



Engineering Level 1 Unit 5

Diploma Portfolio Extracts

Edexcel, a Pearson company, is the UK's largest awarding body, offering academic and vocational qualifications to more than 25,000 schools, colleges, employers and other places of learning in the UK and in over 100 countries worldwide. Qualifications include GCSEs, AS and A Levels, NVQs, Diplomas and our BTEC suite of vocational qualifications from entry level to BTEC Higher National Diplomas, recognised by employers and higher education institutions worldwide.

We deliver 9.4 million exam scripts each year, with more than 90% of exam papers marked onscreen annually. As part of Pearson, Edexcel continues to invest in cutting-edge technology that has revolutionised the examinations and assessment system. This includes the ability to provide detailed performance data to tutors and students which helps to raise attainment.

References to third-party material made in this specification are made in good faith. Edexcel does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

Authorised by Nick Kelly
Prepared by Mark Woodcock

All the material in this publication is copyright
© Edexcel Limited 2009



Foreword

Welcome to the sample of portfolio guidance extracts for Phase One Principal Learning subjects. We are delighted to continue to add to the range of support materials Edexcel has on offer to further support Consortia in maximising their Principal Learning performance. For our full range of information and guidance across administration, delivery and assessment support please see our website www.edexcel.com/diploma, or contact the DAB delivery team to access our range of training and support.

Purpose

The purpose of these materials is to help practitioners understand the requirements of the Principal Learning unit assessment through review and commentary on extracts of learner work. We have used a selection of learner evidence across a range of learner performance to help improve understanding of how to maximise performance.

This material has been selected and commented on by our Senior Moderation team after the first year of reviewing and setting the standards on the initial cohort of learners. Please ensure to read all of the commentary available as this aims to show how the extracted evidence used is relevant for that mark band and, where possible, what might make it suitable for the other bands.

If you have any feedback or comments regarding these materials, or any of our Diploma services, please contact diplomaops@edexcel.com. Alternatively for further discussion or questions around standards or Principal Learning specifications please use our **Ask The Expert service**, via our website, for a direct response from our Senior team within 2 working days.

Using these materials

The basic principle when awarding marks against the relevant mark grids is that it is ‘best fit’. It is not a hurdle approach. Marks may be awarded from the next band if one or more of the items within the marking criteria have been met. With this in mind it is essential when reviewing the enclosed commentaries that you read the comments across all 3 of the marks bands.

All marks awarded on the enclosed sample assignments are for “Marking Grid A” only. The awarding of marks for “Mark Grid B”, which is ephemeral, has not been commented on or included in the overall marks awarded.

This work is indicative only, not all learners will approach their assignments in the same way. Similarly, they will not necessarily present their evidence in the same format.

Important note!

The evidence contained within these pages has been extracted from a variety of completed portfolios and not all of the learner’s evidence has therefore been included. These extracts are not designed to show you how much work to produce but show different types of evidence that could contribute to a learner’s final work.

Your Training & Support from Edexcel

Edexcel offers a wide range of support and training to support you in the delivery of Principal Learning, managing your consortium, as well as all other Diploma components.

Training

Our training events are an ideal opportunity for you to understand the qualification requirements, share experience and learn from emerging practice. The sessions are designed to be practical, stimulating and informative, and are developed each year to reflect the evolving needs of practitioners.

Previewing the Diploma events are Line of Learning specific and designed for practitioners who will be delivering the Principal Learning for the first time, Local authority advisors and Diploma advisors.

Delivery and assessment events cover all of our lines of Principal Learning and are focused on approaches to planning for assessment, writing assignments and assessing learner work.

Developing assignments and assessing learners events cover all of our lines of Principal Learning and will review tutor support materials and will look at developing assignments as well as standardisation exercises.

Online training is an ideal opportunity for you to participate in training without leaving your centre. These events are short in duration, stimulating in content and designed to answer a training need identified by practitioners.

Consortium-based training is for any consortium or group of consortia, working together, who wishes to access our off-the-shelf training, delivered at a time and place of your choice. There is also the option to customise the events to suit your own individual requirements. These events are aimed at consortium managers, assessors and practitioners - in fact, your whole Diploma team!

