



# Mark Scheme (Results)

January 2021

Pearson BTEC First  
In Engineering (21174E)  
Unit 9: Using and Interpreting Engineering  
Information

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## Unit 9: Interpreting and Using Engineering Information

### 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.

### Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

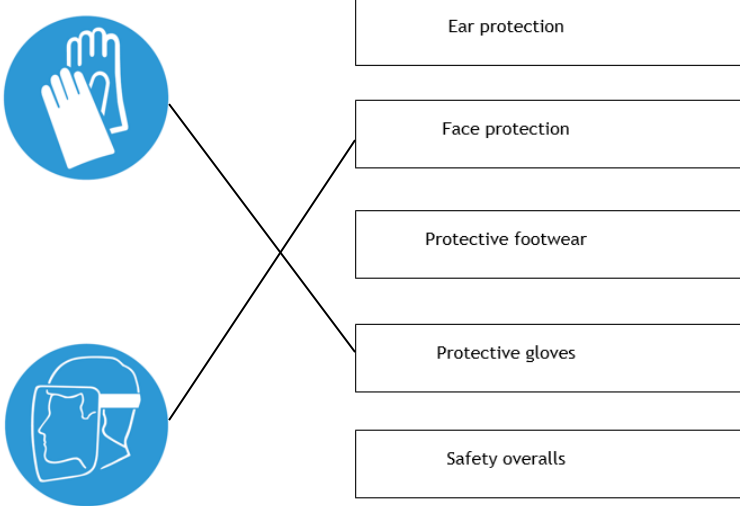
Rows in the grids identify the assessment focus/outcome being targeted. When using a mark grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

**BTEC NG Engineering level 2 Unit 9 – Mark scheme**

Question Number	Answer	Mark
1a	A - Caution trip hazard	1

Question Number	Answer	Mark
1b	C - Green and white	1

Question Number	Answer	Mark
1c	 <p>The diagram consists of two blue circular icons on the left. The top icon shows a pair of white protective gloves. The bottom icon shows a white face shield. Lines connect the top icon to the 'Protective gloves' label and the bottom icon to the 'Face protection' label. Other labels include 'Ear protection', 'Protective footwear', and 'Safety overalls', which are not connected to any icons.</p>	2

Question Number	Answer	Mark
2a	C - General assembly	1

Question Number	Answer	Mark												
2b	<p>Award <b>one</b> mark for each correctly matched drawing type, up to a maximum of <b>two</b> marks.</p> <table border="0" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 50%;">Drawing type</th> <th style="width: 50%;">Application</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Circuit diagram</td> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Checking the layout of electronic components</td> </tr> <tr> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Installation drawing</td> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">How to make an adjustment to a drill guard</td> </tr> <tr> <td></td> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Showing pipe connections for water services</td> </tr> <tr> <td></td> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Used to identify dimensions and surface finish when machining components</td> </tr> <tr> <td></td> <td style="border: 1px solid black; border-radius: 10px; padding: 5px;">Where to position drilled holes on a pitch circular diameter</td> </tr> </tbody> </table>	Drawing type	Application	Circuit diagram	Checking the layout of electronic components	Installation drawing	How to make an adjustment to a drill guard		Showing pipe connections for water services		Used to identify dimensions and surface finish when machining components		Where to position drilled holes on a pitch circular diameter	2
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Question Number	Answer	Mark
2ci	<p>Only acceptable answers:</p> <ul style="list-style-type: none"> <li>• Radius (1)</li> <li>• Radii (1)</li> <li>• RAD (1)</li> </ul> <p>Accept phonetic spelling.</p>	1
2cii	<p>Only acceptable answers:</p> <ul style="list-style-type: none"> <li>• Countersink/ counter sink (1)</li> <li>• Countersunk/ counter sunk (1)</li> </ul> <p>Accept phonetic spelling.</p>	1

Question Number	Answer	Mark
2d	<p>Award <b>one</b> mark for <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• 149mm (1)</li> <li>• 149 (1)</li> <li>• One hundred and forty nine (1)</li> <li>• One hundred and forty nine mm (1)</li> <li>• One hundred and forty nine millimetres (1)</li> </ul>	1

Question Number	Answer	Mark
3a	<p>Only acceptable answers:</p> <ul style="list-style-type: none"> <li>• Job card (1)</li> <li>• Job ticket (1)</li> </ul>	1

Question Number	Answer	Mark
3b	<p>C – Manufacturers’ manual (1)</p> <p>E - Weld procedure specification (1)</p>	2

