OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE
ADDITIONAL SCIENCE B

B623/01

Unit 1 Modules B3 C3 P3 (Foundation Tier)

11LMP01038

Candidates answer on the question paper.
A calculator may be used for this paper.

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Wednesday 19 January 2011
Morning

Duration: 1 hour

B623 01

Candidate forename		Candidate surname	

Centre number						Candidate number				

MODIFIED LANGUAGE

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. Pencil may be used for graphs and diagrams only.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

Answer **all** the questions.

Section A – Module B3

1 Read this newspaper article carefully.

Scientists clone a frozen mouse

Scientists have produced clones of a mouse that has been dead and frozen for 16 years.

This comes 11 years after the first living adult mammal was cloned.

Scientists thought it was impossible to clone dead, frozen animals because of cell damage. Genetic material is destroyed when ice crystals form inside cells.

The scientists used genetic material from brain cells because the high fat content protected the cells from ice damage.

This work may be used on humans in the future. This would raise many ethical issues.

(a) Ice crystals often destroy the genetic material (genes) in cells.

(i) Which part of the cell contains the genetic material?

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

(ii) What chemical is the genetic material made of?

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

(b) Write down the name of the first mammal that was cloned from an adult.

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

(c) The article claims that there are possible ethical issues if this cloning technique were to be used on humans.

One of these statements does **not** contain an ethical issue.

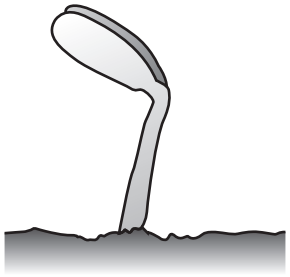
Put a tick (✓) in the box next to this statement.

In the future, humans could be frozen after death and cloned.	☐
The technique took years to develop.	☐
Many of the embryos produced by this technique die because they are abnormal.	☐
Children produced by cloning may be expected to develop certain skills.	☐

[1]

[Total: 4]

2 The diagram shows a soya plant growing out of the soil.



(a) The shoots and roots of the soya plant grow in different directions.

Finish these sentences to explain the direction of their growth.

The shoots grow upwards in response to .....

The roots grow downwards in response to ..... **[2]**

(b) Plant hormones control the growth of the soya plant.

(i) Write down the name of **one** of these plant hormones.

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

(ii) Plant hormones control other features.

Put a tick (✓) in the box next to the feature controlled by plant hormones.

the colour of the flowers	☐
the type of seed made	☐
when the plant produces flowers	☐

[1]

(c) To grow, soya plants need to make new cells.

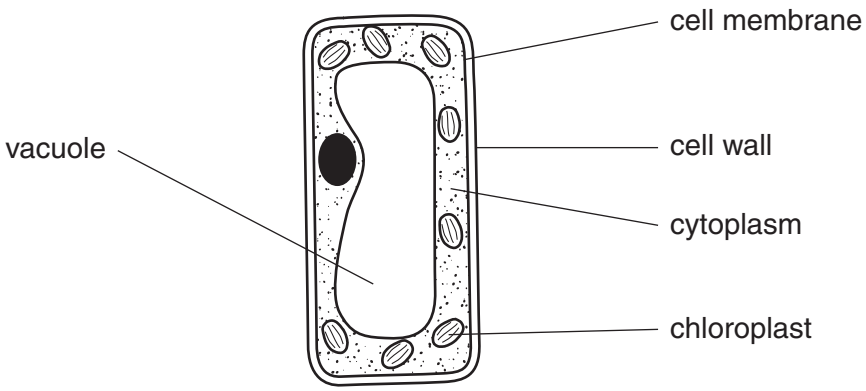
Write down **two other** reasons why a plant needs to make new cells.

.....

.....

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

(d) The diagram shows a cell from the leaf of a soya plant.



Which **two** labelled parts of the plant cell help to support the plant?

..... and ..... **[2]**

(e) Scientists have produced soya plants that are resistant to herbicides (weed killers).

They have done this by genetic engineering.

What is meant by **genetic engineering**?

.....

