

Centre Number	Candidate Number	Name
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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.

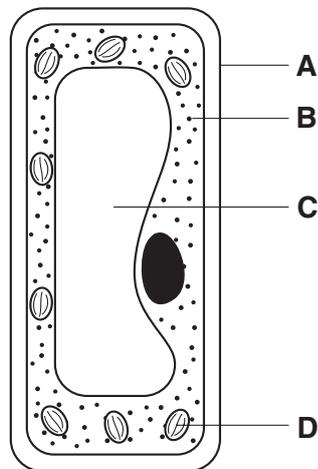
- 1 The table shows some features of four vertebrates.

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

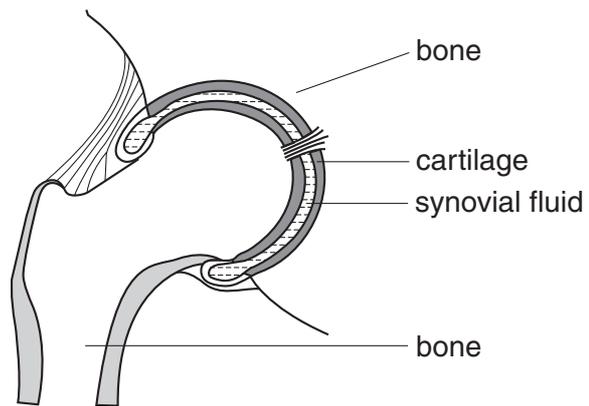
Which two vertebrates belong to the same class?

- 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?



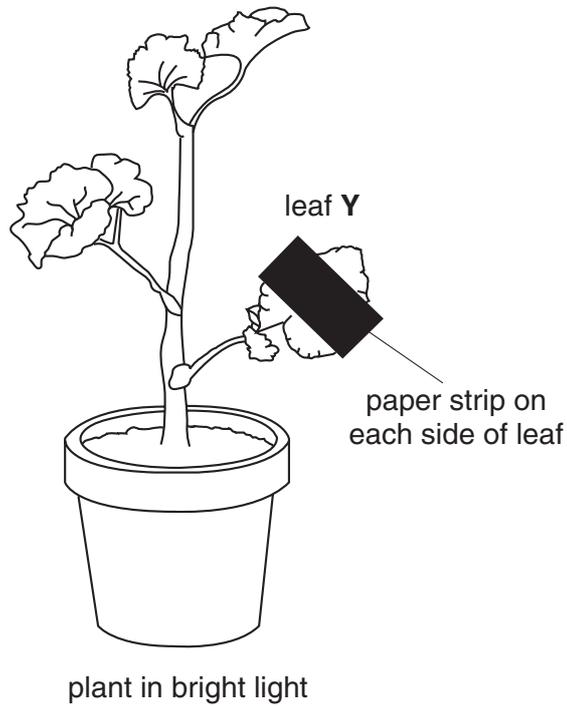
3 The diagram shows a synovial joint.



Which parts of this joint help to reduce friction?

	bone	cartilage	synovial fluid
<b>A</b>	✓	✓	✗
<b>B</b>	✗	✓	✓
<b>C</b>	✗	✗	✓
<b>D</b>	✓	✗	✗

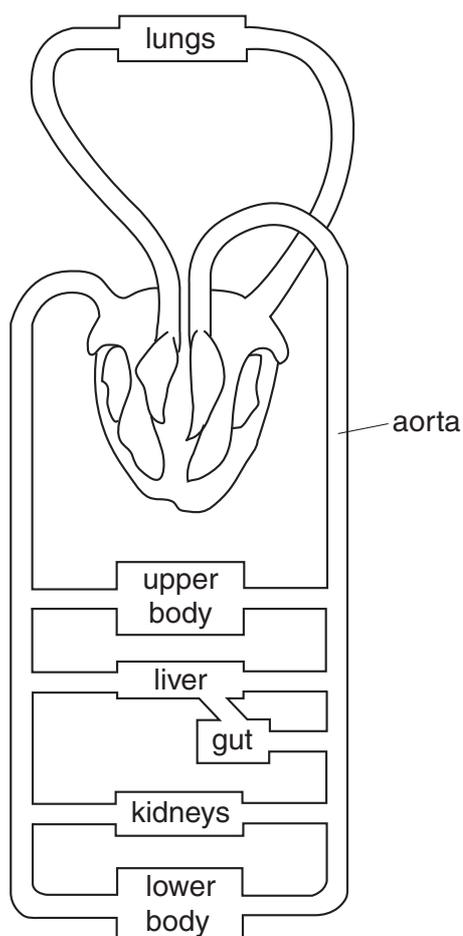
- 4 An experiment is set up as shown to investigate starch production in the leaves of a plant. After six hours in sunlight, leaf **Y** is tested for starch.



