

Science Test B

Mark Scheme

2003

1. (a) Award **ONE** mark for an indication that pulse rate is a measure of heart rate 1
- heart rate;
 - the number of heart beats per minute;
 - how fast your heart is pumping;
 - how much the heart beats.
- Allow:**
- (the speed of your) heart beat;
 - the number of beats per second.
- Do not give credit for a response that includes incorrect science:*
- how fast you are breathing.
- Do not give credit for an insufficient response:*
- how fast your heart is moving/going;
 - (the speed of) your heart.
- (b) Award **ONE** mark for a response indicating that the heart rate had increased: 1
- their heart beat was faster;
 - their hearts were pumping more quickly.
- Allow:**
- the heart pumps more blood around the body;
 - the blood is pumped around the body faster.
- Do not give credit for an insufficient response:*
- their pulse goes up because they are running/moving around [given];
 - they need more blood.

◆ **Give credit** for a correct response that goes beyond the key stage 2 programme of study indicating that the human body requires more oxygen/energy from the blood during exercise:

- the blood moves more quickly because the body needs more energy;
- they needed more oxygen/food/glucose so their hearts were pumping faster;
- to get rid of carbon dioxide from cells more quickly.

(c) Award **ONE** mark for an indication that their pulse would decrease and/or return to normal: 1

The children's pulse rates will...

- return to normal;
- go down;
- get slower.

Allow:

- drop;
- calm down.

Do not give credit for an insufficient response:

The children's pulse rates will...

- change.

[3]

2. (a) Award **ONE** mark for **both** parts correct: 1

- | | Yes | No |
|---|-------------------------------------|-------------------------------------|
| • | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | <input checked="" type="checkbox"/> | |

(b) Award **ONE** mark for: 1

- a solid formed.

(c) Award **ONE** mark for a response indicating that the children should add different volumes of vinegar to the milk: 1

- put different amounts of vinegar in each;
- put a small amount of vinegar in one container. Put a bit more vinegar in the next container and lots in the last one.

Do not give credit for an insufficient response:

- put vinegar in each.

(d) Award **ONE** mark for an indication that the children could weigh the balls: 1

- they could weigh the balls.

Allow:

- put the balls on scales.

OR

Award **ONE** mark for a response which controls the size of the balls in at least one dimension and describes the dimension to be measured (if it is different to the method already given):

- the children could put the balls into identical containers, squash them flat and measure the height;
- the children could flatten the balls to the same height and measure the area;
- the children could harden the balls in the fridge/freezer/oven before measuring;
- draw a circle around the ball and measure its area (on graph paper).

Allow:

a response that attempts to control the size of the ball in one dimension without indicating how they will measure it:

- make the white ball flat and measure it.
- ◆ **Give credit** for a correct response that goes beyond the key stage 2 programme of study, showing an understanding that the size of the white balls may be measured by displacement when the balls are pushed into the water:
- measure how much the volume increases when the white ball is pushed into the water.

Do not give credit for an insufficient response:

- *measure its area;*
- *use a ruler;*
- *use string;*
- *look at them.*

[4]

3. (a) Award **ONE** mark for: 1
- ruler;
 - metre rule;
 - tape measure.
- Allow:**
- measurement stick;
 - metre stick.
- Do not give credit for an insufficient response:*
- *a piece of string.*
- (b) Award **ONE** mark for: 1
- in a table
- (c) Award **ONE** mark for a recognition of the need for control/fair test: 1
- to make the test fair;
 - making it different will make it unfair.

OR

- identification of lack of comparability;
- dropping it at different heights will make it go higher/different;
- dropping it at different heights will be unfair.

Do not give credit for an insufficient response:

- to see if it changed.

(d) Award **ONE** mark for a recognition of the independent variable as the surface: 1

- the surface;
- the surface used to bounce the ball.

Allow:

- ground;
- material.

Do not give credit for a response that includes incorrect science which indicates an investigation of a factor not mentioned in the table:

- area.

Do not give credit for a response that includes incorrect science giving the dependent variable:

- how high it bounces.

(e) Award **ONE** mark for: 1

- concrete

(f) Award **TWO** marks for a general comparison describing the relationship between the **height of drop** and the **height of bounce**: 2

- the higher the drop the higher the bounce;
- the lower the drop the lower the bounce.

or

If you are unable to award two marks, award **ONE** mark for **two specific** comparisons describing the relationship: 1

- the highest drop bounces highest,
- the lowest drop bounces lowest.