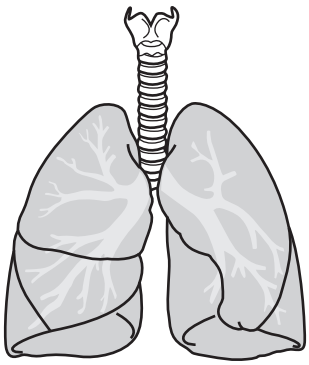
..... **[1]**

[Total: 9]

3 The diagram shows human lungs.

Air passes down the windpipe to lots of small air sacs.

The air sacs allow gases to pass into and out of the blood.



(a) What is the name of the small air sacs in the lungs?

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

(b) Put ticks (✓) next to the **two** statements that describe where oxygen enters and leaves the blood.

Oxygen enters the blood in the lungs.	☐
Oxygen enters the blood in body tissues.	☐
Oxygen leaves the blood in body tissues.	☐
Oxygen leaves the blood in the lungs.	☐

[1]

(c) It is difficult for Julie to get air into her lungs.

This is because her windpipe is damaged.

Doctors repair her windpipe using stem cells.

Suggest why they use stem cells.

.....

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

[Total: 3]

4 The table shows some information about the three main types of blood vessel in the body.

type of blood vessel	diameter in mm	average thickness of wall in mm	percentage of the body's blood contained in the vessel
arteries	4 – 25	1	
	0.01	0.001	5
veins	5 – 30	0.5	60

(a) The name of one of the three types of blood vessel is missing from the table.

Write down the name of this type of blood vessel.

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

(b) Which type of blood vessel contains blood at the highest pressure?

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

(c) The heart contains 12% of the body's blood.

Calculate the percentage of the body's blood contained in the arteries.

.....

.....

answer ..... % **[1]**

(d) The heart pumps blood into two arteries.

One of these is the pulmonary artery.

Write down the name of the **other** artery.

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

[Total: 4]

Section B - Module C3

5 This question is about the elements in the Periodic Table.

Look at the list of elements.

aluminium	**bromine**
chlorine	**fluorine**
gold	**helium**
hydrogen	**iron**
oxygen	**phosphorus**
sulfur	**zinc**

Answer the questions.

Choose your answers from the list.

Each element can be used **once**, **more than once** or **not at all**.

The Periodic Table on the back page may help you.

(a) Which element has an **atomic number** of 16?

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

(b) Which element relights a glowing splint?

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

(c) Which element burns with a squeaky pop when ignited with a burning splint?

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

(d) Which **metal** element is usually extracted from its mineral using electrolysis?

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

(e) Which element is a green gas at room temperature?

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

(f) Which element is an orange liquid at room temperature?

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

[Total: 6]

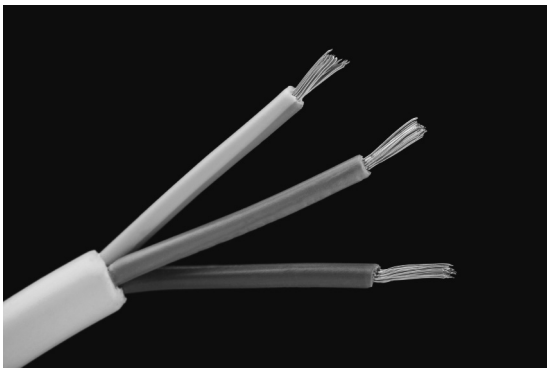
6 Iron and copper are typical metals.

(a) Iron is used to make steel for bridges.

Write down one **other** use for iron.

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

(b) Look at the picture of some electrical wires.



Copper is used to make electrical wire.

Write down **one** reason why copper is used to make electrical wire.

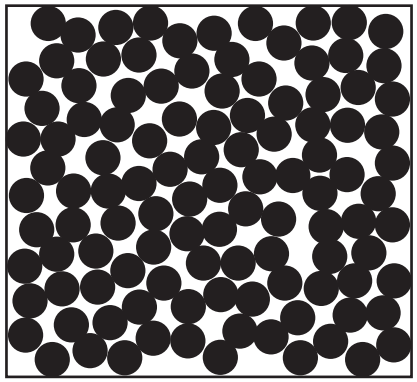
..... **[1]**

(c) Put a tick (✓) next to the correct statement about metals.

