

Mark Scheme (Results)

January 2016

NQF BTEC Level 1/Level 2 Firsts in  
Engineering

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

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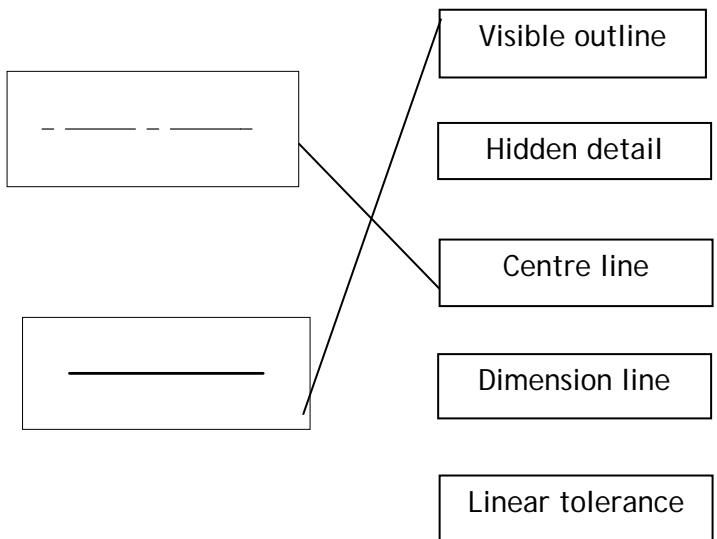
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Question Number	Answer	Mark
1 (a)	B – Sketches D – Flow charts	2

Question Number	Answer	Mark
1 (b)(i)	<p>Award 1 mark for each linetype matched to the correct linetype name.</p> <p>Drawing linetype</p>  <p>Linetype Name</p> <ul style="list-style-type: none"> <li>Visible outline</li> <li>Hidden detail</li> <li>Centre line</li> <li>Dimension line</li> <li>Linear tolerance</li> </ul>	2

Question Number	Answer	Mark
1 (b)(ii)	<p>Award 1 mark for each of the following responses, up to a maximum of 2 marks</p> <ul style="list-style-type: none"><li>• Parts of a drawing are easy to identify/understand (1)</li><li>• For consistency as they are standardised (1)</li><li>• Universally/internationally recognised (1)</li><li>• So the user can see different drawing/component features/details (1)</li><li>• Speed as it is quicker than writing notes on a drawing (1)</li><li>• Centrelines show you that a part is symmetrical (1)</li><li>• Hidden detail lines save you drawing additional views (1)</li><li>• Visible outlines are thicker to show the outline of a shape (1)</li></ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
2 (a)(i)	Battery – A (1)  <b>Accept the correct components being circled on the diagram and the symbol being drawn in the space for the answer.</b>	1

Question Number	Answer	Mark
2 (a)(ii)	Push switch - B  <b>Accept the correct components being circled on the diagram and the symbol being drawn in the space for the answer.</b>	1

Question Number	Answer	Mark
2 (a)(iii)	Motor	1

Question Number	Answer	Mark
2 (b)(i)	Green  or  5  <b>5 is acceptable. Although not a colour, it represents green on the chart.</b>	1

Question Number	Answer	Mark
2 (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>• Resistors are too small to put values on (1)</li> <li>• Quick method of obtaining a resistors value (1)</li> <li>• Use a standard colour scheme to identify values (1)</li> <li>• Universally recognised/independent of language barriers (1)</li> <li>• Visual representation allows for ease of memorising (1)</li> <li>• Easier to understand/interpret (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept answers that relate to the function of a resistor in a circuit design, or responses that include references to the strength, power or current of a resistor.</b></p>	2

Question Number	Answer	Mark
3 (a)	B – Scale D – Fixed reference points	2

Question Number	Answer	Mark
3 (b)	<p>A linked response, award 1 mark for identifying reason and 1 mark for the extension, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Allows products to work as designed (1) as parts will fit together correctly (1)</li> <li>• Identifies a size range to work within (1) to ensure connecting parts fit and function correctly (1)</li> <li>• To reduce costs (1) as unnecessarily tight tolerances make parts more expensive to manufacture (1)</li> <li>• To reduce production times (1) as some parts have wider tolerances than others (1)</li> <li>• Removes engineers best guess (1) as they may not know how the parts fit together (1)</li> <li>• Defines the type of fit required on a part (1) so they can make the part accurately (1)</li> <li>• To ensure consistency (1) as all products are made to the same dimensional standard (1)</li> <li>• Defines the type of fit (1) allowing appropriate machines/tools/techniques to be selected (1)</li> <li>• To allow accurate checking/gauges/QA (1) and easy accept/reject decisions (1)</li> <li>• To ensure parts will fit together correctly (1) allowing products to work as designed (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
4 (a)(i)	B – Square butt	1

Question Number	Answer	Mark
4 (a)(ii)	<p>Award 1 mark</p> <p>Fillet</p> <p><b>Accept other types of fillet weld such as continuous fillet.</b></p> <p><b>Accept any recognisable spelling (phonetic) of the answer above.</b></p>	1

