Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
June 2006

DESIGN AND TECHNOLOGY
(RESISTANT MATERIALS TECHNOLOGY)
Written Paper
Higher Tier

3545/H

H

Thursday 25 May 2006 9.00 am to 11.00 am

For this paper you must have:
- a pen, pencil, ruler, eraser, pencil sharpener and coloured pencils
- an insert of colour photographs (enclosed)

Time allowed: 2 hours

Instructions

- Use blue or black ink or ball-point pen. Use pencil and coloured pencils only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- Show the working of your calculations.

Information

- The maximum mark for this paper is 125.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Question	Mark	Question	Mark
1		9	
2		10	
3			
4			
5			
6			
7			
8			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Questions 1 to 3 on this paper relate to the Design Brief given below.

Design brief

A manufacturer of children's toys has asked you to design an educational toy.

The toy is for a child aged between 6 months and 3 years.

Your ideas should focus on the following situations:

Situation 1 a toy which encourages a young child to walk;

Situation 2 a toy which improves hand / eye coordination;

Situation 3 a toy which uses a mechanism.

Answer **all** questions in the spaces provided.

Question 1 is about the design specification.

You should spend about 5 minutes on this question.

1 Give **five** design requirements for a child's educational toy. (The toy is for a child aged between 6 months and 3 years.)

Explain each of your answers.

Requirement 1: .....

Explanation: .....

.....

(2 marks)

Requirement 2: .....

Explanation: .....

.....

(2 marks)

Requirement 3: .....

Explanation: .....

.....

(2 marks)

Requirement 4: .....

Explanation: .....

.....

(2 marks)

Requirement 5: .....

Explanation: .....

.....

(2 marks)

10

Question 2 is about design ideas.

You should spend about 40 minutes on this question.

2 Study your **design specification** (question 1) and the information given in the **design brief** (page 2).

Use this information to help you to sketch **one** idea for **each** situation.

Remember to:

- add notes to explain your sketches;
- evaluate each idea.

This question is worth 32 marks.

Marks will be awarded for:

- three different ideas; *(3 × 6 marks)*
- quality of sketches; *(5 marks)*
- quality of notes; *(3 marks)*
- quality of evaluations. *(3 × 2 marks)*

Situation 1 a toy which encourages a young child to walk

Evaluation : .....

.....

Situation 2 a toy which improves hand / eye coordination

Evaluation : .....

.....

Situation 3 a toy which uses a mechanism

(You will be asked to develop this mechanism in Question 3.)

Evaluation : .....

.....

32

Question 3 is about systems and control.

You should spend about 15 minutes on this question.

3 Use notes and sketches to show details of the mechanism you have used in **Question 2 (Situation 3)**.

Show clearly how the mechanism works.

Marks will be awarded for:

- details of the mechanism; *(5 marks)*
- quality of sketches; *(2 marks)*
- quality of notes. *(3 marks)*

10

Question 4 is about making.

You should spend about 20 minutes on this question.

4 **Figure 1** on the colour insert sheet shows two designs for a counting frame which could be made in a school workshop.

Choose **one** of the counting frames.

Chosen counting frame: .....

Use notes and sketches to show clearly how you would make **a batch of ten** counting frames.

At each stage, name all the tools and equipment you would use.

Answer this question on pages 8 and 9.

Question 4 continues on the next page

Stage 1: Marking out **or** CAD (computer aided design)

(4 marks)

Stage 2: Shaping and drilling **or** CAM (computer aided manufacture)

(4 marks)

Stage 3: Joining the frame to the base

(4 marks)

Stage 4: Finishing

(2 marks)

14

Question 5 is about designing.

You should spend about 5 minutes on this question.

5 A model is often produced during the designing of a product.

Study **Figure 2** and **Figure 3** on the colour insert sheet.

(a) Give **one advantage** and **one disadvantage** of using construction kits, such as those shown in **Figure 2** on the colour insert sheet, rather than the modelling materials shown in **Figure 3** on the colour insert sheet.

Explain your answers.

Advantage: .....

.....

(1 mark)

Explanation: .....

.....

(1 mark)

Disadvantage: .....

.....

(1 mark)

Explanation: .....

.....

(1 mark)

(b) Explain why a **designer** would make a model of his/her idea as part of the design process.

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(5 marks)

9

Question 6 is about health and safety.

You should spend about 5 minutes on this question.

6 (a) Name **four** making / manufacturing processes which use heat.

Process 1: .....
(1 mark)

Process 2: .....
(1 mark)

Process 3: .....
(1 mark)

Process 4: .....
(1 mark)

(b) Handling and working hot metal can be a dangerous activity.

Complete the table shown below.

Hazard	Risk to user	Safety precaution
Picking up hot metal		
Hot metal / flux could 'spit' onto your clothing		
Hot metal / flux gives off fumes		

(6 marks)

10

Turn over for the next question

Question 7 is about materials and finishes.

You should spend about 10 minutes on this question.

7 Study the high chairs shown in **Figure 4** on the colour insert sheet.

(a) Name **one** suitable, *specific* material from which to make the *frame* of each high chair and give **two** reasons for each choice.

