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CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/01

Paper 1 Multiple Choice

October/November 2003

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C, and D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

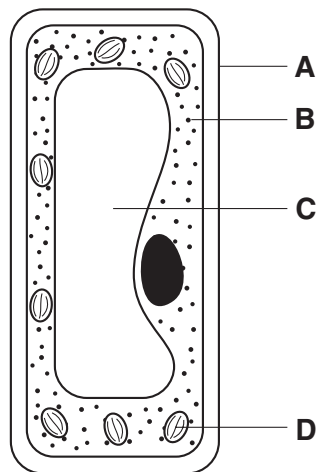
- 1 The table shows some features of four vertebrates.

feature	vertebrate			
	P	Q	R	S
has hair	✓	X	✓	X
has feathers	X	✓	X	X
has scales	X	X	X	✓
has wings	✓	✓	X	X
lays eggs	X	✓	X	✓
produces milk	✓	X	✓	X

Which two vertebrates belong to the same class?

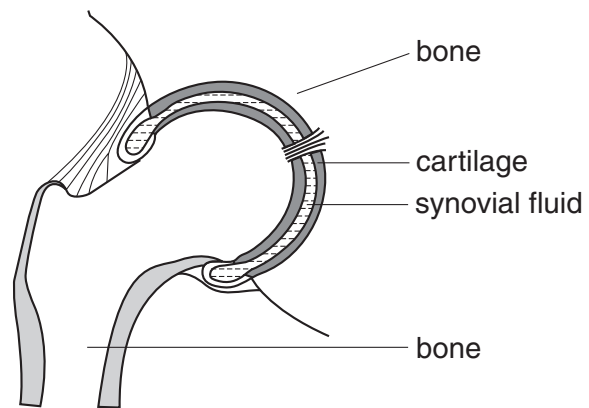
- A** P and Q **B** P and R **C** Q and S **D** R and S
- 2 The diagram shows a plant cell.

In which part of the cell is starch produced?



3

3 The diagram shows a synovial joint.

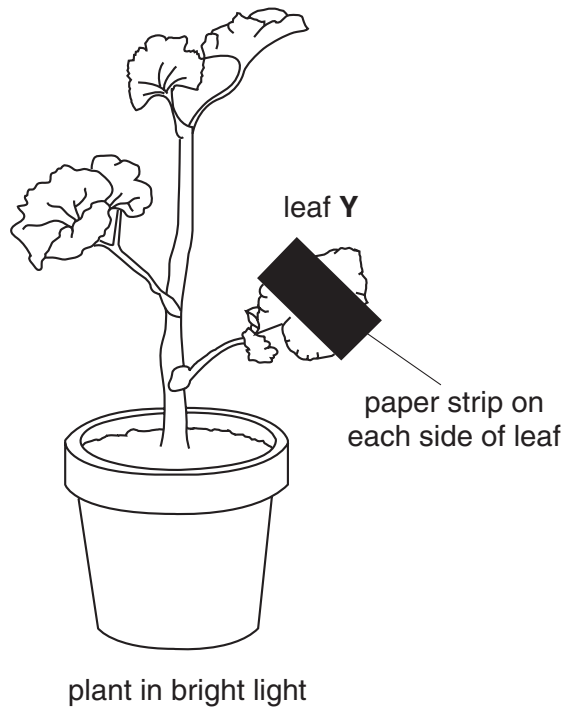


Which parts of this joint help to reduce friction?

	bone	cartilage	synovial fluid
A	✓	✓	✗
B	✗	✓	✓
C	✗	✗	✓
D	✓	✗	✗

4

- 4 An experiment is set up as shown to investigate starch production in the leaves of a plant. After six hours in sunlight, leaf **Y** is tested for starch.

