



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE

5130/01

Paper 1 Multiple Choice

October/November 2008

1 hour

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.

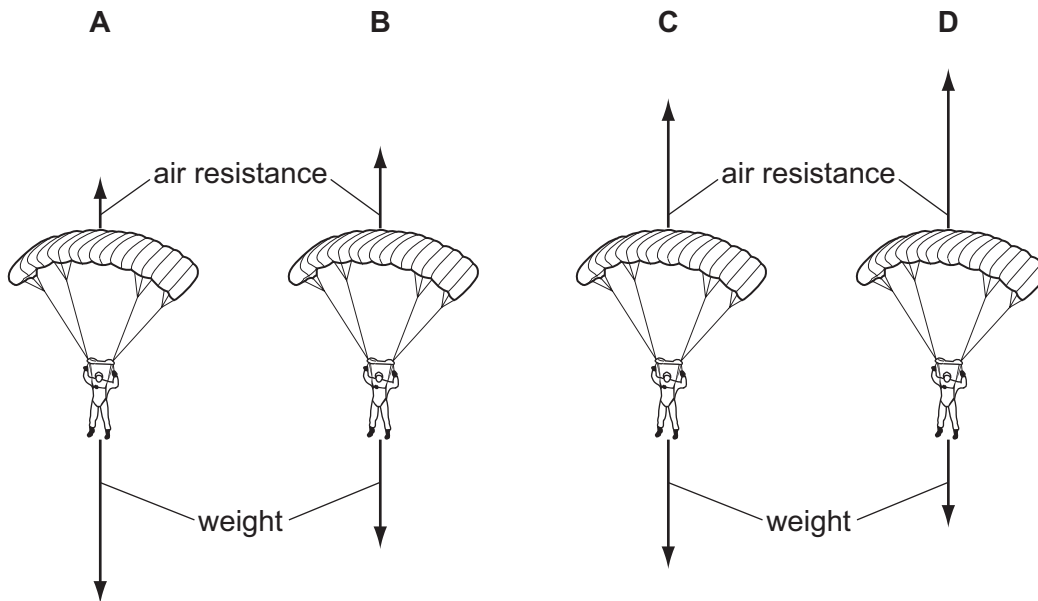
A copy of the Periodic Table is printed on page 16.

This document consists of **16** printed pages.

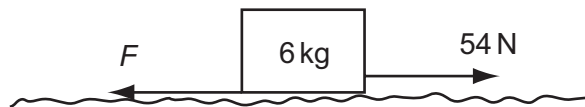


- 1 The diagrams show the forces acting on four parachutists. The size of each force is shown by the length of the arrows.

Which diagram shows a parachutist moving with constant speed?



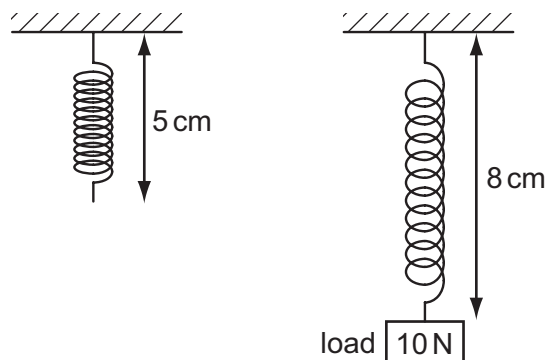
- 2 A block of mass 6 kg is pulled across a rough surface by a 54 N force, against a friction force F .



The acceleration of the block is 6 m/s^2 .

What is the value of F ?

- A 9 N B 18 N C 36 N D 54 N
- 3 The diagram shows how the length of a spring changes when a load of 10 N is hung on it.



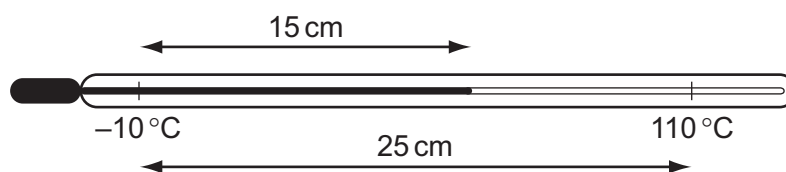
What will be the length of the spring if the 10 N load is replaced by a 20 N load?

- A 6 cm B 11 cm C 13 cm D 16 cm

- 4 Which types of nuclear reaction release thermal energy in the Sun and in nuclear power stations?

	the Sun	nuclear power stations
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

- 5 The diagram shows a mercury-in-glass thermometer. The distance between the -10°C and the 110°C markings is 25 cm.

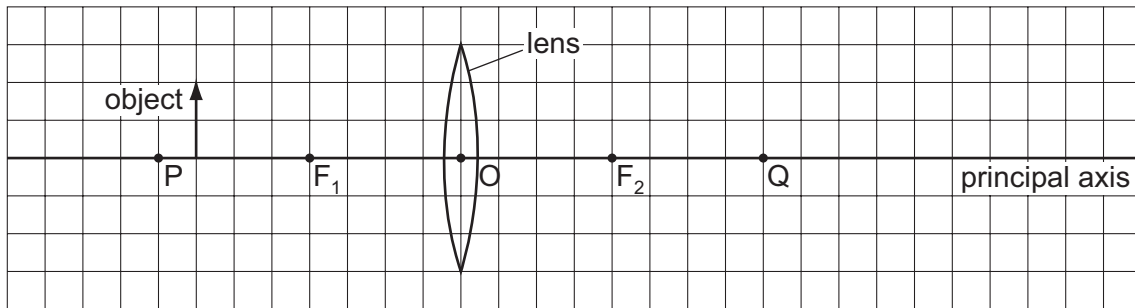


At which temperature is the end of the mercury thread 15 cm from **the -10°C mark**?

- A** 50°C **B** 60°C **C** 62°C **D** 72°C
- 6 Which line in the table correctly shows examples of transverse and longitudinal waves?

	transverse	longitudinal
A	gamma-rays	sound
B	infra-red	water waves
C	radio	light
D	sound	X-rays

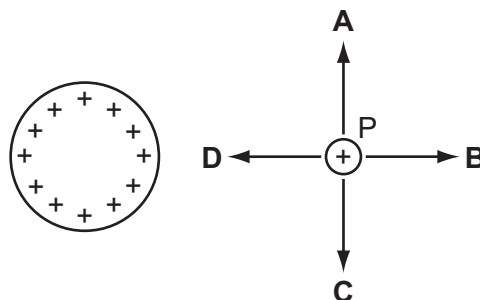
- 7 The diagram shows an object between P and F_1 on the principal axis of a converging (convex) lens. The principal foci of the lens are at F_1 and F_2 .



Where is the image formed by the lens?

- A at infinity
 B between O and F_2
 C at Q
 D beyond Q
- 8 A small positive charge, P, is positioned close to a positively charged sphere.

What is the direction of the electrostatic force on P?

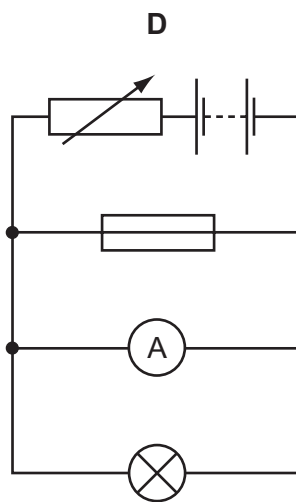
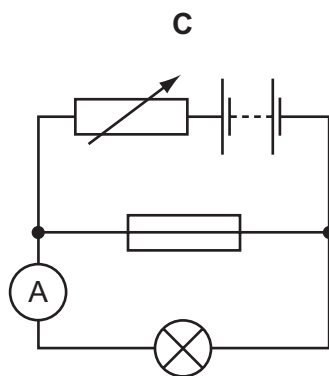
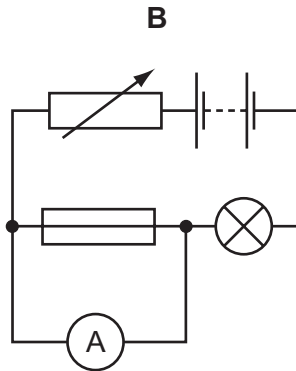
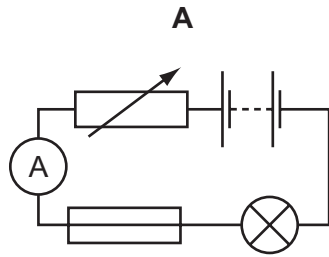


- 9 What is the smallest total resistance which can be obtained using only a $6\ \Omega$ resistor and a $12\ \Omega$ resistor?

