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Pearson BTEC Level 1/Level 2 First Award	Centre Number					Learner Registration Number				
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<h1>Engineering</h1> <h2>Unit 38: Materials Used in Engineered Products</h2>										
Wednesday 11 January 2017 – Morning						Paper Reference				
Time: 1 hour						<b>20573G</b>				
You do not need any other materials.									Total Marks	

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

### Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 The materials used in the manufacture of engineered products are chosen because of their specific properties or because they are a particular type of material.

(a) Name **one** example of a composite material.

(1)

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(b) Identify **two** examples of a ferrous metal.

(2)

- A Carbon steel
- B Copper
- C Tungsten carbide
- D Gold
- E Cast iron

(c) Name **two** examples of alloys.

(2)

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(d) Identify **two** examples of physical material properties.

(2)

- A** Wear resistance
- B** Hardness
- C** Mass
- D** Opacity
- E** Fibre alignment

(e) Name the mechanical property of an engineering material that enables it to resist bending when a force is applied.

(1)

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**(Total for Question 1 = 8 marks)**

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2 (a) Engineering materials have a life cycle.

Identify **one** activity where ore is removed from the ground.

(1)

- A Transportation
- B Mining
- C Biodegradation
- D Particulate

(b) These **two** engineering products are produced by different engineering sectors.

Draw **one** straight line from each engineering product to the sector that has produced it.

(2)

**Component**

**Sector**



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Satellite dish



@GwoeiShutterstock

Rotor blade

Aerospace

Automotive

Marine

Communications

Nuclear

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(c) Give **one** advantage of a polymer being supplied as granules.

(1)

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**(Total for Question 2 = 4 marks)**

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3 (a) Identify **one** material type that is associated with crystal growth.

(1)

- A Laminates
- B Elastomers
- C Metals
- D Thermosets

(b) Solvent resistance is a property of some engineering materials.

Name the category of material properties that solvent resistance belongs to.

(1)

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(c) Composites can be supplied in the form of pipes or tubes.

Give **two** applications of composites when they are supplied in the form of pipes or tubes.

(2)

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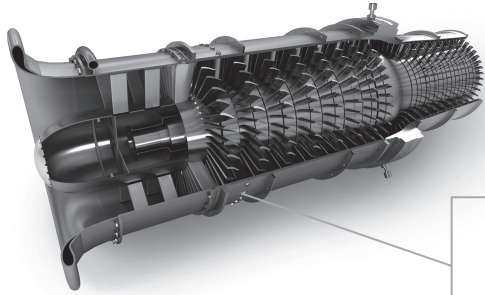
(d) These two component parts of an aeroplane are made from different materials.

Draw **one** straight line from each component to the material it is most likely to be made from.

(2)

**Component**

**Material**



External compressor casing

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Landing gear strut

Medium carbon steel

Tin

Magnesium

Zinc

Cast iron

**(Total for Question 3 = 6 marks)**



4 SK5 Engineering manufactures wheels for use on cars. The company manufactures the wheels from low carbon steel that is supplied in sheet form.

(a) Name the engineering sector that manufactures wheels for cars.

(1)

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(b) The wheels that SK5 Engineering manufactures have surface treatments applied to them before they are fitted to cars.

Name **one** example of a surface treatment.

(1)

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(c) Explain **one** advantage to SK5 Engineering of the low carbon steel for the car wheels being supplied in sheet form.

(2)

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(d) Explain **two** advantages of using low carbon steel in the manufacture of car wheels.

(4)

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**(Total for Question 4 = 8 marks)**

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5 BA8 Engineering develops and manufactures component parts that make use of smart materials.

(a) Some smart materials react to changes in the environment.

State the change in the environment that causes a shape memory polymer to return to its original shape.

(1)

(b) Shape memory polymers are used by BA8 Engineering to improve the function of engineered products, such as mechanical fastenings.

Name **two** other examples of the use of shape memory polymers in engineered products.

(2)

1

2

(c) BA8 Engineering uses metallic materials to produce other smart materials.

The metallic materials are imported in the form of mineral ore.

Explain **one** disadvantage of BA8 Engineering extracting metallic materials from mineral ore for the production of other smart materials.

(2)

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(d) BA8 Engineering has developed its use of thermochromic materials to improve kitchen appliances. For example, it has replaced the standard clear glass panel used in an oven door with a thermochromic panel.



Standard clear glass panel

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Explain **two** advantages to the end user of having a thermochromic panel in an oven door.

(4)

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2 .....

**(Total for Question 5 = 9 marks)**

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6 1JQ Engineering manufactures and supplies standard and one-off engineered products for use in the marine sector.

(a) 1JQ Engineering manufactures chains for use with anchors.



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(i) The chains are manufactured from ferrous metals.

Name **one** form of supply that would be used to manufacture chains.

(1)

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(ii) The chains are tempered as part of the manufacturing process.

Explain **one** advantage of tempering chains.

(2)

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(b) 1JQ Engineering produces customised sonar masts for racing yachts. The sonar masts are manufactured from composite materials.

Explain **two** advantages of adding additional fibre reinforcement to the composite materials that are used to manufacture the sonar masts.

(4)

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2

**(Total for Question 6 = 7 marks)**



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7 DT8 Engineering manufactures smartphones for a number of telecommunications companies. DT8 Engineering is aware that there are environmental considerations related to the life cycle of smartphones.

DT8 Engineering has analysed the materials used in its product range, and has identified the average material contents of its smartphones as:

- Non-ferrous metals – 24%
- Polymers – 23%
- Ferrous metals – 21%
- Others – 32%

Discuss the implications of a smartphone being made from a large range of materials when it reaches the end of its life cycle.

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**(Total for Question 7 = 8 marks)**

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**TOTAL FOR PAPER = 50 MARKS**

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