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

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

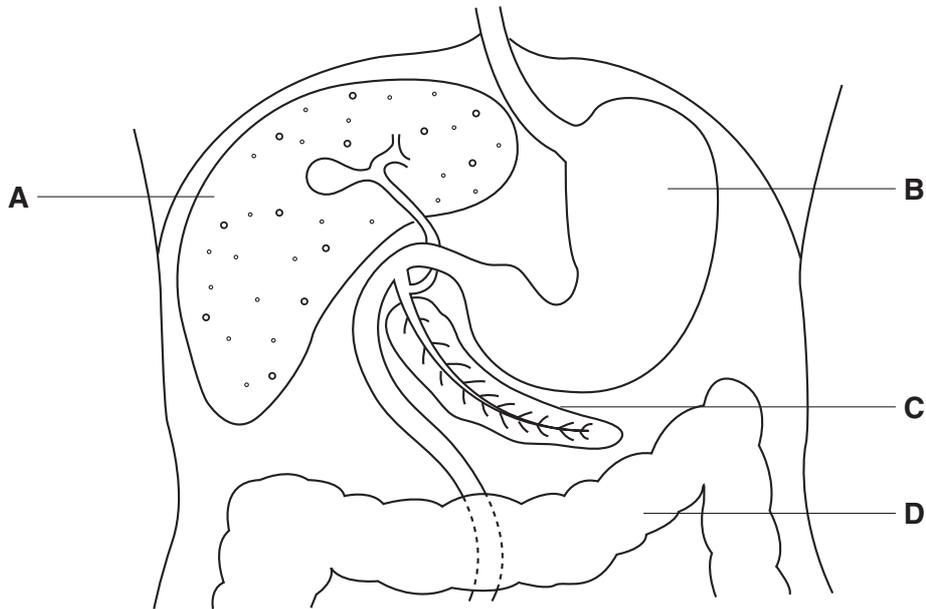


How many times does blood from the kidneys pass through the heart on its way to the aorta?

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

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

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



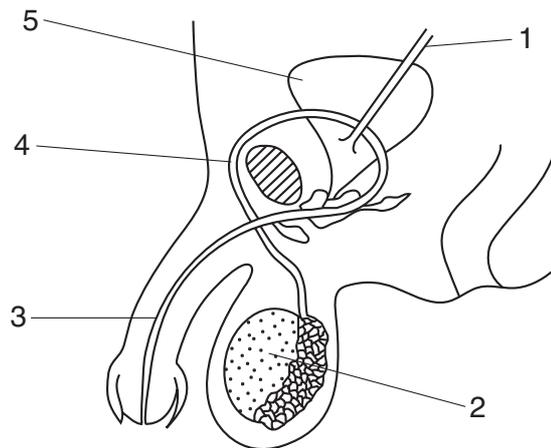
- 9 Food tests were performed on four substances. Which substance contained oil and protein?

substance	test reagent			
	Benedict's	biuret	ethanol	iodine
<b>A</b>	✓	✗	✗	✓
<b>B</b>	✓	✓	✗	✗
<b>C</b>	✗	✓	✓	✗
<b>D</b>	✗	✗	✓	✓

- 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?