To book or search for an event visit www.edexcel.com/training if you are an Edexcel Online user. If you are not an Edexcel Online user email your request to trainingbookings@edexcel.com so our training team can process the booking for you.

Alternatively, call 0844 576 0028 for further details and book your place.

Diploma Delivery Pack

Your **Diploma Delivery Pack** is an essential administrative support tool for your Consortium. It also contains important information for your exams office, your teachers and tutors! For example it includes:

- Administration, procedures and delivery options and requirements
- ASL cross sector model and sector specific model
- Introduction to Diploma planning and roles
- 36 example Delivery Plans across Levels 1 & 2 for Phase I & II Diplomas
- CD-ROM access with practical guidance and useful links

These are available through your local training events or via your DAB Centre Support Officer.

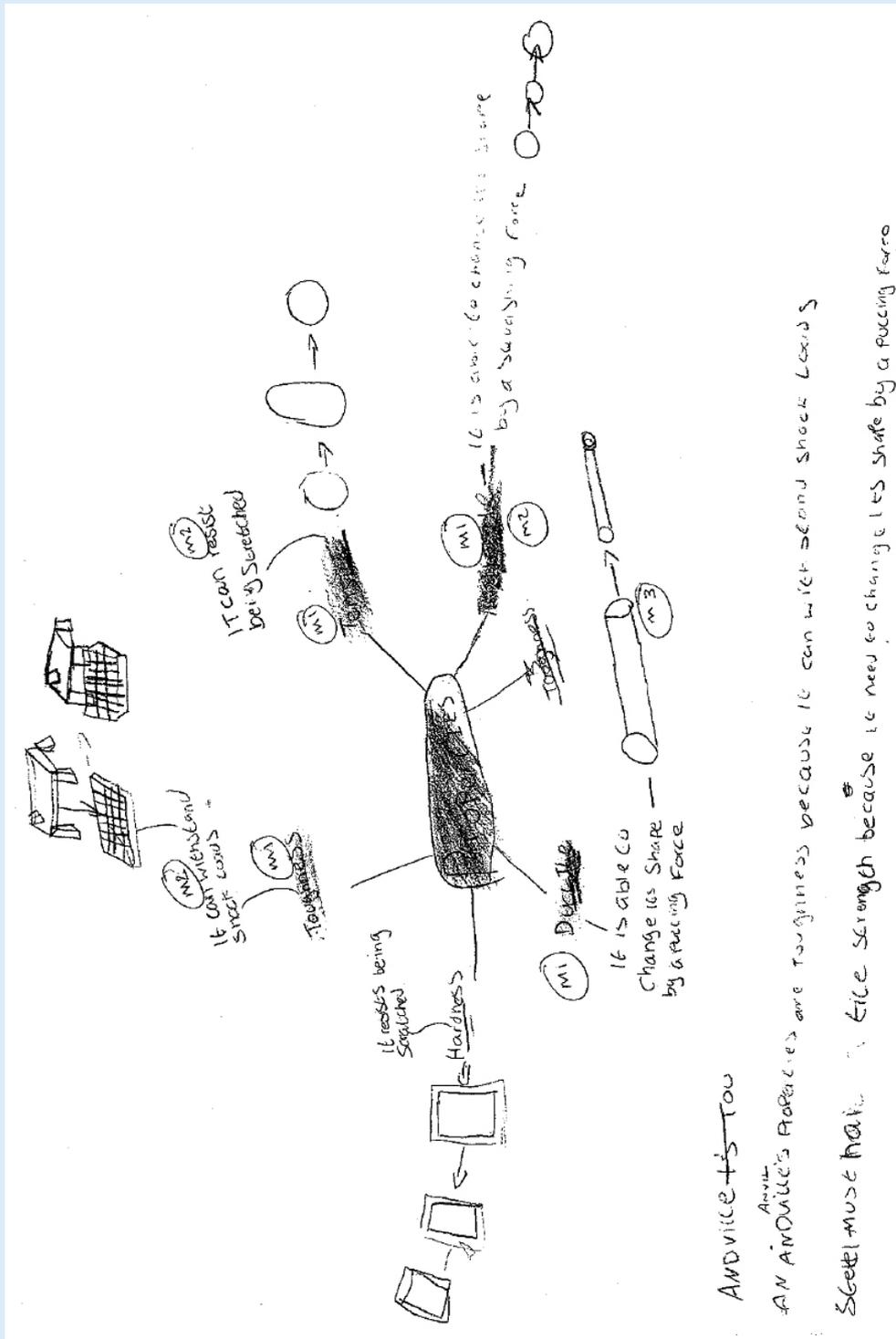
Contact us about this Diploma Sample Portfolio

If you have ideas, comments or suggestions on what went well and what can be improved, please email diplomaops@edexcel.com or call your DAB Centre Support Officer (CSO) on 0844 576 0028.

