



Cambridge Lower Secondary Sample Test

For use with curriculum published in September 2020

Science Paper 2

Stage 9

45 minutes

Name

No additional materials are needed.

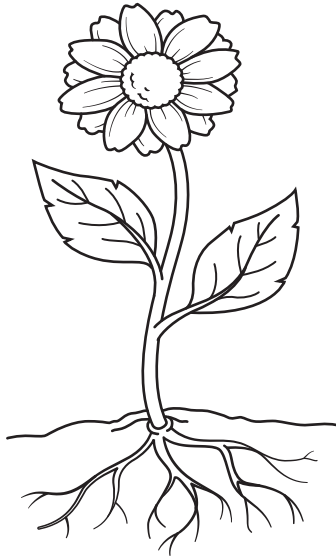
INSTRUCTIONS

- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

1 The diagram shows a flowering plant.



Plants need to absorb water and transport it to all of their living parts.

(a) (i) Name the process that plants use to **absorb** water through the roots.

..... [1]

(ii) Name the tissue that **transports** water to different parts of the plant.

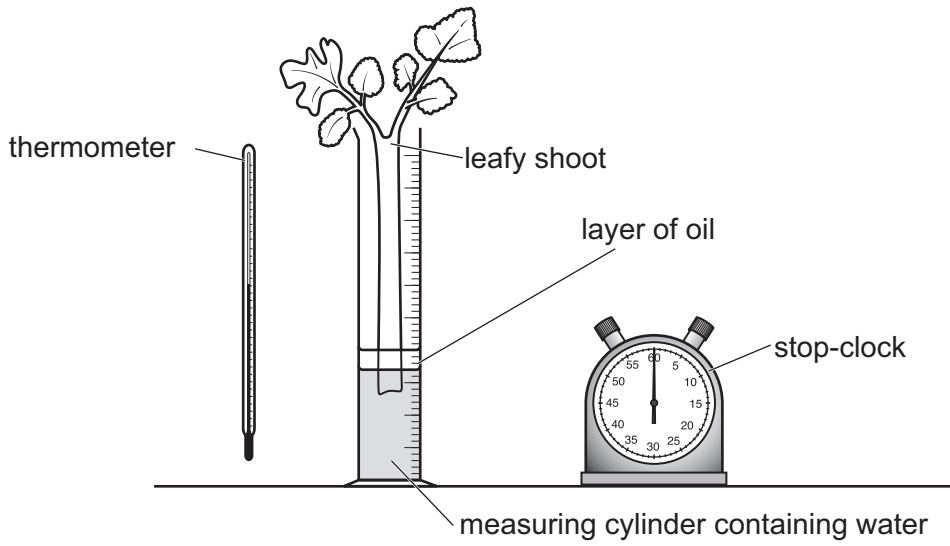
..... [1]

(iii) Name the part of the plant that loses water by transpiration.

..... [1]

(b) Several factors affect the amount of water lost by transpiration.

Chen uses this equipment to measure the rate of transpiration.



Chen predicts that the temperature of the air affects the rate of transpiration.

(i) Which variable must Chen change to test his prediction?

..... [1]

(ii) State **two** variables that Chen needs to control in his investigation.

1

2

[2]

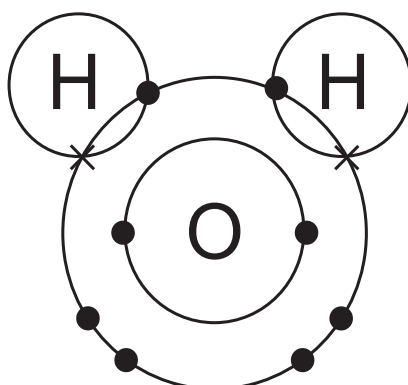
(iii) Describe how Chen measures the rate of transpiration.

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

(iv) Predict the effect of changing the temperature of the air on the rate of transpiration.

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

2 Look at the diagram of a water molecule, H_2O .



(a) State the **type** of bonding in a water molecule.

.....

Explain how you can tell.

.....

.....

[2]

(b) An oxygen atom has the electronic structure 2.6.

To which group of the Periodic Table does oxygen belong?

