>Any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• 85 (1)</li> <li>• 85 mm (1)</li> <li>• 8.5 cm (1)</li> <li>• 0.085 m (1)</li> <li>• Eighty five</li> </ul>	1

Question Number	Answer	Mark
4 (a) (ii)	<p>Award 1 mark for any of the following responses:</p> <p>Any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• Counterbore</li> <li>• Counterboring</li> </ul> <p><b>Accept any phonetic spelling of the above word.</b></p> <p><b>Do not accept 'Countersinking'.</b></p> <p><b>Accept no variation</b></p>	1

Question Number	Answer	Mark
4 (b)	<p>A linked response, award 1 mark for identifying the advantage and 1 mark for the extension, up to 2 marks for <b>each</b> response, up to a maximum of 4 marks:</p> <ul style="list-style-type: none"> <li>• Allows a more accurate interpretation (1) as a three dimensional object can be shown in two dimensions (1)</li> <li>• The layout of views follows a set of rules/conventions (1) that are universally recognised as they follow BS/ISO/International standards (1)</li> <li>• They usually contain the necessary information to allow the part to be produced/manufactured (1) reducing the need to refer to other documentation/drawings (1)</li> <li>• Drawings are scaled (1) providing a realistic depiction of the part being represented (1)</li> <li>• They use a range of specific linetypes/styles (1) which can be used to easily represent different features of the part (1)</li> <li>• Prevents confusion/errors in size (1) as there is a standard/unique dimensioning style used (1)</li> <li>• To allow specific/particular features to be produced (1) as it uses specific conventions/codes for tolerances/surface finish (1)</li> </ul> <p><b>Accept any other appropriate response.</b> <b>Do not accept 'easier' without appropriate justification.</b></p>	4

Question Number	Answer	Mark
4 (c)	B Third angle	1

Question Number	Answer	Mark
5 (a)	<p>Award 1 mark for <b>each</b> of the following responses:</p> <ul style="list-style-type: none"> <li>• 1 – Process / Method / Operation / Procedure / Instructions / Production / Job / Activity</li> <li>• 2 – Inspection / Quality control check / Critical control point</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept 'check' on its own.</b></p>	2

Question Number	Answer	Mark
5 (b)	<p>A linked response, award 1 mark for identifying the advantage and 1 mark for the extension, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• The skilled engineer has an auditable record of the method used (1) for accountability purposes (1)</li> <li>• The skilled engineer can establish if similar production plans exist (1) when considering tools/equipment/material purchasing decisions (1)</li> <li>• To facilitate continuity (1) if the skilled engineer can no longer carry out all of the design/making activities (1)</li> <li>• To establish if productivity can be improved (1) by interrogating the plans to reduce/combine inefficient operations (1)</li> <li>• It is quicker to amend an existing plan then create a new one (1) if the skilled engineer produces a similar design (1)</li> <li>• The production plan can be sent to a customer/supplier (1) if the part is to be made elsewhere (1)</li> <li>• One-off parts might break/need replacing (1) saving the plan allows the part to be made again quickly (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
6 (a) (i)	<p>Award 1 mark for any of the following responses:</p> <p>Any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• Operation sheets</li> <li>• Job cards</li> <li>• Test schedules</li> <li>• Weld procedure specification</li> <li>• Engineering drawing</li> <li>• Orthographic projections</li> <li>• Blueprints</li> <li>• Technical drawings</li> <li>• First/third angle projection</li> <li>• Production plan</li> <li>• Standard operating procedure/SOP</li> </ul> <p><b>Do not accept machinery handbook, Zeus chart, risk assessments, reference tables and charts.</b></p>	1

Question Number	Answer	Mark
6 (a) (ii)	<p>Award 1 mark for <b>each</b> of the following responses, up to a maximum of 2 marks</p> <ul style="list-style-type: none"> <li>• To ensure the parts are fitted correctly/a procedure is followed/consistency (1)</li> <li>• Clear instructions are given (1)</li> <li>• To meet the product specification (1)</li> <li>• To avoid injury/danger to the user/operator (1)</li> <li>• To prevent the need for rework (1)</li> <li>• Full list of parts are provided (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept easier/cheaper/faster without justification.</b></p>	2

