OCR
RECOGNISING ACHIEVEMENT

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A336/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

ADDITIONAL APPLIED SCIENCE A

Materials and Performance (Foundation Tier)

FRIDAY 20 JUNE 2008

Morning

Time: 45 minutes

Candidates answer on the question paper.
Additional materials (enclosed):
None

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

CUP/T44418

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 36.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**6**	
2	**4**	
3	**9**	
4	**7**	
5	**10**	
TOTAL	**36**	

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

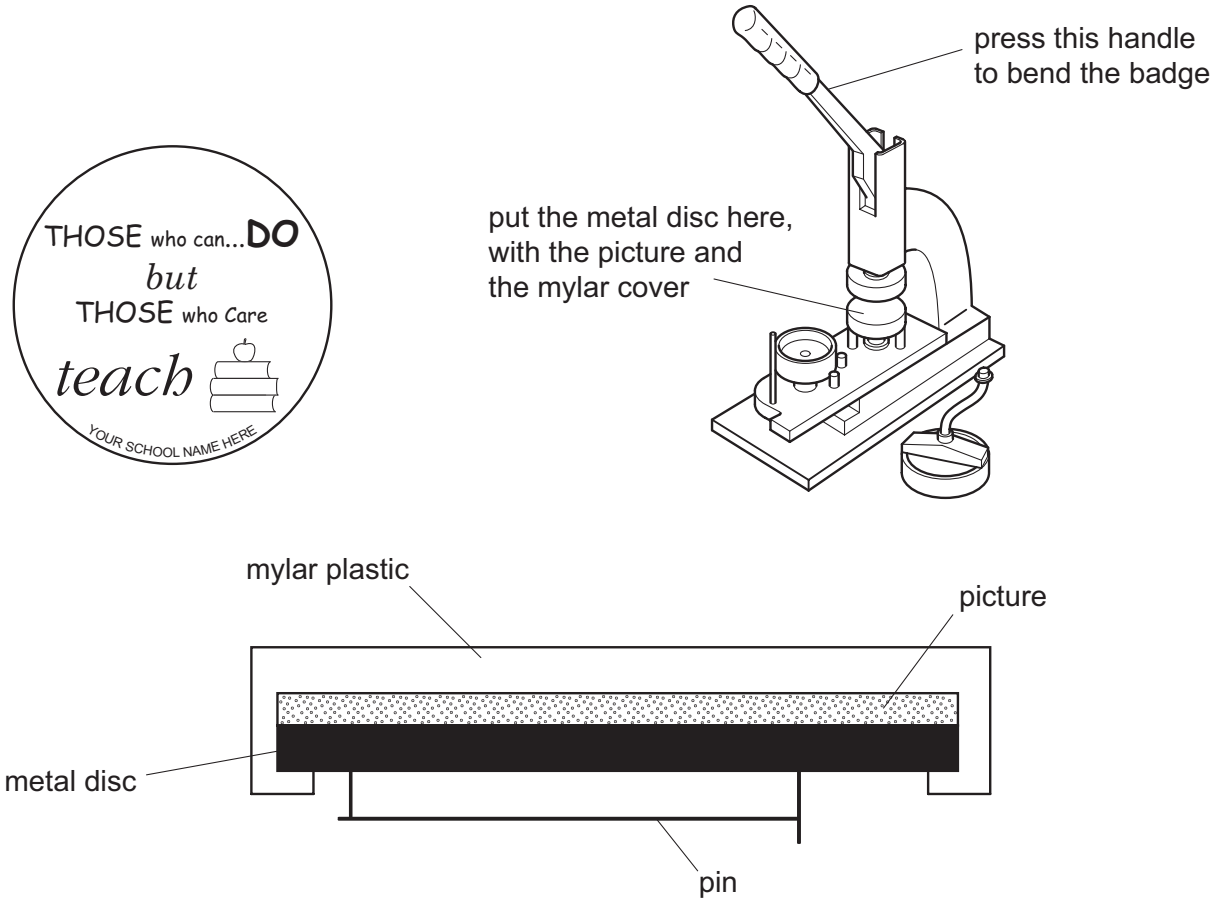
[Turn over

Answer **all** the questions.

1 Chris makes badges.

He puts a picture and a clear mylar cover on a metal disc. He uses a machine to bend the materials into shape.

The badge has a metal pin to hold it in place.



(a) Complete the sentences. Use words from this list.

ductile **malleable** **opaque** **stiff** **transparent**

Chris can see the picture on the badge because the mylar cover is ..... .

Metal can be rolled out for making discs because it is ..... .

Metal can be drawn into wires for making pins because it is ..... .

Chris has to use a machine to shape the badge because the metal is ..... .

[4]

(b) Chris tries to bend a mylar cover with his fingers.

Complete the sentences. Choose words from this list.

elastic **plastic** **rustic** **static**

If he bends the cover slightly, it returns to its original shape.

This type of behaviour is called ..... .

