OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

A336/01

Materials and Performance
(Foundation Tier)

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Wednesday 24 June 2009
Morning

Duration: 45 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Maria is a science technician. She is preparing samples of materials for use in lessons.

(a) She puts the samples in trays to show the different classes of materials.

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

material	class
brick	ceramic
copper	composite
rubber	metal
	polymer

[3]

(b) Maria makes three cards, **A**, **B** and **C** to put with the samples.

Card A

stiff and brittle

insulators of heat and electricity

Card B

shiny and malleable

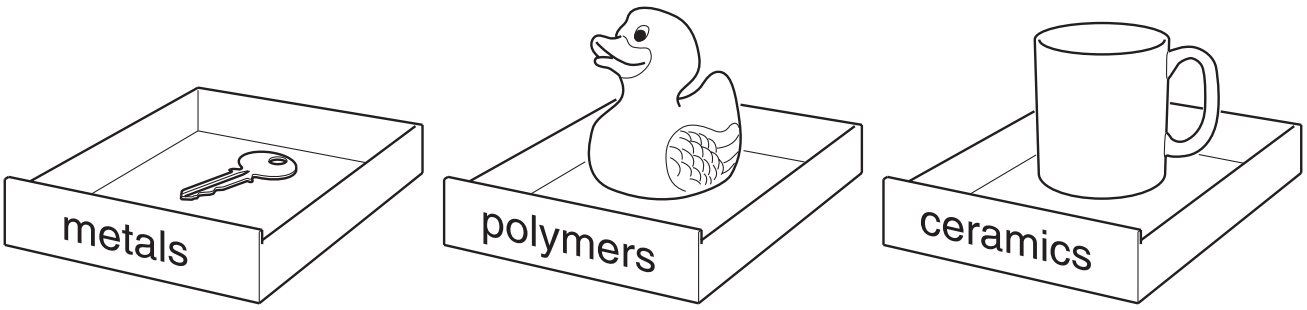
good conductors of heat and electricity

Card C

often flexible

insulators of electricity

Write the letter **A**, **B**, or **C** under each tray to show where she should put each card.



Card ..... Card ..... Card ..... **[2]**

(c) Maria also makes some cards for matching the uses of materials to properties needed.

Draw straight lines to link each **use of material** with the **properties needed**.

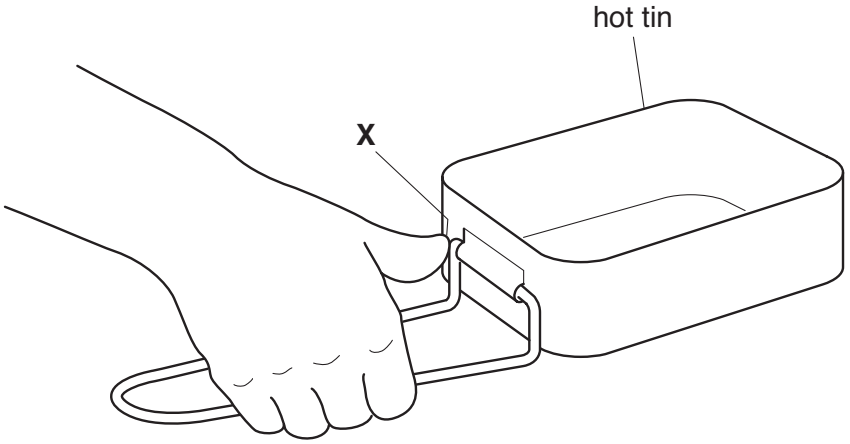
use of material	properties needed
brick for a house wall	flexible
copper for wiring	tough
rubber tubing for a Bunsen burner	stiff
	strong in compression
	strong
	conductor of electricity

[2]

[Total: 7]

2 Simon and Jo are camping. They cook their food in a mess tin.

(a) (i) When Jo touches the hot metal tin with his thumb, he burns his hand.



Which of the four arrows shows the direction in which the heat moves at **X**?

Put a (ring) around the correct arrow.