Question Number	Answer	Mark
6 (b)	<p>A linked response, award 1 mark for identifying the advantage and 1 mark for the explanation, up to two marks for <b>each</b> response, up to a maximum of 4 marks:</p> <ul style="list-style-type: none"> <li>• Can be used to confirm the manufacturing process at CF82 is meeting quality indicators (1) so non-value adding inspection can be reduced (1)</li> <li>• Can be used to assist in the diagnosis of ongoing manufacturing issues at CF82 (1) so the root causes can be addressed (1)</li> <li>• Can be used to identify special causes of manufacturing variability (1) to ensure changes are only made when required (1)</li> <li>• Can be used to check if manufacturing process changes are having a positive impact (1) to ensure process improvement efforts are focused (1)</li> <li>• Can be used to promote a quality culture at CF82 (1) as technicians will complete/monitor the charts (1)</li> <li>• Can be used to predict when faults may occur (1) allowing for preventative action to be taken (1)</li> <li>• Can be used to compare manufacturing processes (1) to identify differences between machines/processes/operators (1)</li> <li>• Gives a visual indication of quality (1) so issues can be easily identified (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	Mark
7 (a)	<p>Award 1 mark for <b>each</b> of the following responses, up to a maximum of 2 marks</p> <ul style="list-style-type: none"> <li>• To prevent manufacturing mistakes</li> <li>• To prevent drawing misinterpretation</li> <li>• To prevent production delays</li> <li>• To ensure the inaccurate drawings are not issued again</li> <li>• To comply with quality assurance procedures</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
7 (b)	<p>A linked response, award 1 mark for identifying the disadvantage and 1 mark for an extension, up to 2 marks for each response, up to a maximum of 4 marks:</p> <ul style="list-style-type: none"> <li>• The original drawing could be used as a working drawing (1) meaning drawings may need to be redrawn (1)</li> <li>• Might not be using the latest version of the drawing (1) meaning that parts/products may not be produced to the latest specification (1)</li> <li>• Personnel could use dirty hands (1) meaning unreadable versions of the drawings may be in use (1)</li> <li>• Personnel could use amend drawings/add graffiti (1) meaning personalised versions of the drawings may be in use (1)</li> <li>• Paper drawings are more easily lost (1) because they often follow the work in progress (1)</li> <li>• Folding methods can cause interpretation errors (1) as important information could be obscured by creases (1)</li> <li>• Speed of data transfer is compromised (1) as drawings may have to be posted to other companies for approval and/or use (1)</li> <li>• Speed of access to drawings (1) as each copy of the drawing will need to be located and signed out/signed in (1)</li> <li>• Filing cabinets are required to store the drawings (1) this has a cost/space/security implication for SN10 Engineering (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Indicative content	Mark
7(c)	<p><b>Possible impact</b></p> <p>This may seem like a way of avoiding extra costs/time/paperwork; however, quality control documentation is part of a quality management system and not only provides a structure and framework, it also ensures the rigour of an audit mechanism that enforces corrective action.</p> <p>Possible implications/impact</p> <ul style="list-style-type: none"> <li>• Processes are not optimised if best practices are not documented</li> <li>• Processes are person-dependent meaning any new employee would not know how to do the work as it isn't documented</li> <li>• Defects are difficult to spot and eliminate at the earliest stage</li> <li>• Corrective actions are unlikely to be taken as soon as defects occur</li> <li>• Changes in procedures and policies are unlikely to be implemented over time/communicated properly</li> <li>• It's more difficult to gauge the capability/performance of processes/machines/operators, etc.</li> <li>• Customers will expect quality control documentation to be in place and up to date</li> <li>• Unable to gain quality recognition to compete for business</li> <li>• Staff will have less accountability/responsibility</li> <li>• The cost of training and implementing the documentation system is avoided</li> <li>• The cost of maintaining/auditing the documentation is avoided</li> <li>• Less paperwork/time required completing documentation</li> <li>• Lack of documentation may result in difficulties defending legal action</li> </ul>	8

	<p><b>Model answer</b></p> <p>Quality control documentation is a key part of a quality assurance system and not having documentation could lead to defects that are difficult to spot and eliminate at the earliest stage. There will be no audit trail and customers will expect this in order to ensure quality and meet normal ISO expectations. Employees may appreciate not having to spend time completing the paperwork, consequentially they will have less accountability/responsibility; however, this is likely to lead to increased variability in products as they may not take the actions that the paperwork would be likely to highlight. Not having documentation is less likely to lead to an organisation that embraces continuous improvement and therefore it may not be able to compete on quality matters.</p> <p><b>Accept any other valid response.</b></p>	
<b>Level</b>	<b>Descriptor</b>	
0 0 marks	No rewardable material	
1 1-3 marks	A few key points identified, or one point described in some detail. The answer is likely to be in the form of a list. Only one viewpoint considered. Points made will be superficial/generic and not applied/directly linked to the impact of not having quality control documentation. The learner shows limited understanding of the use of quality control documentation.	
2 4-6 marks	Some points identified, <b>or</b> a few key points described. Consideration of more than one viewpoint but there will be more emphasis on one of them. The answer is unbalanced. Most points made will be relevant to the impact of not having quality control documentation but the link will not always be clear. The learner shows good understanding of the use of quality control documentation.	
3 7-8 marks	Range of points described, <b>or</b> a few key points explained in depth. All sides of the case are considered and the answer is well-balanced, giving weight to all viewpoints. The majority of points made will be relevant and there will be a clear link to the impact of not having quality control documentation. The learner shows developed understanding of the use of quality control documentation.	

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