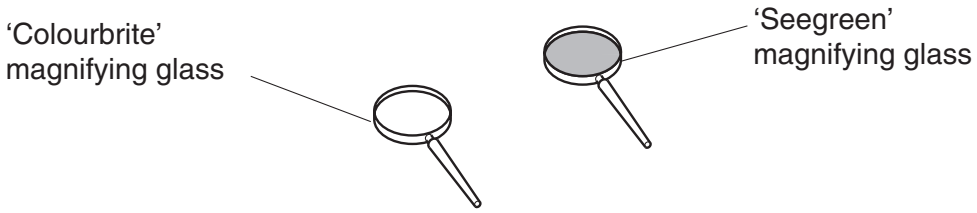
If he folds the cover, it does not return to its original shape.

This type of behaviour is called ..... .

[2]

[Total: 6]

2 Harry collects stamps. He wants to buy a magnifying glass for looking at his stamps.



The glass in 'Seegreen' is slightly green.
The glass in 'Colourbrite' is colourless.
'Colourbrite' costs more.

(a) Harry does not want the 'Seegreen' magnifying glass. Suggest a reason why.

.....

.....[1]

(b) The magnifying glass helps Harry to see the stamps.

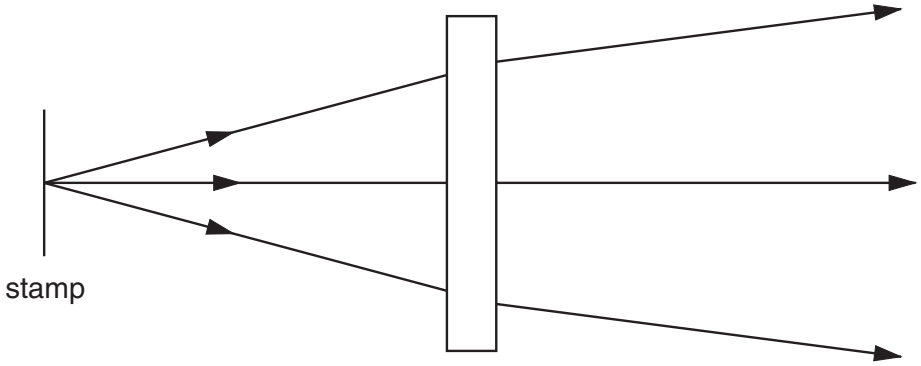
Complete the sentence. Choose a word from this list.

enlarged **inverted** **real** **translucent**

The image produced by a magnifying glass is upright and ..... .

[1]

(c) The diagram shows the rays of light as they pass through the magnifying glass.



magnifying glass

(i) What type of lens is in the magnifying glass?

Put a (ring) around the correct word.

converging **diverging** **reflecting**

[1]

(ii) Harry's magnifying glass **changes the direction** of the light rays.

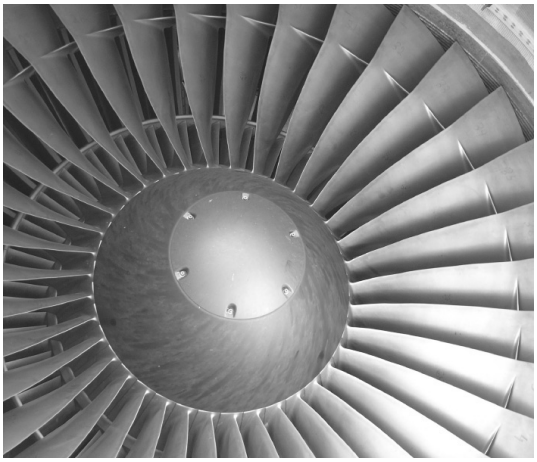
Put a tick (✓) in the box next to the word that best describes this process.

conduction	☐
evaluation	☐
expansion	☐
refraction	☐

[1]

[Total: 4]

3 Rory works for a company that makes turbines.



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He chooses the material for a turbine blade.

Here is a list of the properties that are needed.

(a) Use a straight line to link each **property** to its correct **meaning**. One is done for you.

property	meaning
hard	does not expand much when heated
high thermal conductance	high mass per unit volume
low thermal expansion	resists cracking
strong	resists scratches or dents
tough	transfers heat quickly
	withstands a large force before breaking

[4]

(b) Rory reads this information.

alloy	toughness (J/m^2)	thermal expansion index	tensile strength (MPa)
titanium alloy	15000	9	460
aluminium alloy	9300	20	120
steel	8900	16	410

(i) Which alloy has the best properties for turbine blades?

.....[1]

(ii) Give **two** reasons for your choice.

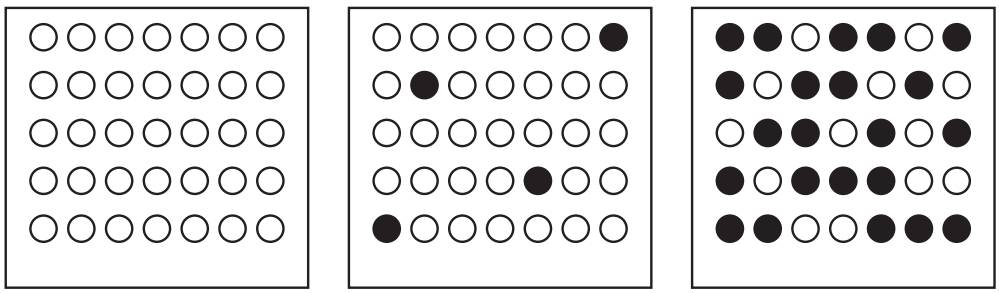
.....