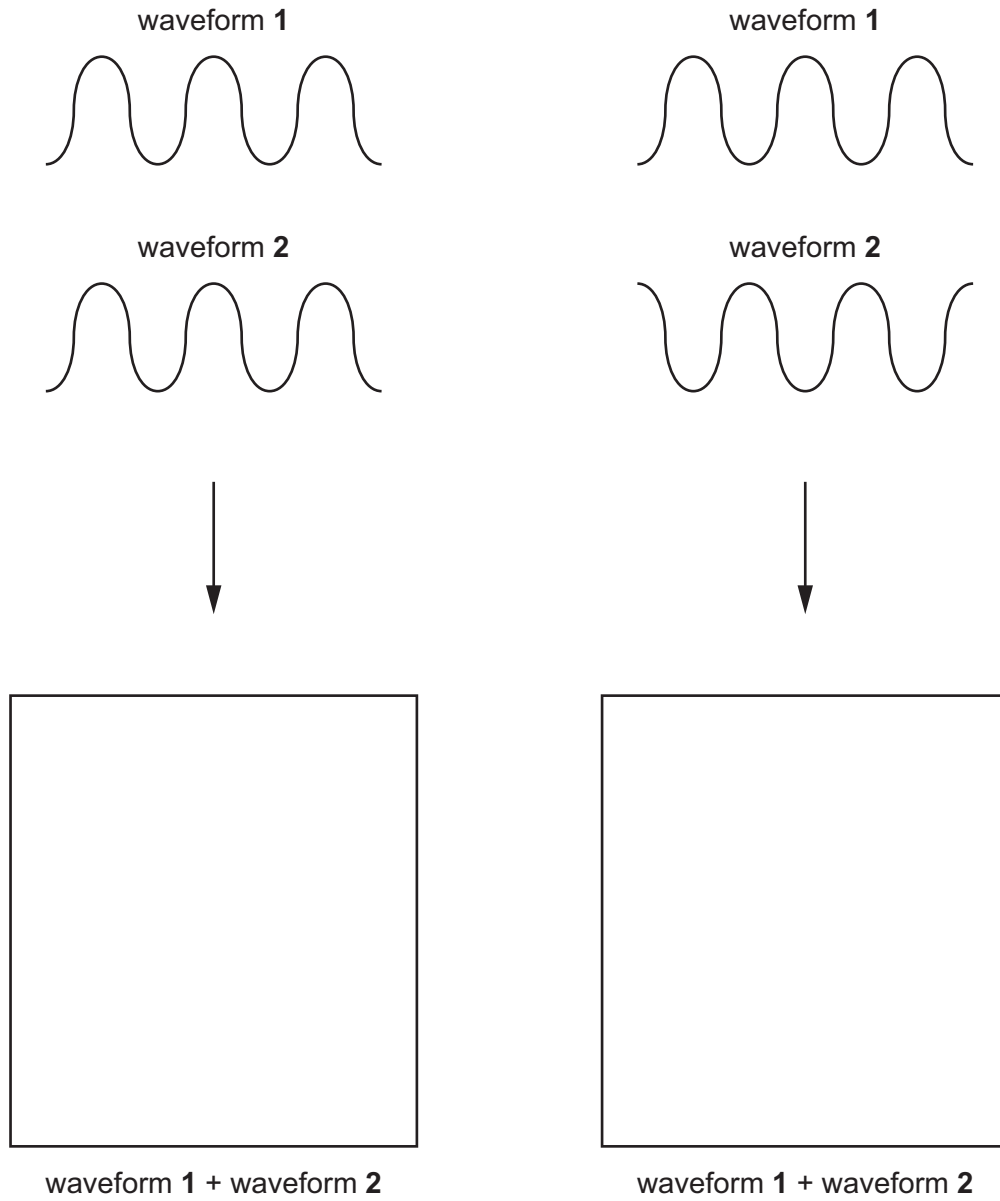
..... [1]

3 Yuri investigates some sound waves.

Sound waves can interact to reinforce or cancel each other.

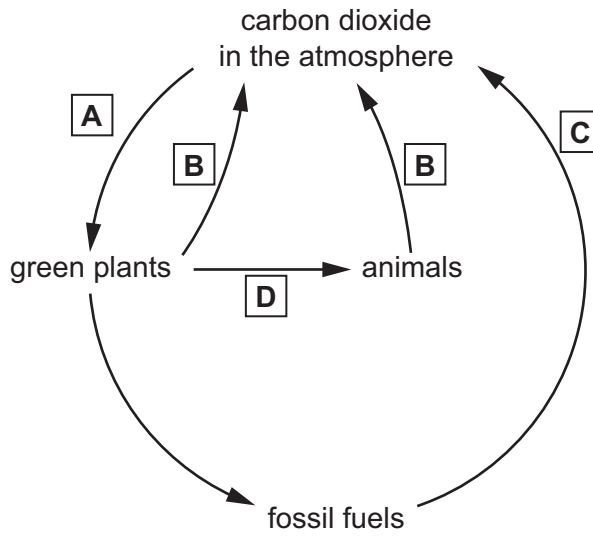
Yuri looks at the waveforms the sound waves make on an oscilloscope.