Question Number	Answer	Mark
3ci	<p>Award <b>one</b> mark for any of the following:</p> <ul style="list-style-type: none"> <li>• Material specifications/spec sheets (1)</li> <li>• Material data sheets (1)</li> <li>• MatWeb (1)</li> <li>• Other appropriate online resource (1)</li> </ul> <p>Do not accept “Internet” on its own.</p> <p><b>Accept any other reasonable response.</b></p>	1
3cii	<p>Award <b>one</b> mark for any of the following:</p> <ul style="list-style-type: none"> <li>• Tapping drill reference charts (1)</li> <li>• Drill/tapping wall charts (1)</li> <li>• Zeus chart (1)</li> <li>• Engineers pocket book (1)</li> <li>• Machinery handbook (1)</li> <li>• Engineering/component/ working drawing (1)</li> <li>• Other appropriate online resource (1)</li> </ul> <p>Do not accept “Internet” on its own.</p> <p><b>Accept any other reasonable response.</b></p>	1

Question Number	Answer	Mark
3d	<p>Award <b>one</b> mark for an advantage and <b>one</b> additional mark for appropriate expansion, up to a maximum of <b>four</b> marks.</p> <ul style="list-style-type: none"> <li>• Allows the design and manufacture to be broken down into individual tasks/activities (1) which can be sequenced to meet the delivery date (1)</li> <li>• Makes it visual/easier to read (1) as it shows a series of bars and lines depicting the activity flow/key dates (1)</li> <li>• To determine an overall project completion (1) as it shows the earliest start and finish time/latest start and finish time of planned activities (1)</li> <li>• Can be used to determine ongoing resource requirements (1) allowing efficient ordering of materials/tooling/equipment (1)</li> <li>• Allows for JIT manufacturing to be incorporated (1) so parts are delivered when needed (1)</li> <li>• Allows a critical path to be determined (1) so priority tasks can be identified/ monitored/ resourced/edited (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	4

Question Number	Answer	Mark
4ai	<p>Award <b>one</b> mark for <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• Material (1)</li> <li>• Material type e.g. metal (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	1
4aia	<p>Award <b>one</b> mark for <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• Orthographic projection (1)</li> <li>• Type of projection/projection (1)</li> <li>• First angle/ third angle (1)</li> <li>• First angle projection / third angle projection (1)</li> <li>• 1<sup>st</sup> angle/ 3<sup>rd</sup> angle(1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	1

Question Number	Answer	Mark
4b	<p>Award <b>one</b> mark for an advantage and <b>one</b> additional mark for appropriate expansion, up to a maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Mistakes will be less likely (1) because engineers will be more familiar with the format/layout of information (1)</li> <li>• Displays authenticity (1) because the working drawings could have an external/different audience (1)</li> <li>• Engineers can collaborate more easily (1) because different sites/locations will use a common approach (1)</li> <li>• It speeds up the production of working drawings (1) because templates are pre-populated (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p> <p>N.B. Reference should be made to the standardised layout and not to the specific content or the working drawing.</p>	4

Question Number	Answer	Mark
5a	A - Isometric (1)	1

Question Number	Answer	Mark
5b	<p>Award <b>one</b> mark for any of the following up to a maximum of <b>two</b> marks:</p> <ul style="list-style-type: none"> <li>• sequence/description of operations (1)</li> <li>• health and safety (1)</li> <li>• materials (1)</li> <li>• components/ product name (1)</li> <li>• feeds and speeds (1)</li> <li>• tools and equipment (1)</li> <li>• jigs and fixtures (1)</li> <li>• quality control checks/information (1)</li> <li>• timings (1)</li> <li>• quantities (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	2



Question Number	Answer	Mark
5 c	<p>Award <b>one</b> mark for any of the following up to a maximum of <b>two</b> marks:</p> <ul style="list-style-type: none"> <li>• determine the type of weld (1)</li> <li>• determine the size of weld (1)</li> <li>• determine the shape of weld (1)</li> <li>• determine the position of weld (1)</li> <li>• select the correct welding process (1)</li> <li>• select the correct welding equipment (1)</li> <li>• select the correct welding settings (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	2

Question Number	Answer	Mark
5 d	<p>Award <b>one</b> mark for each advantage and <b>one</b> additional mark for each appropriate expansion, up to a maximum of <b>four</b> marks.</p> <ul style="list-style-type: none"> <li>• Can highlight problems with manufacturing (1) allowing corrective measures to be introduced/preventing mistakes before they occur (improved efficiency) (1)</li> <li>• To prevent faulty trays from reaching the customer (1) which improves the reputation of DH1 Engineering (1)</li> <li>• To show compliance with standards (1) which can gain accreditation/recognition from quality organisations (1)</li> <li>• It allows traceability of manufacturing (1) to assist with auditing/warranty claims/disputes with customers/product improvement (1)</li> <li>• It highlights engineer/staff performance (1) which can assist with training/development/recognition of good practice (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	4