[1]

(ii) Simon uses a wooden spoon to stir the food. The wooden spoon does not feel hot or cold.

Complete the sentence about the spoon.
Choose words from the list.

condenses **does not move** **moves away from Simon** **moves towards Simon**

When Simon touches the wooden spoon, the heat .....

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

(iii) Wood and metal are good materials to use to make the spoon and the mess tin.
Draw a straight line to link each **material** with its **property**.

material	**property**
	low thermal conductance
wood	
	high thermal expansion
metal	
	high thermal conductance

[2]

(b) Mess tins are made of aluminium instead of steel.
Here is some data for aluminium and steel.

metal	**thermal conductivity in W/mK**	**density in kg/m^3**	**tensile strength in MPa**
aluminium	180	2710	80
steel	15	7860	460

Give **two** reasons why aluminium is better than steel for a mess tin.
Use data from the table.

1 .....

.....

2 .....

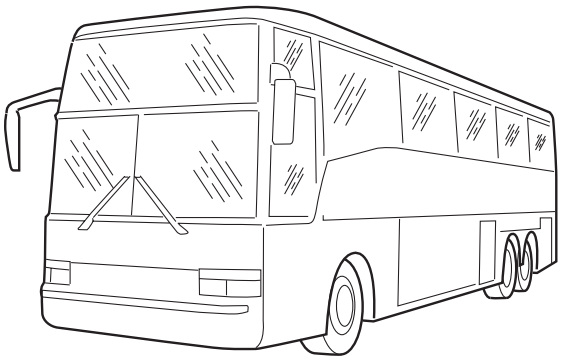
..... **[2]**

[Total: 6]

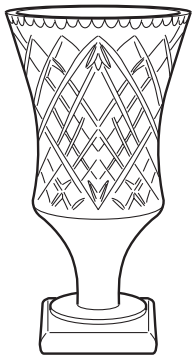
3 Robert works in a large glass factory. The factory produces glass for different purposes.

(a) Write down the **best** type of glass for each purpose.
Choose from the list.

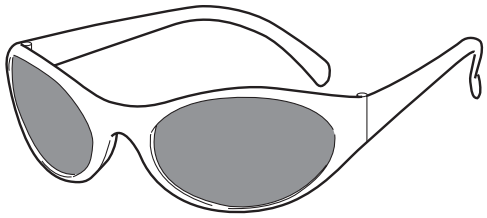
toughened glass **self-cleaning glass** **lead glass** **photochromic glass**



for safe
bus windows .....



for a
flower vase .....

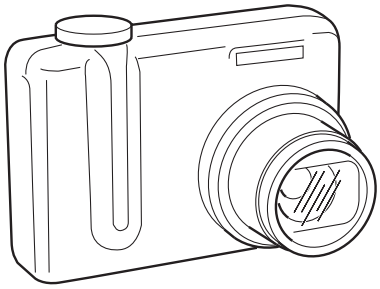


for
sunglasses .....

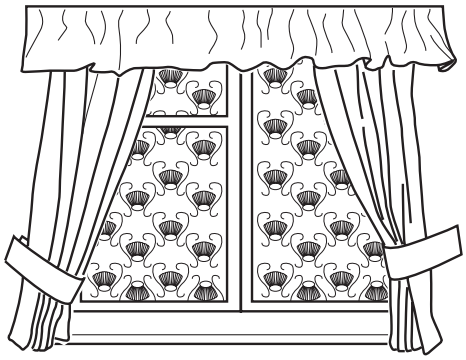
[3]

(b) The factory produces glass with different optical properties for different purposes.
Complete the sentences.
Choose words from the list.

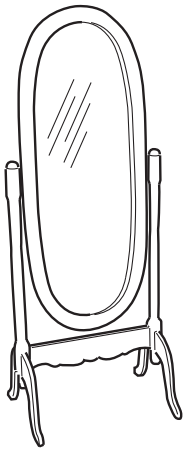
opaque **reflective** **translucent** **transparent**



Glass for a
camera lens is .....



Glass for a frosted
bathroom window is .....



