

**Wednesday 1 February 2012 – Afternoon****GCSE 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)

**Duration:** 45 minutes

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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 Justin is learning about construction. He learns the names of some material properties.

(a) Draw a straight line to join each **property** to its **description**.

property	description
brittle	it bends easily
flexible	it does not bend easily
stiff	it does not shatter
tough	it shatters

[3]

(b) Justin uses a tub of plaster.

Its volume is 25 litres. Its mass is 15 kg.

Calculate the density of the plaster.

Use **density =  $\frac{\text{mass in kilograms}}{\text{volume in litres}}$**

answer ..... kg/l. [2]

[Total: 5]

2 Anita repairs motor bikes. She understands the effect of forces on pieces of metal.

(a) Use straight lines to link the **start** of each sentence to its correct **end**.

**start**

**end**

Forces acting in compression on a metal...

... make it shorter.

Forces acting in tension on a metal...

... make it longer.

... twist it round.

[2]

(b) Anita knows the meaning of **tensile strength**.

Put a tick (✓) in the box next to the **best** description of tensile strength.

force needed to stretch a sample

force needed to squash a sample

force needed to break a sample by stretching it

force needed to break a sample by squashing it

[1]

(c) Describe how you would measure the tensile strength of a sample of a metal wire.

Use a diagram to help your answer.

You should show

- how to hold the sample in place
- how to apply a force
- how to measure the force.

.....

.....

.....

..... [3]

[Total: 6]

3 Maria works in an office.

(a) There are lots of different windows in her office.

Write down the most important property for each window.

Choose from this list.

**self-cleaning      infrared reflective      toughened      lead**

A window in the roof, which cannot be reached. ....

A window in the wall, where the sun shines in. ....

A window in the door, where someone might fall against it. ....

[2]

(b) In the office, there are objects with different optical properties.

Draw a straight line to join each **object** to its **optical property**.

**object**

**optical property**

magnifying glass

opaque

diffuser light shade

reflective

mirror glass

translucent

brick wall

transparent

[3]

(c) Some people in the office wear spectacles. The spectacles have lenses.

(i) A spectacle lens makes light rays change direction.

Put a **ring** around the word which describes this effect.

**compression**

**conduction**

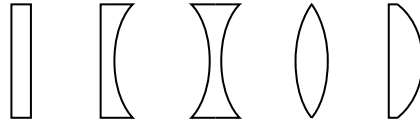
**refraction**

**vibration**

[1]

(ii) People with short sight need spectacles with **diverging** lenses.

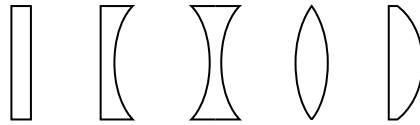
Put a **ring** around the **two** lenses that would make rays of light **diverge**.



[1]

(iii) People with long sight need spectacles with **converging** lenses.

Put a **ring** around the **two** lenses that would make rays of light **converge**.



[1]

[Total: 8]

4 Katy chooses a kettle for her new flat. Kettles are made of plastic or metal.

(a) Katy chooses a plastic kettle because she thinks it is safer for hot water.

Suggest why plastic is safer than metal for holding hot water.

Give a reason for your answer.

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

(b) (i) The plastic kettle sits on a plastic base.

Put ticks (✓) in the boxes next to the **two** most important properties of the plastic base.

- electrical conductor
- electrical insulator
- flexible
- rigid structure
- transparent
- opaque

[2]

(ii) An electrical cable is attached to the plastic base.

Put ticks (✓) in the boxes next to the **two** most important properties of the metal wire in the electrical cable.

- electrical conductor
- electrical insulator
- flexible
- rigid structure
- transparent
- opaque

[2]

[Total: 6]