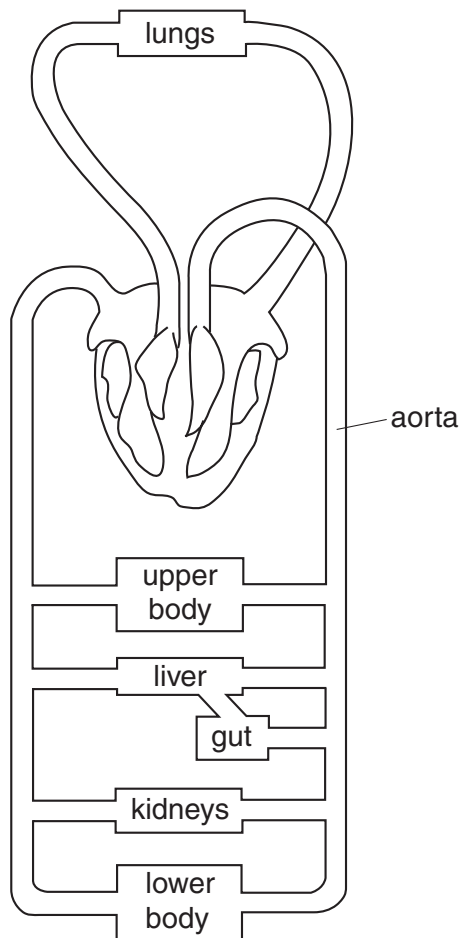


There is no starch produced under the paper strip because there was an absence of

- A carbon dioxide.
 - B chlorophyll.
 - C light.
 - D oxygen.
- 5 Which sequence shows the correct order of structures through which air passes when we breathe in?
- A alveolus → bronchiole → bronchus → trachea
 - B bronchus → trachea → alveolus → bronchiole
 - C bronchiole → alveolus → bronchus → trachea
 - D trachea → bronchus → bronchiole → alveolus

5

- 6 The diagram shows the blood circulatory system of a human.



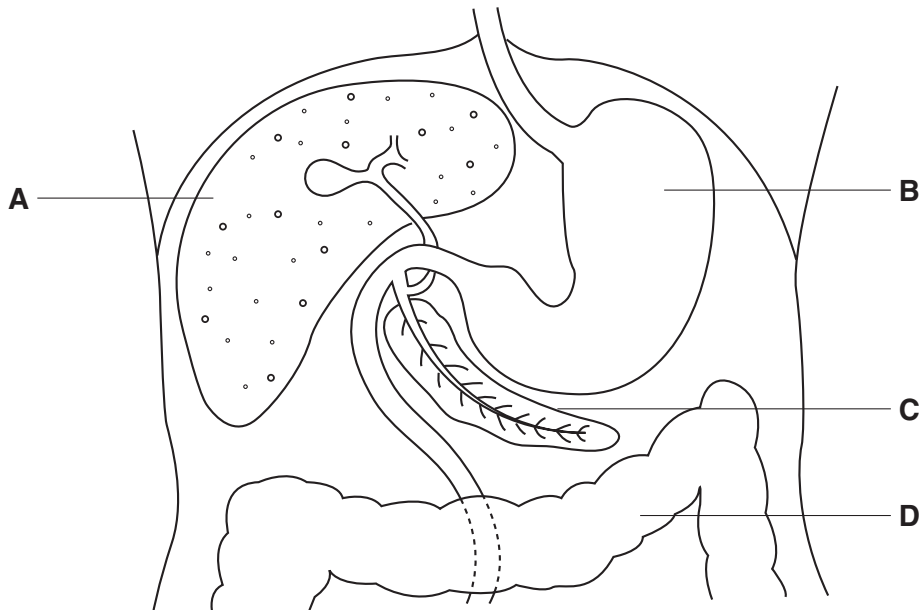
How many times does blood from the kidneys pass through the heart on its way to the aorta?

- A** one
B two
C four
D more than four
- 7 What happens during anaerobic respiration in muscle cells?

	oxygen used	waste products
A	no	carbon dioxide and water
B	no	lactic acid
C	yes	carbon dioxide and water
D	yes	lactic acid

6

- 8 The diagram shows part of the alimentary canal and some other organs in the abdomen.
Which is the pancreas?



