

KS3 Level Descriptor Statements Derived from GCSE 9-1 Engineering

Introduction

Schools use attainment criteria to facilitate the assessment of progress. However, the Secretary of State for education has disappplied the attainment criteria previously used for Key Stage 3 Design & Technology. One of the weaknesses of the previous attainment criteria was that there was no direct link to progression at Key Stage 4/GCSE Engineering. This disapplication gives the opportunity to adopt new assessment criteria, which more accurately reflect the development of skills that will be assessed in GCSE Engineering.

The following descriptor statements are based on the NEA assessment criteria in the new GCSE 9-1 Engineering specification. They were developed by a group of examiners for use in their own classrooms. They were not prepared by, and have not been approved by, any exam board.

Important notes on the Interpretation of These Levels:

These descriptors represent attainment levels in year 9. They are based on 'working at' levels, derived from the GCSE Engineering criteria. They can be used to identify the current status of levels of pupils in other year groups. 'Normal' progression is assumed to be one level per year. This means that the 'working at' assessment for the end of year 7 is 2 levels higher than the stated level. I.e. A pupil who should achieve a level 8 in year 9 should be achieving a level 6 in year 7.

Note on interpretation, based on experience of a senior examiner: where a criteria is quantified as 'a few' this typically means 2-5; 'most' typically means 5+, or over half of the relevant points.

These level descriptors are fully supported by a range of materials and Assessment for Learning (AfL) resources available from www.attainmentineducation.org.

Level 1 descriptor Y9

At level 1, the pupil can identify a design problem and a few of the constraints and customer needs arising from it. The pupil can come up with a basic solution to the design problem and state at least one design choice. The pupil can attempt to model the design idea using at least one approach. The pupil can put a few simple labels and annotations on their drawings or models. The pupil develops a solution using a drawing. The pupil can identify a system used in their product and produce a simple systems block diagram, consisting of a single input, process and output. The pupil can work safely, following a simple production plan that identifies the main processes to be used. The pupil can use a few materials, parts, processes and tools. The pupil can identify the processes that have been used for manufacturing and testing their product. The pupil can use a simple jig or make a part on a CNC machine using a provided program. The pupil can attempt to produce a prototype that has a low level of challenge, although it may not work adequately and may be incomplete. The pupil can carry out a simple measurement on their product using a single method and compare the results to the product specification. The pupil can describe how well their product meets the requirements of the brief.

Level 2 descriptor Y9

At level 2, the pupil can identify a design problem and some of the constraints and customer needs arising from it. The pupil can come up with a solution to the design problem and state at least one design choice. The pupil can attempt to model the design idea using at least one approach. The pupil can put a few simple labels and annotations on their drawings or models. The pupil develops a solution using a few drawings and can create an engineering drawing using CAD. The pupil can identify a system used in their product and produce a simple systems block diagram, consisting of a single input, process and output. The pupil can work safely, following a simple production plan that identifies the main processes. The pupil can use a few

materials, parts, processes and tools. The pupil can state the processes that have been used and apply quality control at one stage. The pupil can use a jig or make a part on a CNC machine using a provided program. The pupil can produce a prototype that has a low level of challenge, although it does not work adequately and may be incomplete. The pupil can carry out a simple measurement on their product using a single method and compare the results to the product specification. The pupil can evaluate one aspect of their product.

Level 3 descriptor Y9

At level 3, the pupil can accurately identify a design problem. They can come up with a solution to the design problem and state a few design choices. The pupil can attempt to make a simple model using one approach, although it may be slightly different to their idea. The pupil develops a solution using a few drawings and can create a few engineering drawings using CAD. The drawings include some simple information about size or shape. The pupil can put a few simple labels and annotations on their drawings or models. The pupil can identify a system used in their product. The pupil can produce a simple systems block diagram, consisting of a single input, process and output. The pupil can work safely, following a simple production plan that identifies the main processes. The pupil can use a few materials, parts, processes and tools. The pupil can state the processes that have been used. The pupil can use a jig or make a part on a CNC machine using a provided program. The pupil can produce a prototype that has a low level of challenge, although it may not work adequately and may be incomplete. The pupil can carry out a simple measurement on their product using a single method and compare the results to the product specification. The pupil can evaluate one aspect of their product.

Level 4 descriptor Y9

At level 4, the pupil can accurately identify a design problem and analyse a few of its requirements. The pupil can come up with a solution to the design problem and state some design choices. The pupil can make a simple model using one approach, although it may be slightly different to their idea. The pupil develops a solution using a few drawings. The pupil can create a few engineering drawings using CAD, which include some simple information about size or shape and conform to a few of the standard conventions. The pupil can put a few annotations on their drawings or models. The pupil can identify a system used in their product and state its purpose. The pupil can produce a simple systems block diagram, consisting of a single input, process and output. The pupil can work safely, following a simple production plan that identifies the main processes and mentions the need for quality control. The pupil can use a few materials, parts, processes and tools and can state the processes that have been used. The pupil can use a jig or make a part on a CNC machine using a provided program. The pupil can apply quality control at one stage. The pupil can produce a prototype that has a low level of challenge, although it may not work adequately and may be incomplete. The pupil can carry out a few basic tests on their product using a single technique and compare the results to the product specification. The pupil can analyse and evaluate one aspect of their completed product, identifying an improvement and stating why it is needed.

