Name:	Index Number:	Class:

YIO CHU KANG SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2020
SECONDARY ONE EXPRESS

SCIENCE

1 hour 30 minutes

Additional Materials:
Optical Answer Sheet (OAS)

6 October 2020 (Tuesday)

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on the cover page.
Write in dark blue or black ink.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

SECTION A: Multiple Choice Questions
This section consists of **fifteen** multiple choice questions. 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 answer in soft pencil in the separate OAS.

SECTION B: Structured Questions
This section consists of structured questions. Answer **all** questions.
Write your answers in the spaces provided.
The number of marks is given in brackets [ ] at the end of each question or part question.

The use of an approved scientific calculator is expected, where appropriate.
A copy of the Periodic Table is printed on page 18.

For Examiner's Use
80

Setter: Mr Wong Mingwei

This document consists of **18** printed pages and **2** blank pages.

SECTION A: Multiple Choice Questions [15 marks]
Answer **all** questions in soft pencil on the separate OAS.

1 Which of the following correctly states the S.I. unit of length, volume and mass?

	length	volume	mass
A	centimetre	cubic metre	gram
B	metre	cubic centimetre	kilogram
C	metre	cubic metre	kilogram
D	kilometre	cubic centimetre	gram

2 The following statements describe an unknown material.

I does not conduct electricity
II not flexible
III not transparent

Which of the following best describes the unknown material?

A ceramic
B fibre
C glass
D metal

3 Sodium chloride, NaCl, dissolves completely in water.

Which of the following is **correct**?

	sodium chloride	water
A	solution	suspension
B	solute	solvent
C	solvent	solute
D	suspension	solution

4 Melvin wanted to investigate the factors affecting the rate at which a substance dissolves.

He added sugar to three cups of coffee under different conditions.
The results are shown in the table below.

cup	temperature (°C)	type of sugar	stirring
X	20	cube	yes
Y	40	cube	yes
Z	20	grains	no

Which of the following statements best explains his result?

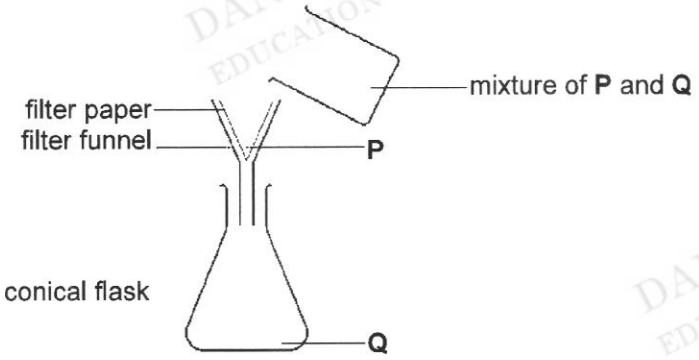
A Sugar in cup **X** dissolves completely faster than sugar in cup **Z** because sugar in cup **X** has a larger surface area exposed to coffee.

B Sugar in cup **Y** dissolves completely faster than sugar in cup **X** because temperature of the coffee was higher in cup **Y**.

C Sugar in cup **Z** dissolves completely faster than sugar in cup **Y** because sugar in cup **Y** has a larger surface area exposed to coffee.

D Sugar in cup **Z** dissolves completely faster than sugar in cup **Y** because temperature of the coffee was lower in cup **Z**.

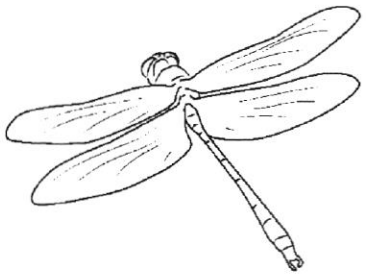
5 The following apparatus was setup as shown below.



Which of the following could **P** and **Q** be?

	P	Q
A	oil	water
B	sugar	chalk powder
C	sand	oil
D	salt	sugar

6 The diagram shows an insect.



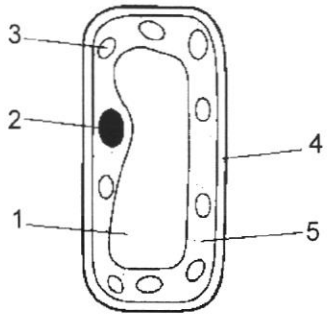
Use the key to identify the insect.