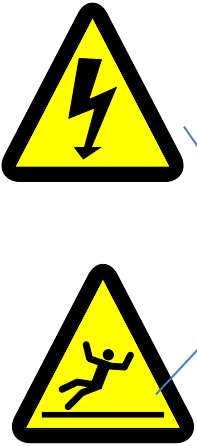
Question Number	Answer	Mark
4 (a)(iii)	<p>A linked response, award 1 mark for identifying the advantage and 1 mark for the extension, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Specific audit trail to refer back to (1) in the event of failure/issue with the customised frame (1)</li> <li>• More likely to be produced to the customised design (1) as a welding drawing is produced for each specific bicycle frame (1)</li> <li>• Welding drawings can be shown to customers (1) to allow them to choose specific weld features (1)</li> <li>• Drawings can be more easily modified (1) allows customers to specify similar designs (1)</li> <li>• Enables experienced welders to choose correct process (1) according to strength/performance requirements of the customer (1)</li> <li>• To ensure the operator can position parts of the frame in the correct place/shows the geometry of the frame (1) as it is probable that other documentation will not be available (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2



Question Number	Answer	Mark
4 (b)(i)	Award 1 mark  Row A – Joint type/type of joint/type of weld/weld used/welding joint	1

Question Number	Answer	Mark
4 (b)(ii)	Award 1 mark  Accept any value in the range 8-25mm and also the range 8-25mm.	1

Question Number	Answer	Mark
4 (b)(iii)	<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>• Allows NP11 to confirm the weld has been produced to the original requirement (1) giving cycling teams confidence that quality is consistent/maintained (1)</li> <li>• Weld procedures are standardised (1) which allows NP11 to repair frames made by a variety of manufacturers (1)</li> <li>• Allows early materials and resource preparation (1) so repair time can be compressed (1)</li> <li>• Allows a skilled welder to refer to the unique material and size constraints of the frame (1) to make best use of the welding resources available (1)</li> <li>• Weld procedure specifications allow NP11 to equip their mobile workshop (1) to cover the widest range of repair solutions (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept 'quicker' / 'cheaper' without appropriate justification.</b></p>	4

Question Number	Answer	Mark
5 (a)	<p>Award 1 mark for each safety sign matched to the correct sign name.</p> <div><p><b>Safety Sign</b></p><p><b>Sign Name</b></p><p>Emergency exit</p><p>Slippery surfaces</p><p>Highly flammable</p><p>Skin irritant</p><p>High voltage</p></div>	2

Question Number	Answer	Mark
5 (b)	<p>A linked response, award 1 mark for identifying the implication and 1 mark for the extension, up to a maximum of 2 marks:</p> <ul style="list-style-type: none"> <li>• Employees could be at risk of accidents/incidents/near misses/dangerous occurrences (1) as there is no prior warning of what hazard/risk a machine presents (1)</li> <li>• The company are breaching health and safety rules (1) therefore they could be prosecuted under HASAW 1974 (1)</li> <li>• Serious injury/death could occur (1) leading to financial penalties/compensation claims/prosecution (1)</li> <li>• Lack of health and safety culture (1) could lead to loss of reputation/certification (1)</li> <li>• Recruitment issues/loss of production (1) as a result of staff reluctance to use machines (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
6 (a)(i)	A – Capacity	1

Question Number	Answer	Mark
6 (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>• It pinpoints the most sensitive activities in a project (1)</li> <li>• Pinpoints activities with flexibility/float (1)</li> <li>• A system of organising tasks/activities in a project (1)</li> <li>• A series of lines and circles depicting activity flow (1)</li> <li>• Indicate which variables have the greatest cumulative effect on a project (1)</li> <li>• Depicts earliest start time/latest start time of activities (1)</li> <li>• Determines the quickest route to achieve project completion (1)</li> <li>• Depicts earliest finish time/latest finish time of activities (1)</li> <li>• Dictates how long a task will take to complete (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	1