Complete the **two** diagrams to show what happens when each pair of waveforms interacts.



[3]

4 The diagram shows part of the carbon cycle.



(a) The boxes **A**, **B**, **C** and **D** show four important processes in the carbon cycle.

Name **each** of these processes.

- A**
- B**
- C**
- D**

[4]

(b) Electricity is often generated using fossil fuels.

Many countries generate their electricity using renewable energy resources such as wind turbines and solar panels.

Predict the effect of using renewable energy resources, rather than fossil fuels, on the carbon cycle.

-
-

Explain the reason for your prediction.

-
-

[2]

(c) Scientists use evidence of climate change to predict damaging effects on ecosystems.

(i) State **one** piece of evidence for climate change.

..... [1]

(ii) Suggest **two** effects of climate change.

1

.....

2

.....

[2]

- 5 Lily compares the densities of three substances **A**, **B** and **C**.

Look at her table of information.

substance	mass in grams	volume in cm ³	density in g/cm ³
A	90.0	20	
B	3.2	1000	0.0032
C	9.7	10	0.97

- (a) Calculate the density of substance **A**.

density of substance **A** = g/cm³ [2]

- (b) Suggest which substance **A**, **B** or **C** is a gas.

.....

Explain your answer.

.....

[2]

6 Answer the questions about thermal (heat) energy transfer.

Choose from the list.

conduction

conductor

convection

radiator

evaporation

insulation

insulator

radiation

(a) What is the main form of thermal energy transfer in solids?

..... [1]

(b) What is the main form of thermal energy transfer in liquids and gases?

..... [1]

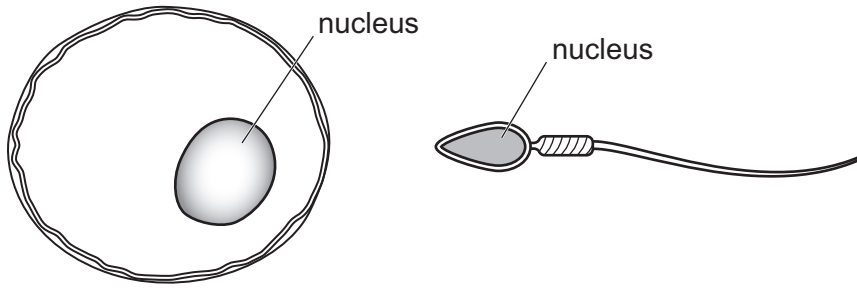
(c) Complete the sentences using words from the list.

(i) Saucepan handles are made from wood.

This is because wood is a good [1]

(ii) Copper is a metal, so it is a good [1]

7 The diagram shows an egg cell and a sperm cell.



NOT TO SCALE

(a) (i) The nucleus of the egg cell and the nucleus of the sperm cell both contain chromosomes.

What are chromosomes made of?

..... [1]

(ii) Describe what happens to the nucleus of the egg cell and the nucleus of the sperm cell during fertilisation.

..... [1]

(iii) Which of these cells, the egg or the sperm, determines the sex of the offspring?

Explain your answer. Use ideas about chromosomes.

cell

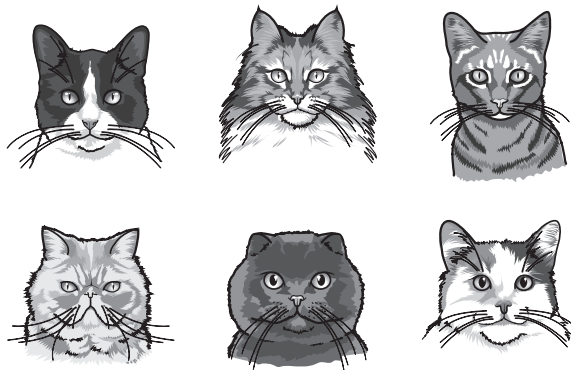
explanation

.....
.....

[2]

(b) The drawing shows a group of cats.

Although they all look different they all belong to the same species.



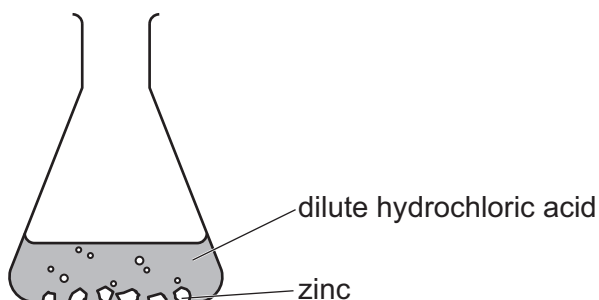
(i) What term describes the differences that occur within the same species?