- A $2\ \Omega$ B $4\ \Omega$ C $6\ \Omega$ D $12\ \Omega$

10 A student measures the maximum current a fuse can take before it melts.

Which circuit should be used?



11 A step-down transformer changes 240 V a.c. to 12 V a.c. There are 600 turns on the primary coil.

How many turns are on the secondary coil?

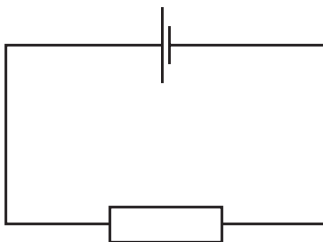
A 20

B 30

C 600

D 12 000

- 12 An electrical circuit consists of a cell connected to a resistor.



What are the correct directions of the electron flow and of the conventional current flow through the resistor?

	electron flow	conventional current flow
A	left to right	left to right
B	left to right	right to left
C	right to left	right to left
D	right to left	left to right

- 13 The table shows how the activity of a radioactive substance changes over a period of time.

time / minutes	0	5	10	15	20	25	30	35	40
activity / counts per second	114	102	90	83	73	65	57	51	45

What is the half-life of the substance?

- A** 73 minutes **B** 57 minutes **C** 30 minutes **D** 20 minutes
- 14 A salt is dissolved in water. The results of two separate tests on the solution are shown in the table.

test		result
1	add aqueous ammonia	a white precipitate which dissolves when an excess of aqueous ammonia is added
2	add dilute nitric acid then aqueous barium nitrate	a white precipitate

What is the salt?

- A** aluminium chloride
B aluminium sulphate
C zinc chloride
D zinc sulphate

- 15 Oxygen crystals are obtained by freezing oxygen at -223°C .

The particles in the crystals would be expected to be

- A** a mixture of oxygen atoms and molecules.
B oxygen ions.
C oxygen molecules.
D single oxygen atoms.

- 16 Aluminium has the symbol ${}_{13}^{27}\text{Al}$.

Which is the correct data for an atom of aluminium?

	number of		
	protons	electrons	neutrons
A	13	14	14
B	13	13	14
C	13	14	27
D	14	13	27

- 17 Information about the ability of four substances to conduct electricity is shown below.

W	does not conduct under any conditions
X	conducts only in aqueous solution
Y	conducts when molten and when solid
Z	conducts when molten and when in aqueous solution

What could these four substances be?

	W	X	Y	Z
A	Pb	HCl	NaCl	S
B	S	HCl	NaCl	Pb
C	S	HCl	Pb	NaCl
D	S	NaCl	HCl	Pb

- 18 What is the mass of magnesium which reacts completely with 250 cm^3 of 1.0 mol/dm^3 sulphuric acid?