Question Number	Answer	Mark
6 (a)(iii)	<p>A linked response, award 1 mark for identifying the advantage 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>• Milestones allow this complex project to be broken down into stages (1) clearly showing critical points of the container manufacture (1)</li> <li>• Milestones allow project reviews (1) allowing the company to evaluate the success of supplier interaction/assembly (1)</li> <li>• Increases visibility of the impact of scheduled revisions (1) to ensure awareness when major milestones have been missed/when there is a risk of missing a milestone when it comes close (1)</li> <li>• Ease of production intervention (1) ensuring that all parts of the complex container come together at the right time (1)</li> <li>• Able to share with suppliers (1) ensuring their production/delivery of parts/their suppliers are able to meet each milestone/stay on schedule (1)</li> <li>• Makes it clear where the assembly dependencies are (1) allowing the company to focus resources on value adding activities (1)</li> <li>• Makes it clear where the supplier's responsibilities lie (1) allows overall central control (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	Mark
6 (b)	<p>Award one mark for any <b>two</b> of the following responses, up to 2 marks:</p> <ul style="list-style-type: none"><li>• NW34 Engineering would not know when the document was first produced</li><li>• NW34 Engineering would not know if they have the latest version</li><li>• NW34 Engineering would not know if there have been any alterations/modifications to a document</li><li>• Products could be manufactured incorrectly</li><li>• Incorrect parts could be ordered</li><li>• The documentation could remain out of date/never get amended/not valid</li><li>• Allows for an audit trail for documentation</li></ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
7 (a)	<p>A linked response, award 1 mark for identifying the advantage 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>• Employees at each site are familiar with the operation sheet layout (1) leading to increased productivity of bolts (1)</li> <li>• Standardised operations are more easily achieved (1) as tooling/materials can be compatible (1)</li> <li>• It is easy to transfer the operation to another site (1) if there is a production issue at one site (1)</li> <li>• Transfer of operators across sites can be more easily accommodated (1) as process familiarity exists over the whole company (1)</li> <li>• Any errors/improvements on the operations sheet may become visible quicker (1) developing/leading to better, more efficient operations in manufacturing (1)</li> <li>• Allows for scheduling of machine use across sites (1) improving machine utilisation (1)</li> <li>• Company can compare the performance of operators/machines (1) as all bolts should be produced in the same time/to the same quality (1)</li> <li>• Lower fixed/planning costs (1) as less time is required to write multiple operation sheets (1)</li> <li>• The operation sheet can be produced to take into account site facilities (1) meaning lower capital investment requirements (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p> <p><b>Do not accept 'easy' without justification.</b></p>	4

Question Number	Indicative content	Mark
7 (b)	<p>Learners may contextualise their responses to reference tables, SPC, Pareto charts, quality control information/ISO9001, although responses are still creditable without this link.</p> <ul style="list-style-type: none"> <li>• Appropriate gauging systems can be designed for quantity production</li> <li>• If a specific bolt was fully inspected based on sampling requirements, judgements can be made against the relevant information</li> <li>• Monitor/track various processes during bolt manufacture</li> <li>• Analyses efficiency and effectiveness of machining operations during quantity manufacture</li> <li>• Helps to improve consistency/maintain standard across bolt sizes</li> <li>• Reduces likelihood of faulty bolts which need to be recalled or replaced</li> <li>• Allows operators to flag up and act on quality issues</li> <li>• Allows operators/machines/processes to be compared</li> <li>• To monitor quality performance over time</li> <li>• Allows records to be generated, which provides an audit trail</li> <li>• Allows quality information to be visually displayed</li> <li>• Reduces the need for 100% sampling/inspection</li> <li>• Allows the company to analyse the source of any major defect with the process of bolt manufacture</li> <li>• To determine the most significant and least significant problems during the bolt manufacture</li> <li>• Easy to identify the issue that has the greatest cumulative effect on the manufacture of the bolts (80/20 rule)</li> <li>• Information will be available for quality audits</li> <li>• Customer satisfaction could result in repeat business due to the provision of quality control information</li> <li>• Standards can be applied across sites and employees</li> <li>• Improved efficiency and reduced waste</li> </ul>	8



	<p>Model answer:  ST24 Engineering will be able to use quality control information at various stages and in various ways when manufacturing large numbers of bolts. An advantage of using reference tables would be that an appropriate gauging system can be designed that would be simple for operators to use during large scale production. An advantage of using SPC is that the company can monitor/track various processes during the manufacture of large numbers of bolts, meaning operators can flag up and act on quality issues, thereby reducing the likelihood of faulty bolts which need to be recalled or replaced. An advantage of using Pareto charts would be that it is easy for the company to identify the issue that has the greatest cumulative effect on the manufacture of large numbers of bolts, and it also allows the same information to be visually displayed. All of the above would allow for full quality audits, leading to customer satisfaction which could result in repeat business.</p> <p><b>Accept any other appropriate response.</b></p>	
<b>Level</b>	<b>Descriptor</b>	
0 0 marks	No rewardable material.	
1 1-3 marks	Obvious advantages of using different quality control information are identified, or one advantage of using quality control information described in some detail. The answer may be in the form of a list. Advantages of using different quality control information be superficial/generic and not applied/directly linked to the situation in the question. Limited knowledge of the use of quality control information.	
2 4-6 marks	Limited range of advantages of using different quality control information are identified, <b>or</b> a few key advantages of using different quality control information described. Consideration of more than one type of quality control information but there will be more emphasis on one of them. Most advantages of using different quality control information made will be relevant to the situation in the question, but the link will not always be clear. A good understanding of the use of quality control information.	
3 7-8 marks	Range of detailed advantages of using different quality control information described, <b>or</b> a few key advantages of using different quality control information explained in depth. A range of quality control information is considered	

	and the answer is justified. The majority of points made will be relevant and there will be a clear link to the situation in the question. A developed understanding of the use of quality control information.
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