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<h2 style="margin: 0;">Friday 17 May 2019</h2>	
Morning (Time: 1 hour)	Paper Reference 20573G
<h1 style="margin: 0;">Engineering</h1> <h2 style="margin: 0;">Unit 38: Materials Used in Engineered Products</h2>	
You do not need any other materials.	Total Marks <input style="width: 50px; height: 30px;" type="text"/>

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

Answer ALL questions.

1 The materials used in the manufacture of engineered products are chosen for specific reasons.

(a) Name **one** example of an alloy.

(1)

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(b) Identify **two** examples of mechanical material properties

(2)

- A** Injection moulding
- B** Compressive strength
- C** Degradation
- D** Toughness
- E** 3D printing

(c) Name **two** examples of physical material properties.

(2)

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2 (a) Engineering materials are processed as part of their life cycle.

Identify **one** stage associated with the disposal of materials.

(1)

- A** Biodegradation
- B** Fabrication
- C** Machining
- D** Mineral ore

(b) These **two** engineering products are associated with different engineering sectors.

Draw **one** straight line from each product to the most appropriate engineering sector.

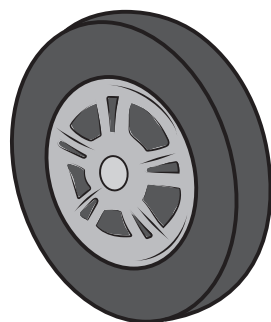
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Product

Engineering Sector



Smart phone



Wheel

Rail

Automotive

Communications

Marine

Nuclear

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(c) State **one** advantage of annealing steel.

(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 grain structure.

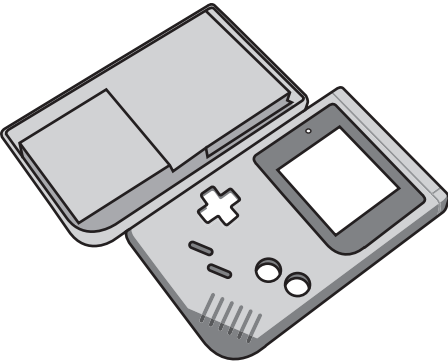

(1)

- A** Composites
- B** Elastomers
- C** Metals
- D** Polymers

(b) These component parts of a hand held games console 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
	Iron
Outer case	Ceramic
	Copper
Circuit board tracks	Glass
	Thermoplastic

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(c) Metals can be supplied as castings.

State **two** other forms of supply for metals.

(2)

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(Total for Question 3 = 5 marks)

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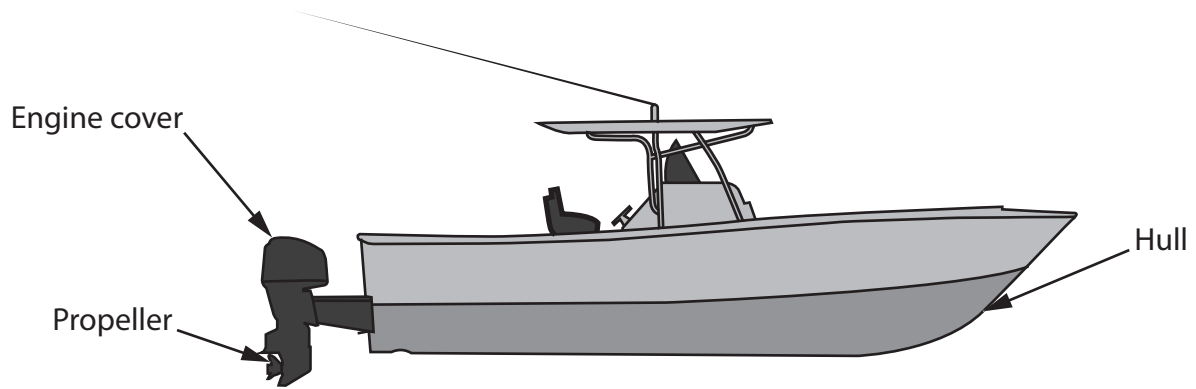
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4 1JQ Engineering manufactures small boats.