<b>A</b>	1	→	5	→	2
<b>B</b>	1	→	5	→	3
<b>C</b>	2	→	4	→	3
<b>D</b>	2	→	5	→	3

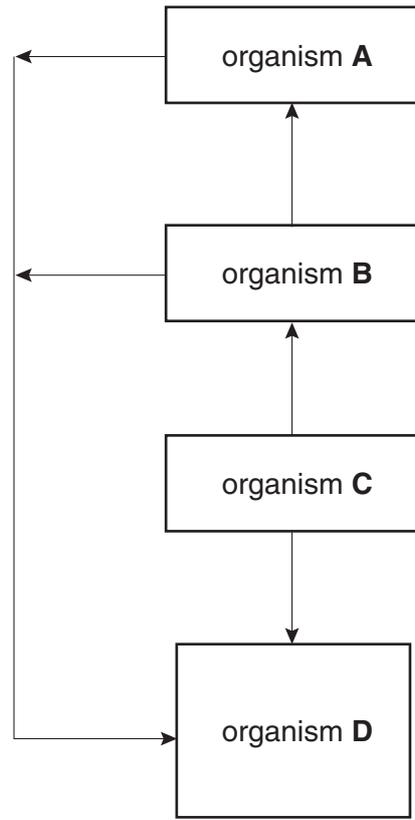
- 12 The genotype of a human albino is homozygous recessive. Phenotypically normal parents have one albino child.

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

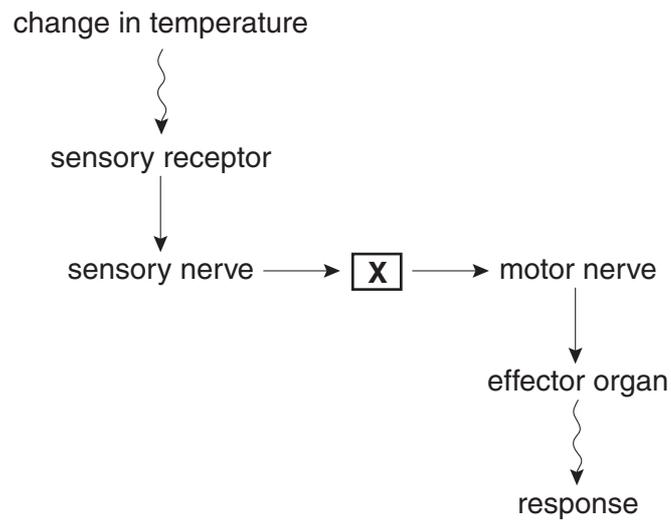
- A** 25%
- B** 33%
- C** 50%
- D** 75%

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

Which organism is the producer in the food chain?



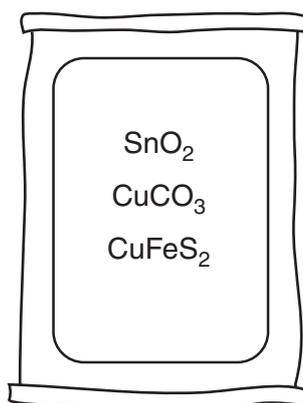
14 The diagram shows the sequence of structures involved in a human response to a change in temperature.



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.

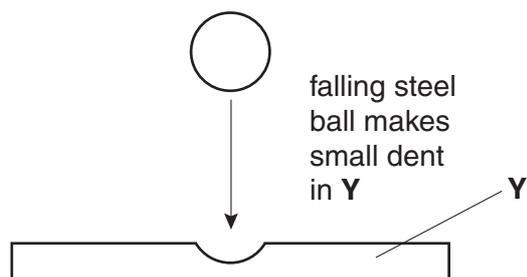
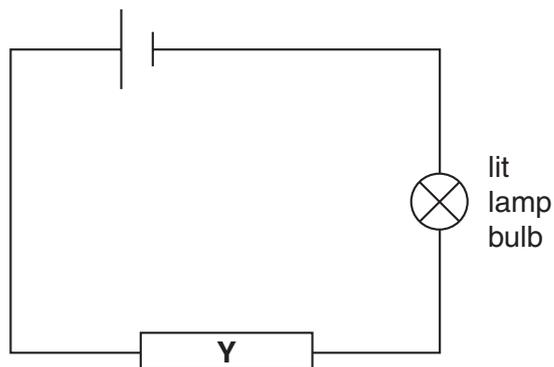
Which statements about this Group of elements and their oxides are correct?

	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?

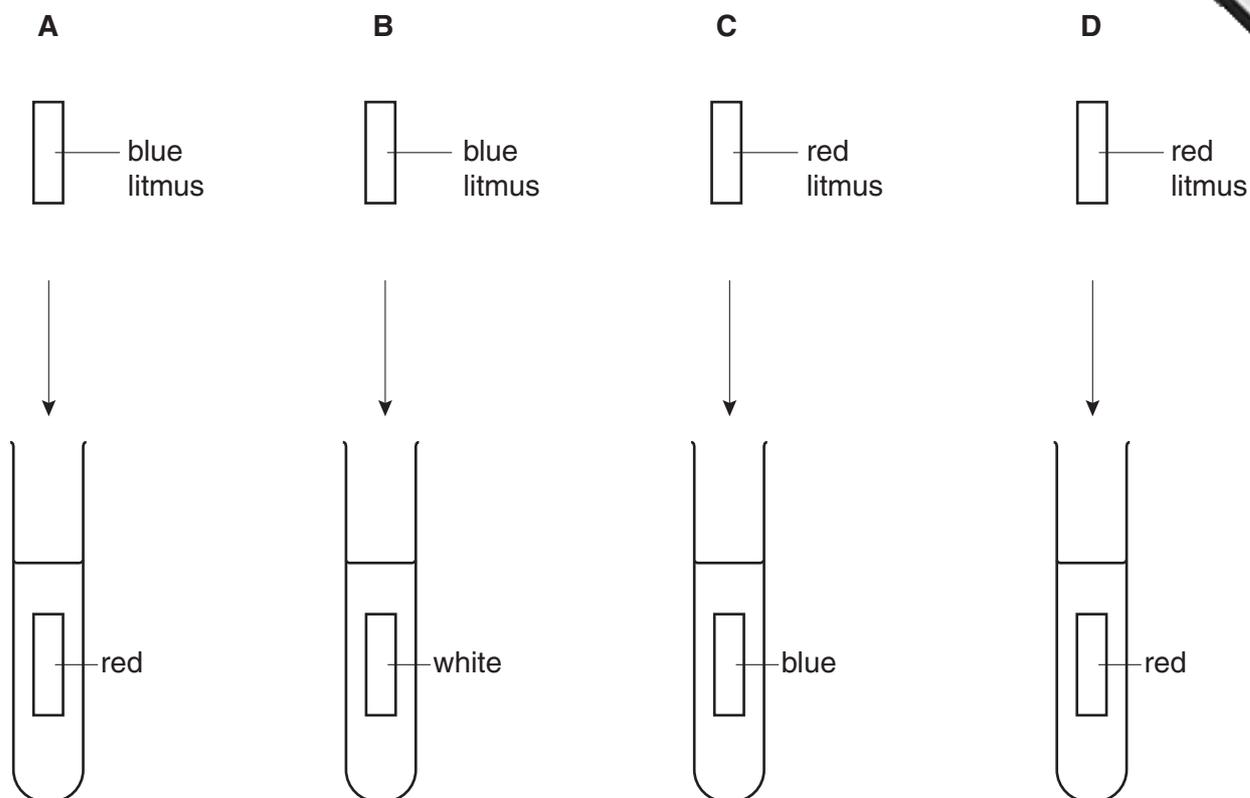
- A brass
  - B diamond
  - C glass
  - D graphite
- 20 Iron is manufactured in a blast furnace.

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?

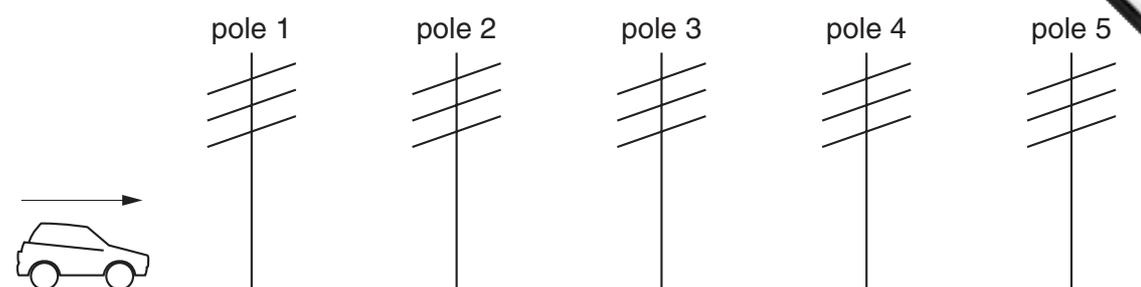
	the particles are	the light beam is
<b>A</b>	dissolved	refracted
<b>B</b>	dissolved	scattered
<b>C</b>	suspended	refracted
<b>D</b>	suspended	scattered

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?

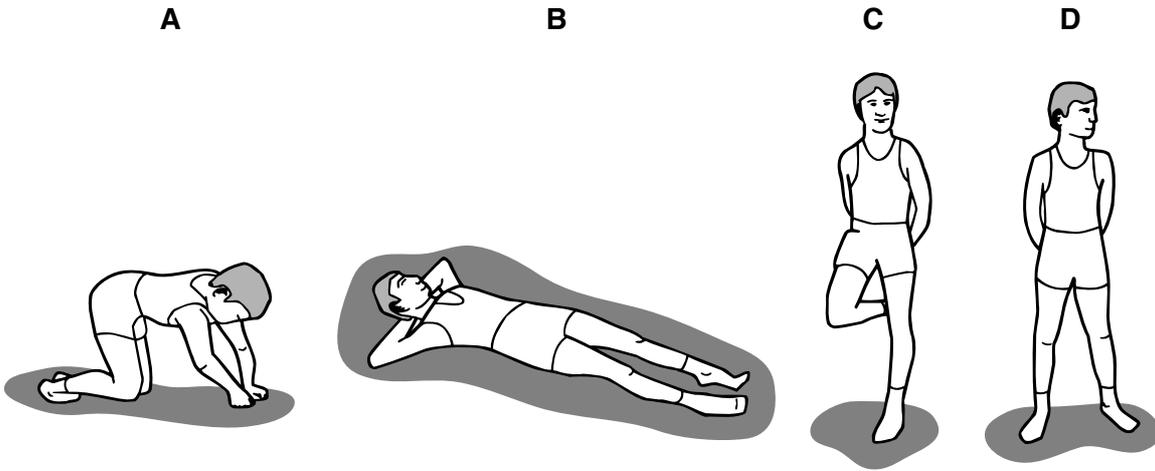
- A Density is volume divided by weight.
- B He should have measured the surface area, not the volume.
- C He should have used the mass in his calculation, not the weight.
- D Weight is not measured with a forcemeter (spring balance).

30 A large electric motor is used to lift a container off a ship.

Which of the following values are enough to allow the power of the motor to be calculated?

- A the mass of the container and the distance moved
- B the force used and the distance moved
- C the current used and the work done
- D the work done and the time taken

31 Which diagram shows the child exerting **least** pressure on the ground?



32 There is a vacuum between the double walls of a vacuum flask.

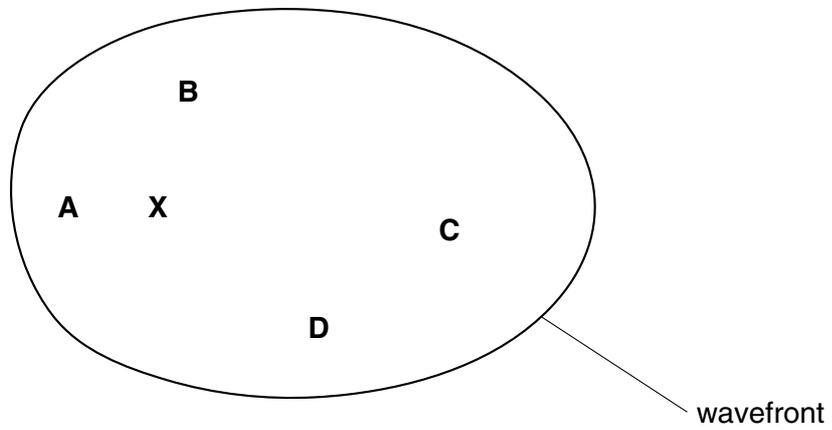
Which types of heat transfer are reduced by the vacuum?

- A conduction and convection
- B conduction and radiation
- C convection and radiation
- D conduction, convection and radiation

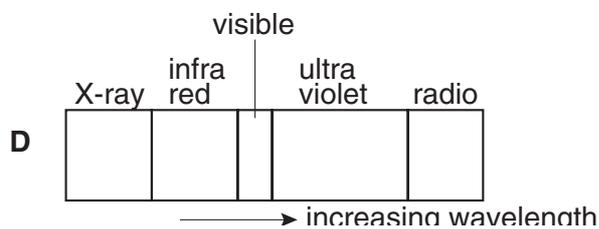
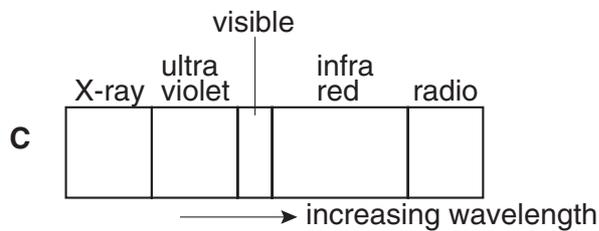
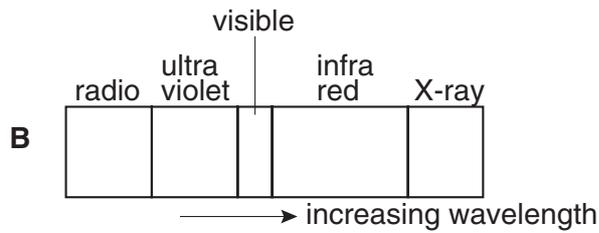
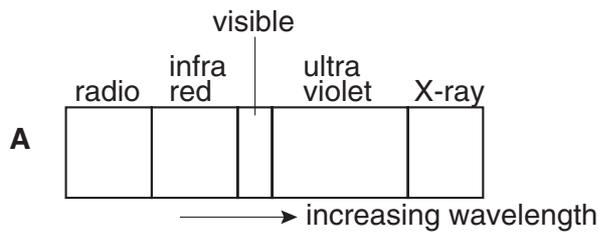
33 Waves travel more slowly on the surface of water when the water is shallow.

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

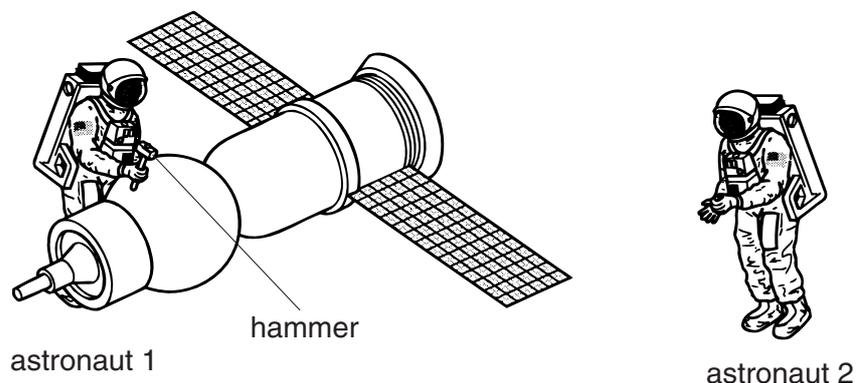
Which region of the pool is likely to be most shallow?



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



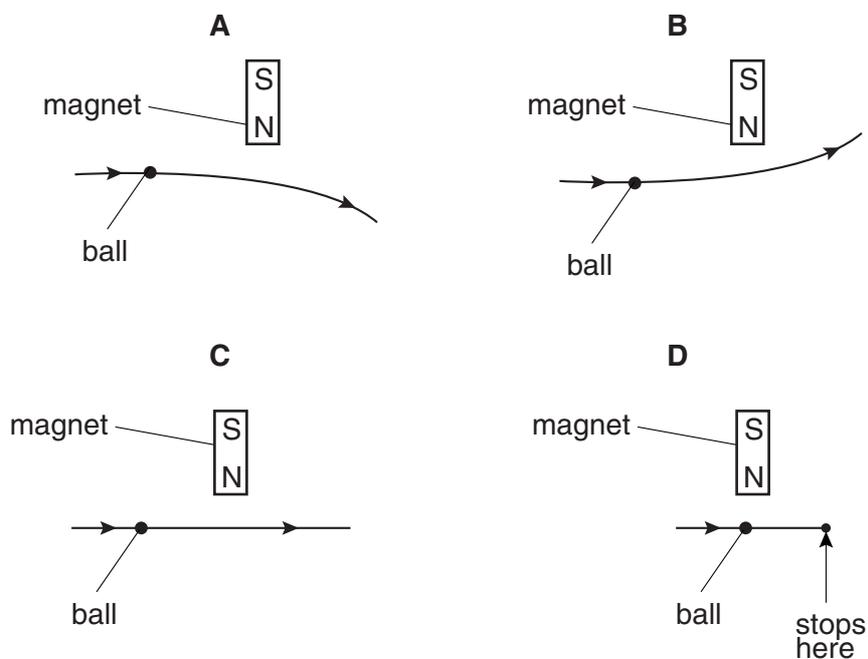
- 35 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. atmosphere in space.



