**National sampling for science**

**Test B**

<table>
<thead>
<tr>
<th>First name</th>
<th>Middle name</th>
<th>Last name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date of birth**

Day  
Month  
Year

**Please circle one**

Boy  
Girl

**School**

__________________________

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*Diagram of a circuit with a battery, switch, light bulb, and alligator clips*

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Do not write on this page.
INSTRUCTIONS

Read this carefully.

You have **45 minutes** for this test.

**Answers**

This pencil shows where you will need to put your answer.

For some questions you may need to draw an answer instead of writing one.

Do not write in the grey margins.

Do not write on or near the bar codes.

Some questions may have a box like this for you to write down your thoughts and ideas.
Do not write on this page.
1 Magnets

(a) Liam has a toy train with two carriages. It has bar magnets to join the carriages to the engine as shown below.

Write ‘N’ (north) and ‘S’ (south) on the end of each bar magnet so the carriages join to the engine.

‘N’ and ‘S’ have been written on the engine for you.

(b) Nisha moves a different bar magnet towards the magnet on the engine. The magnets do not touch each other. The engine moves away from Nisha’s magnet.

Explain why the train engine moves away from the bar magnet.

..................................................................................................................................................
..................................................................................................................................................

(1 mark)
2 Duckweed

(a) Duckweed is a plant that floats on the water in ponds.

The root of the duckweed keeps the plant stable and reduces movement across the pond.

What other function does the root have?
.................................................................................................................

(b) Mandy wonders if duckweed reproduces more quickly if it gets more light. She does an investigation to see if this is true.

Mandy fills identical jars with 75 cm³ of water.

Which piece of equipment is most accurate for measuring 75 cm³ of water? Tick ONE box.

- Beaker
- Measuring cylinder
- Spoon
- Jug

(1 mark)
(c) Mandy puts one duckweed plant in each jar.

She puts each jar in sunlight for a different amount of time. When the jars are not in the sunlight, they are kept in a dark cupboard.

Mandy predicts how many duckweed plants will be in her jars at the end of the week.

Complete the table by predicting how many duckweed plants there will be if the duckweed reproduces more quickly when it gets more light.

<table>
<thead>
<tr>
<th>Amount of sunlight (hours per day)</th>
<th>Number of duckweed plants at the end of the week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

(d) Why is it important for Mandy to do an investigation to test her idea? Tick ONE box.

- so she can collect evidence
- so she can learn about the duckweed’s food chain
- so she can protect the environment
- so she can identify what type of duckweed it is

(1 mark)
3 Rocket

(a) Jonathan puts half a vitamin C tablet into some cold water. It bubbles in the water.

Circle the correct word in each box to complete the sentences below.

(i) The bubbles show that a **gas** is produced.

(ii) This change is **not reversible**.

(b) Jonathan puts a tight lid on the container. After a short time the lid pops off the container.

Jonathan uses the container to launch a rocket.

To stay safe, he stands well away from his rocket when it goes up in the air.

Tick ONE box to show why Jonathan must stand well away from the rocket to stay **safe**.

He might get burnt. □ The lid might come off. □

His shoes might get wet. □ He is not sure where the rocket will go. □
(c) Jonathan times how long it takes the rocket to launch into the air with different amounts of tablet. He launches the rocket three times with each amount of tablet. The table below shows his results.

<table>
<thead>
<tr>
<th>Amount of tablet</th>
<th>Time for rocket to launch (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
</tr>
<tr>
<td>quarter</td>
<td>14</td>
</tr>
<tr>
<td>half</td>
<td>11</td>
</tr>
<tr>
<td>whole</td>
<td>5</td>
</tr>
</tbody>
</table>

What is the relationship between the amount of tablet and the time taken for the rocket to go up?

.................................................................................................................

.................................................................................................................

(1 mark)

(d) Predict how long the rocket would take to go up if two whole tablets were used. Use the table to help you.

