

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A
Materials and Performance
FOUNDATION TIER
FRIDAY 15 JUNE 2007**

F A336/01

Morning

Time: 45 minutes

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)



* C O P / T 3 2 9 1 9 *

Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

- The number of marks available is given in brackets [] at the end of each question or part question.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	11	
2	7	
3	5	
4	13	
TOTAL	36	

This document consists of **12** printed pages.

Answer **all** the questions.


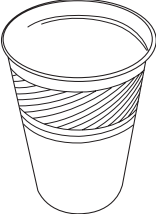
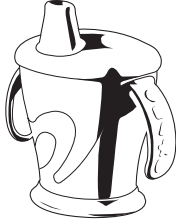

1 Corrie buys things for the kitchen.

(a) She chooses drinks containers for different purposes. They are made of different materials.

Finish the table by writing down the reason for each choice.

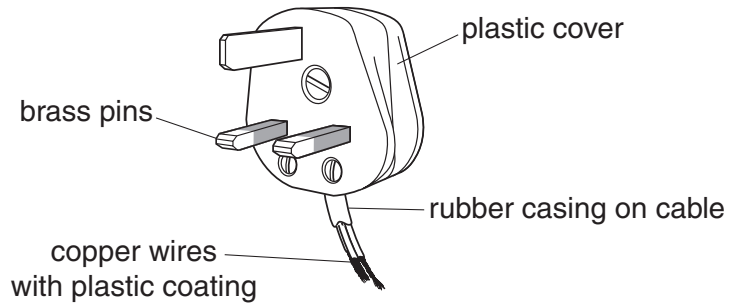
Choose the **best** word from this list.

attractive brittle cheap thermal insulator tough

chosen item	purpose	reason for choice
<p>mug with a double wall</p> 	<p>to keep drinks warm</p>	<p>.....</p>
<p>plastic cups</p> 	<p>for a large party</p>	<p>.....</p>
<p>plastic feeding cup</p> 	<p>to be safe for a young child</p>	<p>.....</p>
<p>wine glasses</p> 	<p>for a wedding celebration</p>	<p>.....</p>

[4]

(b) Corrie buys a toaster. The toaster has a plug.



Look at the plug.

Write the letter **I** next to materials which are electrical insulators.

Write the letter **C** next to materials which are electrical conductors.

brass

copper

plastic

rubber

[3]

(c) Each material belongs to a **class of materials**.

Draw a straight line from each **material** to its **class**.

One has been done for you.

material	class
copper	wood
glass	ceramic
paper	alloy
pine	metal
rubber	polymer
	composite

Note: A line is drawn from 'paper' to 'composite'.

[4]

[Total: 11]

2 Dan has a toy space ship.

**An image has been removed due to
copyright restrictions**

Details:
a clipart-style illustration of a
flying saucer toy space ship

He looks inside the spaceship through the Perspex windows.

(a) There are mirrors inside the spaceship.

(i) Put a ring around the word which **best** describes a mirror.

dull flat heavy reflective

[1]

(ii) The mirrors inside this spaceship make it seem bigger.

Give another example of how mirrors can be used in amusements or in buildings.

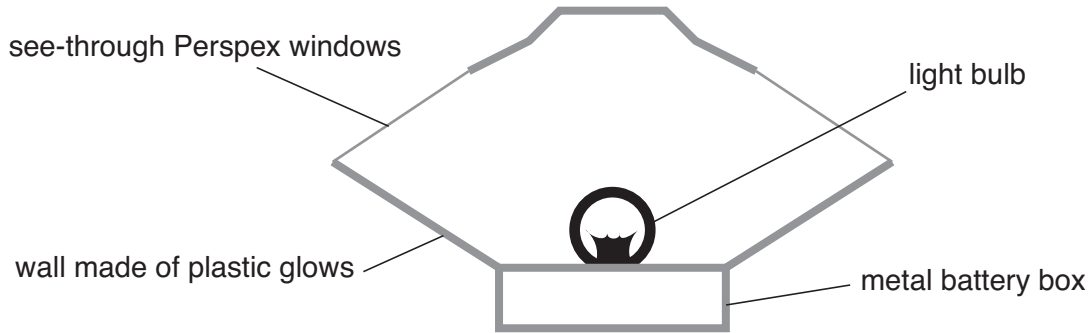
.....

.....[1]

(b) There is a light bulb inside the spaceship.

When it is switched on, the plastic walls of the spaceship glow.

The batteries are in a metal box at the base of the spaceship.



Complete the sentences to describe the **optical properties** of the materials in the spaceship.

