

**Monday 16 June 2014 – Morning**

**GCSE ADDITIONAL APPLIED SCIENCE**

**A192/01 Science of Materials and Production (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: 1 hour**




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**

- Your quality of written communication is assessed in questions marked with a pencil (  ).
- 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 **50**.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 A new shopping centre is too noisy.



The manager decides to reduce the noise level by laying carpet on the floors.

(a) Suggest **another** way of reducing the noise level.

Explain how this method works.

.....

.....

..... [2]

(b) The carpet changes the sound level from 75 dB to 65 dB.

What does this do to the loudness of the sound?

Put a tick (✓) in the box next to the correct answer.

The loudness is half of what it was.

The loudness is double what it was.

The loudness is four times what it was.

The loudness is one quarter of what it was.

[1]

(c) Use straight lines to link each **sound intensity** to its **description**.

**sound intensity**

40 dB
90 dB
140 dB

**description**

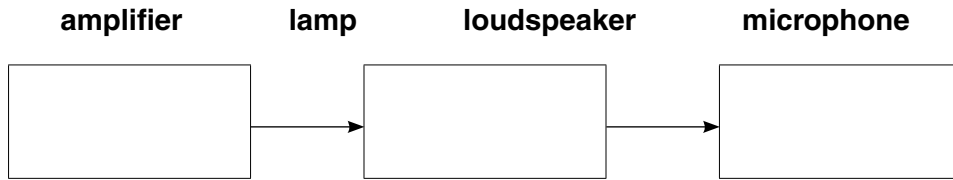
causes temporary hearing loss
very painful to listen to
very quiet

[2]

(d) The shopping centre has a public address (PA) system.

Complete the PA system diagram.

Choose words from the list.



[2]

[Total: 7]

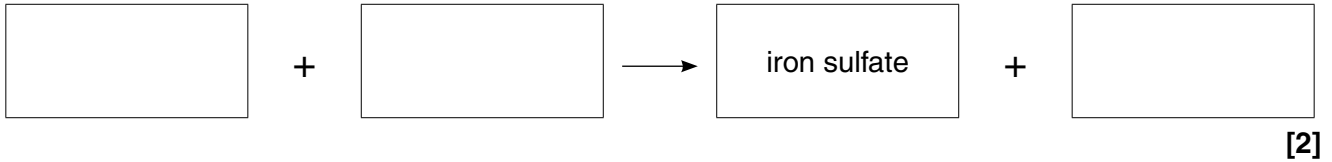
2 Some people do not have enough iron in their blood.

This makes them feel tired and weak.

Tablets containing iron sulfate may be prescribed to make them better.

(a) Iron sulfate is a soluble salt which is made by reacting iron with sulfuric acid.

Complete this word equation for the production of iron sulfate.



(b) Powdered iron is added to the sulfuric acid until there is no more reaction.

Describe how the unreacted iron is separated from the iron sulfate solution at the end of the reaction.

.....

.....

.....

..... [2]

(c) Each iron sulfate tablet has this formulation:

- 0.10 g of iron sulfate
- 0.35 g of starch filler
- 0.05 g of sugar coating

How much iron sulfate is needed to make 100 g of tablets?

Complete the calculation below.

Choose numbers from this list.

**0.10      0.50      20      200**

mass of one tablet = ..... g

number of tablets in 100 g =  $\frac{100}{0.50} = 200$

mass of iron sulfate in 100 g = ..... × ..... = ..... g

[2]

[Total: 6]

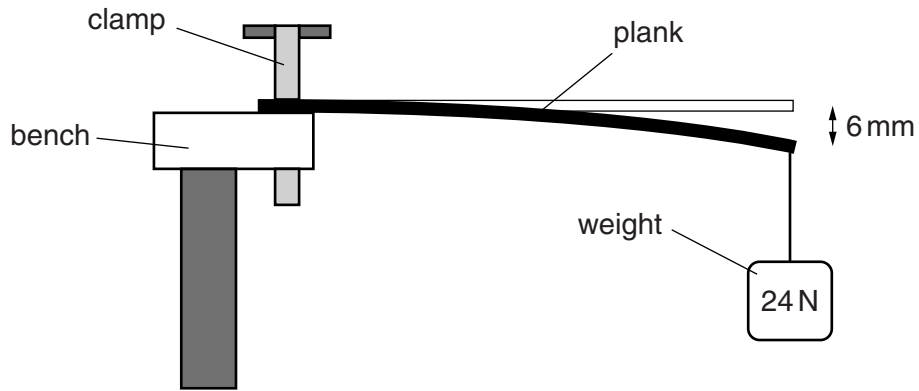


4 Jake is making a gym floor out of planks of wood.

The planks need to be stiff enough for the forces on the floor.

Jake decides that each plank needs to have a stiffness of at least 5 N/mm.

(a) Jake uses the apparatus below to check the stiffness of one plank.



