Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4111/01

S17-4111-01

DESIGN AND TECHNOLOGY
UNIT 1
FOCUS AREA: Resistant Materials Technology

TUESDAY, 23 MAY 2017 – MORNING

2 hours

	For Examiner's use only		
	Question	**Maximum Mark**	**Mark Awarded**
Section A	**1.**	**15**	
	2.	**10**	
	3.	**10**	
	4.	**25**	
Section B	**5.**	**10**	
	6.	**15**	
	7.	**20**	
	8.	**15**	
	Total	**120**	

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ADDITIONAL MATERIALS

You will need basic drawing equipment, coloured pencils and a calculator for this examination.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. Where the space is not sufficient for your answer, continue at the back of the booklet, taking care to number the continuation correctly.

You are reminded of the necessity for good English and orderly presentation in your answers.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

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Section A

Marked out of 60 60 minutes

1. This question is about Product Analysis. It is worth a total of 15 marks.

Study the images of the two clothes pegs shown below and answer the questions that follow.

Clothes Peg A	Clothes Peg B
	
Materials: Birch and Spring Steel.	Material: Polypropylene.
Traditional design in use over 100 years.	Modern product, **designed to improve on clothes Peg A.**

(a) A design specification was produced before designing **Peg B**.
State how the following specification points have been achieved in the final product.

(i) Durability [1]

"The peg should be designed to have a long life span."

Specification point achieved by .....

.....

(ii) Function [1]

"The peg should hold items securely but not mark the clothes being hung."

Specification point achieved by .....

.....

(iii) Manufacturing [1]

"The peg should be designed for ease of manufacture."

Specification point achieved by .....

.....

(iv) Sustainability [1]

"The peg must be designed to cause the least possible harm to the environment."

Specification point achieved by .....

.....

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(b) **Underline** the correct manufacturing process that has been used to make **Peg B**. [1]

Blow moulding **Press moulding** **Injection moulding**

(c) Parts of **Peg A** have been made from birch.
Explain why birch is a suitable material. [2]

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(d) **Peg B** displays the symbol shown below.

Explain the purpose of displaying this symbol on the product. [2]

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Turn over.

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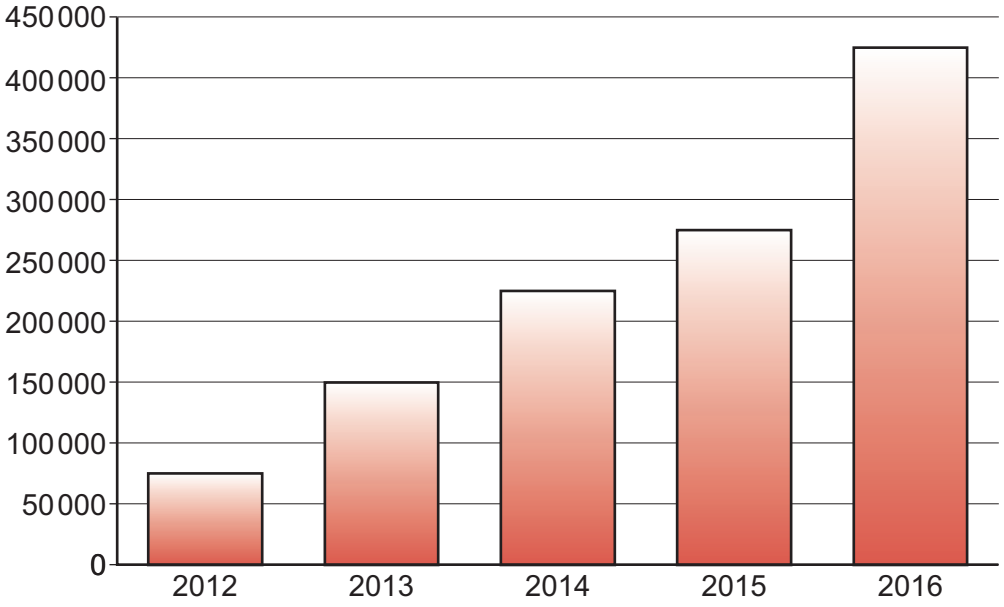
(e) The bar chart below shows the sales of **Peg B** over a 5 year period.



