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 26 January 2011
Afternoon

Duration: 45 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

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 Anya learns about materials.

(a) There are many different metal objects in Anya's house. They are used for different purposes.

Draw a straight line to join each **metal object** with the **metal property** it needs most.

metal object	metal property
cable for electric current	good conductor of heat
central heating radiator	good conductor of electricity
door handle	high thermal expansion
jewellery	shiny
	stiff

[4]

(b) There are many different materials in the house. Anya learns which class they belong to.

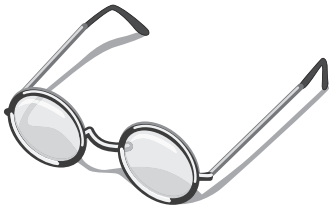
Draw a straight line to join each **material** to its correct **material class**.

material	material class
brick	alloy
pine	ceramic
paper	pure metal
stainless steel	wood
	wood product

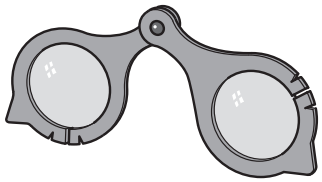
[4]

[Total: 8]

2 Spectacles have been made for hundreds of years.



modern frames



ancient frames

(a) Some modern spectacles have frames made of metal wire.

Ancient spectacles have frames made of two flat pieces of metal.

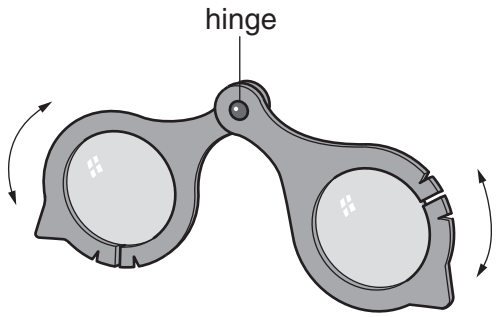
Both frames are made by forming the metal.

Draw a straight line to join each **frame** to **how it is formed**.

frame	**how it is formed**
	heat and draw into wires
modern frame	
	heat and beat into sheets
ancient frame	
	melt and pour into a mould
	carve from a large block

[2]

(b) In ancient spectacles, the two pieces of metal are joined by a hinge.



Suggest why this is useful.

.....

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

(c) The lenses in ancient spectacles are glass. People who play sports often use plastic lenses.

Which property is **improved** by using plastic instead of glass?

Choose from this list.

Put a (ring) around the correct answer.

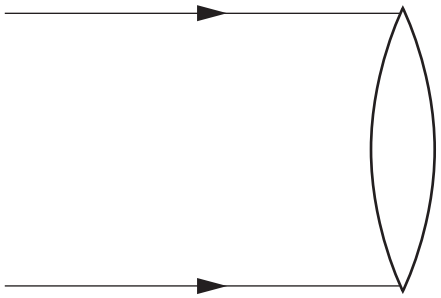
conductivity **hardness** **melting point** **toughness**

[1]

(d) Spectacles may have **converging** or **diverging** lenses.

(i) Complete the diagram of rays passing through this lens.

Draw the path of each ray as it leaves the lens.



[1]

(ii) Look at lenses **A**, **B** and **C** below.

A **B** **C**

Which lens, **A**, **B** or **C**, is a diverging lens? ..... **[1]**

(iii) Rays change direction as they pass through a lens.

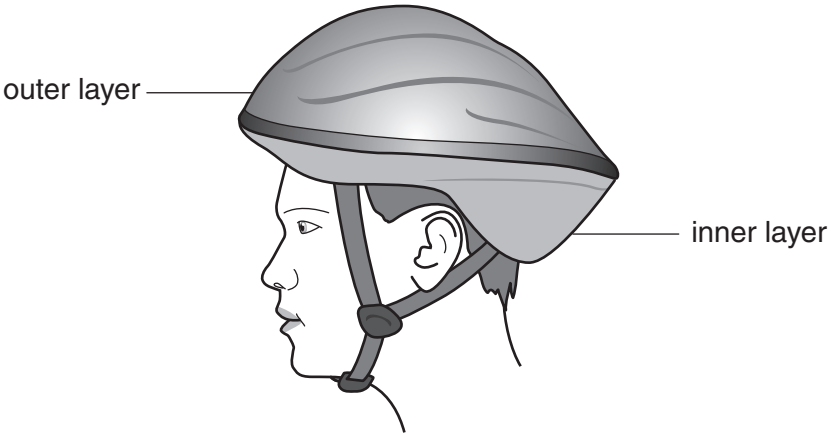
Put a (ring) around the name of the process which causes this.

conduction **contraction** **reflection** **refraction**

[1]

[Total: 7]

3 Danny rides a bicycle. He wears a protective helmet.



(a) Put ticks (✓) in the boxes next to **two** properties that the outer layer needs.

dense	☐
flexible	☐
hard	☐
insulator	☐
tough	☐

[2]

(b) Danny collides with a wall. He is not hurt.

(i) The **inner** layer of the helmet protects Danny's head.