L01 Examples

Focus

Know about the properties that are used to describe the performance of engineering materials



Mark Band 1

The idea of presenting information using a spider diagram for a level 1 learner is suitable for this outcome. Four properties have been stated so maximum marks can be awarded from this mark band.

Mark Band 2

In a simple way the learner has been able to define three properties, including in some cases an illustrative answer.

Mark Band 3

Applications are given but limited explanation of how these would be affected, otherwise full marks could have been awarded.

L02.1 Examples

Focus

Know about ferrous metals and their forming processes

Christopher

Assessment 2

Ferrous metals

Mark band 1

The High carbon steel hammer head is made by the forging process. ✓
Another item that can be made from a forging process is horse shoes and swords. ✓

The mild steel bolt is made by the wasting process. ✓
Another item that can be made from a wasting process is a drill bit.

The cast iron Engineers vice is made from casting process. ✓
Another item made from the casting process is car body panels. ✗

Mark band 2

The cast iron vice properties is hard skin, softer underneath, but brittle. It corrodes by rusting.

Mild steel is tough, ductile and malleable. Good tensile strength, poor resistance to corrosion.

Mark band 3

The mild steel bolt is good because it is tough, ductile, malleable and tensile. It is good for the wasting process because it is easy to cut with a machine.

The cast iron vice is good because it has hard skin, softer underneath but brittle. It is good for the casting process because it is easy to shape but if you used the forging process it would break.

CASTING CAN BE USEFUL FOR MAKING PARTS WITH COMPLICATED SHAPES. A POST BOX OR DRAIN COVER WOULD BE A GOOD EXAMPLE.

CAR BODY PANELS ARE MORE LIKELY TO BE PRESSED OUT OF A THIN METAL LIKE MILD STEEL OR ALUMINIUM.

Mark Band 1

The responses given do show forming processes. Applications for each material are appropriate, however casting as a process associated with car body parts is not correct. This means there will be a restriction on the marks that can be awarded.

Mark Band 2

There are descriptions of the properties of two materials, so marks can be awarded from this mark band.

Mark Band 3

There is limited justification of the use of processes is given, however one mark can be awarded from this mark band.

L02.2 Examples

Focus

Know about non-ferrous metals and their forming processes

Christopher

Non-ferrous

Mark band 1

The aluminium drinks can is made by the casting process. Another item made by the casting process is a post box. 0

The copper pipes are made by the extrusion process. Another item made by the extrusion process is alloy wheels. 0.5

The led flashing is made by the rolling process. Another item made by the rolling process is sheet metal which is made out of aluminium. 1 $\frac{1.5}{3}$

Mark band 2

The properties of aluminium are it has good strength to weight ratio, light, soft, ductile, good conductor of heat and electricity and resists corrosion. 1

The properties of copper are malleable and ductile, good conductor of heat and electricity and resists corrosion. 1 $\frac{2}{2}$

Mark band 3

The aluminium drinks can is good because it has good strength to weight ratio, light, soft and ductile. It is good for the casting process because it is easy to shape. The properties are good for the can because the can is easy to pick up for us to drink out of. 0.5

The copper pipes are good because it is malleable and ductile. They are good for the extrusion process because they can be reshaped without breaking. The properties are good because the pipes can be reshaped all the time. They are also a good conductor of heat and electricity. 1 $\frac{1.5}{2}$

CASTING INVOLVES HEATING METAL UNTIL IT MELTS, THEN POURING IT INTO A MOLD. THIS WOULD NOT BE AN EFFICIENT WAY OF MAKING CANS FROM THIN PLATE.

Mark Band 1

Not all responses match the requirement of this mark band. The casting process mentioned is not appropriate, however it is possible that some copper piping could be made by extrusion and lead flashing would be made by rolling so two marks can be awarded.