Glass for
a mirror is .....

[3]

[Total: 6]

4 Sarah mixes some mortar to build a wall. She wants the mortar to have a good compressive strength.

(a) Describe how you could test the **compressive** strength of a sample of mortar in the school laboratory.
You may draw a diagram in the space below to help you answer the question.

.....

.....

.....

..... **[3]**

(b) Sarah considers adding gravel to the mortar mix. This makes a **composite** material.

One of these building materials is a composite.
Put a tick (✓) in the box next to the correct composite material.

steel-reinforced concrete	☐
glass	☐
PVC	☐
gold	☐

[1]

(c) Give **another** example of a composite material and describe **how it is used**.

.....

..... **[2]**

[Total: 6]

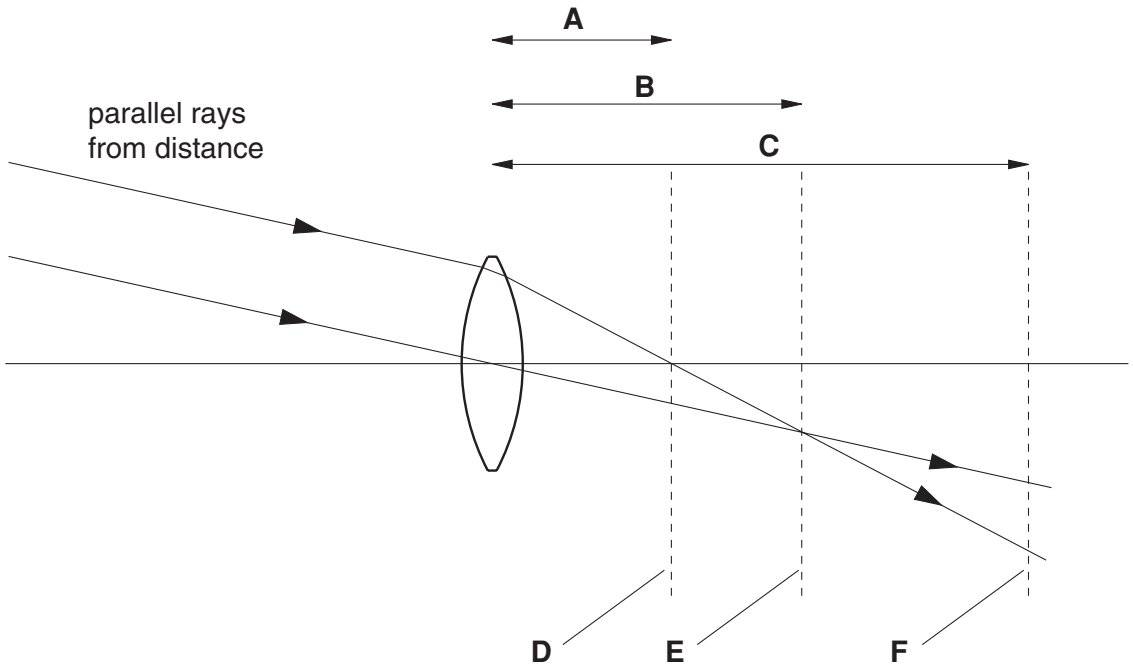
5 Chris is a teacher. He uses a projector to give some questions to the class.
The image formed by the projector is **larger than** the original writing.

(a) Give **two** other properties of the image.

1 .....

2 ..... **[2]**

(b) Chris shows the class how a convex lens brings rays of light to a focus.



This ray diagram shows how a lens produces an image of the top of a distant object.

(i) Which letter, **A**, **B**, **C**, **D**, **E** or **F** labels the **focal plane**? ..... **[1]**

(ii) Which letter, **A**, **B**, **C**, **D**, **E** or **F** labels the **focal length**? ..... **[1]**

(c) Chris uses a second, more powerful lens.

(i) How is its focal length different from the first lens?

.....