Award **ONE** mark for a single comparison of the variables:

- the highest makes it bounce high;
- the lowest height makes it bounce low;
- a low height makes it bounce low.

Do not give credit for a response that changes one or both variables:

- the higher it drops the faster it goes;
- the higher the drop the harder it bounces.

Do not give credit for a response that gives an incorrect or correct explanation:

- there is more force pulling down so the bounce is bigger.

[7]

4. (a) Award **ONE** mark for an indication that plants need to produce seeds to reproduce, or to allow the plant type to disperse: 1

- to allow it to reproduce;
- it allows the species/type of plant
- to survive;
- so that it produces new/young plants/seedlings;
- so that new plants can grow in different places;
- to complete the life cycle;
- so that a young plant will grow.

Allow:

- to spread the plants out;
- without seeds, no new plants would grow;
- to make baby plants;
- to produce more plants.

Do not give credit for an insufficient response that implies the individual plant will die if it does not produce seeds:

- it allows the plant to survive;
- to carry on living.

Do not give credit for a non-specific or ambiguous response:

- they would not grow if they did not have seeds;
- to (help them) grow;
- so that it can grow [implies that the original plant regrows].

- (b) Award **ONE** mark for: 1

- Birds spread the seeds in their droppings.

- (c) (i) Award **ONE** mark for: 1
- red.
- (ii) Award **ONE** mark for a response that links the colour/visibility (of the berries) with attraction to birds and/or 1
- to seed dispersal:
 - birds can see red seeds more easily and they will be eaten more often;
 - birds will eat the red berries that they can see easier;
 - berries that blend in may not be eaten as often as when the berries are ripe;
 - the brighter the seeds, the more are dispersed.

Allow:

a response that links colour of berries to visibility, implying that more or less seeds are dispersed, depending on colour referred to:

- birds can see red more clearly;
- birds may not notice berries which are the same colour as the leaves;
- the brighter the berry, the easier it is for birds to see them;
- the more contrast between the leaves and the colour of the berry, the more likely the birds are to see them.

Do not give credit for an insufficient response that does not refer to visibility of the berries to the birds:

- *the berries are brighter;*
- *red stands out;*
- *red is better.*

Do not give credit for an insufficient response that changes a variable in the relationship:

- *the number of berries depends on the type of bird.*

[4]

5. (a) Award **ONE** mark for: 1
- liquid to gas.
- (b) (i) Award **ONE** mark for identifying one way her test is not fair: 1
- the containers are different shapes/sizes;
 - the vinegar container is wider;
 - there is more vinegar than water;
 - there is less water.

- (ii) Award **ONE** mark for an understanding that her results will not be reliable if her test is not fair: 1

- because she will not be able to trust her results if her test is not fair;
- because she will not know what her results mean;
- because she will not be sure if her results are the true results of her test;
- she will not be able to interpret/compare her results.

Allow:

- she will not be able to tell which liquid evaporates more quickly.

Do not give credit for an insufficient response:

- *her results will not be accurate [her test may be accurate but because her test is not fair, she cannot draw a reliable conclusion from her results].*

- (c) Award **ONE** mark for a conclusion indicating that more vinegar than water evaporated (over three days): 1

- less water than vinegar evaporated;
- the vinegar's volume decreased more than the water's.

Allow:

a response that does not make explicit the two factors being compared:

- vinegar evaporated most;
- water evaporated least.

- ◆ **Give credit** for a correct response that goes beyond the key stage 2 programme of study, indicating the relationship in terms of a rate:

- the vinegar evaporated a bit faster than the water (over the three days);
- overall, the water evaporated at a slower rate than the vinegar.

Do not give credit for an insufficient response:

- *different amounts of water and vinegar evaporated;*
- *she found an answer to her test;*
- *she was right/wrong;*
- *the vinegar evaporated first.*

- (d) Award **ONE** mark for an indication that the air temperature increased **or** that there was more movement of air: 1

- it was hotter;
- it might have been a warmer day;
- it was sunnier;
- it was more draughty/windy;
- the air was drier/less humid;
- it was not as hot on the other days;
- it was cooler/less windy on Monday and Wednesday.

Allow:

- it was sunnier;
- there was more sunlight; [implies it was hotter].

Allow:

a response given in absolute terms:

- it was hot;
- it was draughty.