Most metals have low melting points.	☐
Most metals are good conductors of heat.	☐
Most metals are weak.	☐
Most metals have a low density.	☐
Most metals are soft.	☐

[1]

(d) Look at the diagram. It shows how the particles are arranged in a **liquid** metal.



The particles are close together but not in a set pattern.

Describe how the particles are arranged in a **solid** metal.

A diagram may help you answer the question.

.....

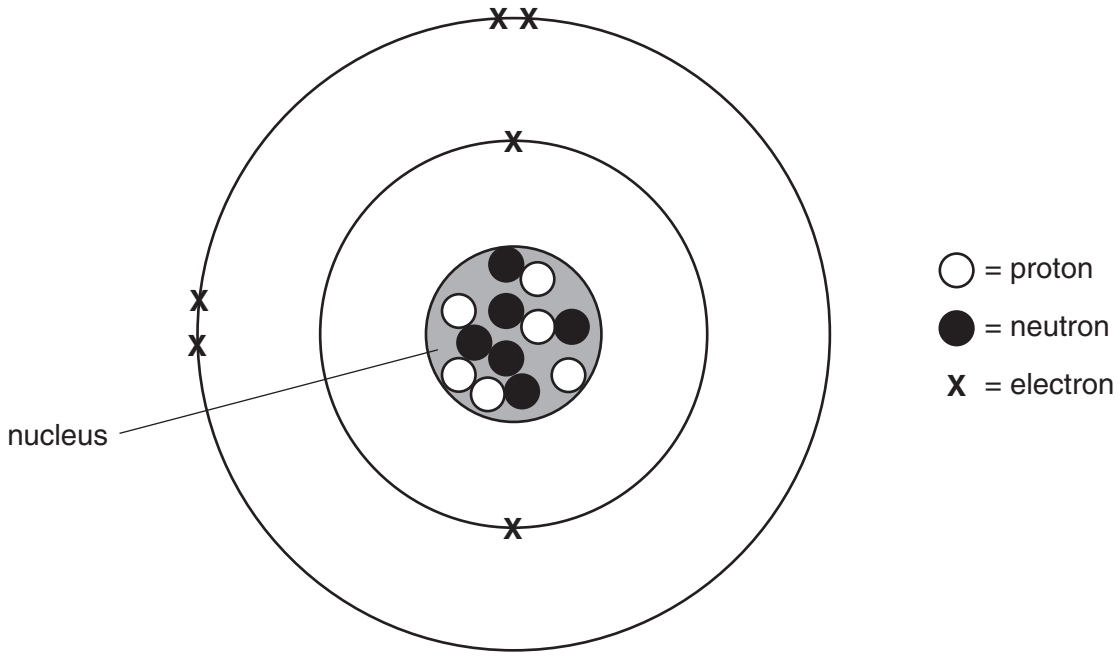
.....

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

[Total: 5]

7 All elements are made up of atoms.

Look at the diagram of an atom of an element.



(a) How many **electrons** are there in the outer shell?

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

(b) This element is in period **2** of the Periodic Table.

How can you tell from the diagram of the atom?

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

(c) The atom has a mass number of 12.

How can you tell from the diagram of the atom?

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

(d) Complete the table about the particles found in atoms.

particle	electric charge	relative mass
electron	.....	0.0005
neutron	0	.....
proton	positive	1

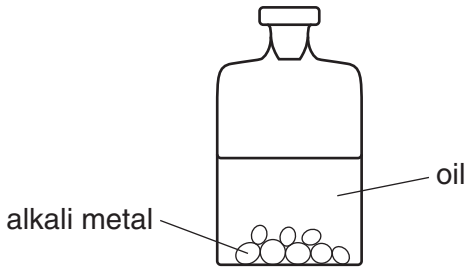
[2]

[Total: 5]

8 Fluorine, chlorine and bromine are halogens.

Lithium, sodium and potassium are alkali metals.

Look at the diagram. It shows how the alkali metals are stored.



(a) Write down **two** reasons why alkali metals are stored under oil.

.....

.....