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

Explanation

The inner layer has air vents to keep him cool. ☐

The inner layer is not very dense to make it light. ☐

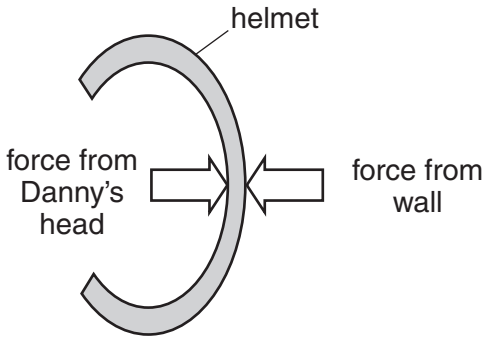
The inner layer fits Danny's head for comfort. ☐

The inner layer increases the time for a collision. ☐

[1]

(ii) When Danny collides with the wall, forces act on the helmet.

This diagram shows some of the forces.



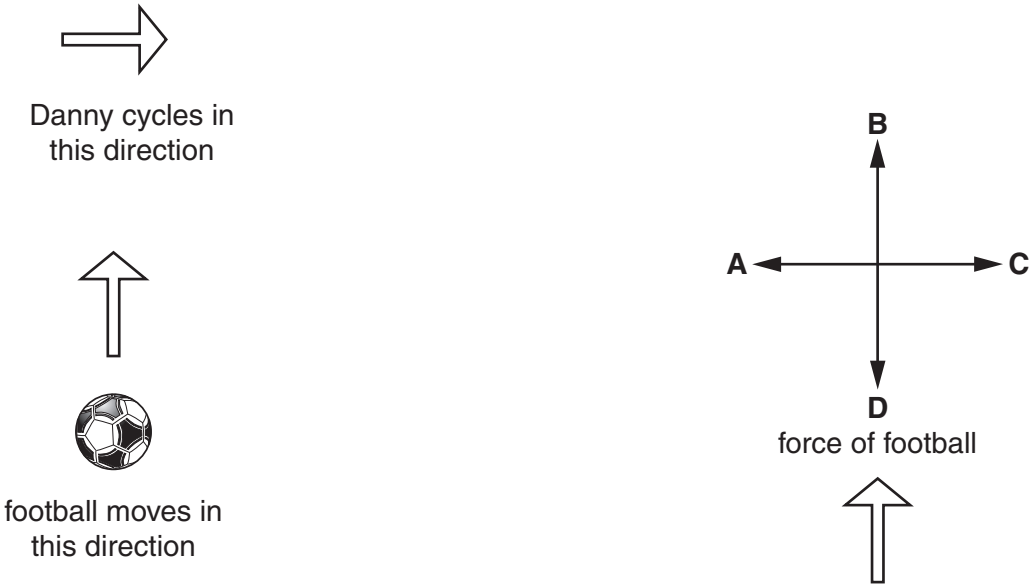
Complete the sentence about forces acting on the helmet.

Choose words from this list.

compression **extension** **refraction** **tension**

The two forces on the helmet act in ..... . **[1]**

(c) Danny cycles past a football pitch. A football hits his bicycle. The force of the football changes the **momentum** of the bicycle.



(i) Which arrow, **A**, **B**, **C** or **D**, shows the **change** in momentum of the **bicycle** when the football hits it? ..... **[1]**

(ii) The bicycle continues to move at the same speed but in a different direction.

Which word describes both **speed** and **direction**?

Choose from this list.

Put a (ring) around the correct word.

acceleration **energy** **mass** **velocity**

[1]

[Total: 6]

4 **(a)** Kieran has a hearing test.

(i) He hears two notes which have **different** frequencies but the **same** intensity.

One note sounds louder than the other.

Put a tick (✓) by the **best** explanation.

The two notes are too close together. ☐

His ear is more sensitive for one frequency. ☐

One note is ultrasound. ☐

One note lasts for a longer time. ☐

[1]

(ii) The test shows that Kieran has normal hearing.

Which frequency does Kieran hear most easily?

Put a (ring) around the correct answer.

20 Hz **200 Hz** **2,000 Hz** **20,000 Hz**

[1]

(b) Complete the sentences about how a note in the hearing test can be changed.

Choose words from this list.

intensity **pitch** **speed**

Increasing the frequency of the note always increases the ..... .

Increasing the size of each vibration increases the ..... .

[2]

[Total: 4]

5 **(a)** It is important to know the tensile strength of materials used for structures.

Describe how you could measure the tensile strength of a material sample in a school laboratory.

You may use a diagram to help your answer.

.....

.....

.....

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

(b) Glass-reinforced plastic is made from glass and resin.

Resin is used in glass-reinforced plastic because it is tough, but it is weak in tension.

Suggest what property of **glass** makes it useful in glass-reinforced plastic.

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

(c) Glass-reinforced plastic is a **composite** material which is used for boats.

(i) Give **another** example of a composite material and its use.

composite material .....

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

(ii) Draw a diagram to show the structure of the composite material you have chosen**.**

[1]

[Total: 7]

6 This question is about lenses.

(a) A projector and a magnifying glass produce images which are larger than the object.

The image from the projector is **real** and **inverted**.

Describe the image from the magnifying glass.

.....

.....

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

(b) The lamp in a slide projector gives out heat energy. The lens in the projector is made of a specialised glass which absorbs the heat energy.

Describe **another** example of a specialised glass and its use.

Give a reason why its special property is needed.

.....

.....

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

[Total: 4]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE