



**Year 7 Science  
February Mock Exam  
Higher**

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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Time:

Marks: **62 marks**

Comments:

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**Q1.**

Two groups of pupils investigated the factors affecting the time taken for an indigestion tablet to dissolve in 100 cm<sup>3</sup> of water.



Group 1 recorded their results in the table below.

**results of group 1**

<b>tablet</b>	<b>time taken to dissolve (s)</b>
whole tablet	34
broken tablet	28
finely crushed tablet	22

(a) What factor did group 1 change as they carried out their investigation?

.....

1 mark

(b) Before the investigation, group 1 made a prediction. They found this prediction was supported by the results in the table.

What prediction did group 1 make?

.....

.....

1 mark

- (c) Group 2 investigated how the temperature of the water affects the time taken for a whole tablet to dissolve.

Here are their results.

**results of group 2**

temperature of water (°C)	time taken to dissolve (s)
65	24
40	35
15	90
5	100

What factor did group 2 change as they carried out their investigation?

.....  
.....

1 mark

- (d) What pattern do the results recorded by group 2 show?

.....  
.....

1 mark

- (e) Look at the results presented by group 1 and group 2.

Both groups used the same type of tablet.

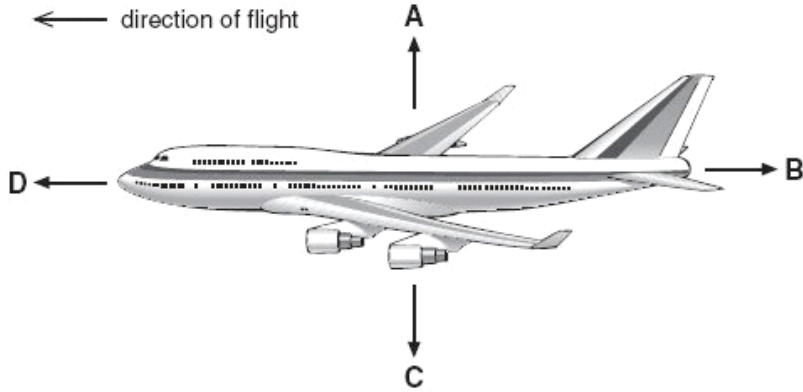
Estimate the temperature of water used by group 1.

.....°C

1 mark  
maximum 5 marks

**Q2.**

The diagram shows four forces acting on a plane in flight.



(a) Which arrow represents air resistance? Give the letter.

.....

1 mark

(b) (i) When the plane is flying at a constant height, which **two** forces must be balanced? Give the letters.

..... and .....

1 mark

(ii) When the plane is flying at a constant speed in the direction shown, which **two** forces must be balanced? Give the letters.

..... and .....

1 mark

(c) (i) Just before take-off, the plane is speeding up along the ground.

Which statement is true? **Tick the correct box.**

Force B is zero.

Force B is greater than force D.

Force D is equal to force B.

Force D is greater than force B.

1 mark

- (ii) Which statement is true about the plane just as it leaves the ground?  
Tick the correct box.

Force C is zero.

Force C is greater than force A.

Force A is equal to force C.

Force A is greater than force C.

1 mark  
maximum 5 marks

### Q3.

This question is about four chemical elements.

- (a) The melting points and boiling points of the four elements are shown in the table. Complete the table to give the physical state, **solid**, **liquid** or **gas**, of each element at room temperature, 21°C.

element	melting point in °C	boiling point in °C	physical state at room temperature, 21°C
bromine	-7	59	
chlorine	-101	-34	
fluorine	-220	-188	
iodine	114	184	

4 marks

- (b) Bromine can be a solid, a liquid or a gas depending on the temperature. In which physical state will 10 g of bromine store the most thermal energy?

.....

1 mark

(c) Is bromine a **solid**, a **liquid** or a **gas** when the arrangement of particles is:

(i) far apart and random? .....

1 mark

(ii) close together but random? .....

1 mark

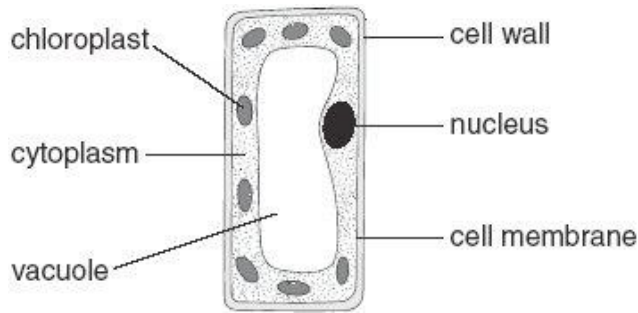
(iii) close together in a regular pattern? .....

1 mark

Maximum 8 marks

**Q4.**

The diagram below shows a plant cell.



(a) In which part of a plant would you find this type of cell?

.....

1 mark

(b) (i) Give the function of the nucleus.

.....  
.....

1 mark

(ii) Give the function of the chloroplasts.

.....  
.....

1 mark

(iii) Give the function of the cell wall.

.....  
.....

1 mark

(c) Give the names of **two** labelled parts that are **not** present in animal cells.

1. ....

2. ....

2 marks

maximum 6 marks

**Q5.**

Hydrochloric acid is a strong acid.

(a) Winston used universal indicator solution to find the pH of some hydrochloric acid.

(i) Suggest the **colour** of the mixture of universal indicator solution and the hydrochloric acid.

.....

1 mark

(ii) Suggest the **pH** of the hydrochloric acid.

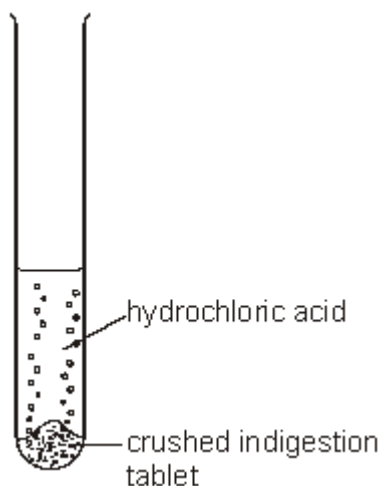
.....

1 mark

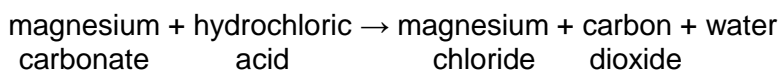
(b) Indigestion can be caused when too much hydrochloric acid is produced in the stomach.

Magnesium carbonate can be used to treat indigestion.

Winston crushed some indigestion tablets containing magnesium carbonate. He added them to hydrochloric acid in a test-tube. The mixture fizzed.



The word equation for the reaction is shown below.



(i) Use the word equation to explain why the mixture fizzed when the reaction took place.

.....  
.....

1 mark

(ii) Winston continued to add crushed tablets to the acid until the mixture stopped fizzing.  
Why did the fizzing stop?