(i) State the total sales of **Peg B** from 2014 to 2016. [1]

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(ii) Calculate the average annual sales for **Peg B** over the 5 year period from 2012 to 2016. [2]
(Show all your workings.)

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(f) The principle of Just in Time (JIT) has been followed in the manufacturing of **Pegs A and B**.
Discuss the advantages of Just in Time (JIT) to the manufacturer. [3]

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2. This question is about the general issues of Design & Technology. It is worth a total of 10 marks.

(a) Complete the following statements by inserting the correct R of sustainability.

(i) When designing new products I could R ..... my design to make it more environmentally friendly. [1]

(ii) I should R ..... parts or components from unwanted products in new products. [1]

(b) Complete the name of the logo shown below.

I ..... S ..... Organisation. 2 x [1]

(c) Explain the purpose of a COSHH assessment. [2]

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(d) Energy sources can be renewable or non-renewable.

(i) State the name of a non-renewable energy source. [1]

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(ii) Outline the reasons why renewable energy sources are considered to be beneficial to the environment. [3]

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3. This question is about the Designers that you have studied. It is worth a total of 10 marks.

During your course you have studied the work of Bethan Gray and Philippe Starck.

(a) Write the correct name of the designer underneath the descriptions below. 2 x [1]

Born in 1949. Influenced by father who was an aeronautical engineer. The winner of the "Excellence Française Award" for Design in 2013.	Born in 1976. Former Design Director of Habitat. The winner of the "Best British Designer Award" 2013.
Designer:	Designer: .....

(b) Write a short essay in the space below comparing the work of Bethan Gray and Philippe Starck, identifying the differences in their design philosophies. [8]

Marks will be awarded for the content of the answer and the quality of written communication.

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4. This question is about the Design Process and how it is used. It is worth a total of 25 marks.

(a) Study the descriptions below and **underline** the correct meaning for the term 'design brief'. [1]

A step-by-step plan for making the product.

A list of criteria that the product should meet.

A statement describing the problem to be solved at the start of the project.

(b) Explain why designers often disassemble existing products during research. [2]

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(c) The folding chair shown in the picture below has been made by a Resistant Materials student.

Explain **two** different activities that could be undertaken to evaluate the success of the completed product.

Activity 1: .....

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..... [2]

Activity 2: .....

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..... [2]

(d) A restaurant provides the following items on each of its tables:

You are required to design a portable storage unit to hold **all** of the items shown as well as clearly displaying the table number.

Specification

The storage unit must:

- be an innovative design, easily moved from table to table;
- sit on the table and be free-standing;
- hold the items separately and securely;
- allow the items to be removed and replaced easily;
- display the table number clearly.

Marks will be awarded for:

(i) a design that satisfies the specification; [6]

(ii) clear details showing the construction of a suitable storage unit; [4]

(iii) labelling suitable materials and components; [2]

(iv) stating **two** important suitable dimensions; [2]

(v) quality of communication. [4]

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Draw **one** design for the storage unit in the space below. *Use notes to explain your ideas.*

Turn over.