1	wings present	go to 2
	wings absent	A
2	two pairs of wings	go to 3
	one pair of wings.....	B
3	wings with circular markings	C
	wings without circular markings	D

7 Which characteristics do bony fish have?

	backbone	scales	hair
A	✗	✗	✓
B	✗	✓	✗
C	✓	✓	✗
D	✓	✗	✓

8 The diagram shows the structure of a plant cell.



Which features are also found in an animal cell?

A 2 and 3

B 2 and 5

C 3 and 4

D 4 and 5

9 Which of the following shows the correct complementary base pairing in a molecule of DNA?

A Adenine pairs with Cytosine.

B Adenine pairs with Guanine.

C Adenine pairs with Thymine.

D Cytosine pairs with Thymine.

10 The basic unit of DNA is a nucleotide.

Which of the following is not a part of a nucleotide?

A nitrogenous base

B phosphate group

C sugar

D sulfur

11 Which of the following substances contains particles that move the fastest at room temperature?

A air

B butter

C ice

D iron

12 The chemical formula for hydrogen peroxide is H_2O_2.

Which of the following cannot be inferred from the chemical formula?

A Hydrogen peroxide is a compound.

B Hydrogen peroxide is a liquid mixture.

C Hydrogen peroxide is made up of two types of elements.

D There are two hydrogen atoms and two oxygen atoms in hydrogen peroxide.

13 Which of the following is **not** an effect of forces?

A change the shape of an object

B change the direction of a moving object

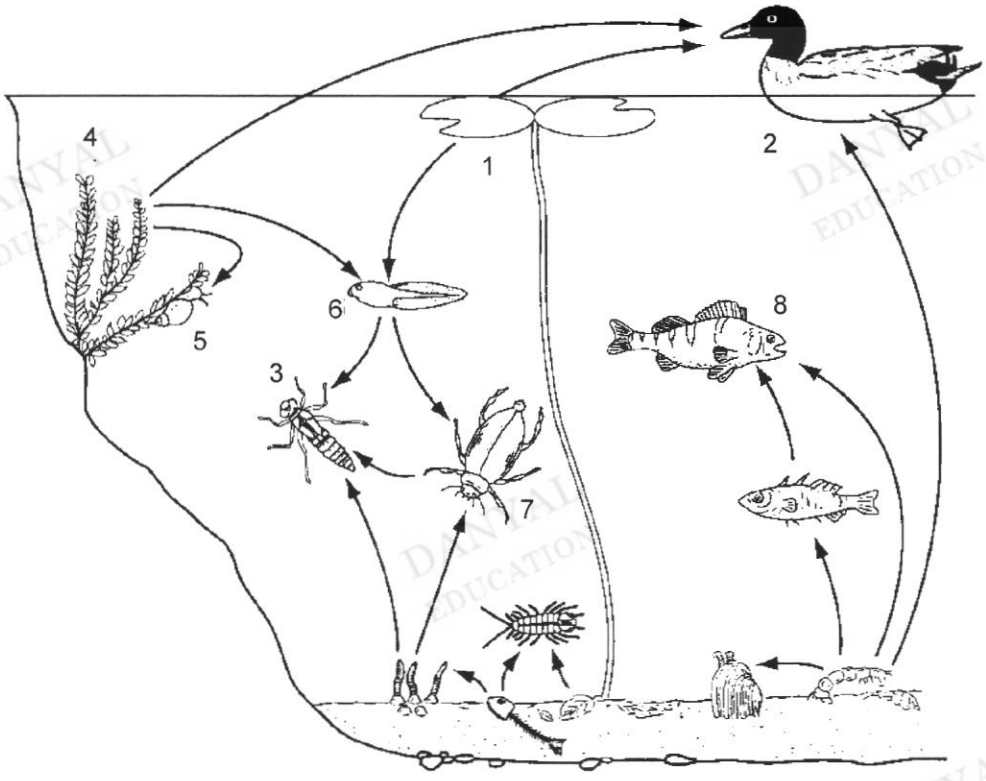
C change the mass of an object

D start a stationary object moving

14 Which of the following is not a contact force?

A friction
B gravity
C pull
D push

15 The diagram shows a food web in a freshwater pond.



Which of the organisms is a producer, a herbivore and a carnivore?

	producer	herbivore	carnivore
A	1	6	7
B	2	4	5
C	4	2	6
D	7	3	8

SECTION B: Structured Questions [65 marks]

Answer **all** questions in the spaces provided.