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

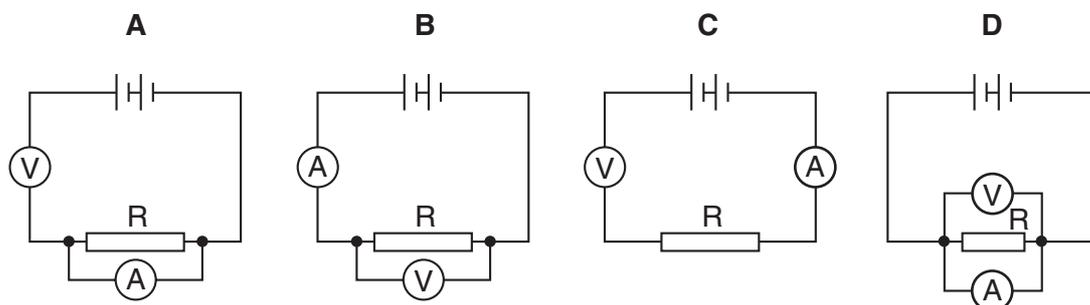
- A no sound at all  
 B a quieter sound  
 C a sound of the same loudness  
 D a louder sound
- 36 A steel ball on a horizontal wooden table rolls near the north pole of a bar magnet that is lying on the table.

