

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE**

**A192/01**

**ADDITIONAL APPLIED SCIENCE**  
**Science of Materials and Production**  
**(Foundation Tier)**

**MONDAY 16 JUNE 2014: Morning**

**DURATION: 1 hour**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**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)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. 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).**

## **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.**

**Any blank pages are indicated.**

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**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.**

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[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** on the left to its **DESCRIPTION** on the right.

**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.

amplifier

lamp

loudspeaker

microphone



[2]

[TOTAL: 7]

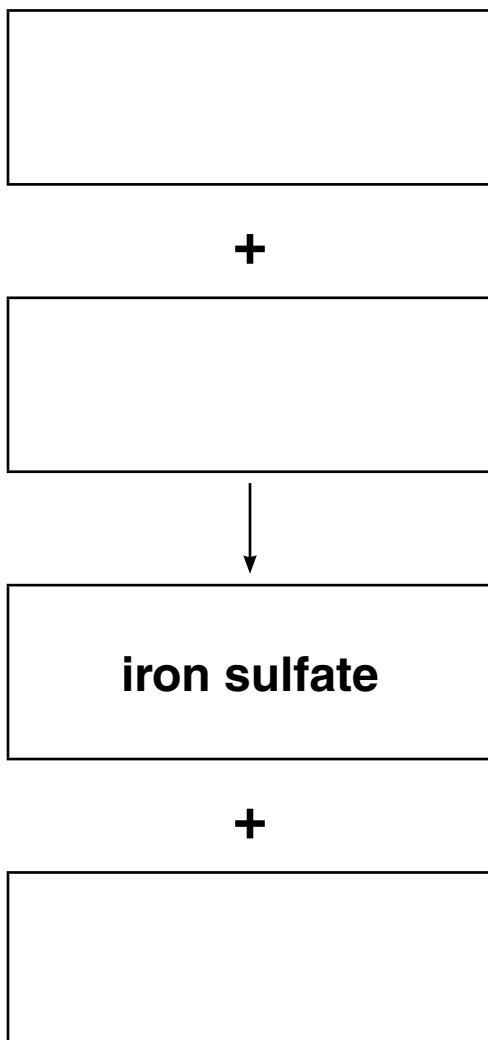
**2 Some people do not have enough iron in their blood.**

**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.**



**[2]**

**(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.**

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**[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]**

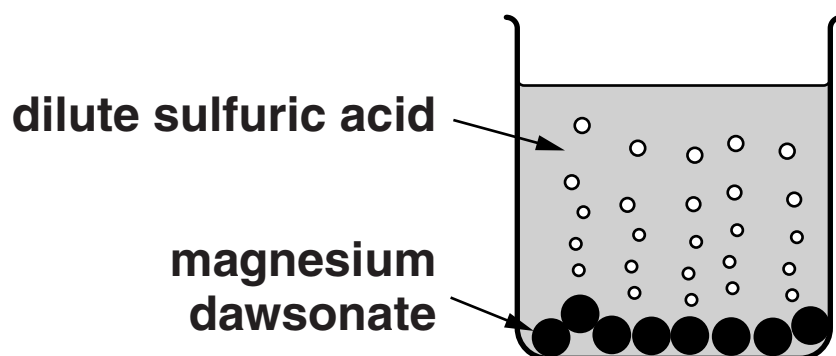
**[TOTAL: 6]**



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**3 Steve works on the batch manufacture of a new medicine.**