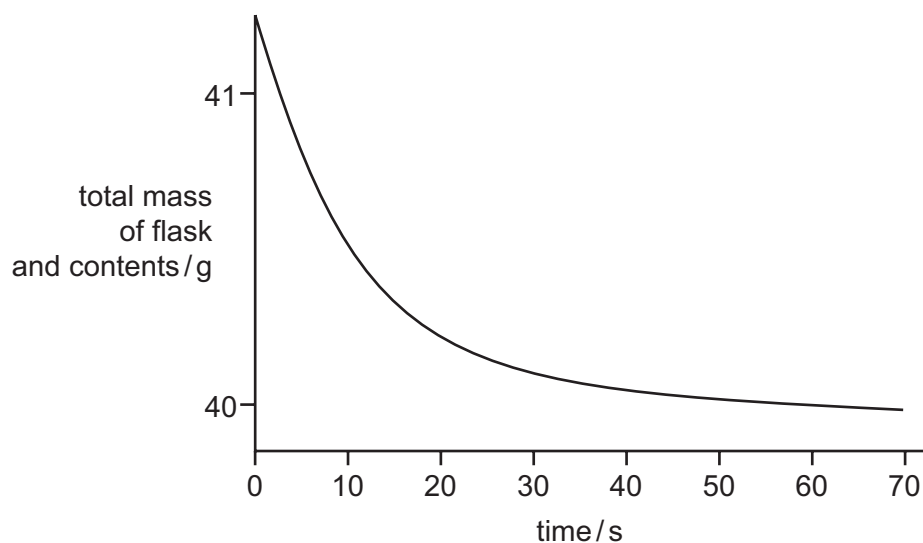
- A** 6g **B** 12g **C** 48g **D** 96g

19 Which positive ions are present in an aqueous solution of copper(II) sulphate?

- A copper(II) and hydrogen ions
- B copper(II) ions only
- C sulphate and hydroxyl ions
- D sulphate ions only

20 Calcium carbonate was placed in a flask on a balance and dilute hydrochloric acid added. The total mass of the flask and its contents was recorded every five seconds.

The diagram shows a graph of the results.



At which time was the reaction fastest?

- A 10s
- B 20s
- C 30s
- D 40s

21 Solution 1 is a weak acid

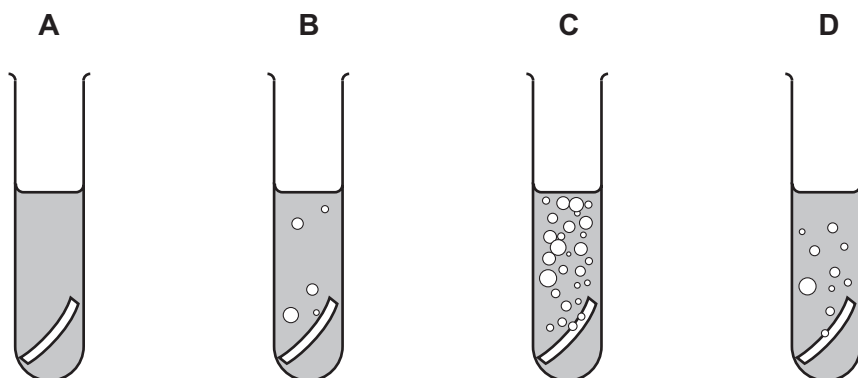
Solution 2 is a strong acid.

What are the pH values of each solution?

	solution 1	solution 2
A	2	5
B	5	2
C	3	8
D	8	3

22 The metals iron, lead, magnesium and zinc are each added to dilute hydrochloric acid.

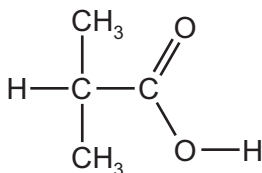
Which tube contains magnesium and dilute hydrochloric acid?



23 Which of the following is a large-scale use of slaked lime (calcium hydroxide)?

- A to increase the pH of acidic soil
- B to make ammonia from ammonium salts
- C to make calcium carbonate
- D to remove impurities from iron ore in the blast furnace

24 A compound has the structure shown.



To which homologous series does it belong?

- A alkenes
- B alcohols
- C acids
- D esters

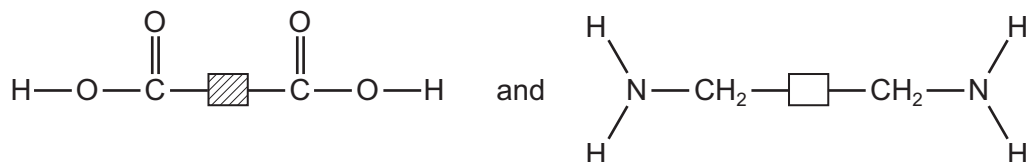
25 Which fraction, obtained by the fractional distillation of crude oil, is the **least** viscous?