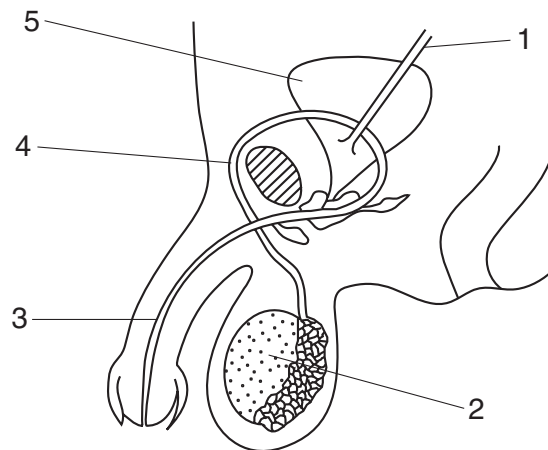
- 9 Food tests were performed on four substances.
Which substance contained oil and protein?

substance	test reagent			
	Benedict's	biuret	ethanol	iodine
A	✓	✗	✗	✓
B	✓	✓	✗	✗
C	✗	✓	✓	✗
D	✗	✗	✓	✓

- 10 Where does fertilisation take place in a flowering plant?

- A anther
- B bud
- C ovule
- D stigma

11 The diagram shows the male reproductive system.



Which path is taken by sperms?

A	1	→	5	→	2
B	1	→	5	→	3
C	2	→	4	→	3
D	2	→	5	→	3

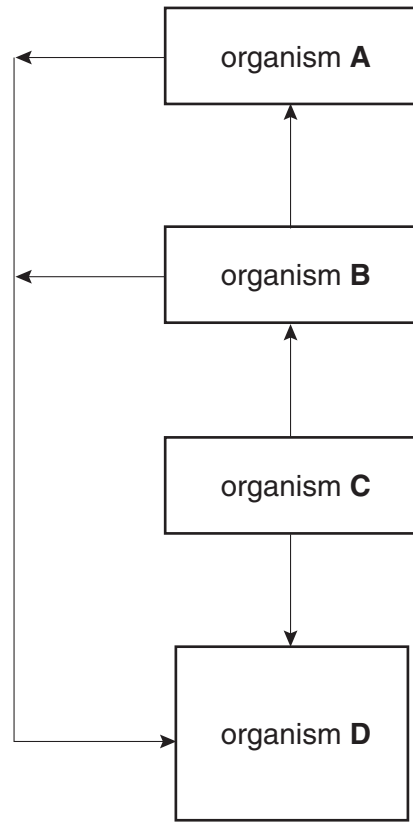
12 The genotype of a human albino is homozygous recessive. Phenotypically normal parents have one albino child.

What is the probability of their next child also being an albino?

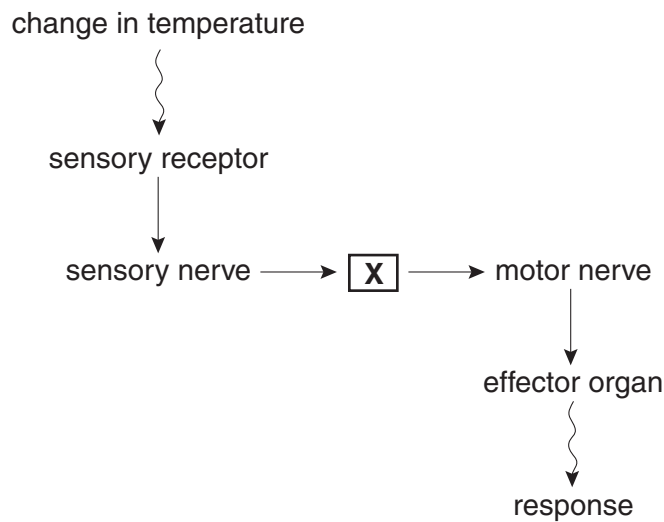
- A** 25%
- B** 33%
- C** 50%
- D** 75%

13 The diagram shows the flow of energy in a food chain.

Which organism is the producer in the food chain?



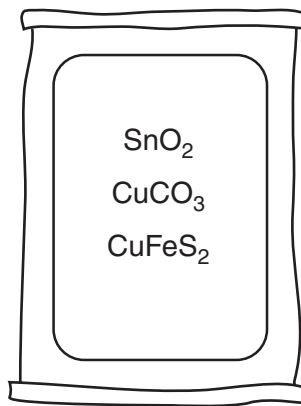
14 The diagram shows the sequence of structures involved in a human response to a change in temperature.