**One chemical in the medicine is made by reacting lumps of solid magnesium dawsonate with dilute sulfuric acid.**



**The reaction is very slow. This makes it expensive to make the medicine.**

**What things can Steve do to speed up the reaction?**

**[6]**



**The quality of written communication will be assessed in your answer.**

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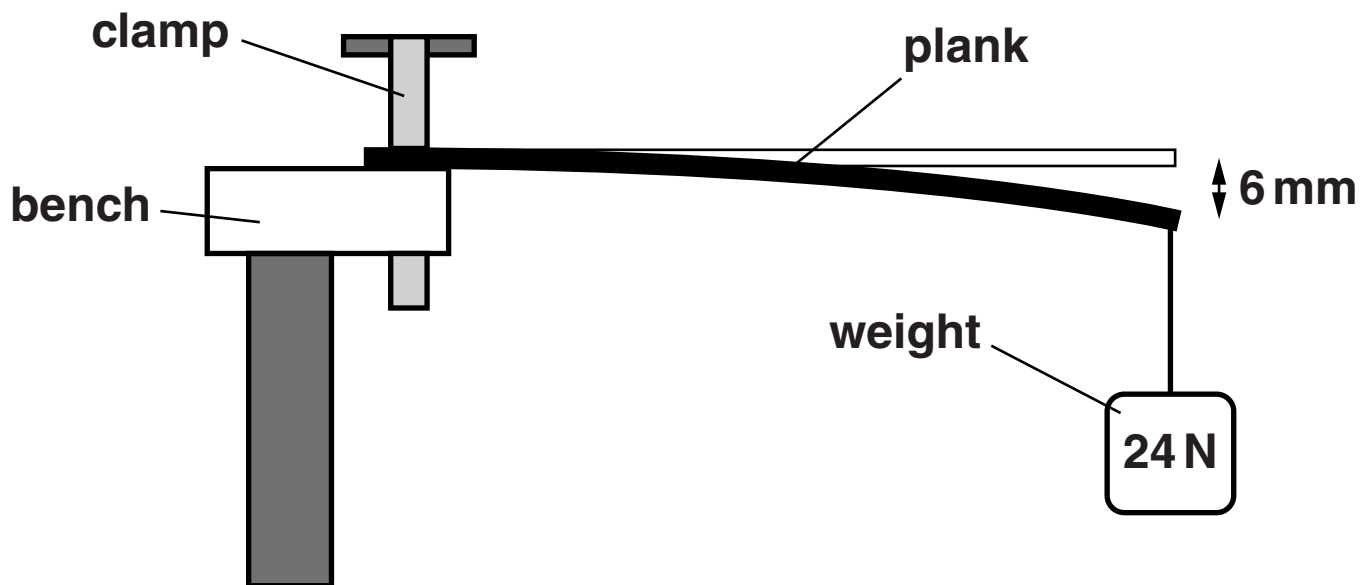
**[TOTAL: 6]**

**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.**

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

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[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**

☐

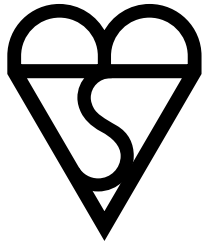
**have a bigger displacement**

☐

[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.**

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[2]