Level 5 descriptor Y9

At level 5, the pupil can accurately identify a design problem and analyse a few of its requirements. The pupil can come up with two alternative solutions to the design problem with a few details about how they will work, or a few ideas without development. The pupil can choose an idea to develop that could be able to solve the design problem. The pupil can develop their solution by making good models of a few features of it using drawings or another form of modelling. The pupil can evaluate the functionality of a few aspects of their proposed solution using drawings. The pupil can annotate a few of their drawings or models to explain a few of the key features and show that they would work. The pupil develops a solution using some drawings. They can produce engineering drawings of their design using CAD, which conform to some standard conventions but may miss some details. The pupil can annotate a few of the important features

on their engineering drawings and give enough information on shapes and sizes so that a prototype could be made. The pupil can present most information in appropriate formats, although some detail may be missing. The pupil can give a basic description of a system used in their product, although this may lack accuracy. The pupil can produce a linear systems block diagram, describing more than one operation. The pupil can produce a simple production plan using information from engineering drawings. In their production plan, the pupil can include at least one quality control technique. The pupil can also include some details of health and safety requirements for the main processes and the use of jigs or programming CNC machines. The pupil can follow a simple production plan, working safely and with some skill using a small range of materials, parts, processes and tools. The pupil can identify most of the main stages in the manufacture of their product and give simple explanations why a few of these processes were used. The pupil can complete a few parts to the stated tolerances and apply quality control to at least two stages. The pupil can produce a functioning prototype, although it may have some minor flaws. If their final product has a high level of challenge, the pupil can make most of it; if it has a low level of challenge, the pupil can complete it. The pupil can carry out a few basic tests on some aspects of their product using a single technique and compare the results to the product specification. The pupil can address some quality issues identified in their product. The pupil can analyse and evaluate one aspect of their completed product, stating why it needs to be improved.

Level 6 descriptor Y9

At level 6, the pupil can accurately identify a design problem and analyse some of its requirements. The pupil can come up with two alternative solutions to the design problem with some details about how they will work, or several ideas without development. The pupil can choose an idea to develop that can solve the design problem. The pupil can develop their solution by modelling some features of it using drawings or physical models. The pupil can annotate some of their drawings or models to explain most of the key features. The pupil can develop a solution using some drawings and evaluate some aspects of their proposed solution. The pupil can produce engineering drawings of their design using CAD, which mostly conform to standard conventions but may miss a few details. The pupil can annotate some of the important features on their drawings and give enough information on shapes and sizes so that a prototype could be made. The pupil can organise and present some information clearly in appropriate formats, although some detail may be missing. The pupil can give a basic description of a system used in their product, although this may lack accuracy. The pupil can produce a linear systems block diagram, describing more than one operation. The pupil can produce a simple production plan using information from engineering drawings and explain the main stages in the production. In their production plan, the pupil can include at least one quality control technique. The pupil can also include details of health and safety requirements for the main processes and the use of jigs or programming CNC machines. The pupil can follow a simple production plan, working safely, accurately and with good skill using a small range of materials, parts, processes and tools and give simple explanations of why some of these processes were used. The pupil can complete some parts to the stated tolerances and apply quality control to at least two stages. The pupil can produce a functioning prototype, although it may have some minor flaws which do not interfere with its main use. If their final product has a high level of challenge, the pupil can make most of it; if it has a low level of challenge, the pupil can complete it. The pupil can carry out a several basic tests on their product using a range of different techniques and compare the results to the product specification, explaining how this ensures quality is maintained. The pupil can address some quality issues identified in their product. The pupil can analyse and evaluate their completed product, explaining why it needs to be improved.

Level 7 descriptor Y9

At level 7, the pupil can accurately identify a design problem and analyse most of its requirements. The pupil can come up with a few alternative solutions to the design problem, with some details about how they will work. The pupil can choose an idea to develop that can solve the design problem. The pupil can develop their solution by modelling several aspects of it using drawings and physical models. The pupil can