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

(b) Lithium reacts with bromine to make lithium bromide.

The reaction of potassium with bromine is much more violent than the reaction of lithium with bromine.

Suggest why.

.....

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

(c) Lithium atoms make lithium ions, Li^+.

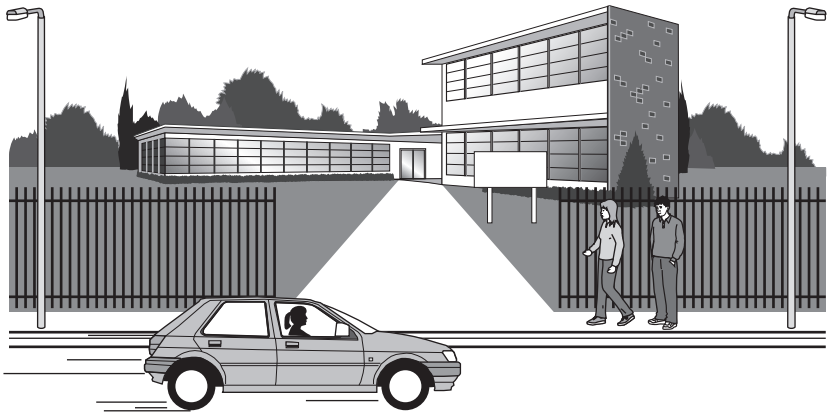
Finish the sentence about how this happens.

Lithium atoms lose ..... to make positive lithium ions. **[1]**

[Total: 4]

Section C – Module P3

9 Neil and Jill check the speeds of cars outside their school.



They time how long the cars take to travel between two lamp posts.

They use some equipment to take the measurements.

(a) Complete the table.

Choose the **best** answers from the list.

30 cm rule

clock

micrometer

stopwatch

tape measure

watch

measurement	equipment used	units
distance		m
time		s

[2]

(b) Neil and Jill use the measurements to calculate the **speed**.

What are the correct **units** for speed?

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

(c) Look at their results.

type of car	time taken to travel between lamp posts in seconds
Audi	3.2
BMW	3.4
Citroen	1.2
Mercedes	3.6
Skoda	1.8
Toyota	2.9

Which car travels the fastest between the lamp posts?

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

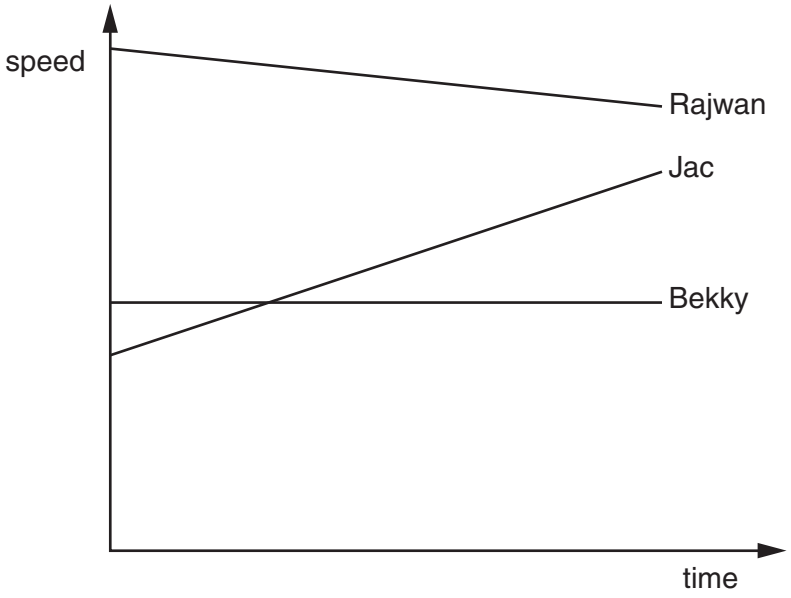
[Total: 4]

10 Three students in a class run a race.

The rest of the class measure their speeds during the race.

The results are shown on a graph.

Look at the graph.



Complete the table.

Write each student's name in the correct place.

name	description of speed
	decreasing speed
	constant speed
	increasing speed

[2]

[Total: 2]

11 Look at the diagram.

It shows information from the Highway Code.