***Do not** give credit for an insufficient response:*

- *the heat was different [does not specify an increase].*

***Do not** give credit for an incorrect response:*

- *they might have put it somewhere warmer.*

[5]

6. (a) Award **ONE** mark for an awareness that the Earth is spherical:

1

- the Earth is a sphere;
- the Earth is spherical;
- a sphere.

Allow:

- the Earth is shaped like a ball.

***Do not** give credit for an insufficient response:*

- *round;*
- *circular;*
- *oval.*

◆ **Give credit** for a correct response that goes beyond the key stage 2 programme of study:

- ovoid;
- geoid.

(b) Award **TWO** marks for **all five** ideas correctly classified:

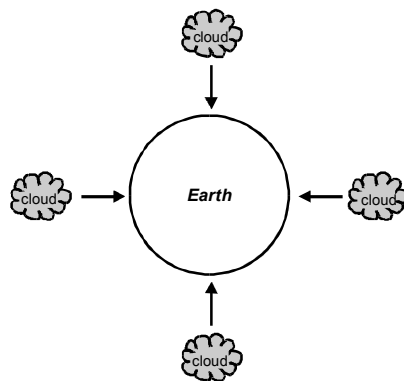
2

Idea	True	False
The Earth goes around the Sun.	✓	
The Earth spins on its axis.	✓	
The Sun is hidden behind the Moon at night.		✓
The Sun orbits the Earth.		✓
Night is dark because thick clouds cover the Sun.		✓

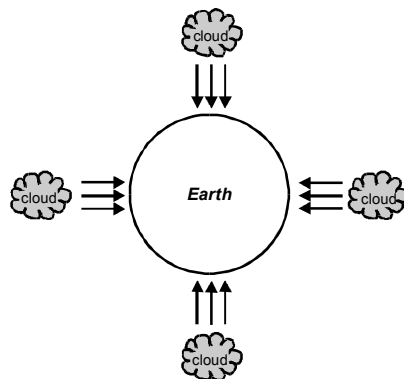
If you are unable to award two marks, award **ONE** mark for **any four** ideas correctly classified.

(c) (i) Award **ONE** mark for **four** arrows drawn from the clouds towards the centre of the Earth:

1

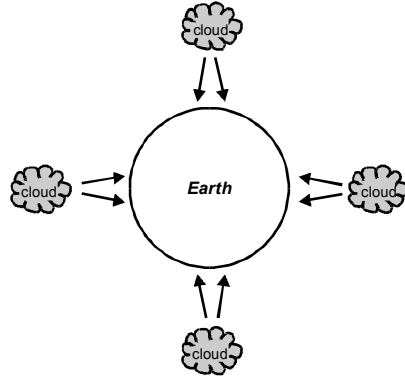


• **Allow:**

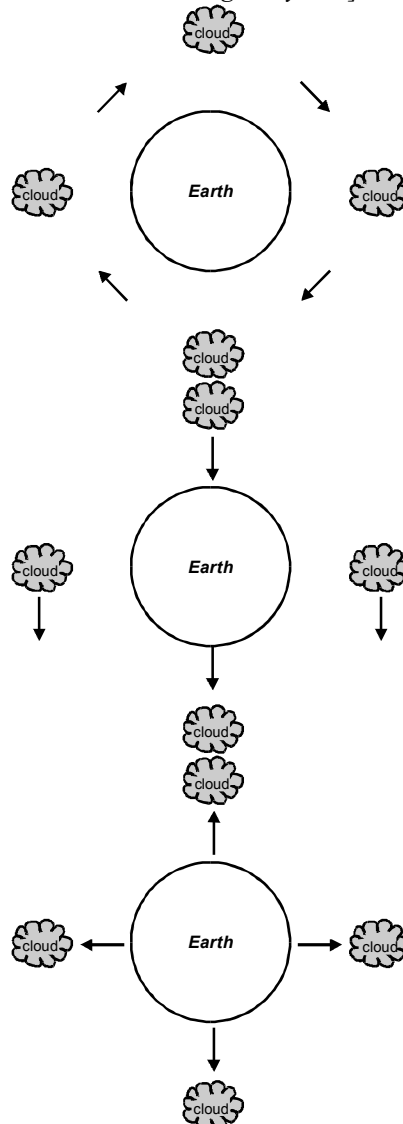


Allow:

a response in which the arrows are not drawn horizontally or vertically as long as they point from the clouds towards the Earth:



Do not give credit for a response that includes incorrect science showing any of the arrows drawn at an inappropriate angle [not the direction in which gravity acts]:



- (ii) Award **ONE** mark for an explanation that gravity acts towards (the centre of) the Earth/a large mass and/or exerts a pulling force on the rain:

1

- gravity acts towards the centre of the Earth;
- gravity acts towards the centre of the mass of a body;
- gravity pulls the rain towards the Earth;
- gravity pulls the rain down.