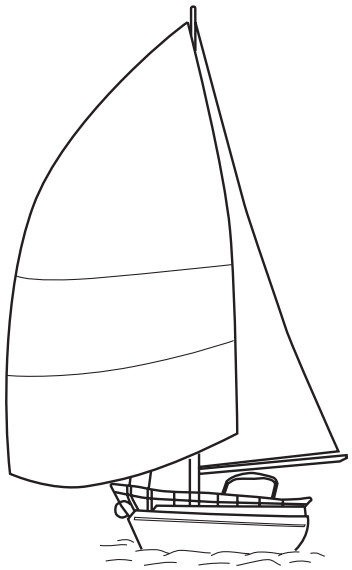
..... **[1]**

(ii) Write down the unit for measuring the power of a lens.

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

[Total: 6]

6 Eva works for a company which makes cloth for the sails of yachts.



The wind blows on the sails with a force that stretches the cloth.

Eva receives a complaint that the cloth becomes permanently stretched too easily.

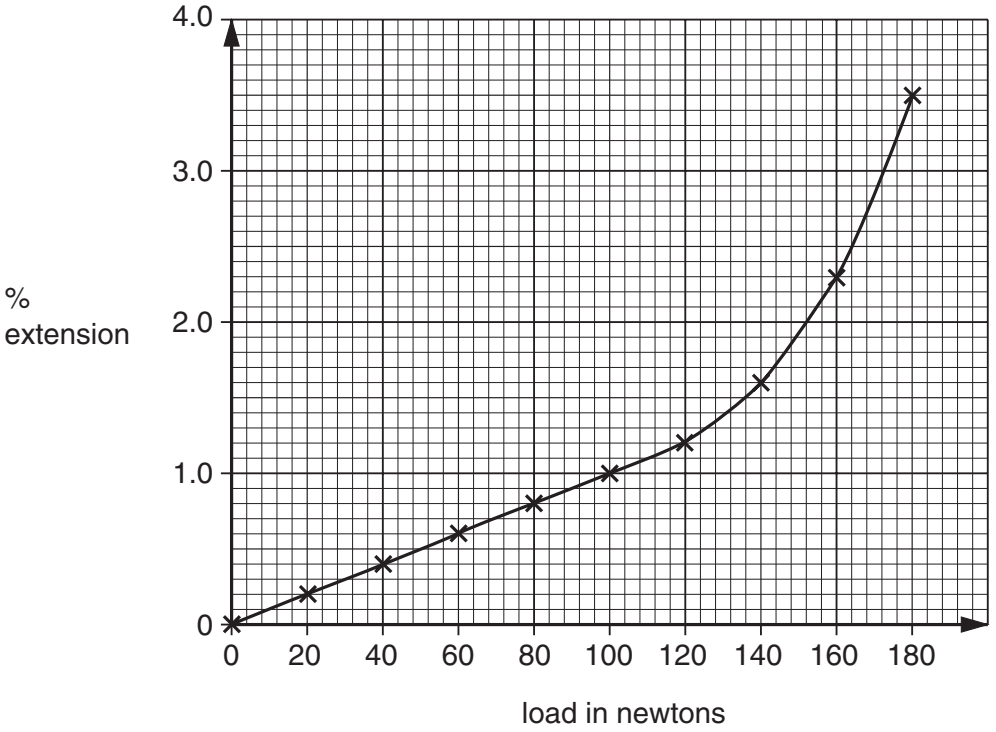
(a) (i) If the force on the cloth is small, the cloth goes back to its original shape after being stretched.

Give the name for this type of behaviour. ..... **[1]**

(ii) If the force on the cloth is too great, the cloth does not go back to its original shape after being stretched.

Give the name for this type of behaviour. ..... **[1]**

(b) Eva tests how the cloth behaves when it is stretched.
This is the graph of her results:



Use the graph to answer these questions.

(i) Up to what load does the cloth probably return to its original shape?

answer .....N **[1]**

(ii) What is the % extension for this load?

answer ..... **[1]**

(iii) Cloth for sails should return to the original shape after being stretched by **1%**.
Does the cloth meet this requirement?
Give a reason for your answer.

.....

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

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE