SERANGOON SECONDARY SCHOOL
PRELIMINARY EXAMINATION
SECONDARY 4 NORMAL TECHNICAL

CANDIDATE NAME		INDEX NUMBER	
CLASS	4 N 1		

SCIENCE SYLLABUS T

5148/01

Paper 1 Multiple Choice

18 Aug 2021
1 hour

Additional Materials: Multiple Choice Answer Sheet

Setter(s): Mr Yan TP

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staplers, paper clips, glue or correction fluid.
Write your name, class and index number and name on the Multiple Choice Answer Sheet.
DO **NOT** WRITE IN ANY BARCODES.

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.

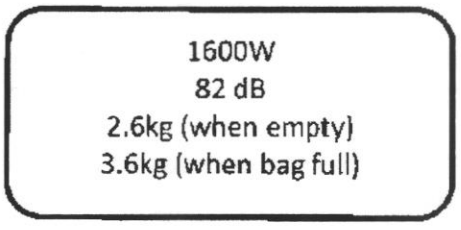
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
The use of an approved scientific calculator is expected, where appropriate.

This question paper consists of **14** printed pages, including this **cover** page.

1 A student uses a broken ruler to measure the length of two pieces of metal rods. What is the **total** length of the two pieces of metal rods?

A 64 mm
B 116 mm
C 124 mm
D 150 mm

2 A new vacuum cleaner has the following information displayed on the box.



What is the power rating and sound level generated by the vacuum cleaner?

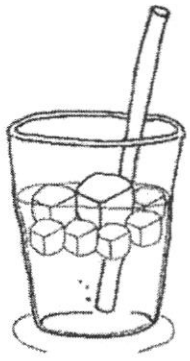
	Power rating	Sound level
A	1 kg	82 dB
B	1600 W	82 dB
C	82 dB	1600 W
D	3.6 kg	1600 W

3 Which of the following properties does not change when a ball is dropped and bounced on a floor?

A direction of ball
B mass of the ball
C shape of the ball
D size of the ball

4 The diagram shows a cup of iced-tea being prepared.

The initial temperature of the ice cubes was 0 °C and the tea was at 85 °C.



After 10 minutes, the temperature of the tea and the amount of ice have changed. Which row describes the change of the temperature?

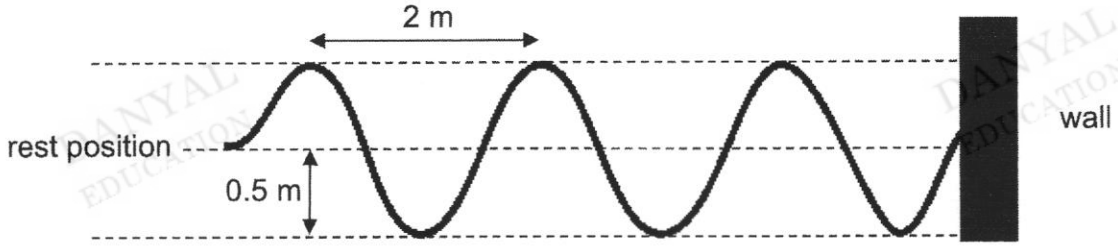
A The temperature of the tea increases while the amount of ice increases as thermal energy is transferred into the ice from the tea.

B The temperature of the tea decreases while the amount of ice increases as thermal energy is transferred into the tea from the ice.

C The temperature of the tea increases while the amount of ice decreases as thermal energy is transferred into the tea from the ice.

D The temperature of the tea decreases while the amount of ice decreases as thermal energy is transferred into the ice from the tea.

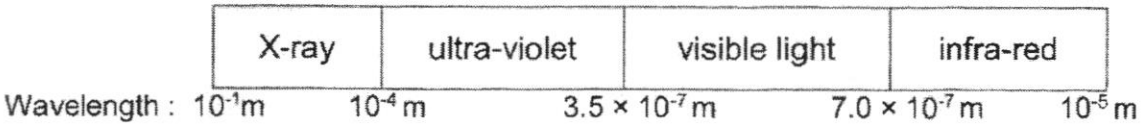
5 The diagram shows a rope wave being produced along a rope with one end fixed on a wall.



What is the wavelength of the wave?

A 0.5 m **B** 1.0 m **C** 1.5 m **D** 2.0 m

6 The diagram shows the wavelengths of some different waves.



What are the waves with the wavelengths in the range 7.0×10^{-7} m to 10^{-5} m used for?