**[TOTAL: 6]**

**5 Ken makes a video.**

**He thinks about light sources for the video.**

**All of the scenes in the video show the actors outdoors in the garden of a house.**

**Write about the different light sources Ken could use for his video.**

**State the advantages and disadvantages of each light source.**



**The quality of written communication will be assessed in your answer.**

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**[6]**

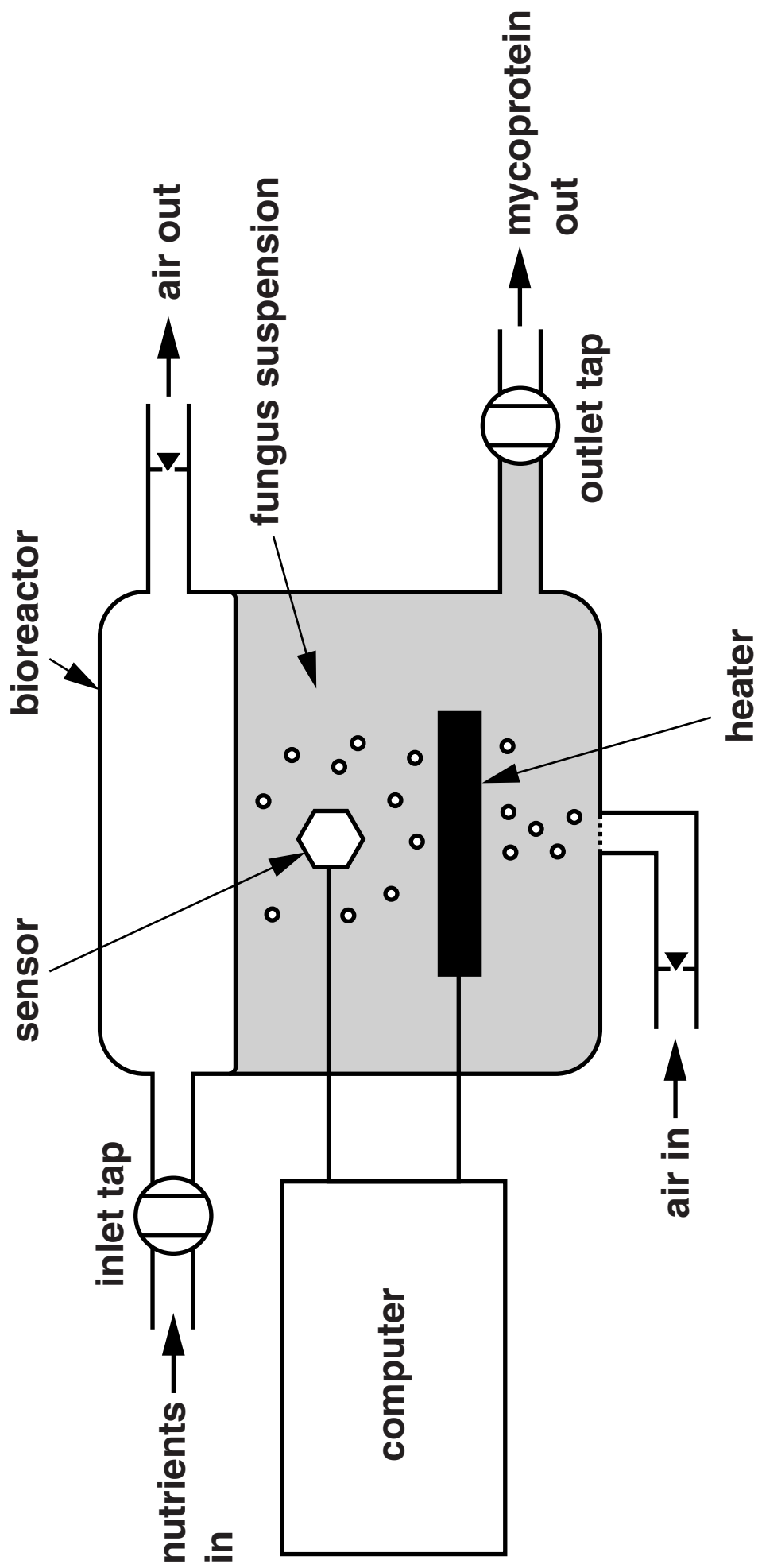