What is represented by box X?

- A blood system
- B central nervous system
- C digestive system

- 15 The diagram shows a sack containing a mixture of three minerals.



Which element is **not** present in the mixture?

- A cobalt
 - B copper
 - C iron
 - D tin
- 16 Heating a metal compound in a Bunsen flame turns the flame green.

Which metal ion is present in the compound?

- A calcium
 - B copper
 - C potassium
 - D sodium
- 17 In a Group, all the elements are solid at room temperature. The reactivity of the elements increases down the Group.

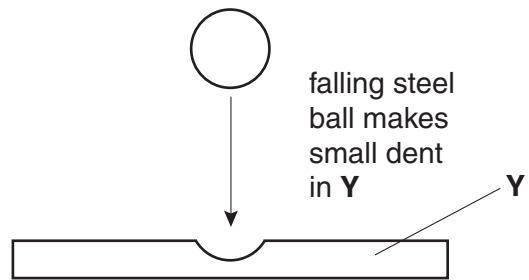
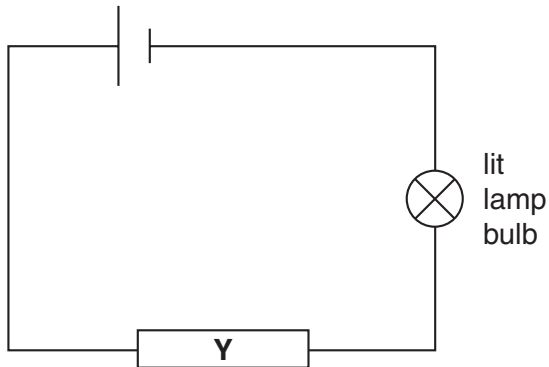
Which statements about this Group of elements and their oxides are correct?

	the elements are in	their oxides are
A	Group I	acidic
B	Group I	basic
C	Group VII	acidic
D	Group VII	basic

18 Which molecules join into long chains to make proteins?

- A amino acids
- B ethene
- C glucose
- D starch

19 Two tests are done on material Y.



The tests show that Y conducts electricity and is hard.

What could Y be?

- A brass
- B diamond
- C glass
- D graphite

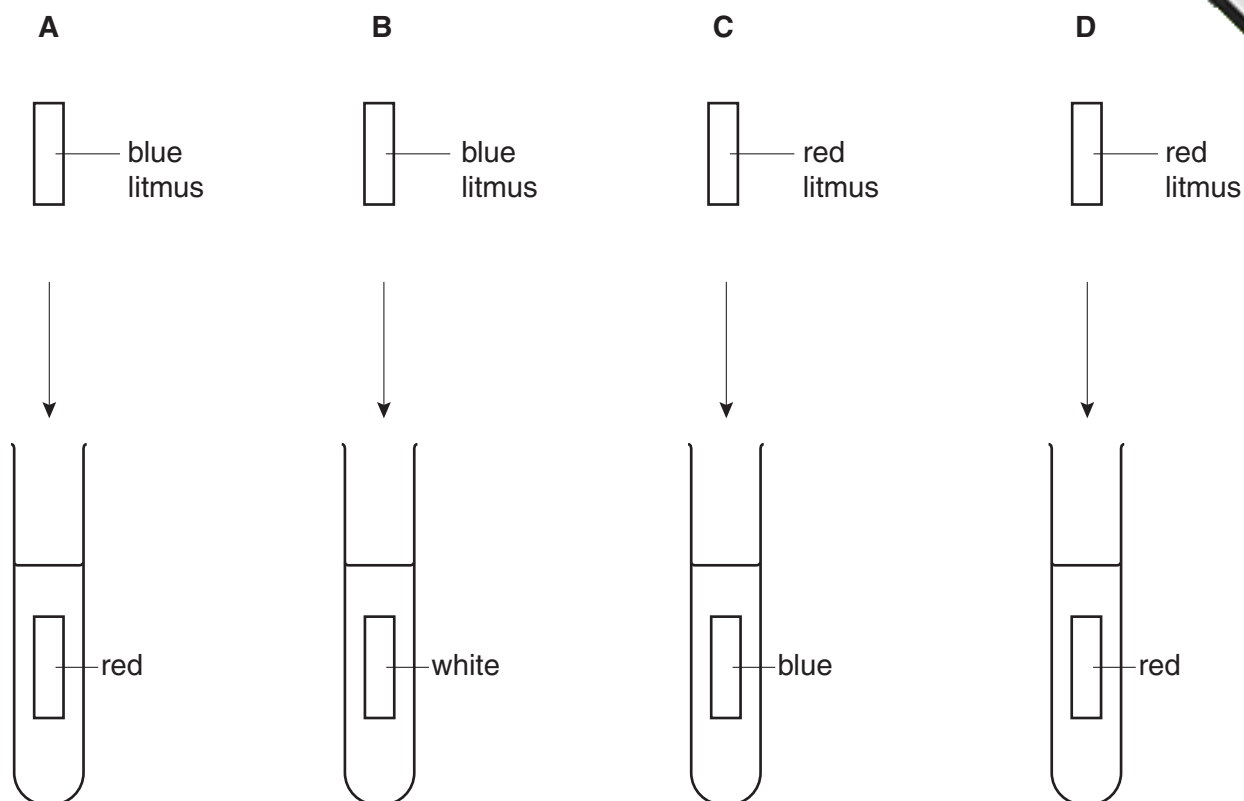
20 Iron is manufactured in a blast furnace.