A radiological applications
B remote control applications
C satellite communications
D disinfection of surfaces

7 Which equation is used to calculate the acceleration of an object?

A change in distance ÷ time taken
B change in speed ÷ time taken
C change in distance × time taken
D change in speed × time taken

8 When is kinetic energy converted into gravitational potential energy?

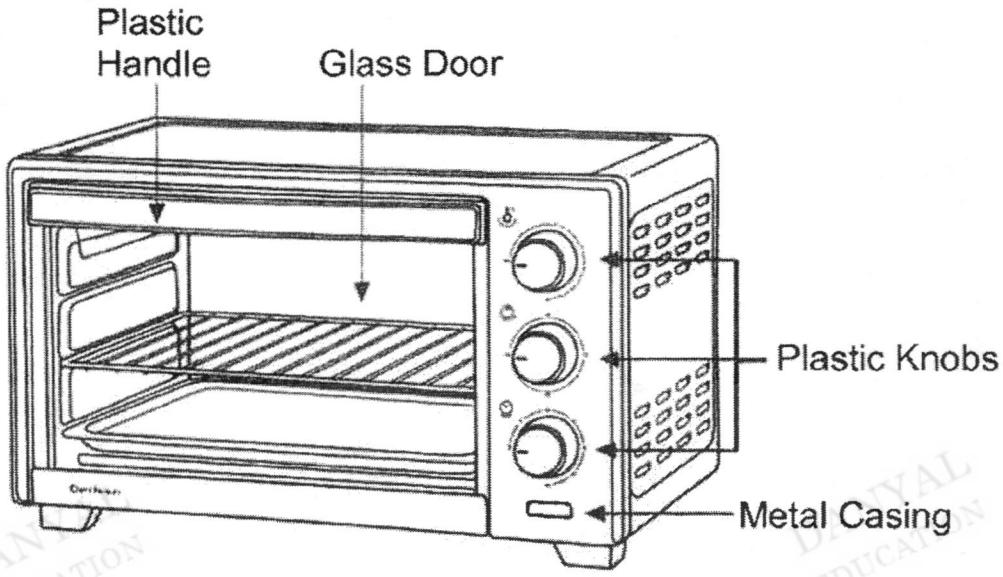
A A ball is thrown up and landed on the roof of a house.
B A ball was kicked on a flat field and landed 10 m away.
C A ball rolled off the roof of a house and landed on the road below.
D A ball was floating in the middle of a swimming pool.

9 A worker used 800 J of energy to transfer sand over 20 s.

What is the power generated by the worker?

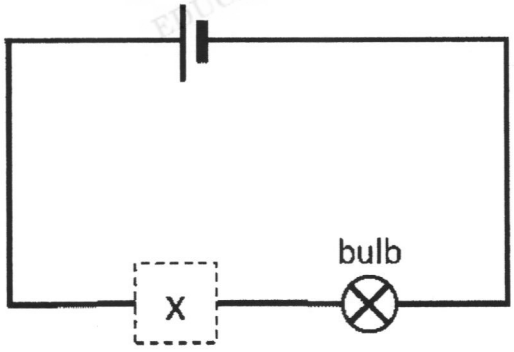
A 4 W
B 20 W
C 40 W
D 1600 W

10 Which part of the toaster should the earth wire be connected to?



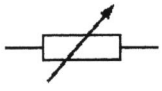
A glass door
B plastic handle
C plastic knobs
D metal casing

11 To adjust the brightness of the bulb, an electrical component is placed at X in the circuit shown below.



What should be connected at X to be able to adjust the brightness of the bulb?

A

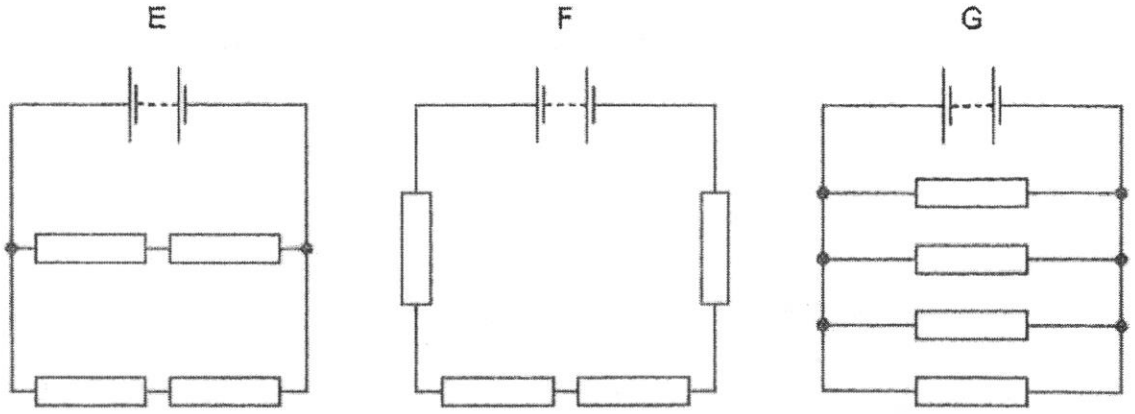


B

C

D

12 Four identical resistors are connected in circuits **E**, **F** and **G**.



Which list gives the circuits in order of their effective resistances from the smallest to the largest?

A E, F, G
B F, G, E
C G, E, F
D G, F, E

13 A man uses four electrical appliances in his home.

Which appliance costs the least to use for the time shown?

A 400 W for 9 hours
B 700 W for 7 hours
C 700 W for 5 hours
D 100 W for 3 hours

14 Which of the following is **not** a fossil fuel power station?

A coal fired power station
B gas fired power station
C nuclear power station
D oil fired power station

15 A transformer is made up of

A two coils of copper wire wrapped around a soft iron core.
B two coils of iron wire wrapped around a copper core.
C four coils of copper wire wrapped around a soft iron core.
D four coils of iron wire wrapped around a copper core.