16 A shopkeeper places two identical blocks of cheese on a balance.

The combined mass of the two blocks of cheese is shown in Fig. 16.1.

Each block measures 2.0 cm × 5.0 cm × 10.0 cm.

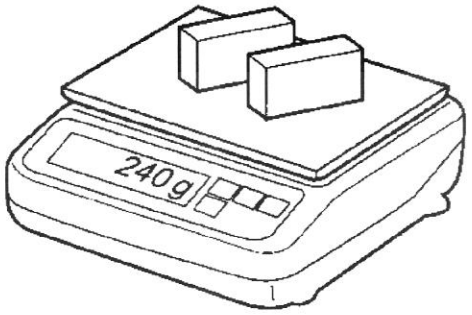


Fig. 16.1

(a) Calculate the density of cheese in g/cm^3.

density = ... g/cm^3 [2]

(b) The shopkeeper's assistant wanted to measure the density of an irregular shaped cheese.

Outline the steps that the assistant should take to measure the density of the cheese. He was only given the following apparatus:

electronic beam balance ***displacement can*** ***measuring cylinder*** ***water***

.....

.....

.....

.....

.....

.....

.....

.....[5]

17 Fig. 17.1 shows a chromatogram of food dyes. A drop of food dye was dropped on a piece of filter paper and the filter paper was placed in a petri dish of solvent.

A, **B** and **C** are approved food dyes while **L**, **M** , **N**, **O** and **P** are food dyes obtained from various food sources.

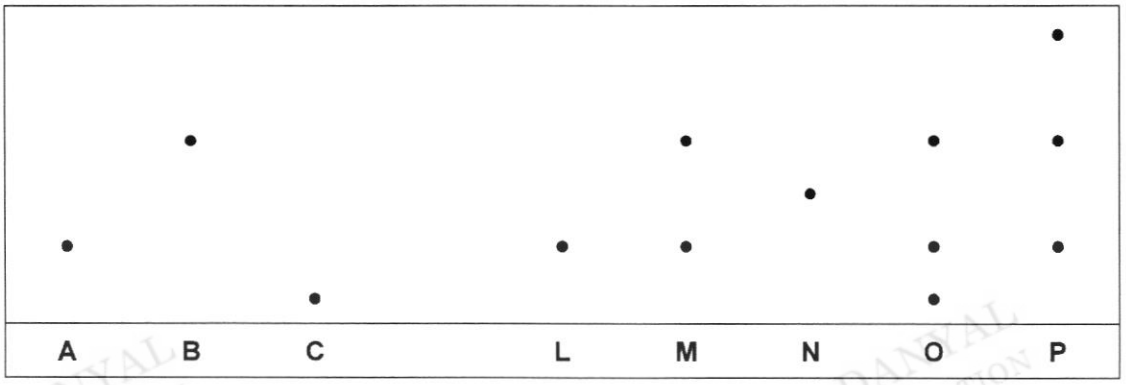


Fig. 17.1

(a) **(i)** With reference to Fig. 17.1, classify the food dyes (**A**, **B**, **C**, **L**, **M**, **N**, **O**, **P**) as pure substances or mixtures.

pure substances .....

mixtures .....[2]

(ii) Explain why you consider the food dye(s) mentioned in **17(a)(i)** as pure substances.

.....

.....[1]

(iii) Describe **one** factor that affects the rate at which the dye moves up the filter paper.

.....

.....[1]

(b) State **and** explain which food dye(s) should not be added into the food humans eat.

food dye(s) .....

explanation .....

.....[2]

18 Fig. 18.1 shows the set-up for fractional distillation.

Fractional distillation separates a pure liquid from a solution of liquids based on the different boiling points of the liquids.