.....  
.....

1 mark

- (c) When magnesium carbonate reacts with hydrochloric acid, magnesium chloride is formed.

Which **two** words describe magnesium chloride?  
Tick the **two** correct boxes.

a compound	<input type="checkbox"/>	a mixture	<input type="checkbox"/>
an element	<input type="checkbox"/>	a salt	<input type="checkbox"/>
a metal	<input type="checkbox"/>	a solvent	<input type="checkbox"/>

2 marks

- (d) It is important that the hydrochloric acid in the stomach is **not** completely neutralised by indigestion tablets.

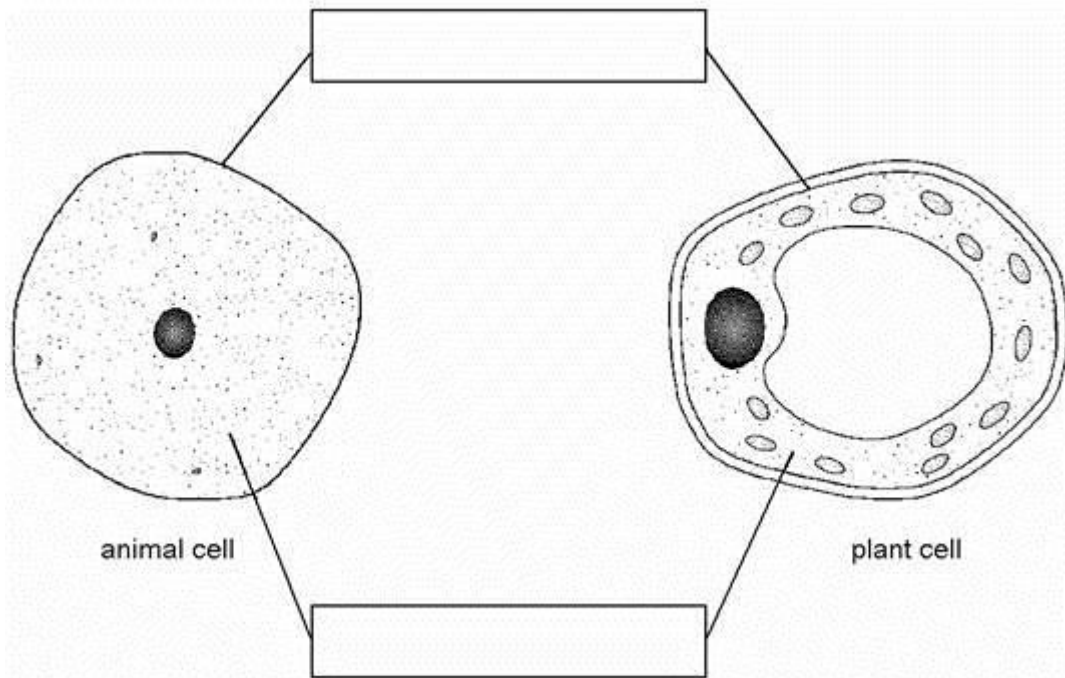
Why is hydrochloric acid needed in the stomach?

.....  
.....

1 mark  
maximum 7 marks

### Q6.

- (a) The diagrams below show an animal cell and a plant cell.



- (i) The lines from the boxes show the positions of two of the parts that are present in both cells.  
In the boxes, write the names of these **two** parts.

2 marks



(ii) Give the names of **two** parts which are present in plant cells **and** in animal cells.

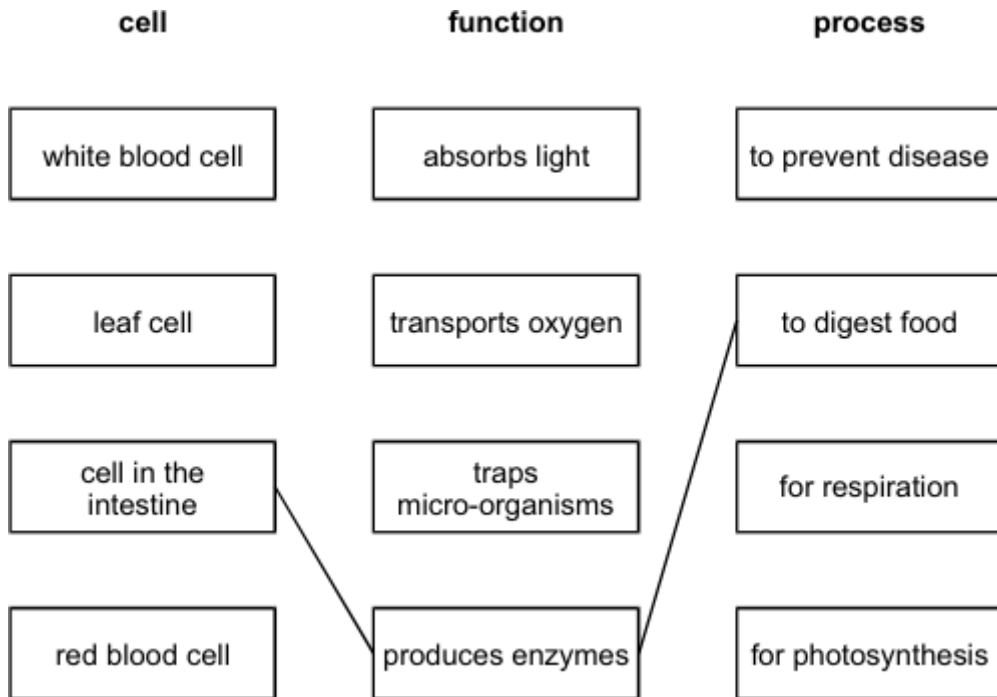
1. ....

2. ....

2 marks

(b) Organs can carry out their functions because of the special cells they have.

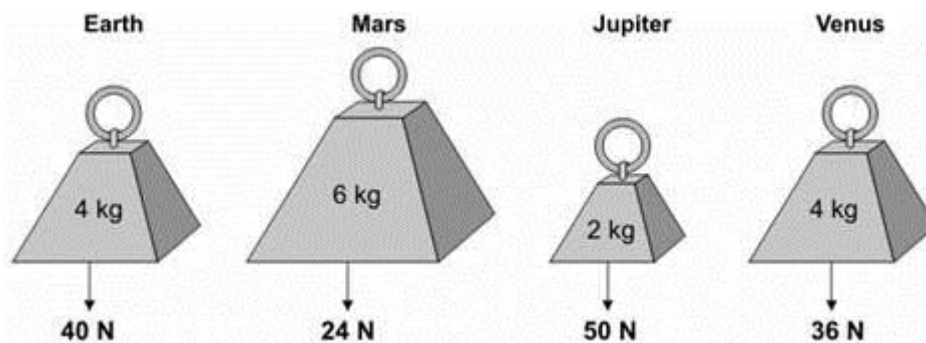
Draw a straight line from the name of each type of cell to the function of the cell and then to the process it carries out. One has been done for you.