Which of the waste gases from the blast furnace is both non-toxic and unreactive?

- A carbon dioxide
- B carbon monoxide
- C nitrogen
- D sulphur dioxide

21 The results of putting pieces of litmus paper into four solutions are shown.

Which solution contains chlorine?



22 Some oil and salt are spilt on to a shirt.

A student uses a non-aqueous organic solvent to try to clean the shirt.

Which substances are likely to be cleaned from the shirt?

- A oil only
- B salt only
- C both oil and salt
- D neither oil or salt

23 What could be the pH values of the solutions in the table?

	acidic	alkaline	neutral
A	9	5	7
B	7	9	5
C	5	9	7
D	5	7	9

24 In which form do plants receive essential elements from fertilisers?

- A atoms
- B carbohydrates
- C ions
- D proteins

25 Why is an analgesic used in medicine?

- A as a painkiller
- B as a vitamin
- C to kill bacteria
- D to kill viruses

26 The element sulphur forms a colloid with water.

How are the sulphur particles held in the water and how do the particles affect a light beam shone on to the colloid?

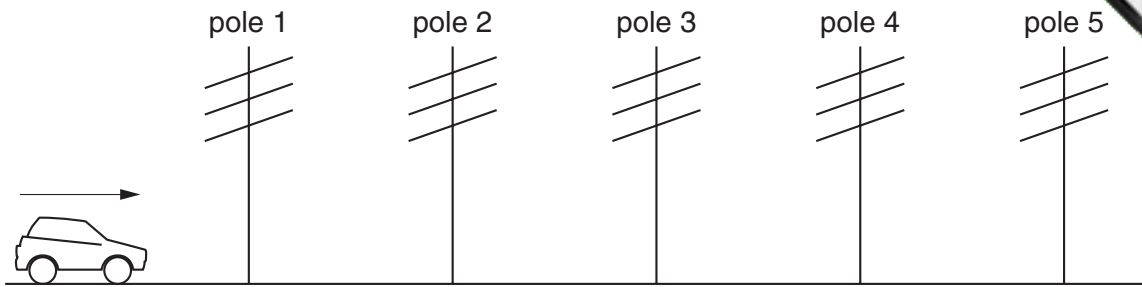
	the particles are	the light beam is
A	dissolved	refracted
B	dissolved	scattered
C	suspended	refracted
D	suspended	scattered

27 An element is in Group III of the Periodic Table.

What happens to an atom of this element when it forms an ion?

- A It gains three electrons.
- B It gains five electrons.
- C It loses three electrons.
- D It loses five electrons.

- 28 Five telegraph poles are positioned at equal distances along the side of a road.



A car accelerates until it is level with pole 4. The car then continues along the road at a steady speed. The times taken to travel between one pole and the next are measured.