Allow:

- gravity pulls you to Earth;
- the rain is pulled to the ground.

Do not give credit for a response that includes incorrect science:

- gravity pushes the rain to the ground.

Do not give credit for an insufficient response that does not explain how gravity acts on the rain:

- rain falls down due to gravity;
- the rain falls to the ground; the force is called gravity;
- everything falls towards the ground (wherever you are on Earth) [no reference to a force].

[5]

7. (a) Award **ONE** mark for: 1
- an observation
- (b) Award **ONE** mark for an indication that he needed to have similar results from more than one person **or** to check that it is safe to use on humans: 1
- to check that his results could be applied to different people;
 - to see if his results applied to everyone;
 - to check his results; to see if it is safe (to give people cowpox);
 - to see if some people are allergic to it.
- Allow:**
- it might not affect some people;
 - in case it did not work on one person;
 - different people might react differently to it;
 - so there is more evidence.

Allow:

a response indicating they are checking the accuracy of the results;

- to see if his results were accurate.

***Do not** give credit for an insufficient response:*

- *to make his test fair.*

***Do not** give credit for an insufficient response indicating that people should be tested, but **not** indicating that there could be variation within a population:*

- *to see what effect it could have.*

(c) Award **ONE** mark for an understanding that these are safety precautions: 1

- so that they do not breathe in/out the micro-organism;
- so that the micro-organism does not get on to their skin;
- so they do not get the illness themselves;
- to protect them from the disease;
- so the germs do not spread (to the scientist).

Allow:

because micro-organisms can be

- harmful/dangerous;
- to stop them catching a disease;
- to be safe.

(d) Award **ONE** mark for **one** correct response indicating a positive benefit of micro-organisms: 1

- to make compost;
- to break down waste material;
- to make cheese;
- to make bread;
- to make yogurt;
- in brewing;
- to help you digest things.

Allow:

- to make medicines;
- to preserve things [like sauerkraut];
- to give yogurt/cheese flavour.

- ◆ Give credit for a correct response that goes beyond the key stage 2 programme of study:
 - some are producers in a food chain.

Do not give credit for an insufficient response, repeating information from the stem:

- to stop you getting ill;
- to help make you better when you are ill.

Do not give credit for an insufficient response:

- in food and drink [can have good and bad effects].

- (e) Award **TWO** marks for **all three** correct: 2

- A is bacterium;
- B is euglena;
- C is blue-green algae.

or

If you are unable to award two marks, award **ONE** mark for **any two** correct. 1

[6]

8. (a) Award **ONE** mark for: 1

- conductors.

Do not give credit for a response that includes incorrect science:

- thermal conductor.



- (b) Award **TWO** marks for identifying **all three** insulators: 2

- sticky tape
- plasticine
- newspaper

or

If you are unable to award two marks, award **ONE** mark for correctly identifying **any two** insulators. 1

- (c) Award **ONE** mark for: 1

•		<input type="checkbox"/>	<input type="checkbox"/>
•		<input checked="" type="checkbox"/>	<input type="checkbox"/>

- (d) Award **ONE** mark for correctly labelling **all three** symbols: 1



Allow:

- battery [in place of 'cell'].

- (e) Award **ONE** mark for an indication of an increase in voltage **or** that the bulb could be removed from the circuit: 1

- add a cell/battery;
- use a cell with a higher voltage;
- take the bulb out of the circuit;
- have two/more cells in the circuit.

Allow:

- use a stronger cell;
- put another cell in;
- recharge the battery;
- use a new cell;
- use a more powerful battery;
- make the circuit/wire shorter/smaller.

- ◆ **Give credit** for a correct response that goes beyond the key stage 2 programme of study:

- use thicker wire;
- use less wire.

***Do not** give credit for an insufficient response:*

- *use a bigger cell [does not indicate an increase in voltage];*
- *make a parallel circuit;*
- *change the position of the buzzer in the circuit;*
- *remove the bulb [does not refer to the circuit].*

[7]