3 marks  
Maximum 7 marks

**Q7.**

The drawings show the mass and weight of four objects on different planets.



(a) On which of the four planets is the object with the largest mass?

.....

1 mark

- (b) How can you tell, from the drawings, that gravity is greater on Earth than on Venus?

.....  
 .....

1 mark

- (c) Gravity is less on the Moon than on the Earth.

Complete the sentences below to compare the weight and mass of an astronaut on the Moon and on the Earth.

The **weight** of an astronaut on the Moon is ..... the **weight** of an astronaut on the Earth.

1 mark

The **mass** of an astronaut on the Moon is ..... the **mass** of the astronaut on the Earth.

1 mark

- (d) The table below gives information about five planets.

planet	distance from the Sun (million km)	time for planet to orbit the Sun (Earth-years)
Venus	110	0.6
Earth	150	1.0
Mars	230	
Jupiter	780	12.0
Saturn	1400	30.0

- (i) Look at the information in the table.

How does the time for a planet to orbit the Sun change with its distance from the Sun?

.....  
 .....

1 mark

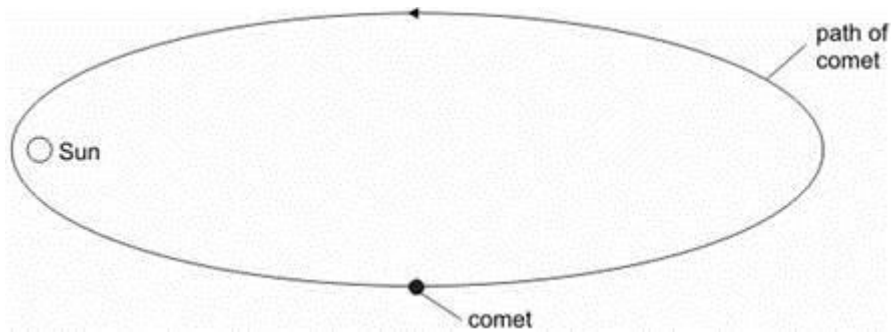
- (ii) Use information in the table to estimate the time for Mars to orbit the Sun.

..... Earth-years

1 mark

- (e) The diagram below shows the path of a comet around the Sun.

**On the path of the comet below**, place a letter X to show the position where the comet is travelling the fastest.

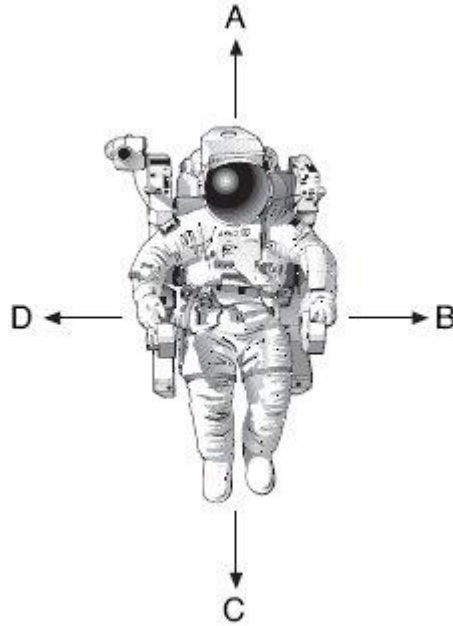


*not to scale*

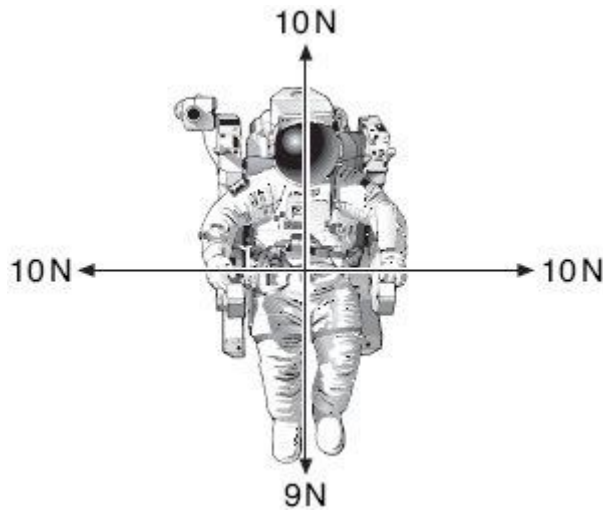
1 mark  
maximum 7 marks

**Q8.**

The drawing below shows an astronaut in space. He has four small jets attached to his space suit. These jets produce forces on the **astronaut** in the directions A, B, C and D.



- (a) The drawing below shows the size and direction of four forces acting on the astronaut.



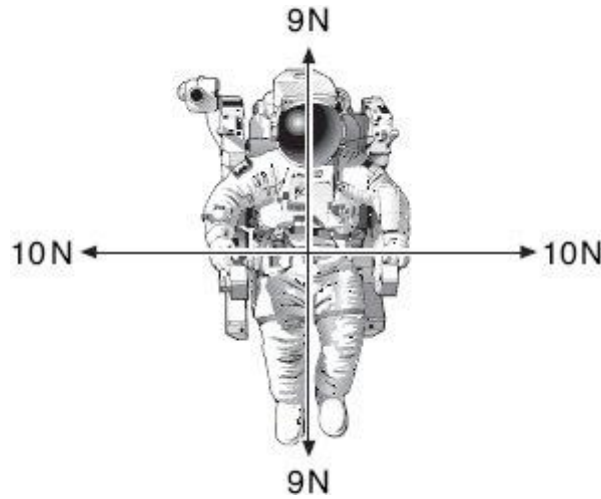
In which direction, A, B, C or D, will the astronaut move?

Give the letter.

.....

1 mark

- (b) The drawing below shows the size and direction of four different forces acting on the astronaut.



What will happen to the astronaut when the jets produce these four forces?

.....

1 mark

Explain your answer.

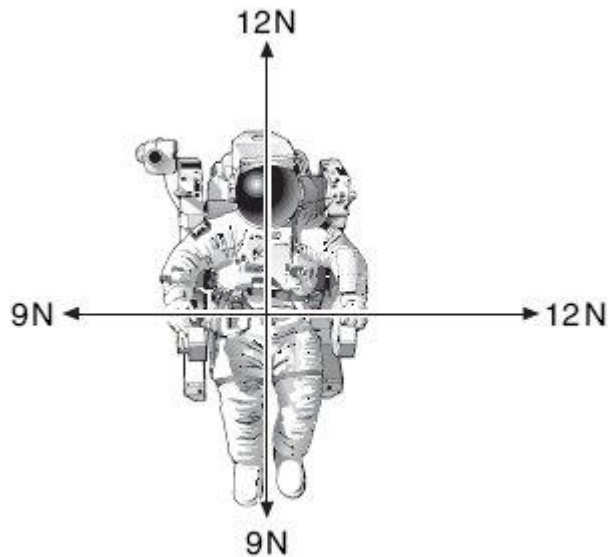
.....