- A bitumen
- B diesel
- C lubricating oil
- D paraffin

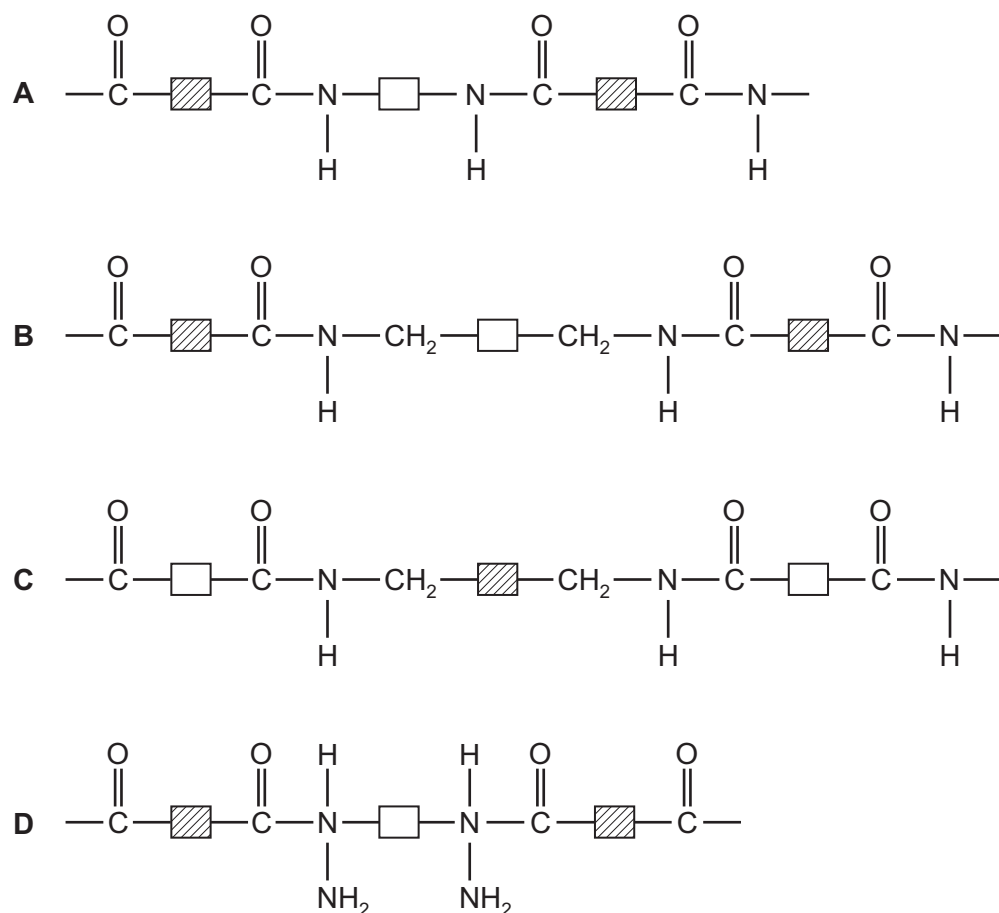
26 Which is the molecular formula of an alkane?

- A C_3H_6 B C_4H_{10} C C_6H_{12} D C_7H_{18}

27 A polymer is made from the two molecules shown.



Which diagram shows the structure of the polymer?



28 How permeable are the cell wall and the cell membrane in a plant cell?

	cell wall	cell membrane
A	fully	fully
B	fully	partially
C	partially	fully
D	partially	partially

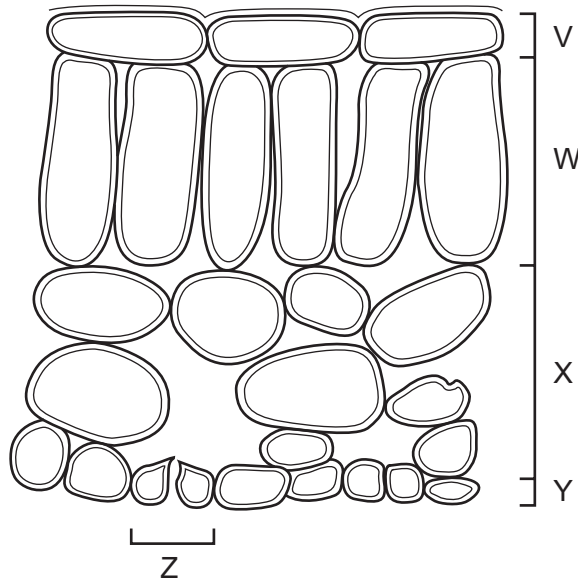
29 The following reaction occurs in the human alimentary canal.