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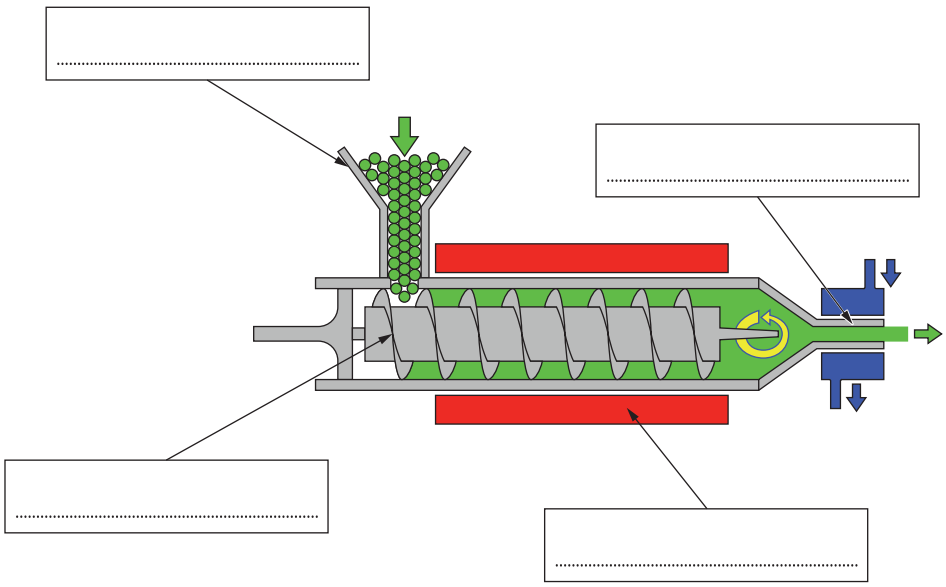
Section B

Marked out of 60 *60 minutes*

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

(a) Using the words provided, correctly label **each** part of the extrusion moulding machine below. 4 x [1]

Screw **Die** **Heater** **Hopper**



(b) Describe in detail **one** reason why many of the products we use in our everyday lives are manufactured in countries such as China. [2]

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(c) The picture below shows wooden components that have been formed by the process of steam bending.

Outline the steps involved in the steam bending process. [4]

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Examiner only

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) State the correct name of the **two** components shown below. 2 x [1]

(i) ..... hinge (ii) ..... screw

(b) (i) State the correct name of **one** Knock Down Fitting (KDF). [1]

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(ii) State **one** advantage of using Knock Down Fittings (KDFs) in furniture construction. [1]

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(c) Metal alloys are a combination of 2 or more metals.

(i) Complete the information for the metal alloys below. 3 x [1]

Copper	+	**Zinc**	=	
Steel	+		=	**Stainless Steel**
	+	**Copper**	=	**Bronze**

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(ii) Explain the benefits of combining different metals to create alloys. [2]

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(d) Use the correct words from the list below to complete the sentences that follow.

Nanotechnology **Smart Materials** **Ferrous Metals** **Composite Materials**

(i) ..... contain iron. [1]

(ii) ..... react to heat, light or sound. [1]

(iii) Coatings to produce self-cleaning windows are an example of [1]

.....

(e) Use notes and sketches to explain in detail the structure of plywood. [3]

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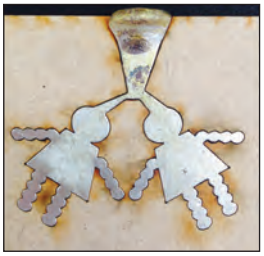
7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name and use for **each** piece of equipment shown.

Equipment	Name and Use
	Name: ..... [1] Use: .... [1]
	Name: ..... [1] Use: .... [1]
	Name: ..... [1] Use: .... [1]

(b) The image shows an item that has been manufactured using pewter casting.



State **two** different safety considerations you should follow when pewter casting.

Consideration 1: .....

..... [1]

Consideration 2: .....

..... [1]

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(c) A 10 mm diameter mild steel rod that has been threaded at both ends is shown below.

(i) Give the correct name of the tool that has been used to cut the threads on the mild steel rod. [1]

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(ii) Explain in detail how you would accurately produce the threads on one end of the mild steel rod. [4]

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(d) The image below shows stacked timber that is being seasoned.