..................................................... seconds

(1 mark)

(e) Tick ONE box to show a different mixture Jonathan could use to make his rocket go up.

vinegar and sugar [ ] water and sugar [ ]

vinegar and bicarbonate of soda [ ] water and bicarbonate of soda [ ]

(1 mark)
4 Drums

(a) This is a picture of a famous musician. Her name is Evelyn Glennie. She plays the drums.

Evelyn moves the drumstick downwards to hit the drum skin. Then the drumstick bounces back up.

Tick **ONE** box to show what force causes the drumstick to bounce up after it has hit the drum skin.

- a pushing force from the drum skin
- a pushing force from gravity
- a pulling force from the drum skin
- a pulling force from gravity

(1 mark)
(b) Evelyn is deaf. She cannot hear the drum with her ears.

When she has bare feet, she can feel the drum’s sound with her feet.

The sound can travel from the drum through the air to Evelyn’s feet.

Name **ONE other** thing that the sound can travel through from the drum to get to Evelyn’s feet.

..................................................................................................................

(1 mark)

(c) What can Evelyn feel with her feet when the drum makes a sound?

..................................................................................................................

(1 mark)

(d) Evelyn can change the way she plays the drum. She can make the sound get louder or higher.

Tick **ONE** box on each row of the table to show if the sound will get louder or higher.

<table>
<thead>
<tr>
<th>How Evelyn plays the drum</th>
<th>The sound...</th>
<th>does not get higher or louder.</th>
</tr>
</thead>
<tbody>
<tr>
<td>gets higher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gets louder.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

with a tighter drum skin

hit the drum with more force

hit the drum faster with the same force

(1 mark)
5 Keeping warm and healthy

(a) Look at the picture showing the inside of the human body.

(i) **Put a cross, X, on the organ in the picture that pumps blood around the body.**

(ii) Name the organ that pumps blood around the body.

.......................................................

(b) Hassan knows that some activities can affect our pulse rates.

**Tick TWO boxes below to show the two activities that would increase pulse rate the most.**

- having a rest
- writing a letter
- going for a walk
- eating fruit
- playing football
- drinking water

(c) **Tick ONE box to show the usual units of measurement for pulse rate.**

- beats
- beats per second
- beats per minute
- beats per hour
(d) Hassan is interested in how temperature affects pulse rate.

He measures the pulse rates of 6 children sitting in the playground on a cold day.

He then measures the pulse rates of the same 6 children after they have sat in a warm classroom for 10 minutes.

Hassan records his results in the table below.

<table>
<thead>
<tr>
<th>Children</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse rate in cold playground (units)</td>
<td>72</td>
<td>68</td>
<td>76</td>
<td>75</td>
<td>67</td>
<td>70</td>
</tr>
<tr>
<td>Pulse rate in warm classroom (units)</td>
<td>80</td>
<td>75</td>
<td>82</td>
<td>80</td>
<td>70</td>
<td>75</td>
</tr>
</tbody>
</table>

Describe **ONE** thing Hassan did in his investigation so he could be sure of his conclusion.

...........................................................................................................................................

...........................................................................................................................................

(1 mark)

(e) Use the table to write a conclusion for Hassan’s investigation.

...........................................................................................................................................

...........................................................................................................................................

(1 mark)
6 Moon trip

(a) Astronauts travel to the Moon in a spacecraft. Rocket engines push the spacecraft away from the Earth.

What name is given to the force that tries to pull the spacecraft back to Earth?

.......................................................

(1 mark)

(b) From the Earth, the Moon looks like a circle. The astronauts know this is not its real shape.

What shape is the Moon?

.......................................................

(1 mark)

(c) The Moon orbits the Earth.

Tick ONE box to show how many days it takes the Moon to orbit the Earth.

1 day   

7 days   

28 days  

365 days

(1 mark)
(d) The astronauts can see the Earth from space. On one half of the Earth it is night. On the other half it is day.

How does the Earth move to cause night and day?

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........................................................................................................................................................................ (1 mark)

(e) Plants do not grow on the Moon. Growth is one of the life processes of plants.

Name another life process of plants.

........................................................................................................................................................................ (1 mark)

(f) Plants cannot live on the Moon. Some of the conditions on the Moon stop plants carrying out all their life processes.