Mark Band 2

Properties of two materials have been described so full marks can be awarded from this mark band.

Mark Band 3

Only one mark should be awarded as there is confusion on the justification of casting for a drinks can.

L02.3 Examples

Focus

Know about thermoplastics and elastomers and their forming processes

	<u>THERMOPLASTICS</u>
	TAKE CARE WHEN ANSWERING QUESTIONS
TASK 2.3	As you have only provided a use for 1 thermoplastic.
TASK 2.3	MARK band 1 BUT YOU GIVE AN APPLICATION IN P3. SET YOUR ANSWERS
THE EVO	OUT CLEARLY AND CHECK ALL PARTS ARE INCLUDED BEFORE MOVING ON. OR Thermoplastics are Nylon, Perspex and Perspex. The elastomer is Styrene
	Rubber. You can use Nylon for Bearings, Seal and gaskets.
	You can use styrene rubber for vehicle tyres. These will be
	MARK band 2 made by compression moulding and seals.
	is made by extrusion 3/3
	MARK band 2
	The Properties of Perspex are it is strong, rigid and easy to scratch.
	The Properties of styrene rubber are it is not ² damaged by oil or petrol. 2
	MARK band 3
	Perspex is suitable for ^{rooflights} seals because it is strong, transparent and rigid. Perspex is suitable for Blow moulding because it is ^{strong} rigid, transparent. Styrene rubber is suitable for vehicle tyres because it ^{it} is resistant to oils and petrol. Styrene rubber is suitable for compression moulding because it is compressive.
	YOU HAVE IDENTIFIED A GOOD USE FOR BOTH MATERIALS AND LINKED THE PROPERTIES TO THAT USE, BUT YOU HAVEN'T TOLD ME WHICH PROPERTIES MAKE THEM SUITABLE FOR THE FORMING PROCESS, I.E. PERSPEX IS SUITABLE FOR BLOW MOULDING AS IT IS MALLEABLE WHEN HEATED AND SETS SOLID WHEN COOLED. 1/2

Mark Band 1

On the balance of evidence it would not be appropriate to award all marks from this mark band just because the learner has not given an application of Perspex as this is discussed further in the response for mark band 3.

Mark Band 2

There is a description of the properties of a thermoplastic and elastomers material, so both marks can be awarded from this mark band.

Mark Band 3

Whilst the justifications for the use of the processes are limited it is appropriate to award one mark from this mark band.

L02.4 Examples

Focus

Know about thermosetting plastics and their forming processes

Thermosetting Plastics
Task 2.4

MARK band 1
The 3 thermosetting plastics are ^{melamine}formica, ^{epoxy resins and}bakelite. ^{Formica}Formica can be used for toilet seats, ^{melamine}epoxy resins can be used for ^{laminates}flooring materials and bakelite can be used for vehicle door handles. you can make all these by Extrusion, compression moulding. Good Answer, Answers
 $\frac{3}{3}$

MARK band 2
The ^{properties}properties of melamine are it is resistant to heat. The properties of formica are it is naturally transparent and can be used in a variety of colours, it is hard, resistant to heat and solvents, good electrical insulator and machinable. $\frac{1.5}{2}$

MARK band 3
The properties of melamine are suitable for laminates because it resists heat. It is also suitable for compression moulding because it ^{resists}resists heat. Formica is suitable for ^{toilet}seats because it is transparent and can be used in a variety of colours and resists heat and these two are suitable for machining.

Melamine is hard wearing because you can't scratch it and it is resistant to heat and solvents. Melamine would be good for different types of floor laminates. $\frac{1}{2}$
 $\frac{1.5}{2}$

MARK BAND 2 your description of the properties of formica are good but you have only mentioned one property for melamine.

MARK BAND 3 one property of formica is that it is naturally transparent and can be produced in a range of colours but you should describe properties that mean it will be good as a toilet seat, water resistant, resists solvent.

Mark Band 1

Appropriate processes are given for thermosetting plastics. Applications of each of three thermosets are given. It would be harsh not to award maximum marks from this mark band, even though compression moulding is listed as the process for all three materials.

Mark Band 2

There are descriptions of the properties of two thermosetting plastic materials, so full marks can be awarded from this mark band.