.....

1 mark

- (c) The drawing below shows the size and direction of four different forces acting on the astronaut.

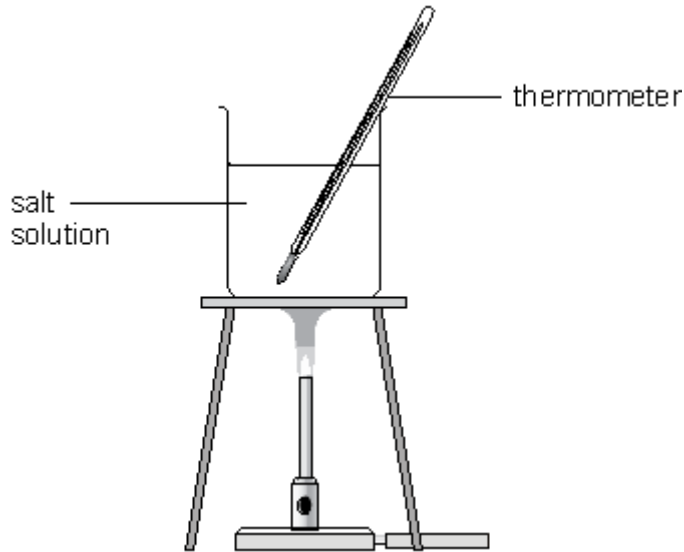
Draw an arrow on the diagram below to show the direction in which he will move.



1 mark  
maximum 4 marks

**Q9.**

Neera and Tom dissolved different masses of salt in 500 cm<sup>3</sup> of water. They measured the temperature at which each salt solution boiled.



(a) They wrote down the variables that might affect the investigation.

temperature of the laboratory	mass of salt dissolved in water	starting temperature of the water
boiling point of salt solution	volume of water	type of salt used

(i) What is the independent variable (the variable they changed) in their investigation?

.....

1 mark

(ii) What is the dependent variable (the variable they measured) in their investigation?

.....

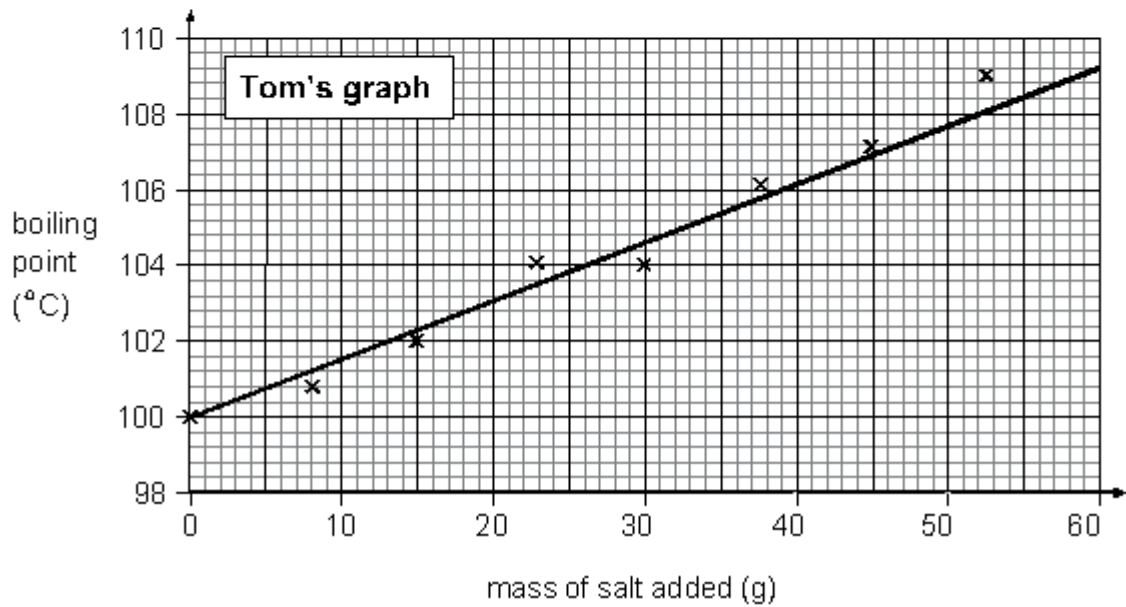
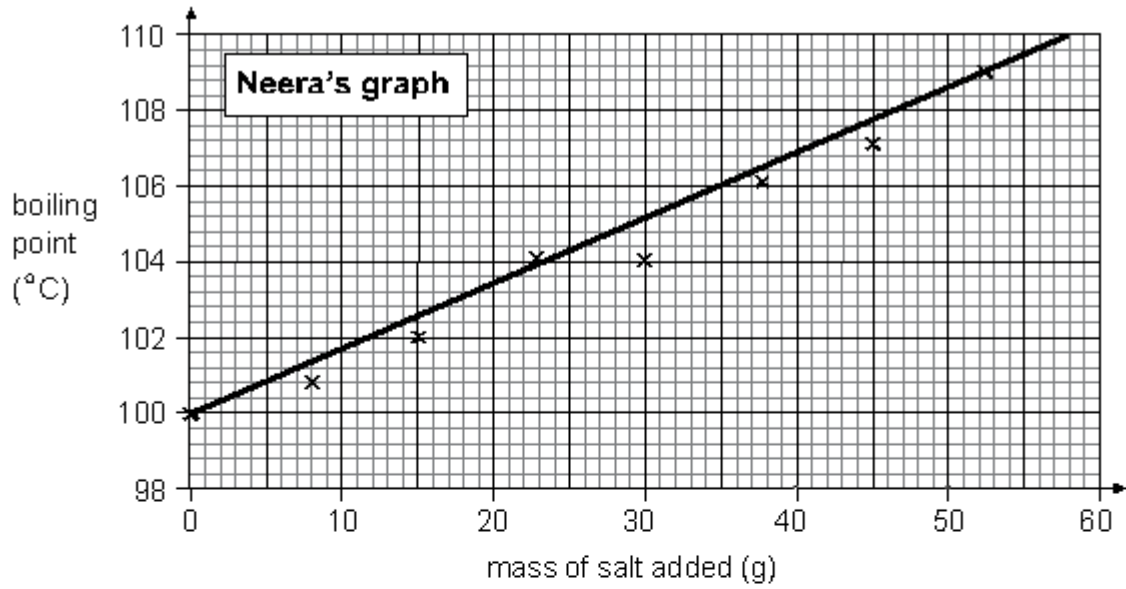
1 mark

(iii) Which variable above would affect the experiment the least?

.....