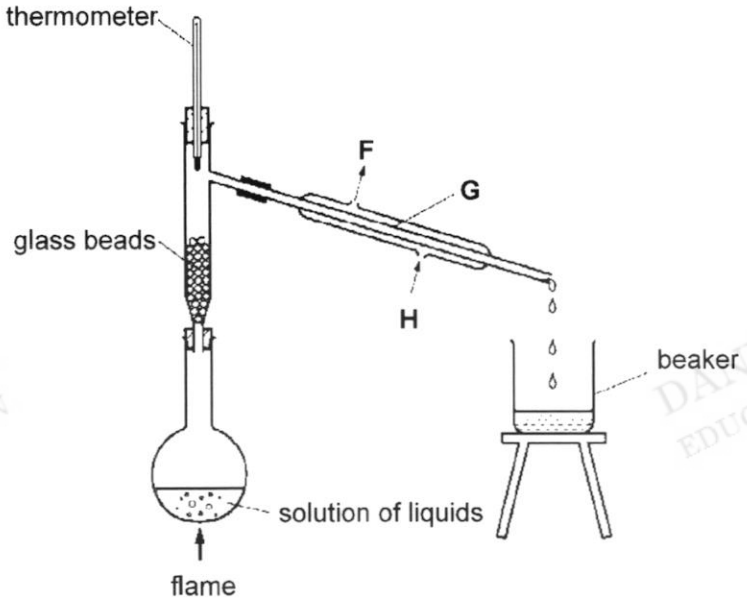


Fig. 18.1

(a) **(i)** Name apparatus **G**.

.....[1]

(ii) Suggest why cool water is pumped in from **H** instead of **F**.

.....

.....[2]

(b) Table 18.1 shows the boiling points of the liquids in the round bottom flask.

Table 18.1

liquid	boiling point / °C
A	78
B	61
C	57
D	100

Arrange the liquids in sequence of collection in the beaker.

collected first	collected second	collected third	collected last

[3]

19 Sodium is represented in the periodic table as $^{23}_{11}Na$.

(a) For one neutral atom of sodium, state

(i) the number of electrons, ... [1]

(ii) the number of neutrons, ... [1]

(iii) its nucleon number. ..... [1]

(b) Fig. 19.1 shows a lithium (Li) ion.

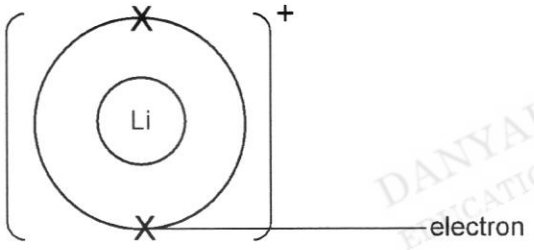


Fig. 19.1

Suggest why the lithium ion has a positive charge.

.....[1]

20 Fig. 20.1 shows five containers, labelled **A** to **E**, filled with different substances. The symbols in the containers represent the particles that make up each substance.

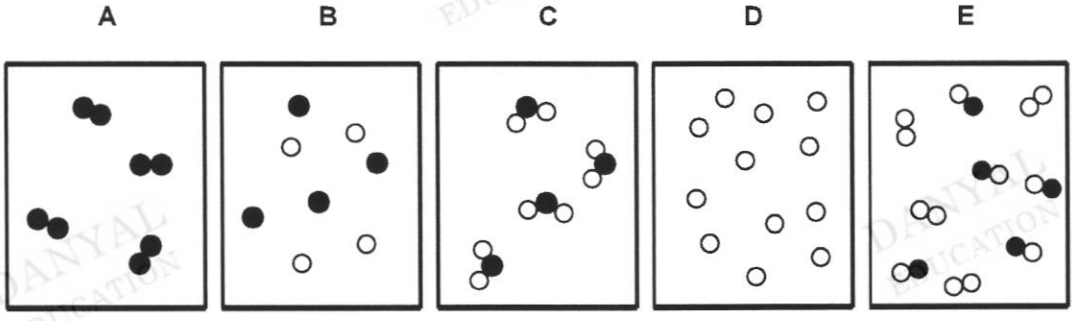


Fig. 20.1

Use the letter **A**, **B**, **C**, **D** or **E** to answer the following questions.
You may use each letter once, more than once or not at all.

(a) Which container(s) contain only atoms? ..... [1]

(b) Which container(s) contain only one element? ..... [1]

(c) Which container(s) contain a mixture of molecules? ..... [1]

(d) Which container(s) contain only compounds? ..... [1]

21 Fig. 21.1 shows some cells found in the trachea (windpipe) of a human which helps to sweep bacteria and dust particles up and out of the trachea (windpipe).