Which time is the greatest?

The time between

- A pole 1 and pole 2.
 - B pole 2 and pole 3.
 - C pole 3 and pole 4.
 - D pole 4 and pole 5.
- 29 A student tries to find the density of a metal block. First he measures the weight with a forcemeter (spring balance). Next he measures the sides of the block using a rule, in order to calculate the volume of the block. Finally he divides the weight by the volume to find the density.

The student has made a mistake.

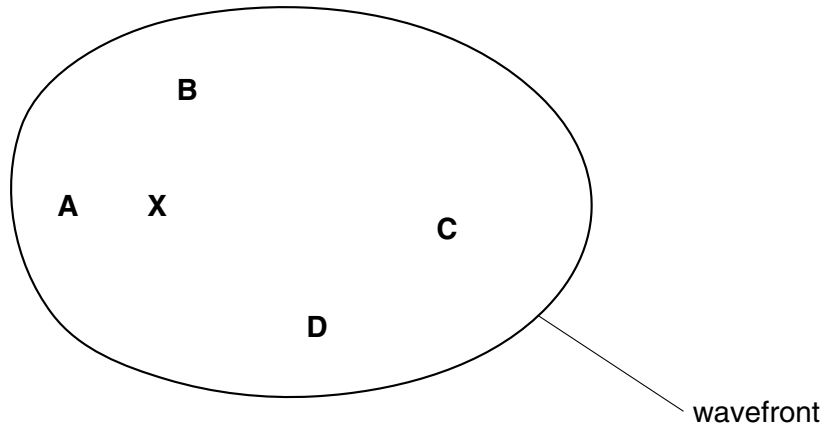
Why does his method **not** give the density?

- A Density is volume divided by weight.
- B He should have measured the surface area, not the volume.
- C He should have used the mass in his calculation, not the weight.
- D Weight is not measured with a forcemeter (spring balance).

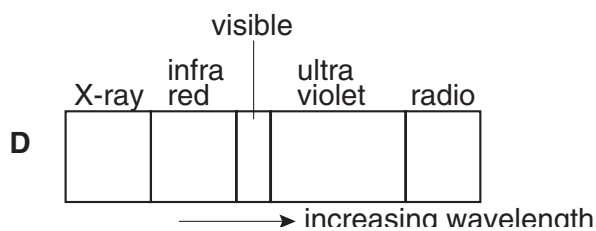
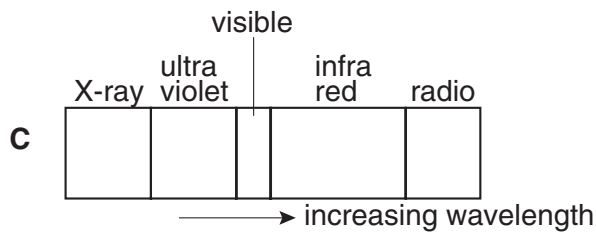
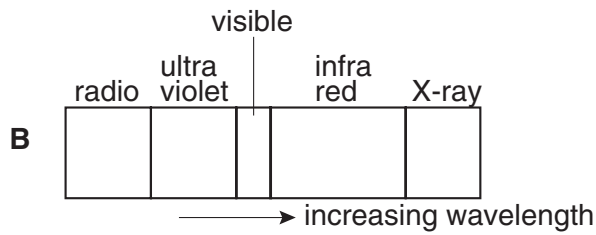
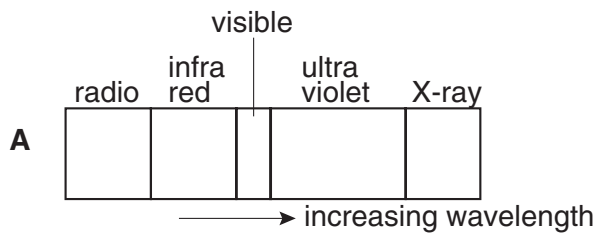
33 Waves travel more slowly on the surface of water when the water is shallow.

A person drops a stone into a pool at **X**. The diagram shows the first wavefront on the surface of the pool.