**[Total: 6]**

**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.**





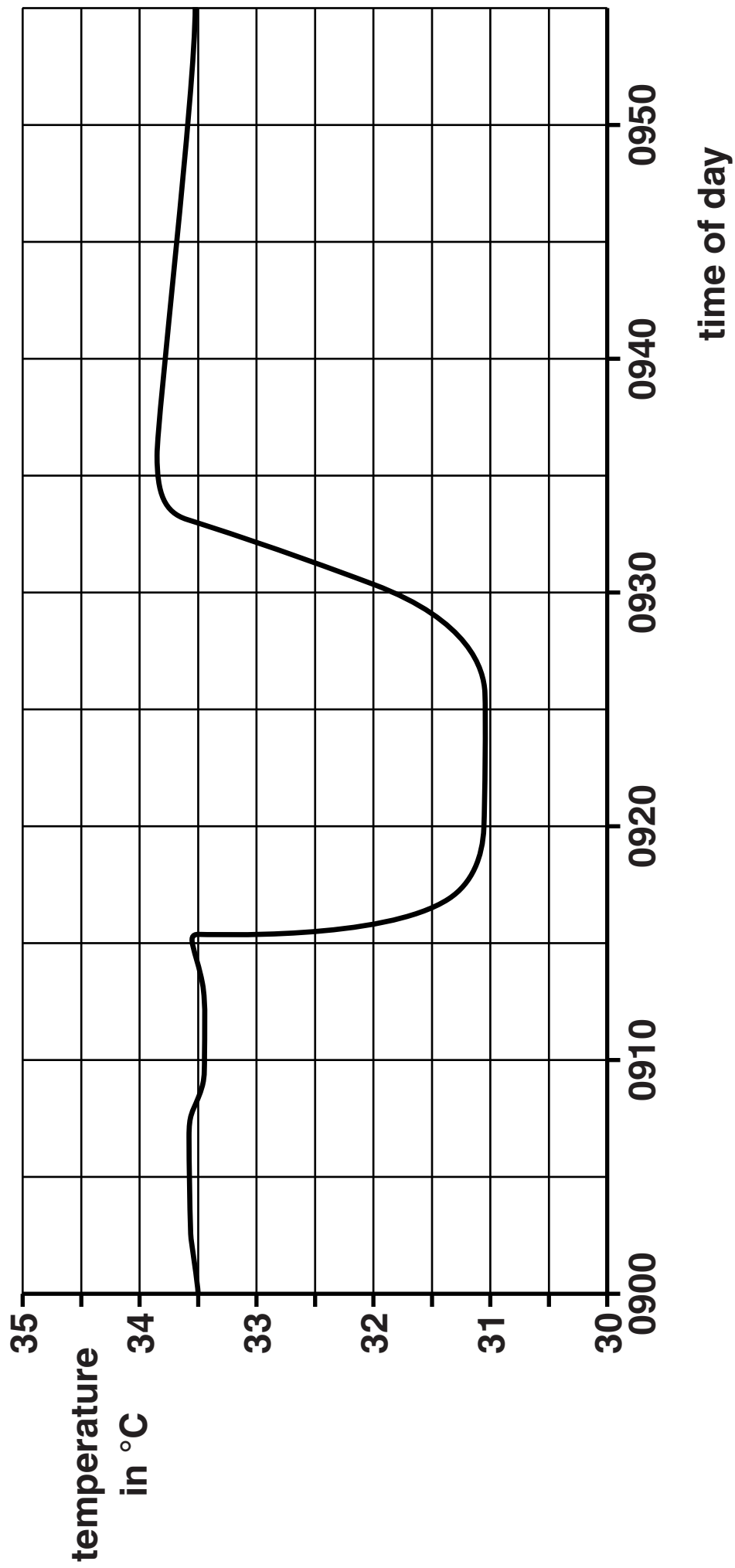
**(a) The computer prints out the temperature-time graph opposite.**

**(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.

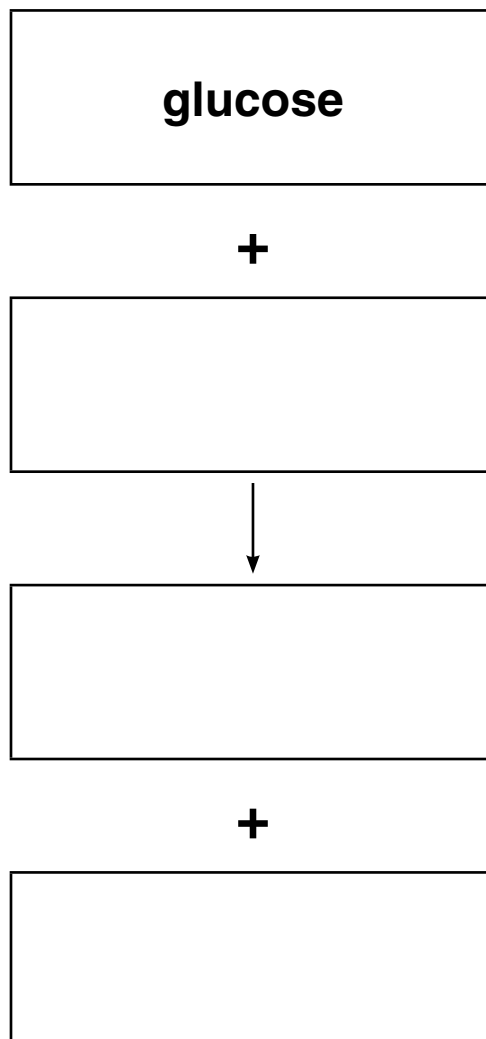
Choose words from the list.

alcohol

carbon dioxide

oxygen

water



[3]

**(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.**

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[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]**