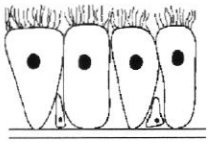


Fig. 21.1

(a) Explain why the cells in Fig. 21.1 is known as a *tissue*.

.....

.....[2]

(b) **(i)** Fig. 21.2 shows some cells found in the blood of humans.

Fig. 21.2

State the function of these cells.

.....

.....[1]

(ii) The cells do not have nuclei when they mature.

Explain the function of the nucleus in a cell.

.....

.....[1]

(c) **(i)** Fig. 21.3 shows a muscle tissue.

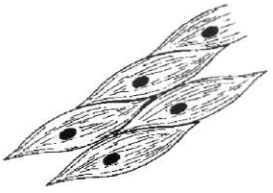


Fig. 21.3

On Fig. 21.3, label the cytoplasm **and** cell membrane. [2]

(ii) State the function of the muscle tissue.

.....

.....[1]

22 Table 22.1 shows the melting and boiling points of some substances.

Table 22.1

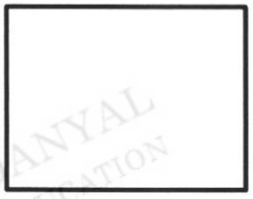
substance	melting point / °C	boiling point / °C
P	- 100	- 56
Q	- 12	26
R	18	97
S	56	205

(a) Indicate the physical state of each of the substances at 27°C by placing the letters **P**, **Q**, **R** and **S** under the correct headings in the table below.

solid	liquid	gas

[2]

(b) Draw the arrangement of particles in substance **P** at 0 °C in the box below.



[1]

(c) Explain the following in terms of the particulate model of matter:

(i) Liquids have no fixed shape.

.....

.....

.....[2]

(ii) Density of solids reduces when heated.

.....

.....

.....

.....[3]

23 Fig. 23.1 shows four different animals.

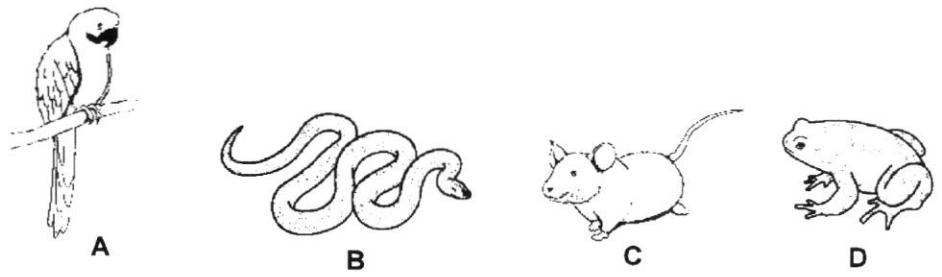


Fig. 23.1

(a) State one characteristic of all vertebrates

.....[1]

(b) Classify each animal into its correct group by choosing words from this list.

Write your answers in the '**group**' column of Table 23.1. [1]

amphibian bird fish insect mammal mollusc reptile

Table 23.1

	group	feature 1	feature 2
A			
B			
C			
D	amphibian	live on land and in water	slimy skin

(c) Using phrases from the list, complete Table 23.1 by adding **two** features of each animal group, as shown for amphibians.

Each phrase can only be used **once**.

- gives birth to live young
- has a shell
- has beak
- has feathers
- has fur
- has gills
- has no backbone
- has scaly skin
- has slimy skin
- has 8 legs
- has 6 legs
- lay eggs with shell
- live on land and in water

[3]

24 A wooden block is pulled across a horizontal table at a constant speed of 0.20 m/s as shown in Fig. 24.1.

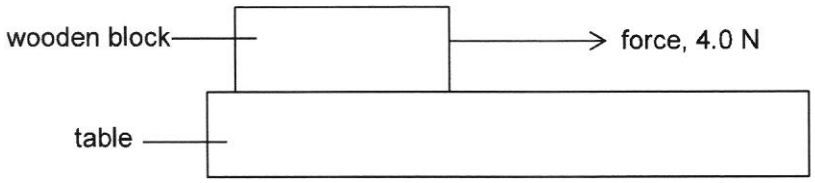


Fig. 24.1

(a) On Fig. 24.1, draw an arrow to indicate

(i) the weight of the wooden block, [1]

(ii) the frictional force acting on the wooden block. [1]

(b) The block is pulled a distance of 0.80 m by the horizontal force of 4.0 N.