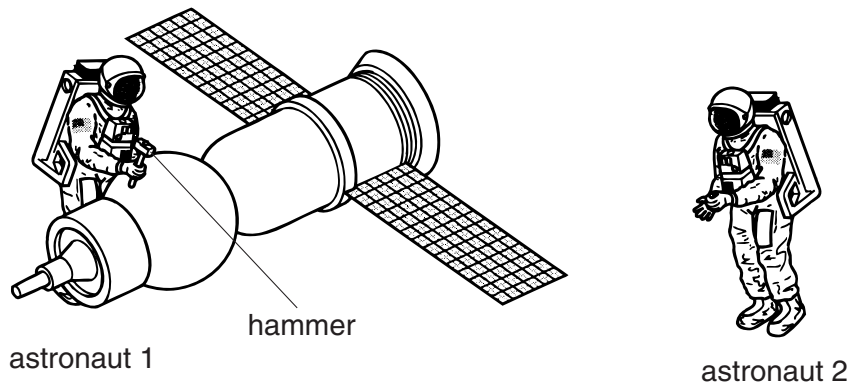
Which region of the pool is likely to be most shallow?



34 Which diagram shows the correct order of the waves in the electromagnetic spectrum?



35 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. atmosphere in space.

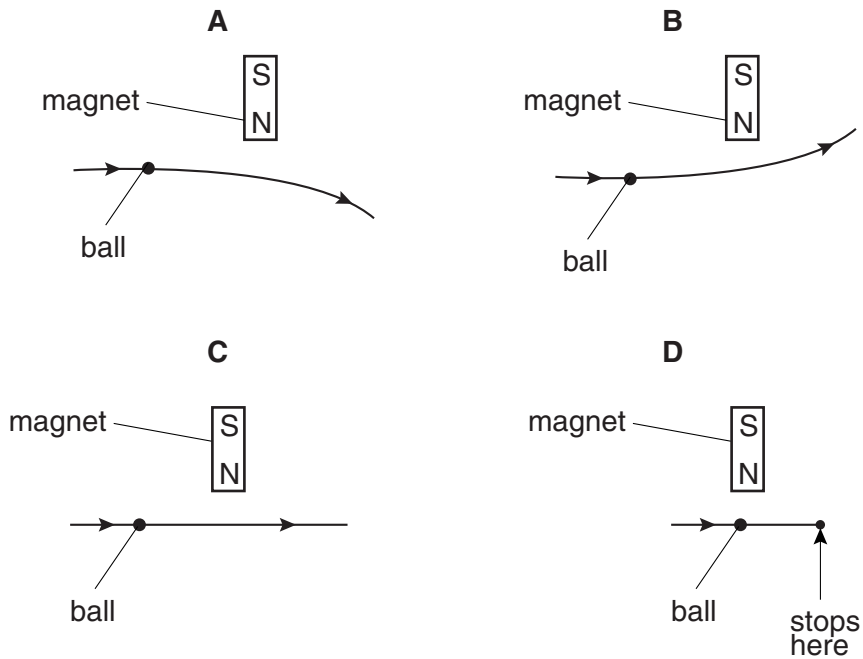


Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

- A no sound at all
- B a quieter sound
- C a sound of the same loudness
- D a louder sound

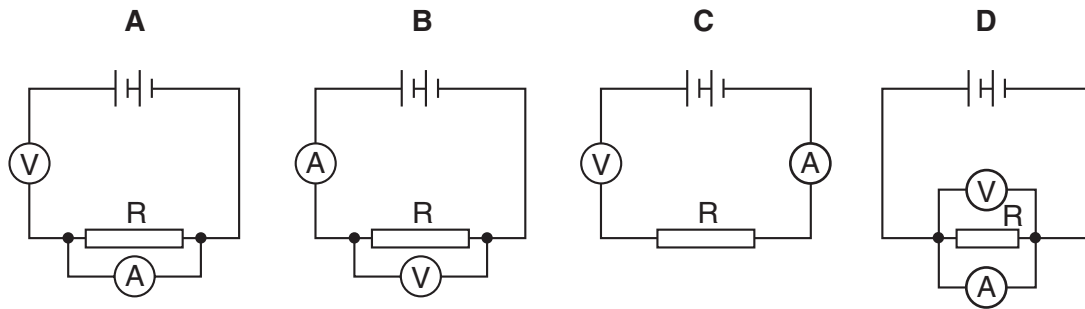
36 A steel ball on a horizontal wooden table rolls near the north pole of a bar magnet that is lying on the table.