Discuss the reasons for seasoning timber before it is used. [3]

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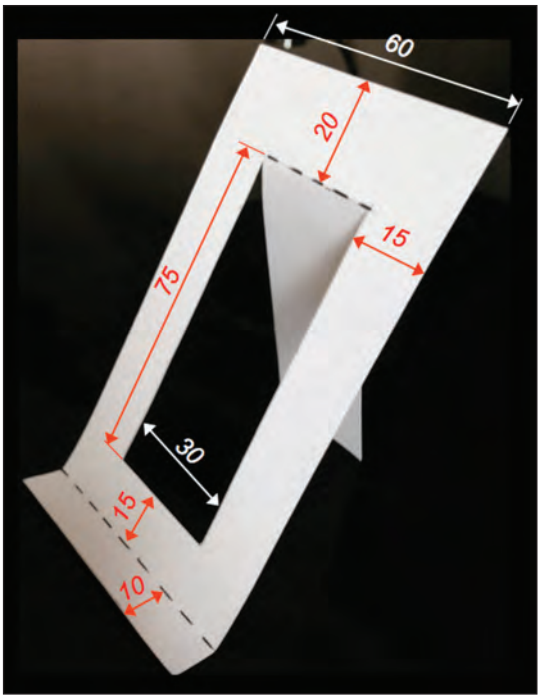
(e) The picture shows a card model of a mobile phone holder to be cut out of a single piece of polystyrene using a laser cutter.

Computer Aided Design (CAD) will be used to draw the holder as a one-piece development / net.



Draw the development / net accurately on the grid below, using solid lines for cutting and dashed lines for folding. [4]

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8. This question is about ICT, CAD/CAM, Systems and Processes. It is worth a total of 15 marks.

(a) State the correct name of the finishing processes used on the products shown below. 3 x [1]

Product	Finishing process
 *Steel coat hanger*	.....
 *Wooden floor*	.....
 *Copper brooch*	.....

(b) (i) Name **one** Computer Aided Design (CAD) software package. [1]

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(ii) Describe **one** disadvantage of using Computer Aided Design (CAD) when developing design ideas. [2]

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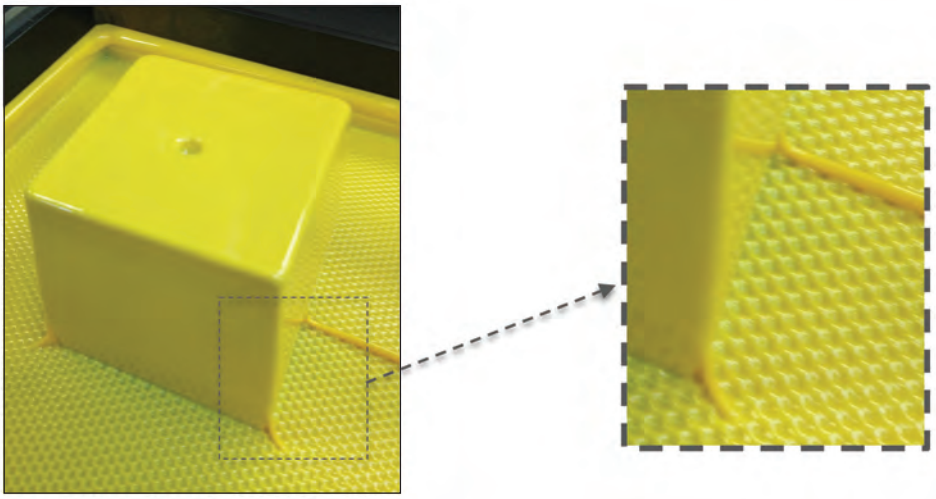
Examiner only

(c) The image below shows webbing that has occurred during vacuum forming.



Explain in detail why webbing can occur. [3]

(d) The image below shows a dowel joint that is used as part of a frame construction. Two hundred of the frames are to be made.

Discuss the advantages of using a jig to carry out the drilling operation when making the dowel joint. [3]

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(e) Discuss the benefits of using 3D printing in the development of products. [3]

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END OF PAPER

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For continuation only.