annotate some of their drawings and models to explain some of the key features and decision making. The pupil can develop a solution using some drawings and evaluate most aspects of their proposed solution. The pupil can produce engineering drawings of their design using CAD, which generally conform to standard conventions. The pupil can annotate most of the important features on their drawings and give enough information on shapes and sizes so that a prototype could be made. The pupil can present most information clearly, in appropriate formats. The pupil can explain in general terms one system used in their product and how it operates. The pupil can produce a systems block diagram of their product and explain each of the system blocks. The pupil can produce a production plan using engineering drawings and explain the main stages in the production. In their production plan, the pupil can include at least one quality control technique. The pupil can also include details of health and safety requirements for the main processes and the use of jigs or programming CNC machines. The pupil can follow a simple production plan, working safely, accurately and with skill using a range of materials, parts, processes and tools and give simple explanations of why the processes were used. The pupil can complete most parts to the stated tolerances and apply quality control to a few stages. The pupil can produce a functioning prototype, although it may have some minor flaws which do not interfere with its main use. If their final product has a high level of challenge, the pupil can make most of it; if it has a low level of challenge, the pupil can complete it. The pupil can carry out a range of tests on their product using a variety of techniques and compare the results to the product specification, explaining how this ensures quality is maintained. The pupil can analyse and evaluate their completed product, explaining why it needs to be improved.

Level 8 descriptor Y9

At level 8, the pupil can describe a design problem and analyse most aspects of the problem to be solved, identifying and considering a few relevant variables that may affect the solution. The pupil can come up with some alternative solutions to the design problem, with details about how they will work. The pupil can choose an idea to develop that can solve the design problem. The pupil can develop their solution by modelling several aspects of it using drawings and physical models. The pupil can annotate most of their drawings and models to explain most of the key features and decision making. The pupil can develop a fully annotated solution using drawings and evaluate their proposed solution. The pupil can produce engineering drawings of their design using CAD, which mostly meet standard conventions. The pupil can annotate the important features on their drawings and give enough information on shapes and sizes so that a prototype could be made. The pupil can organise and present information clearly, in appropriate formats. The pupil can explain in general terms one system used in their product and how it operates. The pupil can produce a systems block diagram of their product and explain each of the system blocks. The pupil can produce a production plan using engineering drawings and explain in detail the main stages in the production. In their production plan, the pupil can include at least one quality control technique, explaining how this ensures quality. The pupil can also include details of health and safety requirements for the main processes and the use of jigs or programming CNC machines. The pupil can follow a production plan, working safely and with a high level of skill using a range of materials, parts, processes and tools and explain why these processes were used. The pupil can complete most parts to the stated tolerances and apply quality control to some stages. The pupil can produce a functioning prototype, although it may have some minor flaws. The pupil can make a high-quality prototype that has a high level of challenge. The pupil can carry out appropriate testing on several aspects of their product to ensure that work is within tolerance and compare the results to the product specification. The pupil can analyse and evaluate all aspects of their completed product, explaining how its operation or manufacture could be improved.

Level 9 descriptor Y9

At level 9, the pupil can describe the design problem accurately, covering most aspects of the problem to be solved. The pupil can analyse several different aspects of the design problem, identifying and considering some relevant variables that may affect the solution. The pupil can come up with a range of alternative solutions to the design problem, explaining how they will work. The pupil can choose an idea to

develop that can solve the design problem, giving some reasons for their choice. The pupil can fully develop their idea into an appropriate solution. The pupil can use a range of modelling techniques, including 3D physical modelling, drawing and mathematical models to produce excellent models that accurately represent some aspects of the final design. Pupils annotate their drawings and models, explaining the design decisions they have made. The pupil can evaluate their final model and demonstrate that the final outcome should function as desired. The pupil can develop a fully annotated solution using comprehensive and appropriate drawings, evaluating and justifying their proposed solution. The pupil can produce accurate engineering drawings of their design using CAD, which meet standard drawing conventions. The pupil can produce CAD drawings of complex parts and rendered 3D presentations. The pupil can annotate the features on their drawings and give enough information on shapes and sizes to enable a prototype to be made. The pupil can present their design work in a well-organised and appropriate format. The pupil can identify and explain at least one system used to organise and control the function of the product. The pupil can produce and explain a detailed systems block diagram for at least one system in their product, including an explanation of sub-systems or feedback. The pupil can produce a detailed production plan identifying all stages in production in a suitable sequence. The pupil can explain the reasons for the sequence of manufacture and explain their choices of which processes to use and why alternative processes were not used. In their production plan, the pupil can include information extracted from engineering drawings or circuit diagrams; details related to the use of jigs or fixtures; explain two or more of the quality control techniques needed to produce the product; and include comprehensive details of health and safety requirements. The pupil can follow the production plan to make the product, providing detailed evidence of how they used jigs and fixtures or CNC programming. The pupil can make a fully functioning, high-quality prototype that has a high level of challenge, showing a high level of skill with a range of different materials, parts, processes and tools. The pupil can show how quality control was applied at most stages during making and that their product meets all the stated tolerances. The pupil can carry out appropriate testing on most aspects of their product to ensure that work is within tolerance. The pupil can compare the results of testing to the product specification and show that their product fulfils the needs of the design brief. The pupil can analyse and evaluate all aspects of their completed product, explaining how and why its operation or manufacture could be improved.