Mark Band 3

There is limited justification why processes are used however this is done in a general sense and does not specifically relate to the materials listed. This means that maximum marks cannot be awarded from this mark band.

L03.1 Examples

Focus

Identify materials specified on an engineering drawing or service schedule

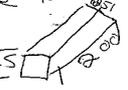
Lo 3.1

MARK BAND 1
 The abbreviation for mild steel is MS, the abbreviation of cast iron is CI and the abbreviation of Aluminium is AL. GOOD WORK CHRISTOPHER 2/2

The abbreviations of Aluminium, mild steel and cast iron would be shown for Mild steel (MS), Aluminium (AL) and cast iron (CI).

MARK BAND 2
 The material used to make a bin is Brass. ✓
 The material used to make the base is stainless steel. 2/2

MARK BAND 3
 The pin has a diameter of 15 and the shape would be a circle.  ✓

The shape of the base is a square profile and 200mm long.  ✓ 2/2

GOOD WORK CHRISTOPHER. FULL MARKS FOR THIS LEARNING OUTCOME.

Task L03.2

MARK BAND 3 2/2

The Properties of Brass are good because it is easy to shape non-ferrous and easy to work with.

The Properties of copper is good for its use because it is a good conductor of heat and electricity, very ductile and malleable and non-ferrous.

To gain 4 marks from MARK BAND 3 you should explain why these properties make the metal suitable for the job. i.e. copper is a good material to use for electrical cables because it is a good conductor of electricity.

Mark Band 1

Descriptions of how three different materials are shown in abbreviated form have been given. The learner response can therefore be awarded full marks from this mark band.

Mark Band 2

All requirements, for the two materials, of this mark band have been met.

Mark Band 3

Dimensional requirements and forms of raw material supply have been described so maximum marks can be awarded for this assessment focus.

L03.3 Examples

Focus

Carry out tests on engineering materials

Mark band 1

The method to check brittleness

Equipment:

Hounsfield balanced impact machine

Aluminium

Brass

The method we used was putting the aluminium and brass test pieces in the pendulums. When we put the aluminium into the pendulums. The pendulums swung past each other and the aluminium snapped after we tested the aluminium. we had to reset the pendulums that involved putting the brake on. Then we put the brass into the pendulums and released the brake the pendulums swung by each other and the brass snapped but before we loaded the test piece and released the brake the scale had to be set to zero, the scale measures in Newton meters.

A GOOD DESCRIPTION OF THE BRITTLINESS TEST CHRISTOPHER BUT TO GET FULL MARKS YOU SHOULD DESCRIBE HOW THIS TEST CHECKS THE BRITTLINESS OF THE MATERIALS.

Tensile test

Equipment:

Nickel chromium

Copper wire

Micrometer

Weights

The method we was putting the nickel chromium and copper wire on the weights when the wire reached it could hold it broke. The weight was in

Mark Band 1

The testing carried out is suitable, in one case there is limited evaluation of the properties these test may be showing, so full marks can not be awarded from this mark band. There are annotated photographs to evidence the practical element of this assessment focus.

Mark Band 2

There is a comparison of the properties of materials based on the outcomes from the tests so full marks can be awarded from this mark band.

Mark Band 3

Industrial type tests should be carried out as outlined in the content of the unit specification. Evaluative statements then need to be made for this mark band. In this case the learner has been given a scenario to make decisions about and has successfully selected tests, albeit one about corrosion resistance.

L03.3 Examples continued

kilograms. We checked the original length when it broke we checked the length of the wire. We measured the diameter by using a micrometer the formula we used to get its tensile strength was mass multiplied by gravity divided by area of wire. Tension is a stretching force. The weights pull the wire until it eventually breaks. *Good you have described what Tension is and how we check it*

N/A

Mark band 2

Results for brittleness:

Material	Diameter	Force required
Aluminium	7.7Mm	10.25Nm
Brass	8.06Mm	7.75Nm

Brass is the most brittle because it required less force than aluminium to break it.

Results for tensile strength:

Material	Area	Force to break	Tensile strength
Nickel chromium	0.000000159	140.28	881,000,000N/m ²
Copper wire	0.000000159	39.24	247,000,000N/m ²

Mark Band 1

The testing carried out is suitable, in one case there is limited evaluation of the properties these test may be showing, so full marks can not be awarded from this mark band. There are annotated photographs to evidence the practical element of this assessment focus.