He suspends a 24 N weight from the free end of the plank.

The displacement of the free end is 6 mm.

Is it stiff enough for the gym floor?

Justify your answer with a calculation.

$$\text{stiffness (N/mm)} = \frac{\text{suspended weight (N)}}{\text{displacement (mm)}}$$

.....

.....

..... [2]

(b) Here are some ways in which Jake could increase the stiffness of the planks.

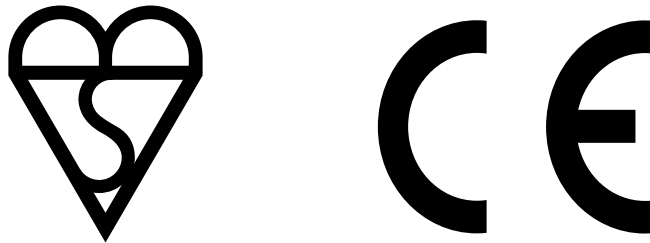
Put a tick (✓) in the boxes next to the **two** correct ways:

- use a longer plank
- use a thicker plank
- use a smaller weight
- use a different material
- have a bigger displacement

[2]

(c) Jake gets planks of wood from different suppliers.

He finds that planks from one supplier have these marks.



Explain why Jake should consider buying these planks.

.....

.....

..... [2]

[Total: 6]





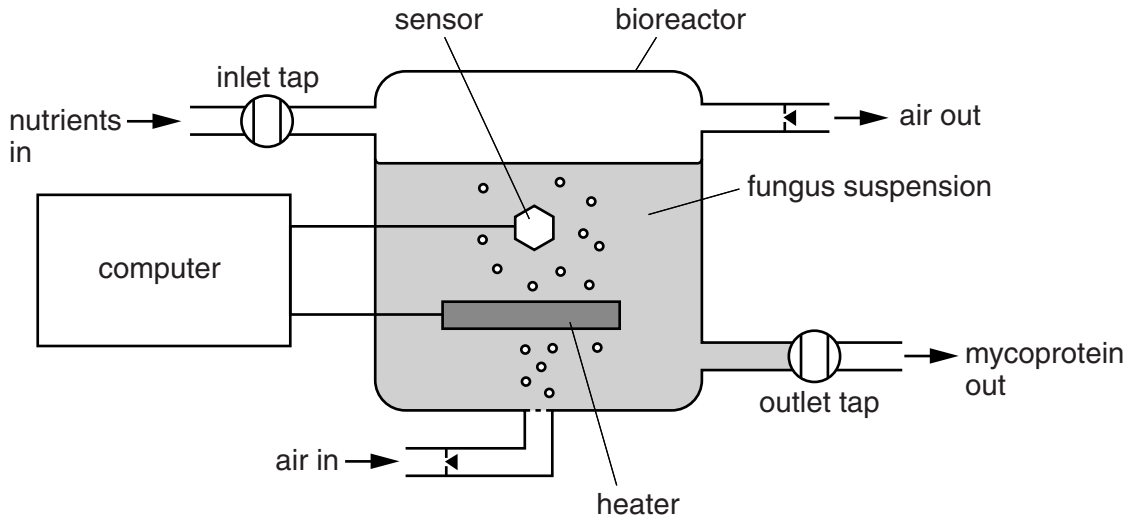
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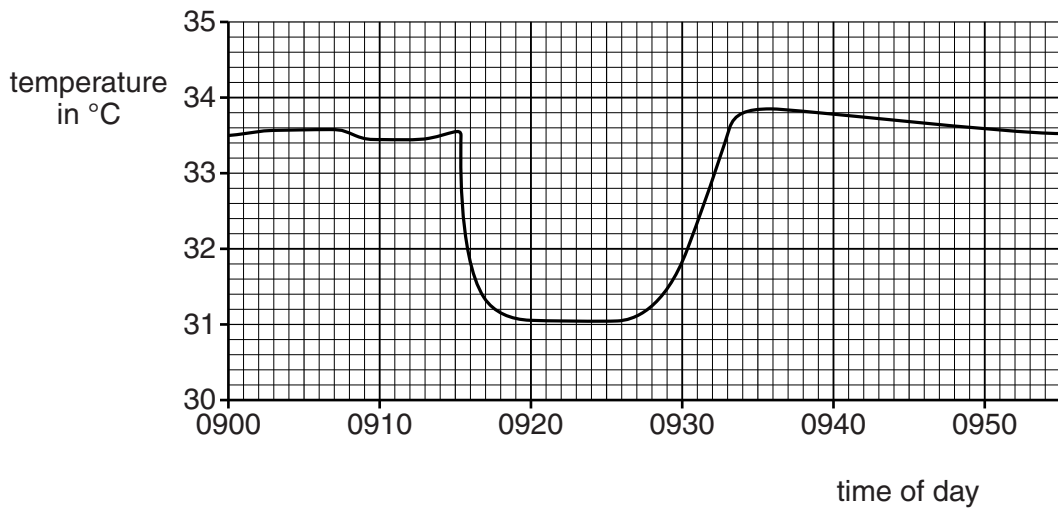
6 Bioreactors are used to obtain a food called mycoprotein from a fungus.