What are the catalyst and the product?

	catalyst	product
A	acid	glucose
B	alkali	energy
C	amylase	maltose
D	bile	amino acid

30 The diagram shows the arrangement of cells inside a green leaf.
(No cell contents are shown)



Which cells contain chloroplasts?

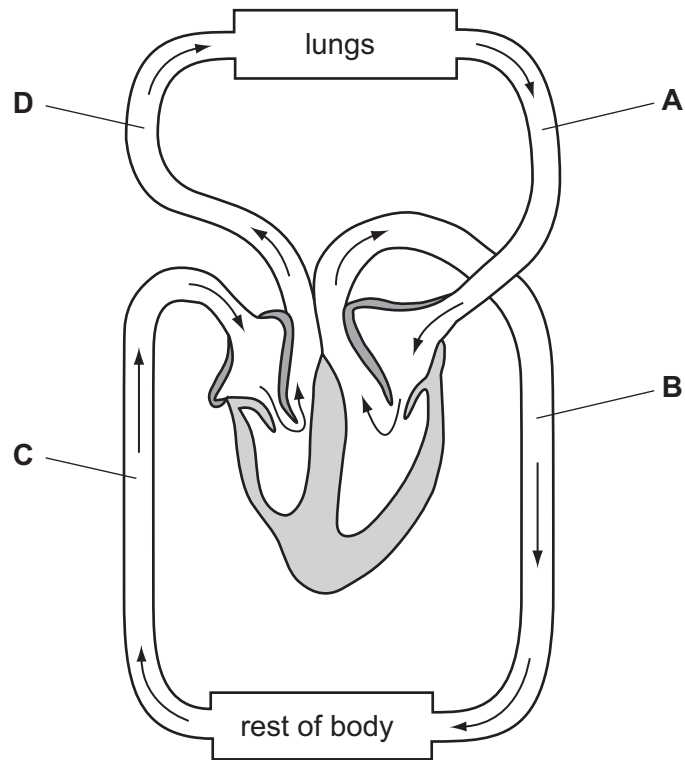
- A** V, W and X **B** V, W and Y **C** W, X and Y **D** W, X and Z

31 Which substance is built up of amino acids?

- A** amylase
B glucose
C glycogen
D urea

32 The diagram shows part of the human circulatory system.

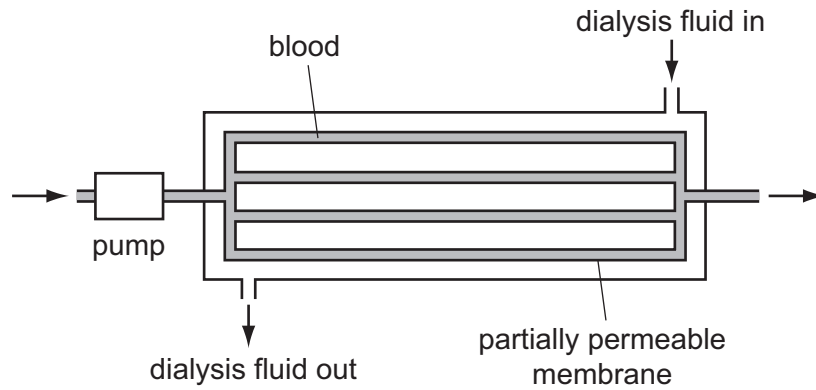
In which vessel is the blood pressure highest?