(a) What does **thinking** distance mean?

.....

.....

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

(b) What does **braking** distance mean?

.....

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

(c) Use the information from the Highway Code to calculate the **stopping** distance.

.....

.....

answer ..... m **[1]**

[Total: 4]

12 This question is about fuels and road transport.

Most cars use fuels made from **fossil** fuel.

(a) (i) Write down the names of **two** of these fuels used to run cars.

..... and ..... **[2]**

(ii) Look at the information on fuel consumption.

type of vehicle	fuel consumption in kilometres per litre
bus	3
car	11
motorbike	23
tractor	4

The motorbike has the **best** fuel consumption.

Use the table to explain why.

.....

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

(b) **Electricity** can be used to power cars.

What provides the electricity for these cars?

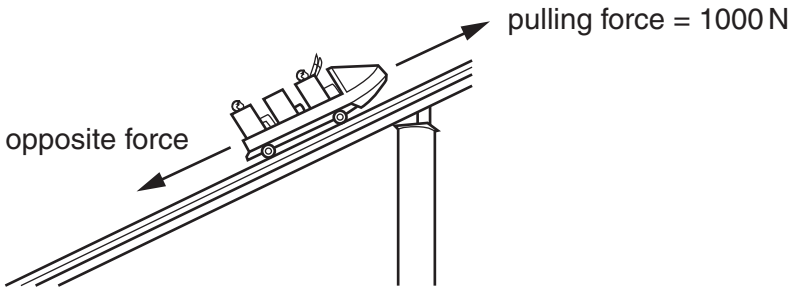
.....

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

[Total: 4]

13 This question is about the energy and speed of a roller coaster.

(a) An electric motor pulls the roller coaster car up the slope.



(i) The car moves 20 m.

The pulling force is 1000 N.

Calculate the work done on the car.

The equations on page 2 may help you.

.....

.....

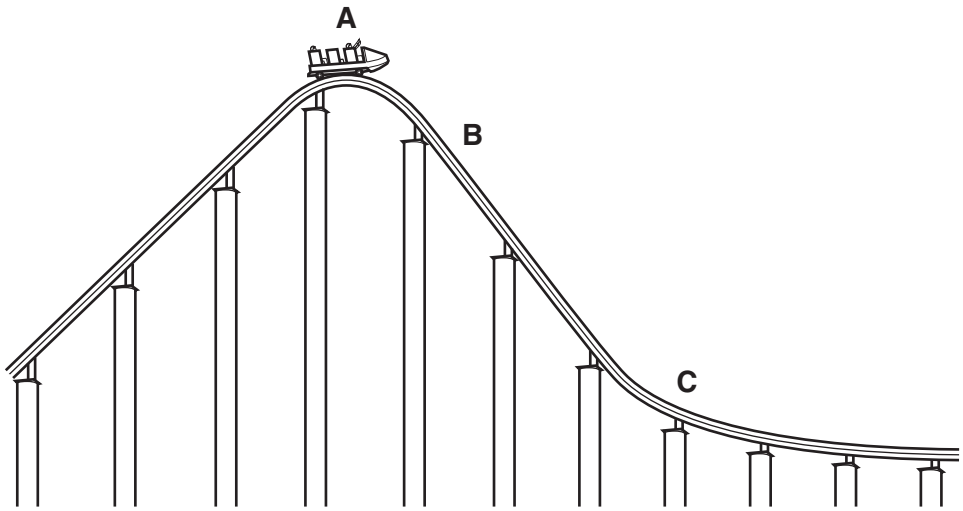
answer ..... J **[2]**

(ii) The car climbs the slope at a **steady speed**.

What is the size of the opposite force when the speed is steady?

answer ..... N **[1]**

(b) Look at the diagram of the roller coaster.



The car stops at point **A**.

What type of energy does the car have when it stops here?

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

(c) The car rolls down the slope.

At point **B** its speed is 6 m/s.

At point **C** its speed has doubled to 12 m/s.

What happens to its **kinetic** energy between point **B** and point **C**?

.....

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

[Total: 6]

END OF QUESTION PAPER

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The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.