



**BTEC  
FIRST**



**BTEC**

# **Sample Assessment Materials (SAMs)**

## **ENGINEERING**

**From September 2013**

Pearson BTEC Level 1/Level 2 First Award in Engineering

Pearson BTEC Level 1/Level 2 First Certificate in Engineering

Pearson BTEC Level 1/Level 2 First Extended Certificate in Engineering

Pearson BTEC Level 1/Level 2 First Diploma in Engineering



# Contents

<b>Introduction</b>	<b>1</b>
<b>Unit 1: The Engineered World sample assessment mark scheme</b>	<b>3</b>



# Introduction

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Sample assessment materials (SAMs) provide learners and centres with specimen questions and mark schemes. These are used as the benchmark to develop the external assessment learners will take.

## **Unit 1: The Engineered World**

The SAMs for this external unit have been provided for the following qualifications:

- BTEC Level 1/Level 2 First Award in Engineering
- BTEC Level 1/Level 2 First Certificate in Engineering
- BTEC Level 1/Level 2 First Extended Certificate in Engineering
- BTEC Level 1/Level 2 First Diploma in Engineering.

The sample test demonstrates some of the mechanisms used within an onscreen test.



# **Unit 1: The Engineered World - sample assessment test and mark scheme**

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This sample assessment test and mark scheme is for the following qualifications:

- BTEC Level 1/Level 2 First Award in Engineering
- BTEC Level 1/Level 2 First Certificate in Engineering
- BTEC Level 1/Level 2 First Extended Certificate in Engineering
- BTEC Level 1/Level 2 First Diploma in Engineering.

The sample assessment test is available online at [www.btec.co.uk/engineering2012](http://www.btec.co.uk/engineering2012)





## 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 be penalised for omissions.
- Examiners should mark according to the mark scheme, not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All the marks in 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 judgment 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.

Question Number	Answer	Mark
1	Turning Drilling  1 mark for <b>each</b> correct answer	(1) (1)

Question Number	Answer	Mark
2	Jet engine – Aerospace  Motorbike – Automotive  1 mark for <b>each</b> correct answer	(1) (1)

Question Number	Answer	Mark
3	Any <b>two</b> from the following: <ul style="list-style-type: none"> <li>• They could be considered to be visually unattractive (1)</li> <li>• They must be positioned correctly [south facing] (1)</li> <li>• They could have a detrimental effect on the structural stability of the roof (1)</li> <li>• They need sunshine/bright daylight to operate efficiently (1)</li> <li>• They require an initial cost outlay that is substantial (1)</li> <li>• It takes a long time to recover the initial cost outlay through savings on energy bills (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	(2)

Question Number	Answer	Mark
4	To meet the high demand for products (1)  To reduce the cost to make products (1)  1 mark for <b>each</b> correct answer	(1) (1)

Question Number	Answer	Mark
5	Bullet proof vest – Kevlar  Canoe – Glass reinforced plastic  1 mark for <b>each</b> correct answer	(1) (1)

Question Number	Answer	Mark
6	<p>Any <b>three</b> from the following:</p> <ul style="list-style-type: none"> <li>• Guard in position (1)</li> <li>• Hold work in a machine vice and not in hand (1)</li> <li>• Do not remove swarf by hand (1)</li> <li>• Wear safety glasses (1)</li> <li>• Long hair tied back (1)</li> <li>• Do not distract others whilst using machinery (1)</li> <li>• Secure loose clothing (1)</li> <li>• Use a hand vice (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	<b>(3)</b>

Question Number	Answer	Mark
7	<p>Any <b>two</b> from the following:</p> <ul style="list-style-type: none"> <li>• They need to be reprogrammed for different products (1)</li> <li>• They include high set up/maintenance costs (1)</li> <li>• Small manufacturing errors are likely to lead to substantial downtime (1)</li> <li>• Small manufacturing errors are likely to lead to substantial rework (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	<b>(2)</b>

Question Number	Answer	Mark
8	<p>Any <b>two</b> from the following:</p> <ul style="list-style-type: none"> <li>• Strong (1)</li> <li>• Lightweight (1)</li> <li>• Durable (1)</li> <li>• Flexible (1)</li> <li>• Suitable for mass production (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	<b>(2)</b>

Question Number	Answer	Mark
9	<p>Any explained advantage from, for example:</p> <ul style="list-style-type: none"> <li>• Smaller components (1) results in a smaller PCB/low energy consumption (1)</li> <li>• Components can be soldered on both sides of a circuit board (1) so that it maximises the space (1)</li> <li>• Components are mechanically stronger (1) so that they don't detach under shake or vibrate conditions (1)</li> <li>• Easy to automate (1) so placement errors can be automatically corrected (1)</li> </ul> <p><b>Accept any other appropriate alternatives. Accept any reasonable explanation provided it relates to the advantage identified.</b></p>	(2)

Question Number	Answer	Mark
10	(a) Chuck on diagram identified	(1)
	(b) Table	
	1 mark for <b>each</b> correct answer	(1)

Question Number	Answer	Mark
11	<p>Any <b>two</b> advantages from, for example:</p> <ul style="list-style-type: none"> <li>• Highly accurate/consistent quality (1)</li> <li>• Can work continuously, 24/7 (1)</li> <li>• Labour costs will be reduced (1)</li> <li>• Can operate in extreme/dangerous conditions (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	(2)

Question Number	Answer	Mark
12	(a) Titanium	(1)
	(b) Casting	(1)
	1 mark for <b>each</b> correct answer	

Question Number	Answer	Mark
13	Detection	(1)

Question Number	Answer	Mark
14	Sintering	(1)

Question Number	Answer	Mark
15	(a) Colour	(1)
	(b) Heat	(1)
1 mark for <b>each</b> correct answer.		