1 mark

(b) Neera and Tom plotted their results and drew the graphs shown below.



(i) How can you tell from the graphs that Neera and Tom started with pure water?

.....  
 .....

1 mark

(ii) Why is Tom's line of best fit better than Neera's line of best fit?

.....  
 .....

1 mark  
 maximum 5 marks

**Q10.**

Solder is a mixture of lead and tin.

The melting point of solder depends on the amount of tin in the mixture.

(a) Look at the table below.

amount of tin in solder (%)	melting point of solder (°C)
0	327
30	255
40	235
50	212
60	188
70	192
80	205
90	220
100	232

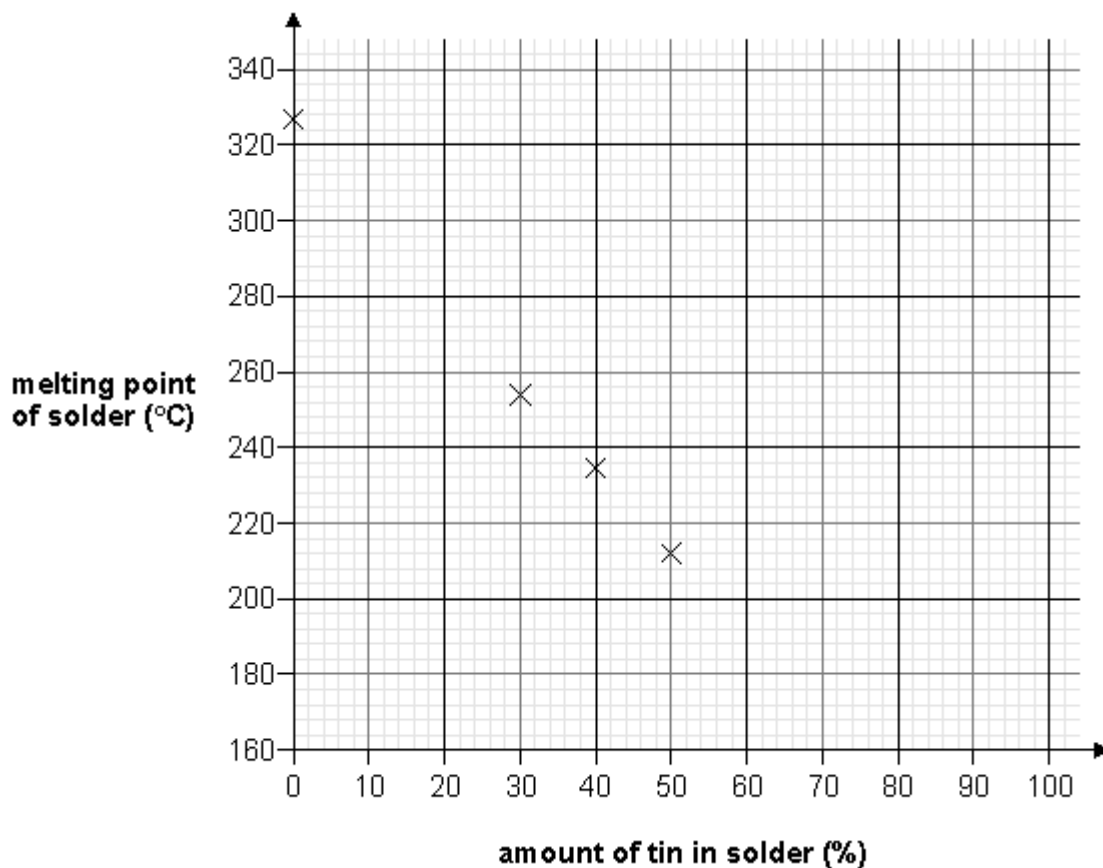
- (i) The melting point of pure tin is 232°C.  
What is the melting point of pure lead?

..... °C

1 mark

- (ii) Use the data in the table to plot the points on the grid below.  
Four of the points are plotted for you.

Draw an appropriate line of best fit.



3 marks



- (b) Use your graph to estimate the amount of tin needed to make solder with the **lowest** melting point.

..... %

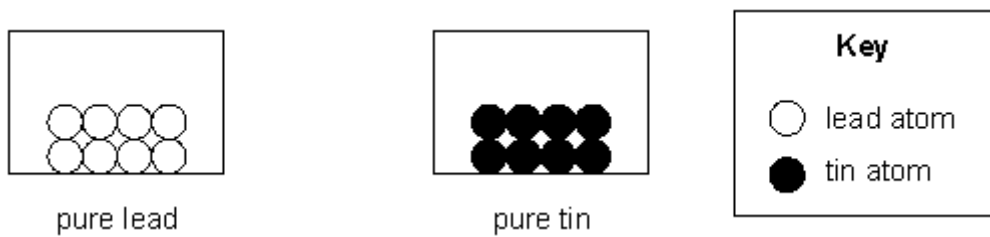
1 mark

- (c) Describe how the melting point of solder changes with the amount of tin in the solder.

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

2 marks

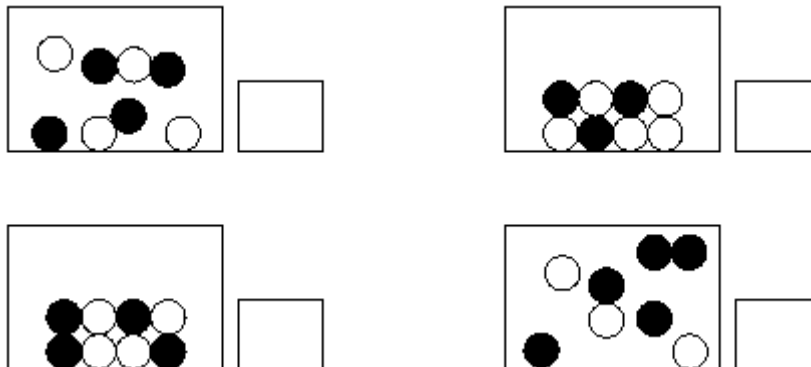
- (d) The diagrams below show the arrangement of atoms in solid samples of pure lead and pure tin.



Which box shows the correct arrangement of the lead atoms and tin atoms in a sample of solder that has a melting point of 212°C at room temperature?

Use the table above.

Tick the correct box.



