

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

A336/01

Materials and Performance
(Foundation Tier)

**Friday 23 January 2009
Morning**

Duration: 45 minutes

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)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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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

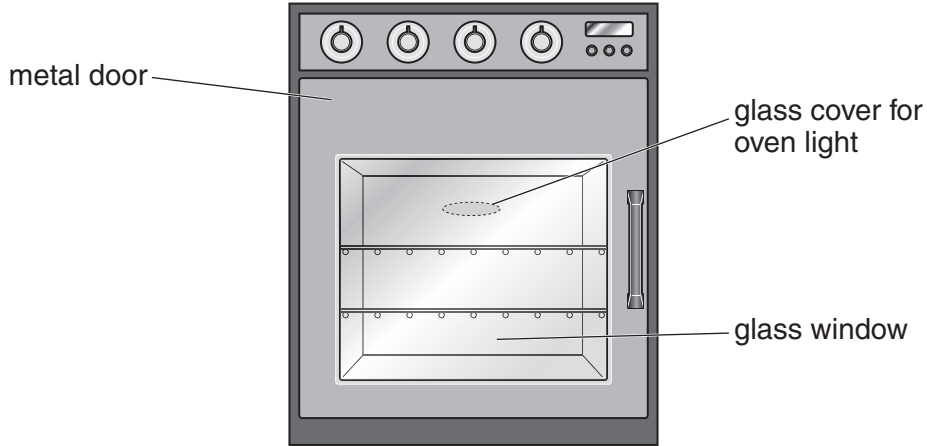
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **8** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	8	
2	5	
3	4	
4	6	
5	8	
6	5	
TOTAL	36	

Answer **all** the questions.

1 Mike wants to improve his kitchen.

(a) He chooses an eye-level oven.



Mike looks through a window in the oven door.
He sees a glass cover for the oven light, but he cannot see the light bulb.

Complete the sentences.
Choose from these words:

opaque plastic translucent transparent

The metal door is

The glass window is

The glass cover for the oven light is

[3]

(b) The oven door handle is a polymer. The glass in the oven door is a ceramic.

Complete the table to show the properties of the ceramic and the polymer.
Put a tick (✓) in each correct box.

	ceramic	polymer
stiff		
flexible		
tough		
brittle		

[3]

- (c) The kitchen floor is made of concrete. It feels cold when Mike touches it. He decides to cover it with another material to make it feel warmer.

material sample	thermal conductance in Wm/K
cork	0.05
marble	2.90
rubber	0.16
wood	0.14

Use data from the table to choose the **best** material.

The best material for the floor is

Give a reason for your choice.

..... [2]

[Total: 8]

2 Louis makes jewellery.



- (a) The properties of metals make them suitable for jewellery.
Draw a straight line from each **description** to the correct **property**.

description

flattens into sheets

pulls into wires

reflects light

resists scratching

property

brittle

ductile

hard

organic

malleable

shiny

[4]

- (b) Louis sometimes uses gold to make jewellery. Pure gold is easily scratched.
Louis uses several different **alloys** of gold. They are different colours.
Suggest **another** reason why he uses different alloys.

.....

..... [1]

[Total: 5]

3 Sparkie is an electrician. She does electrical safety checks.

(a) Sparkie makes measurements on the electrical wiring.

(i) Which property should she measure?
Underline the **correct** answer.

refractive index

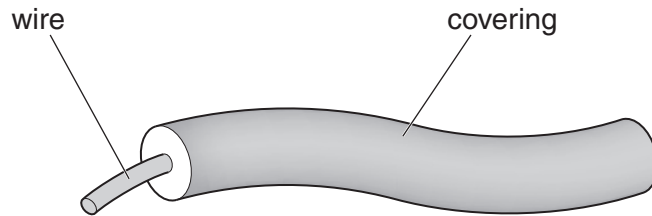
thermal expansion

thermal conductance

electrical conductance

[1]

(ii) Suggest a suitable material for each part of the electrical wiring.



Choose words from the list.

ceramic metal polymer wood

Wires carrying electric current should be made of

The protective covering for the wires should be made of [2]

(b) Sparkie tests some plugs in a kitchen.

These are some of her results:

appliance	measured conductance in Siemens	minimum safe conductance in Siemens
freezer	9	10
kettle	33	10
iron	17	10
toaster	25	10

Which appliance in the table has failed the safety test?
Give a reason for your answer.

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

[Total: 4]

Turn over

4 Avril teaches music. Her pupils learn about sounds.

(a) (i) Put these sounds in order of **pitch**, starting with the lowest pitch.

pen squeaking on a whiteboard rumble of thunder school bell

lowest pitch
.....
highest pitch

[1]

(ii) Complete the sentence. Choose from the list.

goes up or down goes down goes up stays the same

If the pitch of a sound increases, its frequency of vibration [1]

(b) Avril's pupils are playing musical instruments. She measures their sound intensity.

Put a ring around the **correct** unit for sound intensity.

centimetres candelas decibels harebells

[1]

(c) The sound intensity is too high.

(i) Which of the following health problems can be caused by high sound intensity?

Underline the **best** answer.

anaemia low blood pressure permanent hearing loss speech defect

[1]

(ii) Avril fits ceiling tiles to reduce the sound intensity by absorbing sound energy.

Describe **another** change to the room which reduces sound intensity.
Give a reason for your answer.

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

[Total: 6]

5 Arun has learned how changes in momentum can affect road safety.

(a) He knows that velocity affects momentum.

Link the phrases in the boxes to make the **best** sentence that describes velocity.
Use straight lines to join the boxes.

	how fast the speed changes	when slowing down
Velocity is	how fast something moves	when going round a corner
	how far something goes	in a particular direction

[2]

(b) Arun uses a trolley of mass 0.80 kg in a test crash. It travels at 2.4 m/s just before it crashes.

Show that the change in momentum in the crash is about 2 kg m/s.
Use the formula:

momentum = mass × velocity

answer kg m/s [2]

(c) Crumple zones increase the time taken for a collision. This protects people.

(i) Explain why increasing the impact time can protect people in a collision.

.....

 [2]

(ii) Crumple zones are made of metal because metal is malleable.

Give **another** use of a material that improves road safety.
Describe how the **mechanical properties** of the material are important.

.....

 [2]

[Total: 8]

Turn over

6 Bobbie designs cars. She knows that fibre glass can be used to make a body shell that is strong but light.

(a) Choose **another** job requiring a good knowledge of materials. Describe an important property of a material used in that job.

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

(b) The steering wheel on a new model of car has too much vibration at motorway speeds. Suggest how Bobbie could stop vibrations getting to the steering wheel. Your answer should include the name of the material used.

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

(c) Bobbie examines a car body. She finds it is made from carbon fibre composite. How can she tell it is a **composite**? A labelled diagram may help your answer.

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

[Total: 5]

END OF QUESTION PAPER



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