Calculate the time taken for the block to move 0.80 m.

time = ... s [1]

(c) In order for the wooden block to be moved at a constant speed across the table, suggest the magnitude of frictional force.

..... N [1]

(d) Suggest one way to reduce the frictional force.

..... [1]

25 Fig. 25.1 shows a soccer boot with studs at the bottom of the boot.

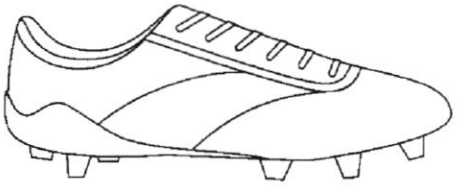


Fig. 25.1

Tyler wears one soccer boot and rest his entire weight on one foot.
Thaddeus wears both soccer boots and rest his entire weight on both feet.

It is given that Tyler weighs 500 N and Thaddeus weighs 750 N, and the total surface area of the studs per soccer boot is 25 cm^2.

Determine who exerts a greater pressure on the ground.
Show your working in the space below.

Answer: ..... exerts a greater pressure on the ground. [4]

26 Fig. 26.1 shows the carbon cycle.

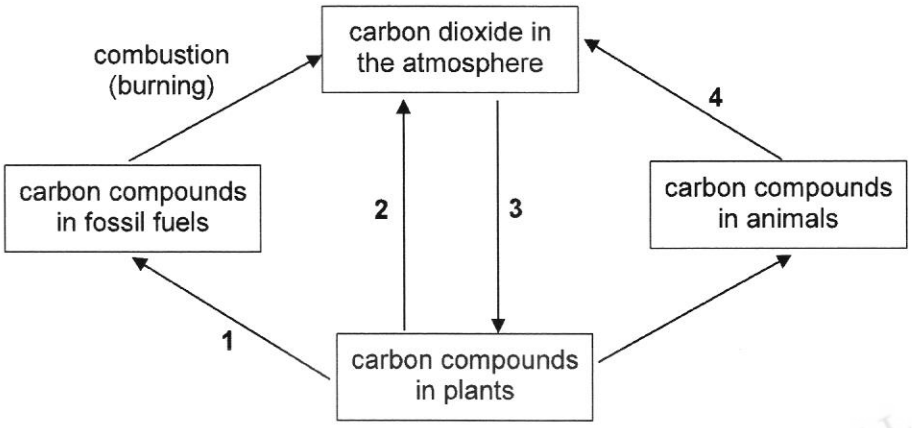


Fig. 26.1

(a) **(i)** State **all** the numbers in Fig. 26.1 that represent respiration.

.....[1]

(ii) State the name of the process represented by **3**.

.....[1]

(b) Deforestation can cause an increase in the concentration of carbon dioxide in the atmosphere.

State **two** undesirable effects of deforestation.

1 .....

.....

2 .....

..... [2]

(c) Suggest **two** ways to conserve the environment.

1 .....

.....

2 .....

..... [2]