Question Number	Answer	Mark
6a	<p>Award <b>one</b> mark for an advantage and <b>one</b> additional mark for an appropriate expansion, up to a maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Manufacturers' manuals contain drawings/illustrations/circuit diagrams of sub-assemblies/parts/electrical components/ tools and equipment (1) that will assist the engineers when stripping/reassembling machines during maintenance activities (1)</li> <li>• Manufacturers' manuals contain troubleshooting guides (1) that enable engineers to locate and repair faults quickly/easily (1)</li> <li>• Manufacturers' manuals contain part numbers of spare/replacement parts (1) that allow engineers to order new parts (1)</li> <li>• Manufacturers' manuals will contain manufacturer contact details and helpline information (1) to allow the engineers to source additional information in the event of problems that cannot be resolved (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	2

Question Number	Answer	Mark
6b	<p>Award <b>one</b> mark for a reason and <b>one</b> additional mark for the appropriate expansion, up to a maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Maintenance manuals may become dirty (e.g. oil and grease)/damaged (1) therefore manuals can become difficult to read (1)</li> <li>• There may only be one copy of a manufacturer's manual available (1) and other engineers will also need to use it (1)</li> <li>• Replacement copies may not be available (1) as machinery/equipment/procedures become obsolete/ preventing repairs (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	2

Question Number	Answer	Mark
6c	<p>Award <b>one</b> mark for each disadvantage and <b>one</b> additional mark for each appropriate expansion, up to a maximum of <b>four</b> marks.</p> <ul style="list-style-type: none"> <li>• Paper-based storage/filing cabinets take up a large amount of space (1) which means that there is less floor space available for other engineering activities (1)</li> <li>• Paper-based maintenance documents can be lost/damaged/fade more easily (1) as creating backups/new copies/editing is more difficult (e.g. time consuming/costly) (1)</li> <li>• Paper-based storage can be slow to find/trace/retrieve documentation (1) requiring physical organisation (1)</li> <li>• Maintenance documents cannot be transferred by email easily (1) thus limiting collaboration/remote working between teams/staff/customers (1)</li> <li>• Version control of maintenance documents may be more difficult (1) as outdated paper copies may still be in circulation (1)</li> </ul> <p><b>Accept any other reasonable response.</b></p>	4

Question Number	Answer	Mark
7	<p><b>Zeus chart contents</b></p> <ul style="list-style-type: none"> <li>• Drill tapping/clearance hole sizes for engineers' reference when producing tapped holes</li> <li>• Bend allowance information when producing fabricated components</li> <li>• Metric/imperial tables for conversion/alternative sizes</li> <li>• Information on limits and fits for mating components</li> <li>• Morse taper sizes</li> <li>• CNC programming information</li> <li>• Triangle calculation formulae</li> <li>• Engineering drawing abbreviations/symbols e.g. surface finish</li> <li>• Hole coordinate calculations</li> <li>• Hardness comparison table</li> </ul> <p><b>Model answer</b></p> <p>The use of Zeus charts will help engineers to find accurate, reliable and relevant information easily and quickly. Zeus charts are also pocket sized and portable. This would help to speed up production and save money.</p> <p>Many classic cars may have components manufactured in sizes using inches rather than millimetres as the unit of measurement. The Zeus charts have comparison and conversion tables to assist the engineer.</p> <p>Engineers may need to identify screw thread sizes or tapping drill hole sizes, which can be found easily in the charts. If engineers are machining mating components they will be able to find information on limits and fits to determine the correct size for clearance, transition and interference fits. Occasionally engineers will need to carry out calculations using trigonometry. Zeus charts have useful tables and formulae, which would allow for accurate calculation of sizes and tapers. All of this type of information is helpful in a situation where the engineer may have to reproduce components without drawings.</p> <p>Engineers can find information using the Zeus charts without having to ask for assistance from their supervisor. This leads to increased confidence in the engineers and also greater satisfaction in overcoming problems when planning for manufacture. Although there have been minor changes to the Zeus charts over the years, the basic format is still the same.</p>	8

Level	Descriptor
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. Points made will be superficial/generic and not applied/directly linked to the situation in the question. The learner shows a limited knowledge of the use of Zeus charts.
2 4-6 marks	Some points identified, or a few key points described. Most points made will be relevant to the situation in the question, but the link will not always be clear. The learner shows a good understanding of the use of Zeus charts.
3 7-8 marks	Range of points described, or a few key points explained in depth. The majority of points made will be relevant and there will be a clear link to the situation in the question. The learner shows a developed understanding of the use of Zeus charts.

**Ofqual**  
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