33 What are the conditions in the muscles when lactic acid is produced?

	concentration of carbon dioxide	supply of oxygen
A	high	less than oxygen demand
B	high	more than oxygen demand
C	low	less than oxygen demand
D	low	more than oxygen demand

34 The diagram represents a kidney machine.

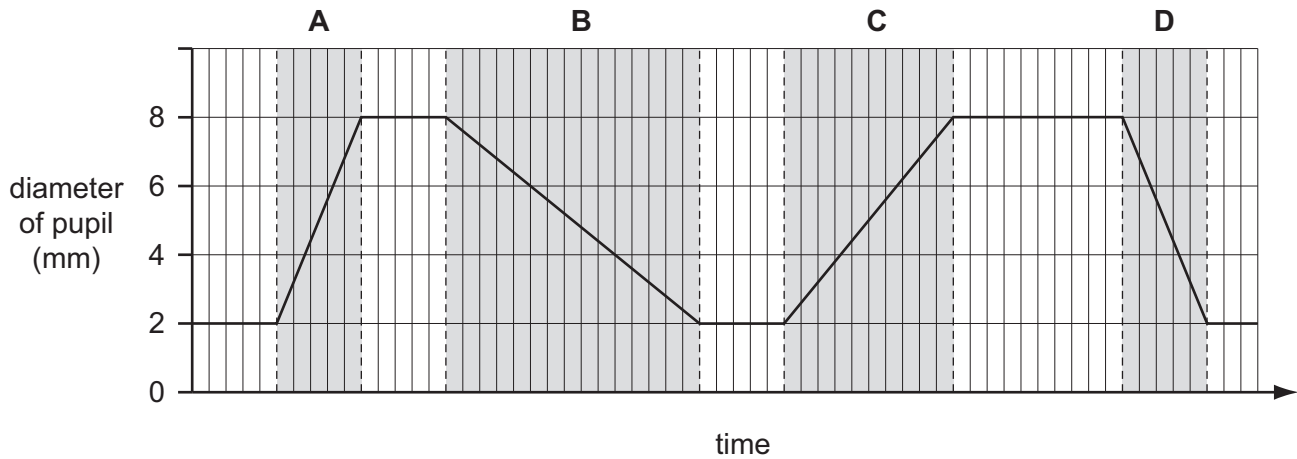


Which substances are present in the dialysis fluid entering the machine?

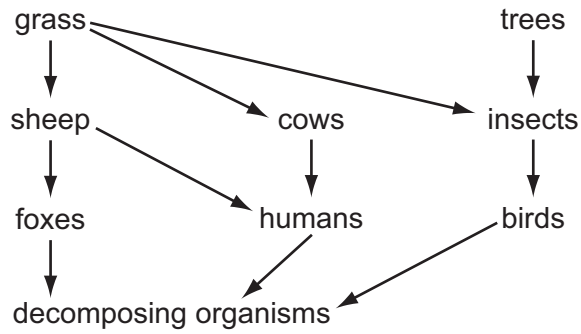
- A glucose and protein
- B glucose and salts
- C protein and urea
- D urea and salts

35 The diameter of a person's pupil is measured as the light intensity is varied.

During which time period does the light intensity increase fastest?



36 The diagram shows part of a food web.

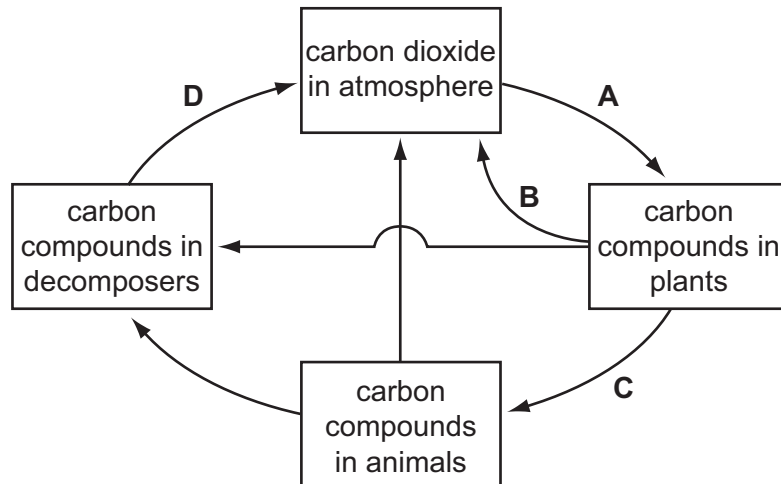


What is the source of energy that enters this food web?