27 Fig. 27.1 shows the energy flow through a food chain.

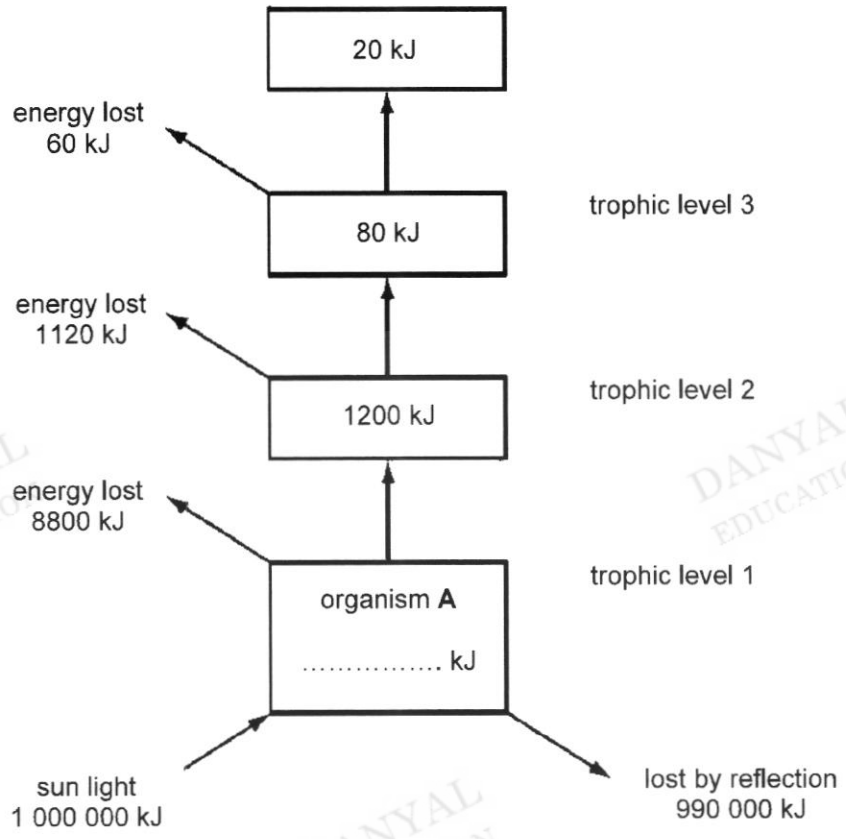


Fig. 27.1

(a) Calculate the quantity of energy trapped by organism **A**.
Show your working.

energy = ... kJ [1]

(b) Suggest **two** ways in which energy is lost at each trophic level.

1 .....

.....

2 .....

..... [2]

END OF PAPER

2020 1E End of Year Examination
Answer Scheme

MCQ

1 C	**2 A**	**3 B**	**4 B**	**5 C**
6 D	**7 C**	**8 B**	**9 C**	**10 D**
11 A	**12 B**	**13 C**	**14 B**	**15 A**

SECTION B

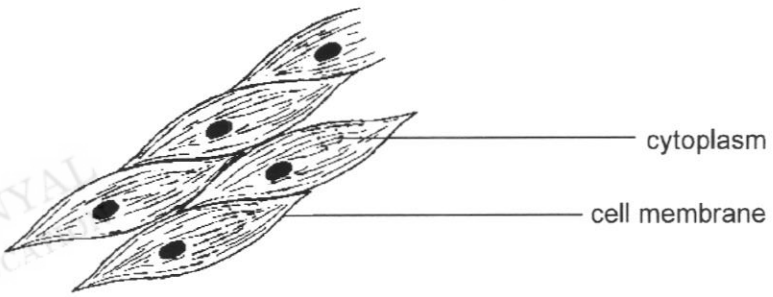
16(a)	volume = 2 x 5 x 10 = 100 cm^3 density = 240/200 = 1.2 kg/cm^3	1 1
16(b)	1 measure the mass of the cheese using an electronic beam balance, and record the value down 2 fill the displacement can with excess water, and allow the water to drain out of the displacement can 3 place the measuring cylinder at the mouth/ spout of the displacement can 4 gently lower the cheese into displacement can and measure the volume of water displaced in the measuring cylinder 5 divide the mass by volume to obtain the density	5
		[Total: 7]

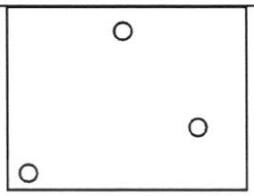
17(a)(i)	pure substances: A, B, C, L, N ; mixtures: M, O, P ;	1 1
17(a)(ii)	the food dyes only contain one component/ did not separate into other components ;	1
17(a)(iii)	solubility of food dye in solvent ; (molecular) mass of food dye ;	1
17(b)	*food dyes* N and P ; *explanation:* the food dyes found in N and P are not approved food dyes ;	1 1
		[Total: 6]

18(a)(i)	condenser	1
18(a)(ii)	1 If water was pumped in from F, it will not be able to fully fill the condenser with cool water ; 2 Hence, it will not be able to cool the hot vapour and convert it to liquid ; *accept reverse answer*	1 1
18(b)	<table><tr><th>collected first</th><th>collected second</th><th>collected third</th><th>collected last</th></tr><tr><td>**C**</td><td>**B**</td><td>**A**</td><td>**D**</td></tr></table> 1 correct – 0M 3 correct – 2M 2 correct – 1M 4 correct – 3M	3
		[Total: 6]