1 mark  
 maximum 8 marks

## Mark schemes

### Q1.

(a) any **one** from

- size of pieces of tablet  
*accept 'size of tablet'*  
*accept 'whether the tablet is whole **or** crushed'*
- surface area of the tablet  
*accept 'form of the tablet'*  
*accept 'particle size'*  
*accept 'mass of each piece'*  
*accept 'number of pieces'*  
*do **not** accept 'mass of tablet'*

1 (L5)

(b) any **one** from

- crushed tablets will dissolve more quickly than whole tablets
- a whole tablet will take longer to dissolve  
*accept 'the finer the tablet the quicker it dissolves'*  
*accept 'the smaller the pieces the faster it dissolves'*
- the bigger the surface **or** area the faster it dissolves  
**answers must include a comparison**  
*award a mark for an answer in the past tense*  
*if a comparison is included*

1 (L5)

(c) temperature of the water

*accept 'temperature'*

1 (L5)

(d) any **one** from

- the higher the temperature the quicker the tablet dissolves
- the lower the temperature the longer it takes to dissolve  
**answers must include a comparison**  
*'at the lowest temperature it takes a long time to dissolve'*  
*is insufficient*  
*'at the highest temperature it dissolves quickly' is insufficient*

1 (L5)

(e) 40

*accept a temperature from 38 to 44*

1 (L6)

[5]

**Q2.**

- (a) B 1 (L5)
- (b) (i) A and C  
*accept 'lift and weight'*  
*answers may be in either order*  
**both** letters are required for the mark 1 (L5)
- (ii) D and B  
*accept A and C*  
*answers may be in either order*  
**both** letters are required for the mark 1 (L5)
- (c) (i) • Force D is greater than force B. ✓  
*if more than one box is ticked, award no mark* 1 (L6)
- (ii) • Force A is greater than force C. ✓  
*if more than one box is ticked, award no mark* 1 (L6)

**[5]****Q3.**

- (a)
- |          |        |
|----------|--------|
| bromine  | liquid |
| chlorine | gas    |
| fluoride | gas    |
| iodine   | solid  |
- 4 (L6)
- (b) gas 1 (L6)
- (c) (i) gas 1 (L6)
- (ii) liquid 1 (L6)
- (iii) solid 1 (L6)

**[8]****Q4.**

- (a) • leaf  
*accept 'stem' or 'stalk'* 1 (L5)

- (b) (i) • it controls the cell **or** cell's activities  
*accept 'it tells the cell what to do'*  
*'it is the brain of the cell' is insufficient*  
*accept 'it contains **or** passes on (genetic) information **or** genes **or** DNA'* 1 (L5)

- (ii) any **one** from
- absorbs light **or** Sun's energy  
*accept 'traps **or** catches light'*  
*do **not** accept 'it attracts light'*
  - photosynthesis  
*accept 'it makes food **or** glucose **or** sugar **or** starch **or** carbohydrate'*  
*'it produces oxygen' is insufficient* 1 (L6)

- (iii) any **one** from
- gives the cell its shape  
*'it protects the cell' is insufficient*
  - supports the cell 1 (L6)

- (c) any **two** from
- cell wall  
*accept 'wall'*
  - vacuole
  - chloroplast 2 (L6)

- (d) •

<i>photosynthesis</i>	<i>respiration</i>
	✓
✓	
	✓
✓	

*if **all four** answers are correct, award two marks*  
*if **two or three** answers are correct, award one mark*  
*if more than one box is ticked in any row, do not credit that row*

2 (L6)

[8]

**Q5.**

- (a) (i) red **or** pink  
*accept 'orange' or 'yellow'* 1 (L5)
- (ii) any number greater than 0 and smaller than 7  
*accept '0'* 1 (L6)
- (b) (i) carbon dioxide is gas  
*accept 'carbon dioxide or a gas is produced'* 1 (L5)
- (ii) any **one** from
- no more carbon dioxide **or** gas was produced
  - the reaction stopped
  - all the hydrochloric acid was used up  
*accept 'the acid had been neutralised'*  
*do not accept 'all the magnesium carbonate was used up'*
  - there was an excess of magnesium carbonate **or** carbonate 1 (L6)
- (c) a compound ✓ 1 (L6)
- a salt ✓  
*if more than two boxes are ticked, deduct one mark for each incorrect tick*  
*minimum mark zero* 1 (L6)
- (d) any **one** from
- without it digestion would stop **or** slow down  
*accept 'to break down food'*
  - acid is needed for digestion
  - the enzymes only work in acid conditions **or** at a low pH
  - it is needed to kill bacteria **or** microbes  
*do not accept 'germs'* 1 (L6)

[7]

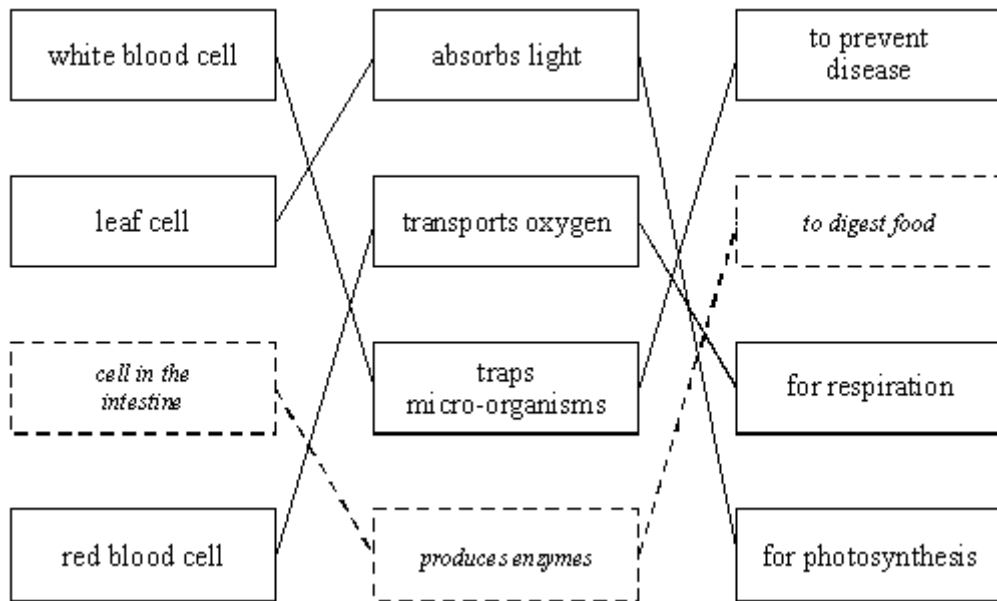
**Q6.**

- (a) (i) cell membrane  
*accept 'membrane'* 1 (L6)
- cytoplasm

- (ii) any **two** from
- cell membrane
  - Nucleus
  - Cytoplasm
  - mitochondria

2 (L6)

(b)



*if more than one line is drawn from any cell or function, award no mark for those linkages*

3 (L6)

[7]

**Q7.**

(a) Mars

*accept '6 kg'  
do not accept '24 N'*

1 (L5)

(b) any **one** from

- 4 kg weighs more on Earth  
*accept the converse  
'different weights' is insufficient*
- the weight of the object is greater on Earth  
*accept the converse  
accept 'Earth is 40 N and Venus is 36 N'  
accept 'Earth is 40 and Venus is 36'*

accept 'more newtons on Earth' **or** 'less newtons on Venus'  
accept 'there is a greater force on Earth'  
do **not** accept 'it has more mass on the Earth'