(a) State **one** advantage of using aluminium for boat propellers.

(1)

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(b) State **two** advantages of using thermoplastic polymers for boat engine covers.

(2)

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(c) The thermoplastic polymers used for the engine covers are processed from crude oil.

Explain **one** disadvantage associated with the processing of crude oil to produce thermoplastic polymers.

(2)

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(d) During production of the hulls of the boats, 1JQ Engineering apply a plastic coating as a surface treatment.

Explain **two** characteristics of plastic coating that makes it a suitable surface treatment for the boat hulls.

(4)

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(Total for Question 4 = 9 marks)

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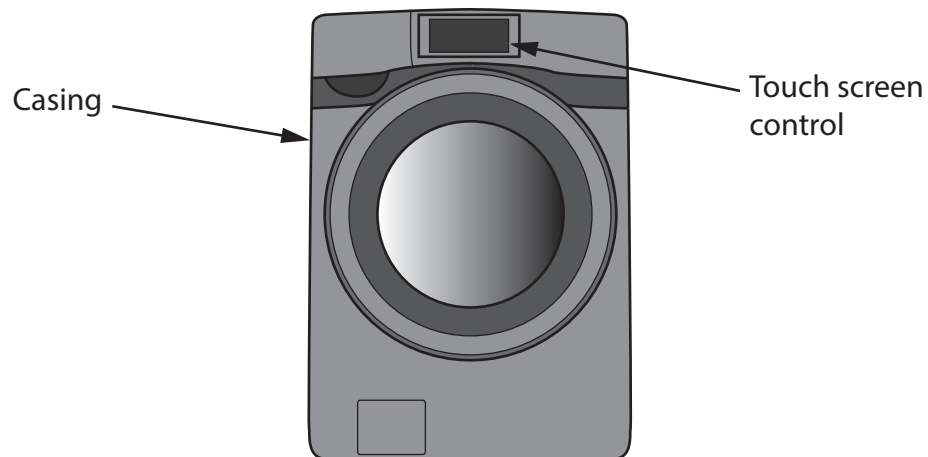
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5 FR59 Engineering manufactures kitchen appliances including washing machines.



(a) Name the engineering sector that manufactures washing machines.

(1)

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(b) The washing machine casing is made from medium carbon steel.

State **two** reasons why medium carbon steel is suitable for this use.

(2)

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(c) The control panel for the washing machine features a touch screen that makes use of quantum-tunnelling composites.

Explain **two** advantages of using quantum-tunnelling composites for the touch screen control panel.

(4)

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(Total for Question 5 = 7 marks)

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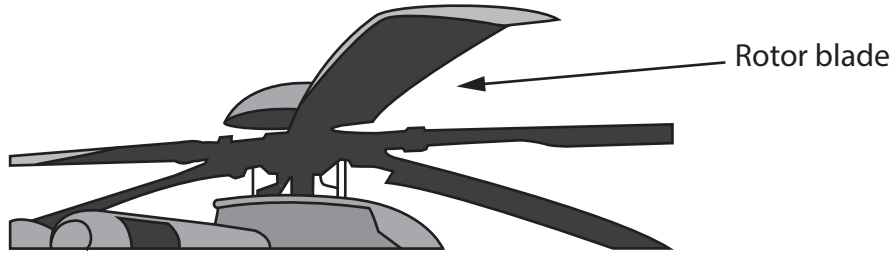
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6 YG8 Engineering manufactures rotor blades and engines for helicopters and wings for aeroplanes using a wide range of engineering materials.



(a) State **one** property of piezoelectric materials that makes them useful for helicopter rotor blades.

(1)

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(b) The helicopter rotor blades are manufactured using a range of materials including polymers that are supplied in the form of a resin.

Explain **two** advantages of polymers being supplied in the form of a resin when manufacturing the rotor blades.

(4)

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(c) YG8 Engineering uses an alloy containing magnesium in the production of the engine castings for helicopters.

Explain **two** properties of magnesium that makes it a suitable material for use as part of a helicopter engine.

(4)

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