..... [1]

(ii) Why do the cats look different?

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

- 8 Pierre investigates the reaction between lumps of zinc and dilute hydrochloric acid.



- (a) Pierre finds that the reaction is faster if he heats the dilute hydrochloric acid.

Explain why, using the particle model.

.....

.....

..... [2]

- (b) Pierre wants to make the reaction go faster.

He does **not** want to change the:

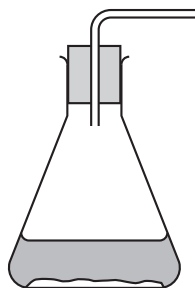
- volume of the dilute hydrochloric acid
- temperature of the dilute hydrochloric acid
- mass of zinc.

Describe **one other** way that Pierre can make the reaction go faster.

..... [1]

- (c) Pierre wants to measure the volume of gas given off during the reaction.

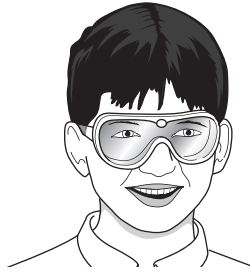
Complete the diagram of the equipment Pierre uses to collect and measure the volume of the gas.



[2]

(d) Pierre does a risk assessment on his investigation.

He decides to wear safety goggles.

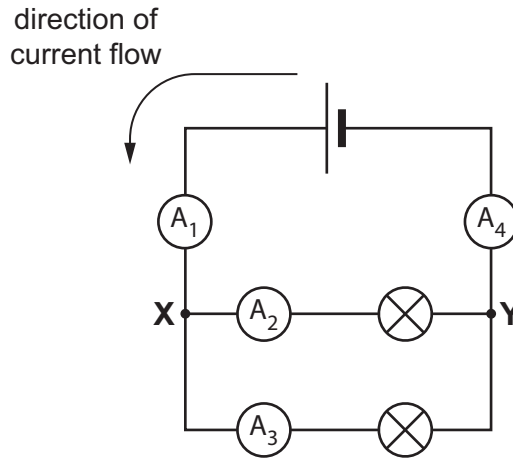


Why does he decide to wear safety goggles?

.....

..... [1]

9 Safia investigates the current in a circuit containing **two identical lamps**.



She changes the number of cells and measures the currents **A₁** to **A₄** in amps.

Look at her results.

number of cells	current in amps			
	A ₁	A ₂	A ₃	A ₄
1	0.4	0.2	0.2	0.4
2	0.6	0.3	0.3	0.6
3	0.8	0.4	0.4	0.8
4	1.2	0.6	0.6	1.2
5	1.4	0.7	0.7	2.8
6	1.8	0.9	0.9	1.8

(a) What do the results tell you about what happens to the current in the circuit at points **X** and **Y**?

.....
 [2]

(b) One of the results is **anomalous**.

Circle the result in the table that is anomalous. [1]

(c) Predict the values of A_2 , A_3 and A_4 if the value for A_1 is 1.6 A.

$A_1 = \dots\dots\dots 1.6 \dots\dots\dots$ A

$A_2 = \dots\dots\dots$ A

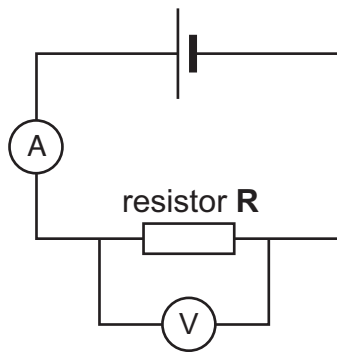
$A_3 = \dots\dots\dots$ A

$A_4 = \dots\dots\dots$ A

[1]

10 Carlos investigates electrical resistance.

Look at his circuit.



The reading on the ammeter is 0.6 A.

The reading on the voltmeter is 1.8 V.

(a) Calculate the resistance of resistor **R**. Include the units.

resistance of resistor **R** = units [2]

(b) Carlos replaces **R** with a resistor of greater resistance.

What happens to the reading on the ammeter?