Question Number	Answer	Mark
16	Riser is correctly identified.	(1)

Question Number	Answer	Mark
17	Alloy wheel	(1)

Question Number	Answer	Mark
18	<p>Any <b>one</b> explained advantage from, for example:</p> <ul style="list-style-type: none"> <li>• Energy absorption/metallic foams will improve sound dampening (1) so the driver is cushioned from excessive noise at high speeds (1)</li> <li>• Energy absorption/metallic foams will improve safety (1) so the driver is less likely to be injured if a crash/impact occurs (1)</li> <li>• Energy absorption/metallic foams will generate a dampening effect over rough ground (1) thereby improving the vehicle ride (1)</li> </ul> <p><b>Accept any other appropriate alternatives. Accept any reasonable explanation provided it relates to the advantage identified.</b></p>	(2)

Question Number	Answer	Mark
19	<p>Up to 2 marks per explained advantage.</p> <p><b>Advantages</b> likely to be identified include:</p> <ul style="list-style-type: none"> <li>• Flexibility (1) can be used in large-scale wind farms for national grid/small individual turbines for rural or isolated locations (1)</li> <li>• Use of wind turbines is non-polluting/ environmentally friendly/sustainable (1)</li> <li>• Produce 50x more energy over its lifetime as is consumed by its construction and installation (1)</li> <li>• Produces low-cost power (1) involves low running and maintenance costs (1)</li> <li>• Can be installed off-shore (1) which minimises visual impact/takes advantage of the constant breezes over open water</li> </ul> <p><b>Accept any other appropriate alternatives</b></p> <p>Up to 2 marks per explained disadvantage.</p> <p><b>Disadvantages</b> likely to be identified include:</p> <ul style="list-style-type: none"> <li>• Can only provide a small amount of the total energy (1) due to the small amount of turbines available</li> <li>• Infrastructure (1) required for wind farms causes some damage to landscape e.g. access roads for maintenance (1)</li> <li>• Controversial (1) as noise and vibration of moving turbine has potential to affect local community and livestock</li> <li>• Affects environmentally sensitive coastal sites (1) e.g. those with lots of nesting birds (1). Also turbines spoil picturesque landscapes (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b></p>	(2)

Question Number	Answer	Mark
20	Composite	(1)

Question Number	Answer	Mark
21	<p>Any <b>two</b> explained advantages from, for example:</p> <ul style="list-style-type: none"> <li>• Environmentally friendly (1) as it has low/no emissions (1) / as only water vapour is emitted (1)</li> <li>• Small amounts of fuel required to travel long distances (1) therefore, highly efficient technology (1) / cost of vehicle fuel reduced (1)</li> <li>• Very simple construction (1) due to few moving parts (1) / low mass production costs (1)</li> </ul> <p><b>Accept any other appropriate alternatives.</b>  <b>Accept any reasonable explanation provided it relates to the advantage identified.</b></p>	(4)

Question Number	Indicative content	Mark
22	<p>Advantages, e.g.:</p> <ul style="list-style-type: none"> <li>• Reduces the cost of inventory [storing raw materials/finished goods]</li> <li>• Reduces work in progress/working capital</li> <li>• Can reduce the occurrence of accidental damage</li> <li>• Balances worker inputs on a production line/reduces worker downtime</li> <li>• Regular production patterns/downtime can be more easily planned (i.e. maintenance)</li> <li>• Pull system/reduces overproduction</li> <li>• Emphasis placed on 'getting it right first time'</li> <li>• Allows specialisation/increases throughput</li> </ul> <p>Disadvantages, e.g.:</p> <ul style="list-style-type: none"> <li>• No room for mistakes</li> <li>• Minimal stock is kept for spikes in production</li> <li>• No inventory if unexpected orders arise</li> <li>• Heavy reliance on suppliers</li> </ul> <p>Judgement, e.g.:</p> <ul style="list-style-type: none"> <li>• The 'Just-in-Time' method reduces waste if - suppliers can be trusted/demand for a product is reasonably consistent</li> <li>• The 'Just-in-Time' method could increase waste if - Push production replaces pull/ quality control procedures are not rigorous</li> </ul> <p>Apply the levels mark scheme below.</p>	<b>(8)</b>
Level	Marks	Descriptor
	0	No rewardable material.
1	1-3	Basic arguments on both sides identified, <b>or</b> only one side considered. 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. No conclusion produced or the conclusion a consequence of only one side of the argument being considered.
2	4-6	Arguments for and against are described, but there will be more emphasis on one side than the other. The answer will be unbalanced. A conclusion is present, but this is either implicit or as a result of unbalanced consideration of the arguments. There is little or unfocused justification of the conclusion. Most points made will be relevant to the situation in the question, but the link will not always be clear.
3	7-8	Balanced explanation of both sides for and against. A conclusion is produced which is justified clearly linked to the consideration of arguments for and against, and their relative importance to the situation. The majority of points made will be relevant and there will be a clear link to the situation in the question.







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