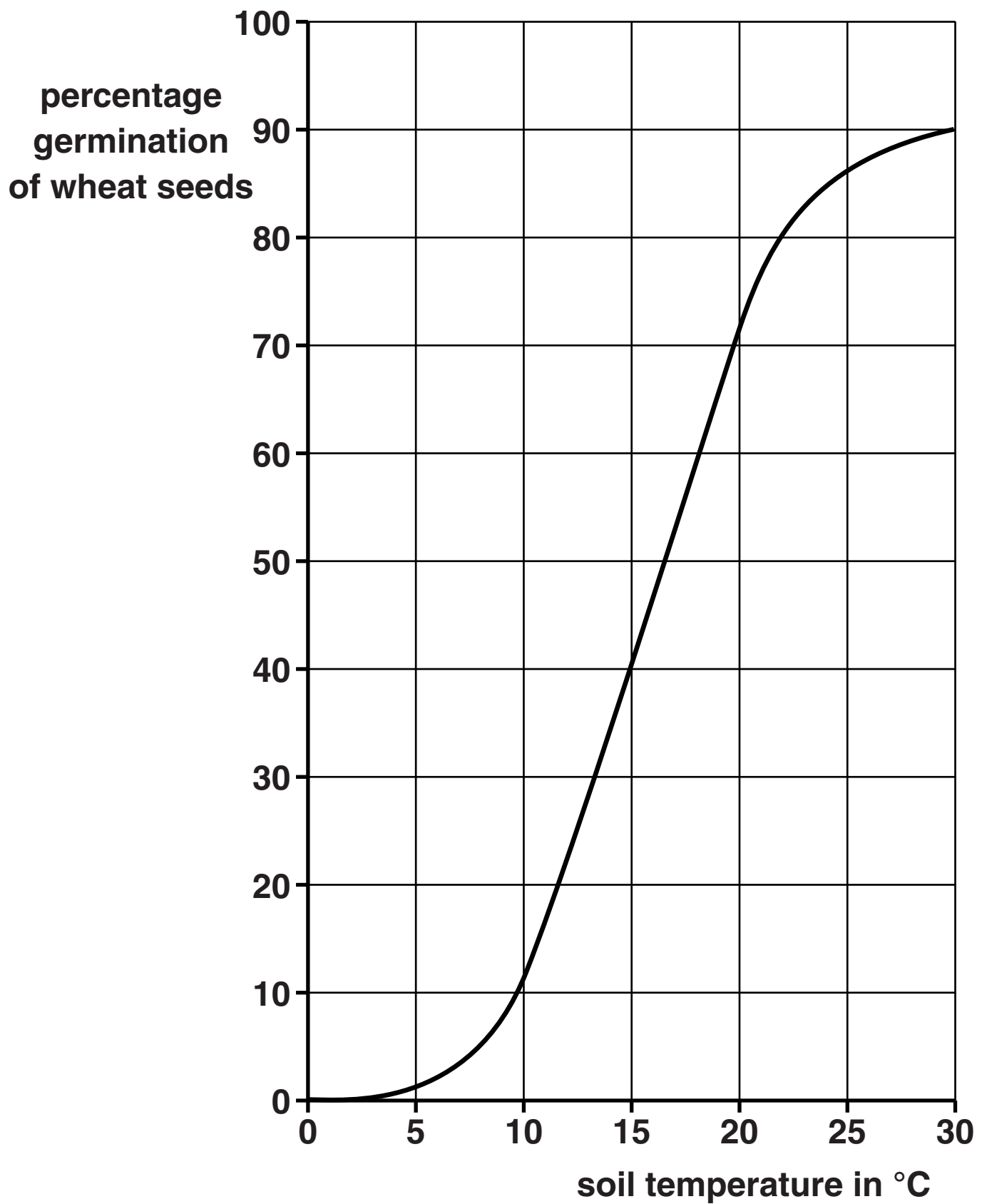
**(b) He waits until the soil is warm enough before sowing the seed.**

**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.**

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



**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.**

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**[3]**

**[TOTAL: 6]**



**8 Philippa keeps a herd of cows for milking.**

**Each cow produces a calf every year.**

**Philippa keeps the male calves on the farm for six months.**

**She then sells the calves to be fattened up for beef.**

**Philippa gets more money for big calves than small ones.**

**State and explain how Philippa should care for the calves so that they grow big.**



**The quality of written communication will be assessed in your answer.**

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**[6]**

**[TOTAL: 6]**

**END OF QUESTION PAPER**

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