.....

.....[2]

(c) The metals in the table are all alloys.

Here are three diagrams, **A**, **B** and **C**, showing arrangements of atoms in metals.



A **B** **C**

(i) Which diagram, **A**, **B** or **C**, best represents an alloy? ..... [1]

(ii) What is the advantage of using an alloy instead of a pure metal?

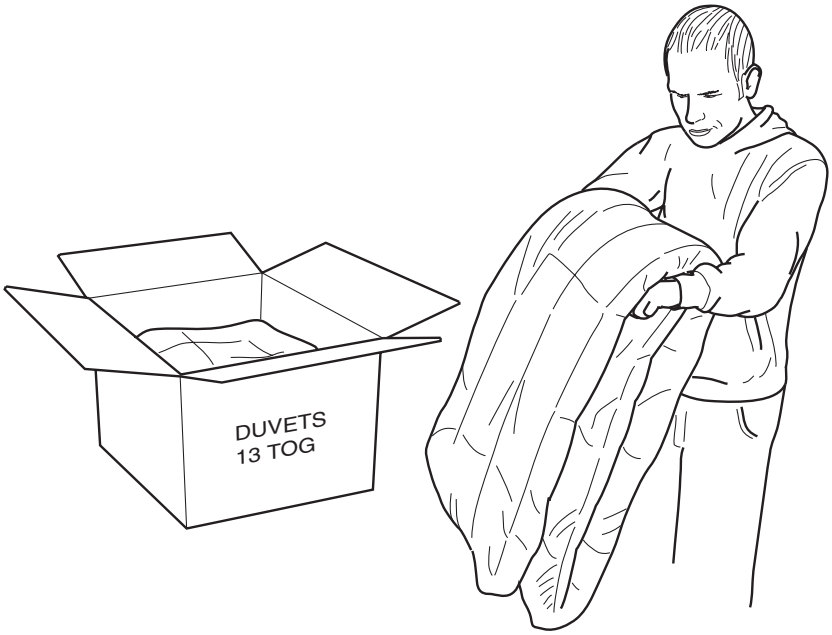
.....

.....[1]

[Total: 9]

4 Ted receives a complaint about some duvets used for bedding.

Ted takes samples of the duvets for testing. He compares the results with **product standards**.



(a) (i) Explain why product standards are necessary.

.....

.....

.....[2]

(ii) Standard Procedures are used for carrying out the tests.

Give a reason why Standard Procedures are used.

.....

.....[1]

(iii) ISO is an organisation that sets product standards.

Give an example of **another** organisation which sets product standards.

.....[1]

(iv) Ted is a trading standards officer. His job is to enforce product standards.

Give an example of **another** job that involves enforcing product standards.

.....[1]

(b) Ted takes some duvets. He tests their tog (insulation) values.

Here are the results:

duvet	**tog value**			
	test 1	**test 2**	**test 3**	**mean**
sample **A**	13.3	13.0	13.6	13.3
sample **B**	12.3	12.1	12.5	12.3
sample **C**	11.2	11.4	11.6	

(i) Ted has calculated the mean of the results for Samples **A** and **B**.

Calculate the mean of the results for Sample **C**.

answer.....[1]

(ii) The label on each duvet says the tog value is 13.

If any measured tog value is less than 12, Ted must test more samples.

Does Ted need to do more tests? Give a reason for your answer.

.....

.....[1]

[Total: 7]

5 A technology park is being built near a noisy motorway. The offices must be quiet.

(a) Complete the sentence. Choose a word from this list.

centimetres **decibels** **inches** **kilograms**

Sound levels are measured in ..... .

[1]

(b) Match each situation with its sound level.

Draw straight lines to join each **situation** with its correct **sound level**.

situation	**sound level**
threshold of pain	60 dB
temporary hearing loss	85 dB
sound level of normal conversation	130 dB

[2]

(c) The average sound level by the motorway during the day is 85 dB. At peak traffic times the sound level rises to 95 dB.

How much louder is the sound level at peak traffic times?

Put a (ring) around the correct answer.

twice as loud **half as loud** **ten times as loud** **five times as loud**

[1]

(d) The hard surface of the office windows reflects sound.

Give the name of **another** material used for controlling sound in buildings. Describe how it is used to reflect or absorb sound.

name of material .....

how it is used .....

.....[2]

(e) (i) How does the loudness of a sound you hear depend on the vibration causing it?

.....

.....

.....[2]

(ii) Heavy lorries on the motorway make the buildings shake.

This can affect some equipment in the buildings.

Explain how this equipment can be protected.

.....

.....

.....[2]

[Total: 10]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE