

Tuesday 22 January 2013 – 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.

Duration: 1 hour

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, 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 **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Debra needs a new pair of football boots.



She looks for boots which have metal studs, rubber soles and polymer uppers.

(a) (i) Put a **ring** around an important material property for metal studs.

brittle flexible hard soft

[1]

(ii) Put a **ring** around an important material property for the rubber sole.

bright colour high transparency low density low strength

[1]

(b) Explain **one** important material property for the polymer uppers.

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

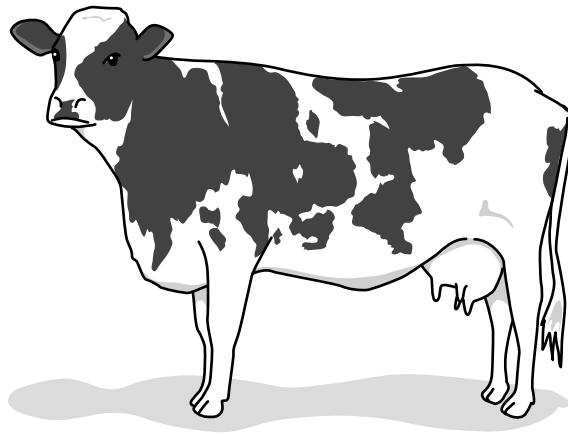
(c) Debra finds the CE and ISO marks on a pair of boots that she likes.

What do these marks tell Debra about the boots?

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

[Total: 6]

2 Mary is a farmer. She makes yogurt with milk from her cows.



(a) Mary follows this recipe to make some yogurt.

- 1 Pour the milk into a large clean bowl.
- 2 Heat the milk to 80°C and then let it cool.
- 3 Stir in a small amount of yogurt from the last batch.
- 4 Cover the bowl with a muslin cloth.
- 5 Leave the bowl at 30°C for two days.
- 6 Place the yogurt in the fridge until needed.

Each stage of the recipe has a different effect on the milk.

Some of these effects are listed in this table.

Effect on the milk	Stage
Bacteria in the milk are destroyed.	
Bacteria multiply and ferment the milk.	
Bacteria from the air cannot get into the milk.	4
Growth of bacteria is slowed down to stop the milk spoiling.	

Complete the table to show which stage causes that effect.

One row has been done for you.

[3]

(b) Mary uses artificial insemination so that the next generation of cows on her farm will produce lots of milk.

Describe how sperm is collected, stored and used in artificial insemination.

.....

.....

.....

.....

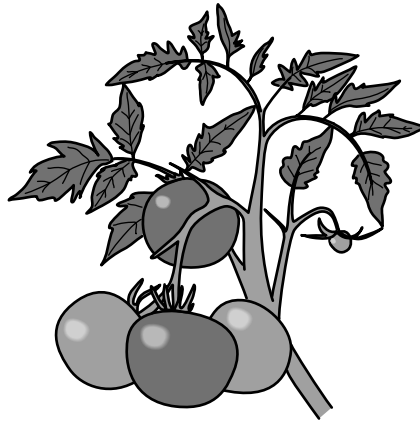
.....

[3]

[Total: 6]

Turn over

- 4 Tomato fertiliser often contains magnesium nitrate $\text{Mg}(\text{NO}_3)_2$.



- (a) $\text{Mg}(\text{NO}_3)_2$ contains three elements.

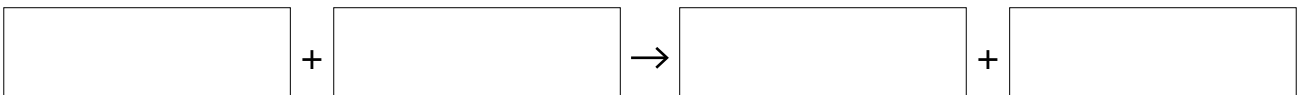
Complete the table to give the names of each element and the number of particles of each element shown in the formula.

Element	Number of particles
magnesium	
nitrogen	
	6

[3]

- (b) Magnesium nitrate is manufactured by reacting magnesium oxide with nitric acid.

Complete a **word equation** for this reaction.



[3]

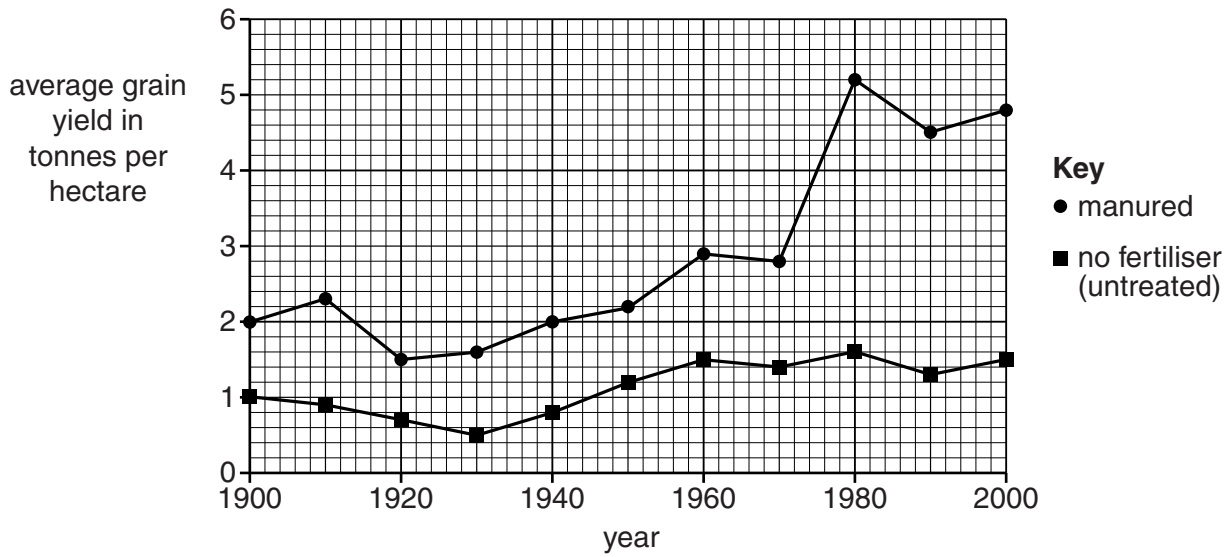
- (c) A farmer uses 80 litres of magnesium nitrate solution to water his tomato plants every week for six weeks. The solution needs to have a concentration of 0.5 g/litre.

How much solid magnesium nitrate does the farmer need to buy?

mass of magnesium nitrate = g [1]

[Total: 7]

5 The graph shows the yield of wheat harvested from two fields since 1900.



One field was treated every year with farmyard manure.

No fertiliser at all was put on the other field.

SuperGro wheat was grown in both fields.

There were some changes introduced during the experiment:

- After 1930, lime was added to both fields.
- After 1960, herbicides were used on both fields.
- After 1970, a different variety of wheat, HyperGro, was grown in both fields.

(a) A scientist claims that all three changes improved the yield in both fields.

Use the graph to show that this claim is **not** correct.

.....

.....

.....

..... [2]

- (b) The seed supplier claims that using HyperGro wheat instead of SuperGro wheat improves the yield between manured and untreated fields by at least 200%.

By completing the calculations in the table below, discuss the validity of the claim.

You may use the space below the table for your working.

Year	Grain yield in tonnes per hectare		Improvement = $\frac{\text{manured yield} - \text{untreated yield}}{\text{untreated yield}} \times 100$
	Untreated	Manured	
1910	0.9	2.3	156%
1970	1.4	2.8	
2000			

.....

 [3]

- (c) Fertilisers are not the only chemicals used to increase the yield of wheat crops.

Draw straight lines to link each **type of chemical** to its **purpose**.

type of chemical	purpose
fertiliser	kills unwanted plants
fungicide	adds nutrients to the soil
herbicide	reduces population of insects
insecticide	inhibits growth of microorganisms

[2]

[Total: 7]

8 Bill is a theatre lighting technician.

(a) When he was studying for his theatre lighting qualification, Bill had to learn about using filters.

Suggest **two other** things he had to learn in order to become a theatre lighting technician.

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

(b) In the theatre, Bill uses different filters to alter the properties of light coming out of the light sources.

Draw straight lines to link what a **filter absorbs** with its **effect on the actors**.

filter absorbs	effect on the actors
ultra-violet light	makes them look yellow
infra-red radiation	protects them from skin cancer
blue light	reduces the amount of heat they absorb

[2]

- (c) Bill tells the theatre manager which lamps he will be using each evening.

This is so that the air conditioning can be set to remove the heat from the lamps. This stops the audience getting too hot.

The manager uses this table to set the power of the air conditioning.

Source of heat	Required air conditioning power
data projector	10.0 kW
floodlight	2.0 kW
one person	0.1 kW

The next performance will use **one** data projector and **ten** floodlights.

It will have an audience of **500** people who will also generate heat.

Calculate the power required for the air conditioning.

Show all your working.

air conditioning power = kW [2]

[Total: 6]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE



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