Mark Band 2

There is a comparison of the properties of materials based on the outcomes from the tests so full marks can be awarded from this mark band.

Mark Band 3

Industrial type tests should be carried out as outlined in the content of the unit specification. Evaluative statements then need to be made for this mark band. In this case the learner has been given a scenario to make decisions about and has successfully selected tests, albeit one about corrosion resistance.

L03.3 Examples continued

Nickel chromium has the most tensile strength because it required more weight than copper to break. ✓ Good you have chosen correctly.

$\frac{2}{2}$

Mark band 3

To test to see if it is corrosion resistant put the mild steel and the stainless steel in a tub of salt water for 2 months if one of them doesn't corrode that's one the manager should use for his pipes. He should use stainless steel because it doesn't rust. To see how much it would stretch until it snaps he should use weights and when it snaps check the length of the metal to see which one is more ductile by seeing which one stretches the most. He should make the pipes from stainless steel because it doesn't rust.

$\frac{3}{3}$

Good, you have chosen two good test and I agree he should use stainless steel.

Mark Band 1

The testing carried out is suitable, in one case there is limited evaluation of the properties these test may be showing, so full marks can not be awarded from this mark band. There are annotated photographs to evidence the practical element of this assessment focus.

Mark Band 2

There is a comparison of the properties of materials based on the outcomes from the tests so full marks can be awarded from this mark band.

Mark Band 3

Industrial type tests should be carried out as outlined in the content of the unit specification. Evaluative statements then need to be made for this mark band. In this case the learner has been given a scenario to make decisions about and has successfully selected tests, albeit one about corrosion resistance.

L03.3 Examples continued



Christopher and Lewis use a micrometer to check the diameter of a test piece before loading it into the brittleness test machine.



Christopher records the results of the tensile test

Mark Band 1

The testing carried out is suitable, in one case there is limited evaluation of the properties these test may be showing, so full marks can not be awarded from this mark band. There is annotated photographs to evidence the practical element of this assessment focus.

Mark Band 2

There is a comparison of the properties of materials based on the outcomes from the tests so full marks can be awarded from this mark band.

Mark Band 3

Industrial type test should be carried out as outlined in the content of the unit specification. Evaluative statements then need to be made for this mark band. In this case the learner has been given a scenario to make decisions about and has successfully selected tests, albeit one about corrosion resistance.

Marking Grid B LO3.2 Examples

Focus
Identify engineering materials



This picture shows me removing the insulation on a wire. The colour of the wire showed me that it could be copper because it was an orangey colour. Also copper is a good conductor of electricity.



This picture shows me filing the ball bearing to see if it scratches. The ball bearing didn't scratch so it must be hard I thought it was high carbon steel.



This picture shows me dinting the metal with a centre punch and a hammer this showed the metal was quite soft. The colour indicates that it is brass because it was a yellow colour.

Mark Band 1

Normally, and as stated in the unit specification, annotated photographs and witness statements/observation records should be included to demonstrate what the learner did when identifying engineering materials. In this case there is strong photographic evidence to support the practical activity and the learner has identified the three materials so full marks can be awarded from this mark band.

Mark Band 2

Maximum marks have been awarded from this mark band as the learner has identified materials and described the properties of two of them so again full marks can be awarded from this mark band.

Mark Band 3

Learners need to justify the selection of two of the materials before they can be awarded marks from this mark band. In this case, although electrical conductivity for the copper is mentioned it is not linked to the function of the component by the learner and the statement about properties is done in a general sense so no marks can be awarded from this mark band.

In future it would be expected that the centre should support the achievement of process type activities by the use of well produced witness statements.

Centres are encouraged to use the teacher resource disc "Engineering Level 1 Foundation Diploma Assessment and Delivery Resource with CD-ROM ISBN 978-0-435756-26-0, and the student book "Edexcel Engineering Level 1 Foundation Diploma" ISBN 978-0-435756-25-3.

The Assessor has awarded half marks for Assessment Foci LO1 and LO2.1, half marks are not available. Assessors should not award half or percentage marks.