1 (L5)

(c)

answers must be in the correct order

- less (than) **or** smaller (than) **or** lower (than)

1 (L6)

- the same (as) **or** equal (to)

1 (L6)

(d) (i)

- the greater the distance

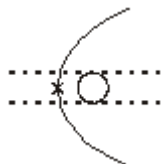
accept 'it increases' the greater the time for one orbit

1 (L5)

- (ii) • an answer from 1.6 to 6 inclusive

1 (L6)

(e)



award a mark for X marked on the orbit within the tolerances shown

1 (L6)

[7]

### Q8.

(a) A

1 (L5)

(b) any **one** from

- he will remain stationary  
accept 'he floats'
- he will continue moving at a constant speed  
accept 'nothing'

1 (L6)

any **one** from

- there is no net force
- the pairs of forces are equal  
accept 'all the forces cancel out'  
accept 'they cancel each other out'  
accept 'the forces are balanced'  
'the forces are equal' is insufficient

1 (L6)

(c) 

accept any arrow drawn going up and to the right

1 (L6)

[4]

**Q9.**

- (a) (i) • mass of salt dissolved in water  
accept *'the mass or amount of salt'*  
*'salt' is insufficient*  
do **not** accept *'the type of salt used'*

1 (L7)

- (ii) • boiling point of salt solution  
accept *'boiling point'*

1 (L7)

- (iii) any **one** from
- starting temperature of the water
  - temperature of the laboratory  
*'temperature' is insufficient*

1 (L7)

- (b) (i) • the boiling point with no salt **or** at the start was 100°C  
accept *'the water's boiling point was 100°C'*  
accept *'the boiling point of water is 100°C'*  
accept *'it boiled at 100°C'*  
**answers must refer to the boiling point**  
*'0 g of salt added' is insufficient*  
*'the graph starts at 100°C' is insufficient*

1 (L7)

- (ii) any **one** from
- there is only one point above the line in Neera's graph  
accept *'most points are below the line in Neera's graph'*
  - there should be a similar number of points above and below the line  
accept *'Tom's goes near more points'*  
or *'Tom's points are nearer to the line'*  
accept *'Neera just joined the first and last points'*

1 (L7)

[5]

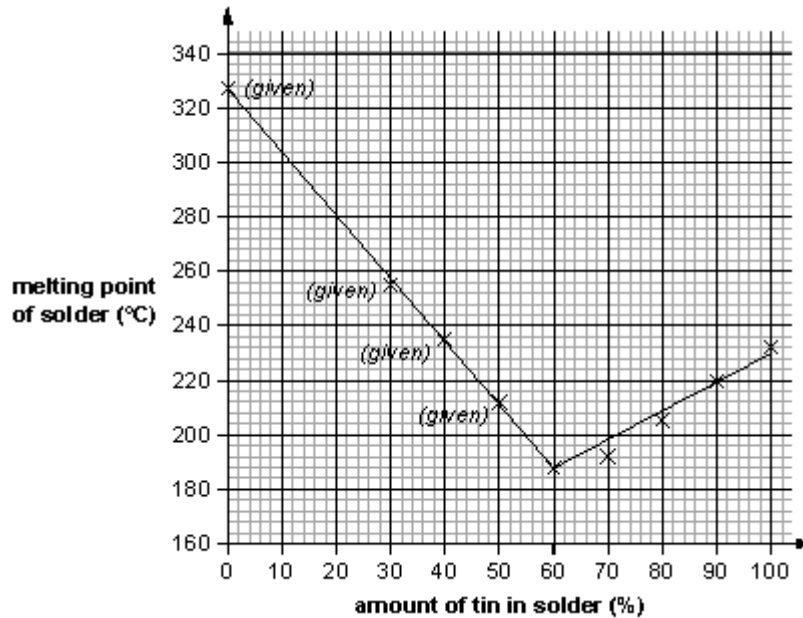
**Q10.**

- (a) (i) • 327 °C

1 (L6)

- (ii) •





for **all five** points correctly plotted, award two marks  
 for **any three or four** points correctly plotted, award one mark  
 for any **one or two** points correctly plotted, award no marks  
 accept a tolerance of  $\pm\frac{1}{2}$  small square

2 (L7)

- two straight lines of best fit which meet  
 accept a curve of best fit for plotted points

1 (L7)

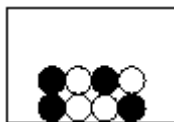
- (b) • any number from 60–66 inclusive  
 accept a number consistent with the drawn line of best fit  $\pm 1$  square

1 (L7)

- (c) • with more tin, the melting point goes down and then increases  
 accept 'it goes down and up'
- (minimum) at 60–66% tin or 180–189°C  
 accept a number consistent with the drawn line  $\pm 1$  square

2 (L7)

- (d) •



if more than one box is ticked, award no mark

1 (L7)

[8]

## Examiner reports

### Q1.

Most pupils at Level 5 and above correctly identified the factor changed in part (a). Of these, the majority referred to the size or form of the tablet, with few mentioning the surface area.

In part (b) few pupils at Levels 3 and 4 but over 75% at Level 5 and nearly all at Levels 6 and 7 correctly suggested the prediction made.

In part (c) few pupils at Level 3, about half at Level 4 and almost all at Levels 5, 6 and 7 correctly identified that temperature was the factor changed in the second investigation.

Almost all pupils at Levels 6 and 7, about 80% at Level 5 but few at Levels 3 and 4 correctly identified the pattern shown in the table of results in part (d).

In Part (e) the majority of pupils at Level 5 and above but few at Levels 3 and 4 were able to compare the two tables of results and estimate the temperature used in investigation 1. More pupils gave an answer that was above the correct range of temperatures than gave an answer that was below the correct range.

### Q2.

In part (a) about 80% of pupils at level 7 correctly identified *B* as the force representing air resistance. The upwards vertical force (*A*) was the most common incorrect answer selected, with very few pupils selecting the downwards vertical force (*C*).

Most pupils at level 5 and above correctly identified the two balanced forces in part (bi) with only a minority choosing *B* and *D* or another incorrect combination.

Part (bii) proved to be the easiest part of the question with most pupils, even at level 4, correctly identifying one of two pairs of balanced forces, the vast majority choosing *B* and *D*.

In part (ci) about 60% of all pupils gained the mark, the most common error was to select *Force B is greater than force D* – the converse of the correct answer.

In part (cii) about 60% of all pupils gained the mark, the most common error was to select *Force C is greater than force A* – again the converse of the correct answer.

### Facility values

	Tier 3-6				Tier5-7		
	L3	L4	L5	L6	L5	L6	L7
a	.15	.17	.32	.47	.37	.60	.79
bi	.37	.50	.75	.96	.85	.95	.98
bii	.51	.64	.82	.91	.90	.95	.98
ci	.16	.28	.50	.72	.63	.80	.94

cii	.19	.20	.46	.72	.62	.78	.93
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### Q3.