Which diagram shows the most likely path of the ball, as seen from above the table?



37 A student wants to find the resistance of resistor R using a voltmeter and an ammeter.

Which circuit should the student use?



38 A $3.0\ \Omega$ lamp and a $6.0\ \Omega$ lamp are connected in series.

What is the total resistance of the combination?

- A $0.5\ \Omega$
- B $2.0\ \Omega$
- C $9.0\ \Omega$
- D $18.0\ \Omega$

39 How is electricity transmitted over large distances and why is it transmitted in this way?

	how	why
A	at high voltage	for safety
B	at high voltage	to reduce energy loss
C	at low voltage	for safety
D	at low voltage	to reduce energy loss

40 In a cathode-ray tube, particles are given off from a hot cathode by thermionic emission.

Which particles are given off?

- A atoms
- B electrons
- C ions
- D protons

DATA SHEET
The Periodic Table of the Elements
Group

I	II	III	IV	V	VI	VII	0	
7 Li Lithium	9 Be Beryllium	1 H Hydrogen					4 He Helium	2
23 Na Sodium	24 Mg Magnesium	11 B Boron	12 C Carbon	14 N Nitrogen	16 O Oxygen	19 F Fluorine	20 Ne Neon	
39 K Potassium	40 Ca Calcium	27 Al Aluminium	28 Si Silicon	31 P Phosphorus	32 S Sulphur	35.5 Cl Chlorine	40 Ar Argon	
85 Rb Rubidium	88 Sr Strontium	70 Ga Gallium	73 Ge Germanium	75 As Arsenic	79 Se Selenium	80 Br Bromine	84 Kr Krypton	
133 Cs Caesium	137 Ba Barium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	131 Xe Xenon	
87 Fr Francium	226 Ra Radium	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon	
		65 Zn Zinc	64 Cu Copper	59 Ni Nickel	63 Ag Silver	78 Au Gold		
		112 Cd Cadmium	108 Pd Palladium	106 Pt Platinum	197 Hg Mercury	201 Pb Lead		
		159 Tb Terbium	157 Gd Gadolinium	152 Eu Europium	201 Hg Mercury	207 Pb Lead		
		162 Dy Dysprosium	162 Dy Dysprosium	163 Am Americium	80 Hg Mercury	82 Pb Lead		
		167 Er Erbium	167 Er Erbium	95 Am Americium	80 Hg Mercury	84 Po Polonium		
		100 Fm Fermium	100 Fm Fermium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		101 Md Mendelevium	101 Md Mendelevium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		102 No Nobelium	102 No Nobelium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		107 Lr Lawrencium	107 Lr Lawrencium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		166 Ho Holmium	166 Ho Holmium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	99 Es Einsteinium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		168 Tm Thulium	168 Tm Thulium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		170 Yb Ytterbium	170 Yb Ytterbium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		171 Lu Lutetium	171 Lu Lutetium	98 Cf Californium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		166 Ho Holmium	166 Ho Holmium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	97 Bk Berkelium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	96 Cm Curium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		166 Ho Holmium	166 Ho Holmium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	95 Am Americium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	94 Pu Plutonium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		166 Ho Holmium	166 Ho Holmium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	93 Np Neptunium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	92 U Uranium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		166 Ho Holmium	166 Ho Holmium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	91 Pa Protactinium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	90 Th Thorium	80 Hg Mercury	85 At Astatine		
		162 Dy Dysprosium	162 Dy Dysprosium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		
		165 Ho Holmium	165 Ho Holmium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		
		167 Er Erbium	167 Er Erbium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		
		169 Tm Thulium	169 Tm Thulium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		
		173 Yb Ytterbium	173 Yb Ytterbium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		
		175 Lu Lutetium	175 Lu Lutetium	89 Ac Actinium	80 Hg Mercury	85 At Astatine		

3-71 Lanthanoid series
0-103 Actinoid series

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

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