Choose words from this list.

brittle opaque tough translucent transparent

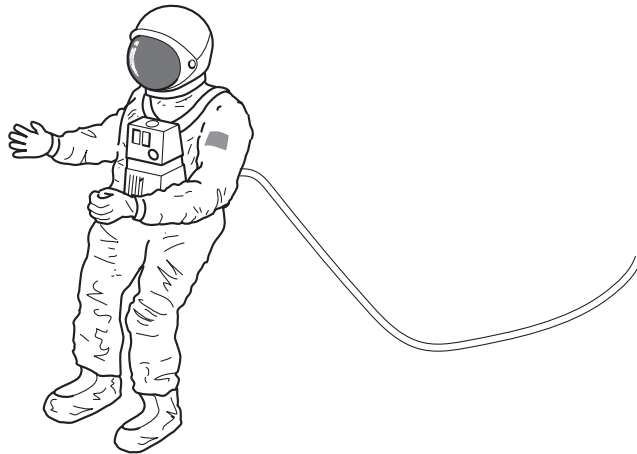
The Perspex windows are

The plastic walls are

The metal battery box is

[3]

(c) There are toy astronauts in the spaceship.



(i) Dan touches the astronaut's spacesuit.

The spacesuit is a thermal insulator and it feels warm.

Put a tick (✓) in the box next to the statement which **best** explains this.

Spacesuits are always warm.

Heat energy does not move away from Dan's hand.

The spacesuit is warmer than Dan's hand.

[1]

(ii) Dan then touches the astronaut's metal helmet.

The helmet is a thermal conductor and it feels cold.

Put a tick (✓) in the box next to the statement which **best** explains this.

Heat energy moves away from Dan's hand.

The helmet is on a toy.

Metal is always cold.

[1]

[Total: 7]

3 Paul tests peoples' hearing. He uses equipment that produces sound vibrations. Paul can change the sound that the equipment makes.

(a) Complete the sentence.

Choose from this list.

- faster louder quieter slower**

If Paul makes the vibrations bigger the sound will be[1]

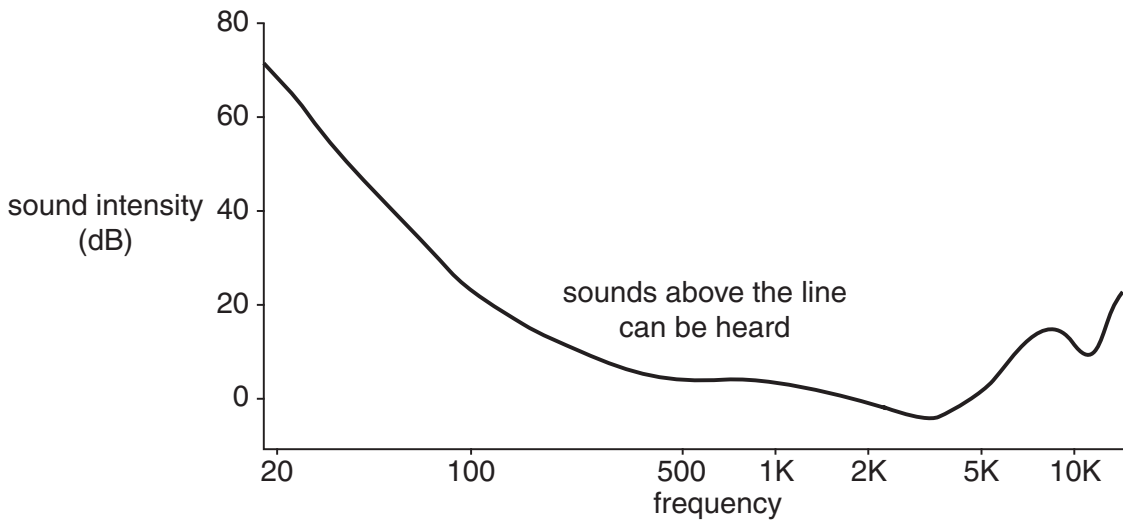
(b) The equipment makes sounds of different frequencies. Write these sounds in order, starting with the lowest frequency. The first is done for you.

- a lion growling a child singing a mouse squeaking distant thunder**

lowest frequency: distant thunder
.....
.....
.....
highest frequency:

[1]

(c) Paul uses a chart.



It shows the quietest sounds that can be heard at each frequency. **Only** sounds above the line can be heard.

(i) Put an **X** on the chart to show where the ear is **most sensitive** to sound.

[1]

- (ii) Paul listens to two sounds which have the same sound level. One is at 50 Hz and one is at 500 Hz. The one at 500 Hz sounds louder.

Put a tick (✓) in the box next to the **best** explanation for this.

His ear is more sensitive at 500 Hz.

He likes this note better.

He isn't listening properly.

[1]

- (iii) The sound level is measured in **decibels**.

Draw a straight line from the word **decibels** to what decibels means.

how dangerous a sound is

the pitch of a sound

decibels

how clear a sound is

the intensity of a sound

[1]

[Total: 5]

4 John is making a gate out of wood.



(a) John fastens the piece of wood shown below onto the gate to make it more rigid.