A substantial majority of pupils entered for tier 3-6, and almost all pupils entered for tier 5-7, were able to link the arrangements of particles to the correct states of matter.

Pupils in both tiers had difficulty determining states of matter from information about boiling and freezing points. Fewer than 30% of pupils entered for tier 3-6 were able to do this correctly. Although performance was better in tier 5-7, few pupils were able to identify correctly the physical state of all four halogens from the information given. Part (b) of this question, linking stored energy to states of matter, was a demanding question which few pupils answered correctly.

### Q5.

**Sc2/Sc3 7 marks Facility: 0.38 (Tier 3-6) / 0.66 (Tier 5-7)**

Part (ai) discriminated well at all levels. Around 8% overall, mostly at Levels 4 and 5, incorrectly gave purple as the colour that hydrochloric acid would turn universal indicator.

At lower levels fewer pupils were able to identify the pH of an acidic solution in part (a ii) than gave the correct colour of such a solution in the previous part. About a quarter of Level 4 and 5 pupils gave a pH of 8 or above.

The facility at the target level was slightly low in part (bi), with many pupils not linking the production of carbon dioxide with fizzing. At Levels 5 and 6 pupils taking the Tier 3-6 paper had significantly greater success than those taking the Tier 5-7 paper.

The variety of possible answers for part (bii) allowed many of those who attempted the question to gain a mark. The most common answer was to say that the acid was neutralised. Over 30% of pupils on both tiers gave other incorrect answers that included answers that did not make it explicit that no more carbon dioxide was produced.

Only at Level 7 were the majority of pupils able to gain both marks for part (c). Although 59% overall knew that magnesium chloride is a compound, less than a third knew that it is a salt. It was more common, particularly at Levels 4 and 5 for *mixture* to be ticked.

Part (d) discriminated well at all levels. Most answers referred to digestion or the breaking down of food. Pupils below Level 5 did not generally know why the conditions in the stomach are acidic.

*Facilities by tier and level achieved*

Item	3-6				5-7		
	3	4	5	6	5	6	7
ai	.13	.32	.63	.80	.63	.91	.98
a ii	.06	.23	.53	.69	.54	.81	.95
bi	.02	.07	.22	.42	.18	.46	.71
bii	.03	.19	.42	.61	.43	.65	.75

c1	.19	.32	.50	.73	.51	.71	.91
c2	.06	.06	.09	.25	.18	.45	.79
d	.08	.26	.59	.78	.64	.80	.93

**Q6.**

Part (ai) required pupils to label parts of the cell present in both animal and plant cells. The majority of pupils in the lower tier, and just under half those in the upper tier, did not name the cytoplasm or cell membrane. In part (a(ii)) fewer than a quarter of the pupils achieving levels 3, 4 and 5 were able to name two parts present in plant cells but not in animal cells. Pupils attaining level 5 and above performed well in part (b) in linking types of cell to their functions and to the they processes carry out.

**Facility values**

Part	Tier 3 – 6		Tier 5 – 7	
	Omit (%)	Facility	Omit (%)	Facility
(a)(i) 1	25	0.32	7	0.52
2	35	0.18	12	0.55
(a)(ii)1	40	0.33	10	0.74
2	53	0.21	20	0.58
(b) 1	8	0.65	0	0.94
2	8	0.77	0	0.99
3	7	0.66	0	0.94

*By level*

Part	Tier 3 – 6				Tier 5 – 7		
	3	4	5	6	5	6	7
(a)(i) 1	.17	.27	.41	.58	.23	.57	.86
2	.03	.07	.25	.41	.21	.62	.88
(a)(ii)	.04	.32	.72	1.18	.62	1.47	1.89
(b)(i)	.25	.57	.86	.95	.89	.98	1.00
(b)(ii)	.36	.76	.95	.97	.94	1.00	1.00
(b)(iii)	.22	.57	.87	.96	.91	.99	1.00

**Q7.**

In part (a), level 7 was the only level where more than half of pupils were awarded the mark. At levels 5 and 6, pupils gave the correct answer *Mars* and the incorrect answer *Jupiter* in equal numbers, with a few giving *Earth*.

For part (b), the majority of pupils who were awarded the mark gave an answer relating to *more newtons on Earth*, although at level 7 a similar number gave the answer *the weight is more on Earth*. The most common incorrect answer was to state that there was more mass on Earth. It appears that a significant number of pupils below level 7 did not gain the mark as a result of confusing mass and weight.

In part (c) the majority of pupils at level 5 and above correctly stated that the weight would be less on the Moon compared to the Earth; relatively few pupils at levels 5 and 6 stated that mass on the Moon would be the same as that on Earth, with many stating that the mass would also be less on the Moon, and about a third of pupils at level 5 suggested that the mass would be greater on the Moon than on the Earth.

All pupils at level 7 stated the correct relationship between the orbit time of planets and their distance from the Sun in part (di). This number fell to about 90% at level 6 and about 70% at level 5.

To gain the mark in part (dii) pupils needed to give a numerical answer between 1.6 and 6 (inclusive). This was answered correctly by more than half of pupils at levels 5, 6 and 7; the most common error was to give a number less than 1.6.

Part (e) proved the most difficult for most pupils with only pupils at level 7 showing a good understanding of how the speed of a comet changes as it orbits the Sun. A significant number of pupils did not mark the position on the orbit line and so did not gain the mark even if the point identified was closest to the Sun as required. Another common error was to mark the position on the orbit *furthest* from the Sun, with a few pupils at all levels putting their mark on either the arrow, or the comet itself.

**Facility values**

	Tier 3-6				Tier 5-7		
	L3	L4	L5	L6	L5	L6	L7
a	.37	.43	.46	.48	.42	.43	.66
b	.16	.37	.62	.65	.56	.63	.71
c1	.07	.35	.69	.77	.67	.68	.83
c2	.00	.02	.10	.32	.12	.35	.71
di	.03	.22	.66	.85	.80	.90	.97
dii	.14	.36	.51	.66	.58	.58	.61
e	.00	.04	.19	.41	.19	.40	.54

**Q8.**

In part (a) the majority of pupils at Level 5 and above correctly identified *A* as the direction

in which the astronaut would move. At all levels, the majority of pupils answering incorrectly gave the answer C.

Part (b) was answered well by most pupils at Level 5 and above, who recognised that the astronaut would not move. Most pupils who gave the correct explanation said *the pairs of forces are equal*. Few pupils said *there is no net force*.

Part (c) proved to be only a little more difficult than part (a), with the majority of pupils at Levels 6 and 7 being able to correctly draw an arrow pointing up and to the right. The most common error from pupils at all levels was to draw an arrow pointing down and to the left.