Tick the TWO conditions which stop plants carrying out their life processes on the Moon.

Tick TWO boxes.

- There is sunlight. ☐
- There are minerals in the rocks. ☐
- There is no rain. ☐
- There is no air. ☐

(1 mark)
7 Baby’s bottle

(a) Robert’s baby sister drinks warm milk from a bottle. Robert thinks he can keep the milk warm for longer by wrapping the bottle up. He has four bottles. He wraps three bottles with different materials. He does not wrap one bottle. 

Why does Robert have one bottle that is not wrapped with material?

(b) What is the scientific name given to a material that does not allow heat to pass through it quickly?

(c) What variables should Robert keep the same to make his test fair? Tick as many boxes as you need.

- size of bottle
- volume of milk in bottle
- number of layers of material wrapping the bottle
- type of material wrapping the bottle
(d) Robert records his results in a table.

<table>
<thead>
<tr>
<th>Material used to wrap bottle</th>
<th>Temperature (°C)</th>
<th>at start</th>
<th>after 30 minutes</th>
<th>after 60 minutes</th>
<th>after 90 minutes</th>
<th>after 120 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle A: not wrapped</td>
<td></td>
<td>45</td>
<td>40</td>
<td>35</td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>Bottle B: wool</td>
<td></td>
<td>45</td>
<td>44</td>
<td>42</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>Bottle C: cotton</td>
<td></td>
<td>45</td>
<td>41</td>
<td>37</td>
<td>35</td>
<td>33</td>
</tr>
<tr>
<td>Bottle D: paper</td>
<td></td>
<td>45</td>
<td>40</td>
<td>36</td>
<td>33</td>
<td>30</td>
</tr>
</tbody>
</table>

Tick ONE box to show which bottle kept the milk warmest.

Use the data in the table to help you.

A  B  C  D

(1 mark)

(e) Robert has a frozen ice lolly.
He wants to stop the ice lolly from melting for as long as he can.
Think about Robert’s results for the bottles of milk.

(i) Tick ONE box to show which material would stop the ice lolly from melting for the longest time.

wool  cotton  paper

(ii) Explain why the material you chose will stop the ice lolly from melting for the longest time.

.................................................................................................................................................

.................................................................................................................................................

(1 mark)
8 Tomatoes

Laura has four brands of tomato seeds.

She wants to know which brand of tomato seed grows best.

You must investigate which brand of tomato seed grows best. You can use the draft box below to plan your investigation.

Use your draft to help you complete the plan for your investigation on the next page.
My planning sheet for the investigation with tomato seeds.

(a) The variable I will change in my investigation is:

...................................................................................................................................................................

(1 mark)

(b) The variable I will measure in my investigation is:

...................................................................................................................................................................

(1 mark)

(c) **ONE** variable I will keep the same to make my test fair is:

...................................................................................................................................................................

(1 mark)

(d) In the table below, write the headings you would use for the **results table** in your investigation.

<table>
<thead>
<tr>
<th></th>
<th>Lee's Seeds</th>
<th>Farmer King's</th>
<th>Aunt Dora's</th>
<th>Kathy's Seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This part would not be filled in until you had done your investigation.</td>
</tr>
</tbody>
</table>

(2 marks)
9 Separating salt

(a) Some children are investigating separating salt mixtures.

Josh wants to separate a mixture of salt and dry pasta. He decides to use a sieve.

What feature of the salt and pasta allows Josh to separate them with a sieve?

.................................................................................................................
.................................................................................................................

(1 mark)

(b) Grace wants to separate a mixture of salt and sand. She adds water to the salt and sand. The salt dissolves.

(i) How could Grace separate the sand from the salty water?

......................................................................................................

(1 mark)

(ii) How could Grace separate the salt from the water?

......................................................................................................

(1 mark)
(c) Caleb has a mixture of salt and sugar. He thinks about how to separate the salt and sugar.

I could add water to dissolve the salt.

Explain why adding water to dissolve the salt will not help Caleb separate a mixture of salt and sugar.
END OF TEST

Please check your answers.

Do not write on this page.
Do not write on this page.