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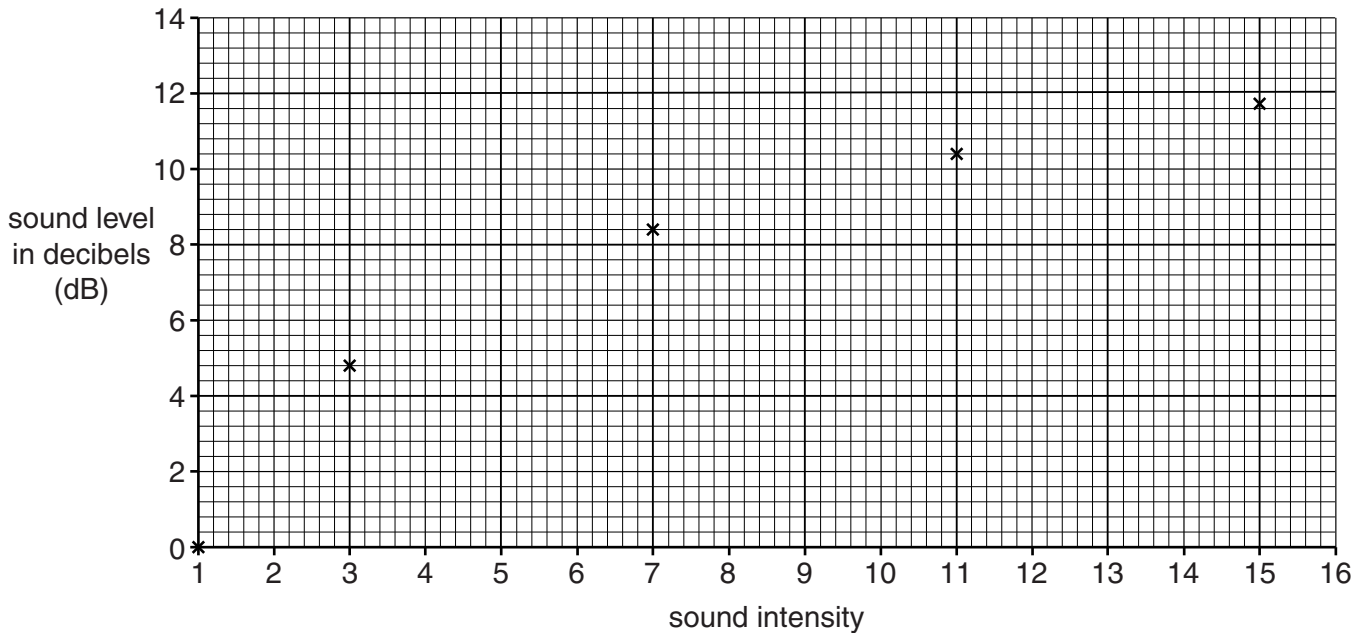
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5 Jo works for an airport. She measures sound intensity in homes near the airport.

(a) Jo uses the decibel (dB) scale to show sound intensity.

This graph shows sound level in decibels plotted against sound intensity.

Complete the graph by drawing a line of best fit through the points.



[1]

(b) (i) Near the airport, Jo measures a sound level of 90 dB.

She says the sound level should be reduced.

Give a reason why the sound level should be reduced.

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

(ii) Jo is concerned that the sound level may reach 130 dB.

Why is a sound level of 130 dB unacceptable?

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

(iii) Prolonged exposure to loud sounds can cause tinnitus.

Describe what tinnitus means.

..... [1]



- (c) Jo says that windows should be double-glazed to increase the reflection of sound from outside the house. This reduces the sound levels inside.

Describe another method of reducing sounds levels inside a house.

Your answer should include

- the material used
- how this material affects sound energy.

.....

.....

..... [2]

[Total: 6]

6 Sam is playing with a toy train. It is moving on a circular track.

(a) Its **speed** is not the same as its **velocity**.

Which sentence, **A**, **B**, **C** or **D**, describes the velocity of the train?

- A The time the train takes to go once round the track.
- B The speed of the train in a particular direction.
- C The distance the train travels in one minute.
- D The maximum speed of the train.

answer ..... [1]

(b) (i) Sam has a red train and a blue train.

The mass of the red train is three times the mass of the blue train.

Choose the words from this list to complete the sentence below.

- one-third**      **half**      **three times**      **four times**      **nine times**

When they go at the **same** speed, the momentum of the red train is .....  
the momentum of the blue train. [1]

(ii) Sam uses a force to change the momentum of the train.

In what direction, **A**, **B**, **C** or **D**, does the momentum change?

- A at right angles to the force
- B downwards
- C in the same direction as the force
- D in the opposite direction to the force

answer ..... [1]

(c) Real trains must have a crumple zone at the front of the train for safety.

Explain how a crumple zone makes a train safer.

Use ideas about time, momentum and force in your answer.

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

[Total: 5]

END OF QUESTION PAPER

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