- A decomposing organisms
- B grass
- C oxygen
- D sunlight

37 The diagram shows part of the carbon cycle.

Which process causes the largest amount of carbon to be converted from one form to another?

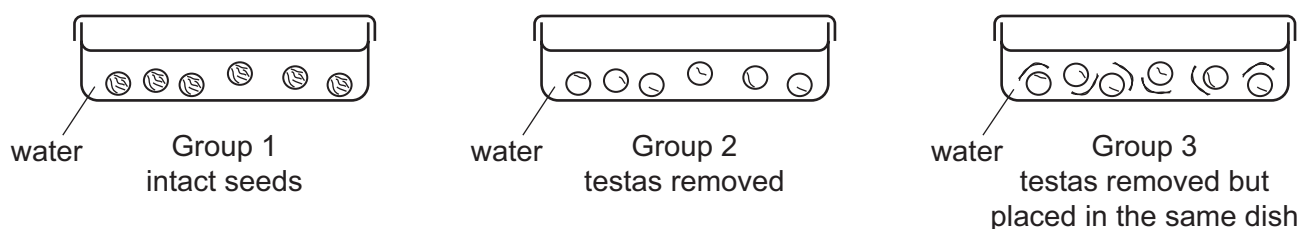


- 38 The seeds of some plants will not normally germinate until they have been in the ground for several months. Seeds of one such plant were divided into three groups and covered with water in shallow glass dishes with loose-fitting lids.

Group 1 were intact seeds.

Group 2 were seeds from which the testas had been removed.

Group 3 were seeds from which the testas had been removed, but the testas were placed separately in the same dish.



Only the seeds in Group 2 germinated.

What would be the most logical extension of this experiment?

- A Find out whether changing the water in the dish daily results in germination of intact seeds.
 - B Compare the germination of aerated seeds with an unaerated control group.
 - C Repeat the experiment at several different temperatures.
 - D Repeat the experiment using different species of seed.
- 39 What are the features of human eggs, when compared with sperm?

	size	number produced
A	larger	larger
B	larger	smaller
C	smaller	larger
D	smaller	smaller

- 40 Some normal fruit flies are subjected to radiation in a laboratory. As a result, they produce offspring with unusual characteristics, such as white eyes.

What causes this?

- A continuous variation
- B discontinuous variation
- C dominance
- D mutation

DATA SHEET
The Periodic Table of the Elements

		Group																			
I	II	III	IV	V	VI	VII	0														
		1 H Hydrogen 1					4 He Helium 2														
7 Li Lithium 3	9 Be Beryllium 4							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 Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18														
39 K Potassium 19	40 Ca Calcium 20	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	101 Ru Ruthenium 44	106 Pd Palladium 46	112 Cd Cadmium 48	115 In Indium 49	122 Sb Antimony 51	131 Xe Xenon 54														
133 Cs Caesium 55	137 Ba Barium 56	190 Os Osmium 76	195 Pt Platinum 78	201 Hg Mercury 80	204 Tl Thallium 81	209 Pb Lead 82	210 Rn Radon 86														
226 Ra Radium 88	227 Ac Actinium 89																				
*58-71 Lanthanoid series																					
†90-103 Actinoid series																					
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%; text-align: center;">a</td> <td style="width: 20%; text-align: center;">X</td> <td style="width: 20%; text-align: center;">b</td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: right;">Key</td> <td></td> <td style="text-align: center;">a = relative atomic mass</td> <td style="text-align: center;">X = atomic symbol</td> <td style="text-align: center;">b = proton (atomic) number</td> </tr> </table>													a	X	b		Key		a = relative atomic mass	X = atomic symbol	b = proton (atomic) number
	a	X	b																		
Key		a = relative atomic mass	X = atomic symbol	b = proton (atomic) number																	
		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71								
		232 Th Thorium 90	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103								

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

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