..... [1]

The Periodic Table of Elements

		Group																																																																																																																																																																																																																																																																																																																																																						
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3 Li lithium 7	4 Be beryllium 9	<table border="1"> <tr> <td>1 H hydrogen 1</td> <td colspan="10" style="text-align: center;"> <table border="1"> <tr> <td colspan="12" style="text-align: center;">Key</td> </tr> <tr> <td colspan="12" style="text-align: center;">atomic number</td> </tr> <tr> <td colspan="12" style="text-align: center;">atomic symbol</td> </tr> <tr> <td colspan="12" style="text-align: center;">name</td> </tr> <tr> <td colspan="12" style="text-align: center;">relative atomic mass</td> </tr> </table> </td> </tr> <tr> <td>11 Na sodium 23</td> <td>12 Mg magnesium 24</td> <td>13 Al aluminium 27</td> <td>14 Si silicon 28</td> <td>15 P phosphorus 31</td> <td>16 S sulfur 32</td> <td>17 Cl chlorine 35.5</td> <td>18 Ar argon 40</td> <td>19 K potassium 39</td> <td>20 Ca calcium 40</td> <td>21 Sc scandium 45</td> <td>22 Ti titanium 48</td> <td>23 V vanadium 51</td> <td>24 Cr chromium 52</td> <td>25 Mn manganese 55</td> <td>26 Fe iron 56</td> <td>27 Co cobalt 59</td> <td>28 Ni nickel 59</td> <td>29 Cu copper 64</td> <td>30 Zn zinc 65</td> <td>31 Ga gallium 70</td> <td>32 Ge germanium 73</td> <td>33 As arsenic 75</td> <td>34 Se selenium 79</td> <td>35 Br bromine 80</td> <td>36 Kr krypton 84</td> <td>37 Rb rubidium 85</td> <td>38 Sr strontium 88</td> <td>39 Y yttrium 89</td> <td>40 Zr zirconium 91</td> <td>41 Nb niobium 93</td> <td>42 Mo molybdenum 96</td> <td>43 Tc technetium —</td> <td>44 Ru ruthenium 101</td> <td>45 Rh rhodium 103</td> <td>46 Pd palladium 106</td> <td>47 Ag silver 108</td> <td>48 Cd cadmium 112</td> <td>49 In indium 115</td> <td>50 Sn tin 119</td> <td>51 Sb antimony 122</td> <td>52 Te tellurium 128</td> <td>53 I iodine 127</td> <td>54 Xe xenon 131</td> <td>55 Cs caesium 133</td> <td>56 Ba barium 137</td> <td>57–71 lanthanoids</td> <td>72 Hf hafnium 178</td> <td>73 Ta tantalum 181</td> <td>74 W tungsten 184</td> <td>75 Re rhenium 186</td> <td>76 Os osmium 190</td> <td>77 Ir iridium 192</td> <td>78 Pt platinum 195</td> <td>79 Au gold 197</td> <td>80 Hg mercury 201</td> <td>81 Tl thallium 204</td> <td>82 Pb lead 207</td> <td>83 Bi bismuth 209</td> <td>84 Po polonium —</td> <td>85 At astatine —</td> <td>86 Rn radon —</td> <td>87 Fr francium —</td> <td>88 Ra radium —</td> <td>89–103 actinoids</td> <td>104 Rf rutherfordium —</td> <td>105 Db dubnium —</td> <td>106 Sg seaborgium —</td> <td>107 Bh bohrium —</td> <td>108 Hs hassium —</td> <td>109 Mt meitnerium —</td> <td>110 Ds darmstadtium —</td> <td>111 Rg roentgenium —</td> <td>112 Cn copernicium —</td> <td>113 Nh nihonium —</td> <td>114 Fl flerovium —</td> <td>115 Mc moscovium —</td> <td>116 Lv livermorium —</td> <td>117 Ts tennessine —</td> <td>118 Og oganeson —</td> <td>119 Uu unbinilium —</td> <td>120 Uub unbinilium —</td> <td>121 Uut ununilium —</td> <td>122 Uuq ununilium —</td> <td>123 Uubk ununilium —</td> <td>124 Uuqk ununilium —</td> <td>125 Uubk ununilium —</td> <td>126 Uuqk ununilium —</td> <td>127 Uubk ununilium —</td> <td>128 Uuqk ununilium —</td> <td>129 Uubk ununilium 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 57 La lanthanum 139 | 58 Ce cerium 140 | 59 Pr praseodymium 141 | 60 Nd neodymium 144 | 61 Pm promethium — | 62 Sm samarium 150 | 63 Eu europium 152 | 64 Gd gadolinium 157 | 65 Tb terbium 159 | 66 Dy dysprosium 163 | 67 Ho holmium 165 | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 | 89 Ac actinium — | 90 Th thorium 232 | 91 Pa protactinium 231 | 92 U uranium 238 | 93 Np neptunium — | 94 Pu plutonium — | 95 Am americium — | 96 Cm curium — | 97 Bk berkelium — | 98 Cf californium — | 99 Es einsteinium — | 100 Fm fermium — | 101 Md mendelevium — | 102 No nobelium — | 103 Lr lawrencium — |

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).