The fungus must be kept at the right temperature.

A computer uses a sensor in the bioreactor to control the temperature.



(a) The computer prints out this temperature-time graph.



(i) What was the temperature of the fungus suspension at 0900?

..... °C [1]

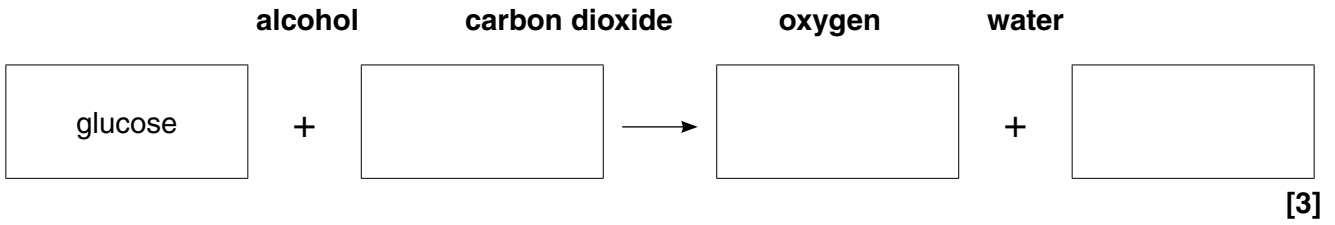
(ii) At some time between 0900 and 0955, cold nutrients were added to the bioreactor. At what time were they added?

..... [1]

(b) The fungus in the bioreactor needs a steady supply of glucose for aerobic fermentation.

Complete the word equation for **aerobic** fermentation.

Choose words from the list.



(c) Every Monday the bioreactor is treated as follows. It is:

- completely emptied
- cleaned with steriliser
- rinsed with fresh clean water
- refilled with fresh fungus suspension.

Explain why the bioreactor is treated this way.

.....

.....

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

**[Total: 7]**

7 Fred grows wheat in one of his fields.



(a) Fred decides to plant spring wheat.

Name one **other** type of wheat he could plant.

..... [1]

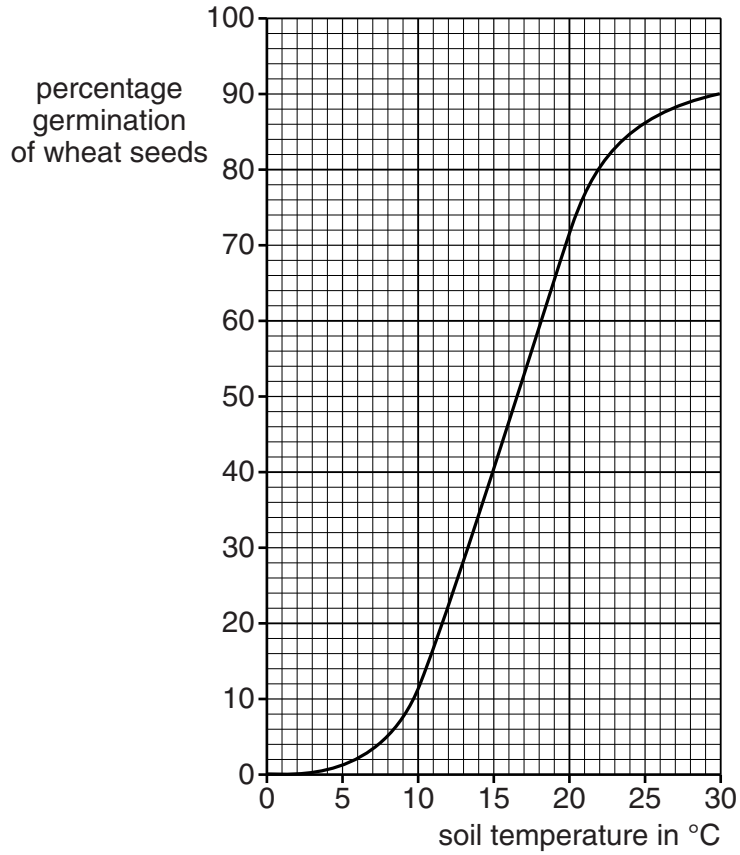
(b) He waits until the soil is warm enough before sowing the seed.

State what else he needs to do before sowing the seed.

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

(c) Fred uses the information below to calculate how much seed to plant.

Area of field	8.0 hectares
Soil temperature	15°C
Ideal planting density	2.5 million plants per hectare



He chooses to plant 60 million wheat seeds on his field.

Has he made the best choice from the above information?

Justify your answer with calculations.

.....

.....

.....

..... [3]

[Total: 6]

Turn over



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