High chair A

Material: .....
(1 mark)

Reason 1: .....

.....
(1 mark)

Reason 2: .....

.....
(1 mark)

High chair B

Material: .....
(1 mark)

Reason 1: .....

.....
(1 mark)

Reason 2: .....

.....
(1 mark)

High chair C

Material: .....
(1 mark)

Reason 1: .....

.....
(1 mark)

Reason 2: .....

.....
(1 mark)

(b) Name **one** suitable, *specific* finish for each of the materials you have chosen for **high chair A** and **high chair C**.

High chair A

Finish: .....

(1 mark)

High chair C

Finish: .....

(1 mark)

(c) Give a specific health and safety requirement of a finish which is to be used on a high chair.

Explain your answer.

Health and safety requirement: .....

.....

(1 mark)

Explanation: .....

.....

(1 mark)

13

Turn over for the next question

Question 8 is about environmental issues.

You should spend about 5 minutes on this question.

8 Plastic materials are widely used in the manufacture of children's toys.

Explain how the use of plastics affects the environment.

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(9 marks)

9

Question 9 is about using ICT.

You should spend about 5 minutes on this question.

9 Designers and manufacturers of children's educational toys may use the Internet in their work.

(a) Give **three** ways designers and manufacturers of children's educational toys could use the Internet in their work.

1 .....
(1 mark)

2 .....
(1 mark)

3 .....
(1 mark)

(b) Give **three** advantages of using CAD (computer aided design) rather than designing with paper and pencil.

Advantage 1: .....
(1 mark)

Advantage 2: .....
(1 mark)

Advantage 3: .....
(1 mark)

6

Turn over for the next question

Question 10 is about product development.

You should spend about 10 minutes on this question.

10 Study the play centre shown in **Figure 5** on the colour insert sheet.

(a) Give **two** features of the play centre which make it appealing to a child.

Explain each of your answers.

Feature 1: .....

Explanation: .....

.....

(2 marks)

Feature 2: .....

Explanation: .....

.....

(2 marks)

(b) Explain how developments in material and manufacturing technology have assisted the design and manufacture of the product.

Explanation: .....

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(8 marks)

END OF QUESTIONS

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General Certificate of Secondary Education
June 2006

DESIGN AND TECHNOLOGY (RESISTANT MATERIALS TECHNOLOGY) FULL AND SHORT COURSES

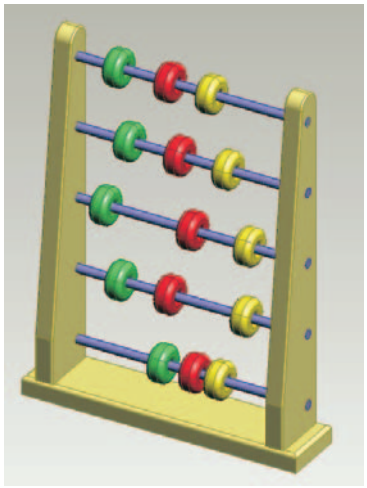
Higher Tier

H

This insert is provided for use in the examination.

Figure 1

Design One – a wooden product



Design Two – a plastic or metal product

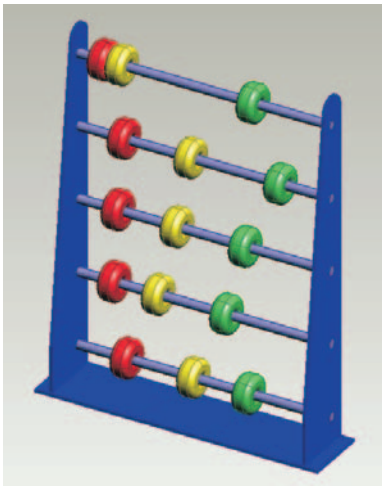
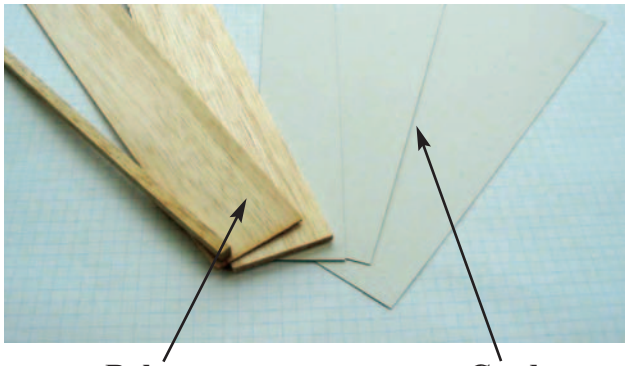


Figure 2

Figure 3



This insert sheet should **not** be sent to the examiner.

Turn over ►

Insert to **3545/H 3555/H**

Figure 4

High chair A

High chair B

High chair C

Image of metal high chair.

Figure 5

Image of children playing on a slide which is part of a play centre.

For copyright reasons it has not been possible to include two of the images on this page.
A full copy of the paper and insert can be obtained from Centre Services.
E-mail: Despatches-M@aqa.org.uk Tel: 0161 953 1180