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 <b>Li</b> Lithium	9 <b>Be</b> Beryllium	1 <b>H</b> Hydrogen					4 <b>He</b> Helium	2
23 <b>Na</b> Sodium	24 <b>Mg</b> Magnesium	11 <b>B</b> Boron	12 <b>C</b> Carbon	14 <b>N</b> Nitrogen	16 <b>O</b> Oxygen	19 <b>F</b> Fluorine	20 <b>Ne</b> Neon	
39 <b>K</b> Potassium	40 <b>Ca</b> Calcium	27 <b>Al</b> Aluminium	28 <b>Si</b> Silicon	31 <b>P</b> Phosphorus	32 <b>S</b> Sulphur	35.5 <b>Cl</b> Chlorine	40 <b>Ar</b> Argon	
85 <b>Rb</b> Rubidium	88 <b>Sr</b> Strontium	70 <b>Ga</b> Gallium	73 <b>Ge</b> Germanium	75 <b>As</b> Arsenic	79 <b>Se</b> Selenium	80 <b>Br</b> Bromine	84 <b>Kr</b> Krypton	
133 <b>Cs</b> Caesium	137 <b>Ba</b> Barium	81 <b>Tl</b> Thallium	82 <b>Pb</b> Lead	83 <b>Bi</b> Bismuth	84 <b>Po</b> Polonium	85 <b>At</b> Astatine	86 <b>Rn</b> Radon	
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	65 <b>Zn</b> Zinc	68 <b>Hg</b> Mercury	80 <b>Cd</b> Cadmium	81 <b>In</b> Indium	82 <b>Sn</b> Tin	83 <b>Xe</b> Xenon	
		59 <b>Ni</b> Nickel	64 <b>Cu</b> Copper	78 <b>Pt</b> Platinum	79 <b>Au</b> Gold	80 <b>Hg</b> Mercury	81 <b>Tl</b> Thallium	
		55 <b>Mn</b> Manganese	56 <b>Fe</b> Iron	76 <b>Os</b> Osmium	77 <b>Ir</b> Iridium	78 <b>Pt</b> Platinum	79 <b>Au</b> Gold	
		52 <b>Cr</b> Chromium	53 <b>V</b> Vanadium	74 <b>W</b> Tungsten	75 <b>Re</b> Rhenium	76 <b>Os</b> Osmium	77 <b>Ir</b> Iridium	
		48 <b>Ti</b> Titanium	49 <b>Sc</b> Scandium	72 <b>Hf</b> Hafnium	73 <b>Ta</b> Tantalum	74 <b>W</b> Tungsten	75 <b>Re</b> Rhenium	
		41 <b>Zr</b> Zirconium	42 <b>Mo</b> Molybdenum	70 <b>Nb</b> Niobium	71 <b>Ta</b> Tantalum	72 <b>Hf</b> Hafnium	73 <b>Ta</b> Tantalum	
		39 <b>Y</b> Yttrium	40 <b>Zr</b> Zirconium	41 <b>Nb</b> Niobium	42 <b>Mo</b> Molybdenum	43 <b>Tc</b> Technetium	44 <b>Ru</b> Ruthenium	
		21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	
		19 <b>K</b> Potassium	20 <b>Ca</b> Calcium	21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	
		139 <b>La</b> Lanthanum	140 <b>Ce</b> Cerium	141 <b>Pr</b> Praseodymium	142 <b>Nd</b> Neodymium	143 <b>Pm</b> Promethium	144 <b>Nd</b> Neodymium	
		137 <b>Ba</b> Barium	138 <b>La</b> Lanthanum	139 <b>Ce</b> Cerium	140 <b>Pr</b> Praseodymium	141 <b>Nd</b> Neodymium	142 <b>Pm</b> Promethium	
		57 <b>La</b> Lanthanum	58 <b>Ce</b> Cerium	59 <b>Pr</b> Praseodymium	60 <b>Nd</b> Neodymium	61 <b>Pm</b> Promethium	62 <b>Sm</b> Samarium	
		227 <b>Ac</b> Actinium	228 <b>Th</b> Thorium	229 <b>Pa</b> Protactinium	230 <b>U</b> Uranium	231 <b>Np</b> Neptunium	232 <b>Th</b> Thorium	
		89 <b>Ac</b> Actinium	90 <b>Th</b> Thorium	91 <b>Pa</b> Protactinium	92 <b>U</b> Uranium	93 <b>Np</b> Neptunium	94 <b>Pu</b> Plutonium	
		101 <b>Fr</b> Francium	102 <b>Ra</b> Radium	103 <b>Ac</b> Actinium	104 <b>Th</b> Thorium	105 <b>Pa</b> Protactinium	106 <b>U</b> Uranium	
		109 <b>Er</b> Erbium	110 <b>Tm</b> Thulium	111 <b>Yb</b> Ytterbium	112 <b>Lu</b> Lutetium	113 <b>Hf</b> Hafnium	114 <b>Ta</b> Tantalum	
		167 <b>Er</b> Erbium	168 <b>Tm</b> Thulium	169 <b>Yb</b> Ytterbium	170 <b>Lu</b> Lutetium	171 <b>Hf</b> Hafnium	172 <b>Ta</b> Tantalum	
		100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium	104 <b>Th</b> Thorium	105 <b>Pa</b> Protactinium	
		100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium	104 <b>Th</b> Thorium	105 <b>Pa</b> Protactinium	
		165 <b>Ho</b> Holmium	166 <b>Er</b> Erbium	167 <b>Tm</b> Thulium	168 <b>Yb</b> Ytterbium	169 <b>Lu</b> Lutetium	170 <b>Hf</b> Hafnium	
		67 <b>Ho</b> Holmium	68 <b>Er</b> Erbium	69 <b>Tm</b> Thulium	70 <b>Yb</b> Ytterbium	71 <b>Lu</b> Lutetium	72 <b>Hf</b> Hafnium	
		99 <b>Es</b> Einsteinium	100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium	104 <b>Th</b> Thorium	
		99 <b>Es</b> Einsteinium	100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium	104 <b>Th</b> Thorium	

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 dm<sup>3</sup> at room temperature and pressure (r.t.p.).