Show the **best** position for this piece of wood by drawing it on the diagram.

[1]

(b) Wood is stronger in **tension** than in **compression**.

(i) Draw arrows on the diagram of the block of wood below to show forces of **tension**.

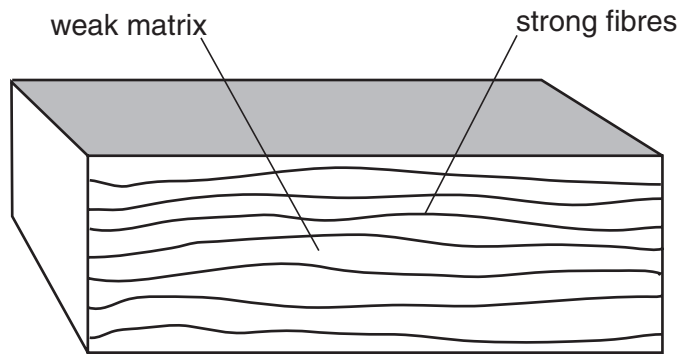


(ii) Draw arrows on the diagram of the block of wood below to show forces of **compression**.



[2]

(c) John finds this diagram which shows the structure of wood.



(i) Describe the arrangement of the fibres by completing the sentence.

Choose the **best** phrase from this list.

to make a pattern

randomly

in line with each other

The fibres are arranged [1]

(ii) Wood splits more easily in one direction only.

Use the diagram above and your answer to part (i) to suggest a reason for this.

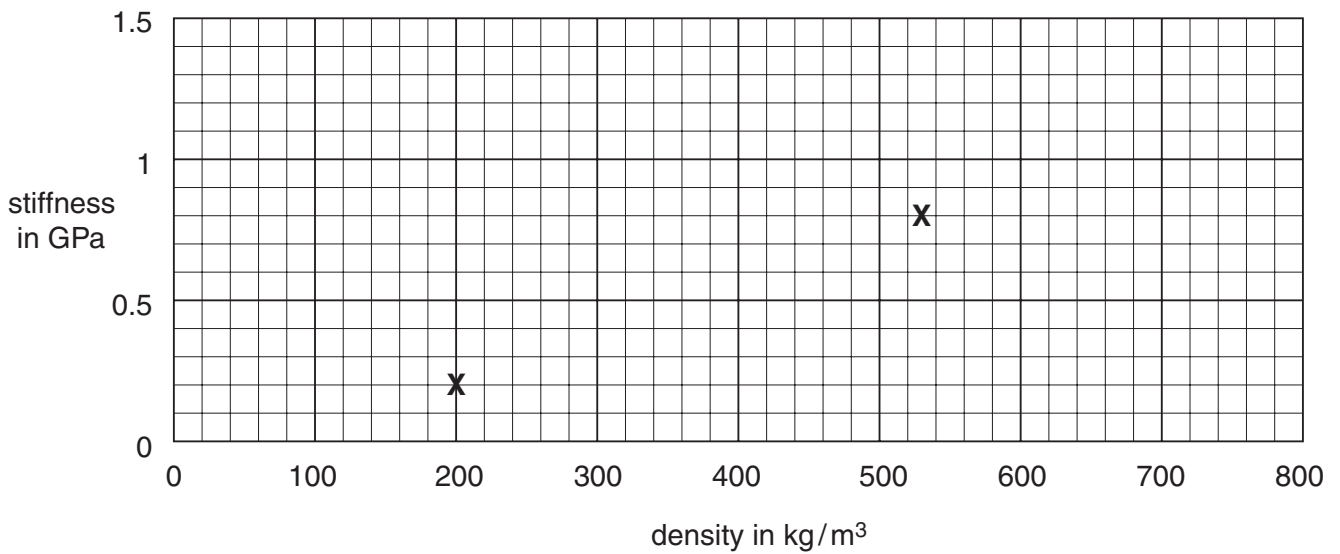
.....
.....[1]

(iii) Wood is a tough material. What is meant by the term **tough**?

.....
.....[1]

(d) The table shows some data for the density and stiffness of wood.

type of wood	density in kg/m ³	stiffness across fibres in GPa
balsa	200	0.2
mahogany	530	0.8
pine	550	0.8
birch	620	0.9
ash	670	1.1
oak	690	1.0



(i) Plot the points on the grid. Two have been done for you. [2]

(ii) Finish the graph by drawing the line of **best fit** through the points. [1]

(iii) What does the graph tell you about the relationship between the density of wood and the stiffness of wood?

.....
[1]

(e) Describe how you could find out the stiffness of a sample of wood in a school laboratory.

Use a labelled diagram to help your explanation.

.....

.....

.....

.....[3]

[Total: 13]

END OF QUESTION PAPER

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