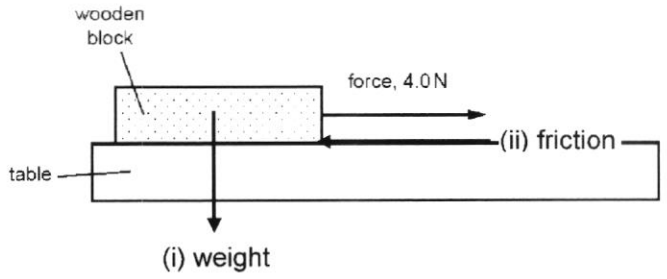
19(a)(i)	11	1
19(a)(ii)	12	1
19(a)(iii)	23	1
19(b)	number of protons more than number of electrons	1
		[Total: 4]

20(a)	only atoms: **B** and **D**	1
20(b)	only one element: **A** and **D**	1
20(c)	mixture of molecules: **E**	1
20(d)	only compounds: **C**	1
		[Total: 4]

21(a)	1 made up of group of (similar) cells ; 2 working together to perform a similar function (sweep bacteria and dust particles up and out of windpipe) ;	1 1
21(b)(i)	(red blood cells) transport oxygen (from lungs) to rest of body ;	1
21(b)(ii)	nucleus controls all cell activities in the cell ;	1
21(c)(i)		1 1
21(c)(ii)	contracts to allow for movement ;	1
		[Total: 7]

22(a)	<table><tr><th>solid</th><th>liquid</th><th>gas</th></tr><tr><td>S</td><td>R</td><td>P, Q</td></tr></table> any two correct – 1M (total 2M)	2
22(b)	 particles must be well spaced out in the diagram ; particles should be approximately similar in size ;	1
22(c)(i)	1 particles of liquid are not held in fixed position (**accept:** *forces of attraction between particles of liquid are weaker than solid*) : 2 particles of liquid roll/ slide across one another hence. taking up the shape of the container ;	1 1
22(c)(ii)	1 when particles of solids are heated, they vibrate more vigorously : 2 hence, moving further apart from each other, increasing the volume of the solid ; 3 mass of the solid remains the same, hence, density decreases ;	1 1 1
		[Total: 8]

23(a)	all have backbone ;	1
23(b)(c)	<table><tr><th></th><th>group</th><th>feature 1</th><th>feature 2</th></tr><tr><td>A</td><td>**bird**</td><td>**has beak**</td><td>**has feathers**</td></tr><tr><td>B</td><td>**reptile**</td><td>**has scaly skin**</td><td>**lay eggs with shell**</td></tr><tr><td>C</td><td>**mammal**</td><td>**gives birth to live young**</td><td>**has fur**</td></tr><tr><td>D</td><td>amphibian</td><td>live on land and in water</td><td>slimy skin</td></tr></table> all correct for 'group' – 1M any <u>two</u> correctly stated feature – 1M (total = 3M)	4
		[Total: 5]

24(a)	 (i) arrow must extend out of the box/ touch the box (ii) arrow must be touching the box & on the surface of the table	2
24(b)	time = distance / speed = 0.80 / 0.20 = 4 s ;	1
24(c)	4.0 N ;	1
24(d)	apply lubricant/ oil/ powder on the surface of the table ;	1
		[Total: 5]

25	Tyler: pressure = 500 N / 25 cm^2 = 20 N/cm^2 Thaddeus: pressure = 750 N / (25x2)cm^2 = 15 N/cm^2 Tyler exerts a greater pressure on the ground	 1 1 1 1
		[Total: 4]

26(a)(i)	respiration: **2** and **4**	1
26(a)(ii)	photosynthesis	1
26(b)	1 results in global warming ; 2 results in soil erosion ; 3 results in flooding ;	max 2
26(c)	1 implement laws to stop burning of forests/ overfishing/ illegal poaching; 2 reduce, reuse and recycle materials such as plastics/ papers ; any other valid points that are linked to the above two points	1 1
		[Total: 6]

27(a)	1 000 000 – 990 000 = 10 000 kJ	1
27(b)	1 lost as heat during respiration ; 2 lost in uneaten body parts of the organism e.g. bones, horns ; 3 lost as excretory products such as faeces, urea ;	max 2
		[Total: 3]