16 Plant crop yields can often be increased by the addition of several types of chemicals.

Which type of chemical is used to increase nutrient level?

A fertilisers
B herbicides
C pesticides
D plant hormones

17 Methods of farming are always changing.

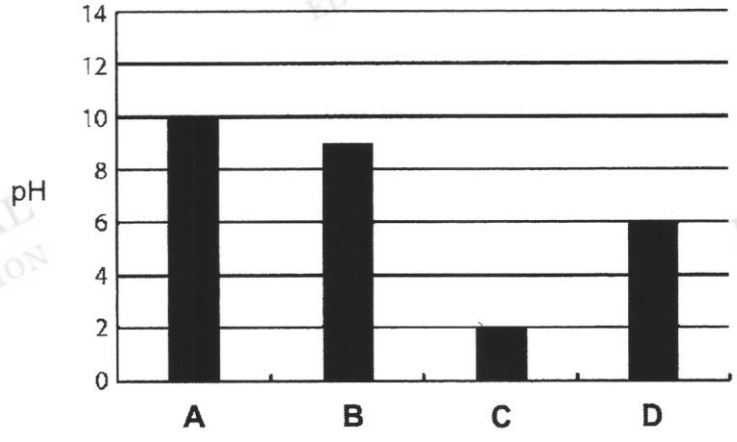
One way they have changed is the development of intensive food production methods.

Which statement is a reason why intensive food production methods are needed?

A There is a limited amount of space to grow crops.
B The world population is decreasing.
C Modern human lifestyle requires lower calorie intake.
D The average human life span has decreased.

18 Mr Tan tested the pH of the soil in four different plots of land to find out the pH of the soils.

The chart below shows the results of his test.



He needs to treat one plot of the land with alkali to neutralise the strongly acidic soil.

Which plot of land, **A**, **B**, **C** or **D**, would Mr Tan be treating?

19 Breakfast is being prepared in a kitchen.

Which processes involve a chemical change?

1. boiling water
2. frying an egg
3. toasting bread
4. melting butter

A 1 and 2 only
B 2 and 3 only
C 1, 2 and 3 only
D 2, 3 and 4 only

20 We brush our teeth with a toothbrush and a toothpaste every day.

What is the chemical reaction that takes place when we brush our teeth?

A burning
B decomposition
C dissolving
D neutralisation

21 Chemicals used in the cleaning of clothes can get washed into rivers.

When this happens, they can cause an increase in the growth of algae and water weeds.

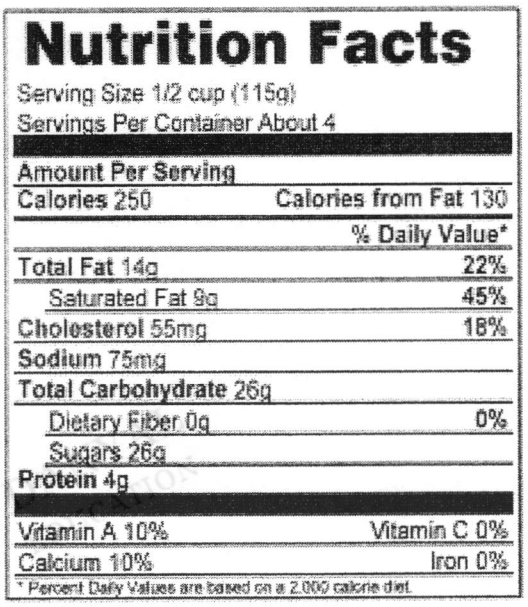
What is the name of this type of chemical?

A acidic waste water
B pesticides
C phosphate detergents
D preservatives

22 Which of the following is used to test for presence of starch in a food sample?

A limewater test
B biuret test
C iodine solution test
D blot test

Refer to the nutrition label found on a container of chocolate biscuits for Questions 23 to 24.



Nutrition Facts

Serving Size 1/2 cup (115g)
Servings Per Container About 4

Amount Per Serving

Calories 250	Calories from Fat 130
	% Daily Value*
Total Fat 14g	22%
Saturated Fat 9g	45%
Cholesterol 55mg	18%
Sodium 75mg	
Total Carbohydrate 26g	
Dietary Fiber 0g	0%
Sugars 26g	
Protein 4g	
Vitamin A 10%	Vitamin C 0%
Calcium 10%	Iron 0%

* Percent Daily Values are based on a 2,000 calorie diet.

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

23 If Haikal consumes one cup of the chocolate biscuits for recess, how much calories would he have consumed?

A 130 calories
B 250 calories
C 260 calories
D 500 calories

24 What is the maximum number of servings that can be consumed without exceeding the daily value of fat?

A 2 **B** 3 **C** 4 **D** 5

25 Which of the following are **not** reasons for using food additives?

A to preserve food
B to produce microbes
C to modify colour
D to modify texture

26 A package of cucumber pickle is made with vinegar and packed in a vacuum-sealed bag.

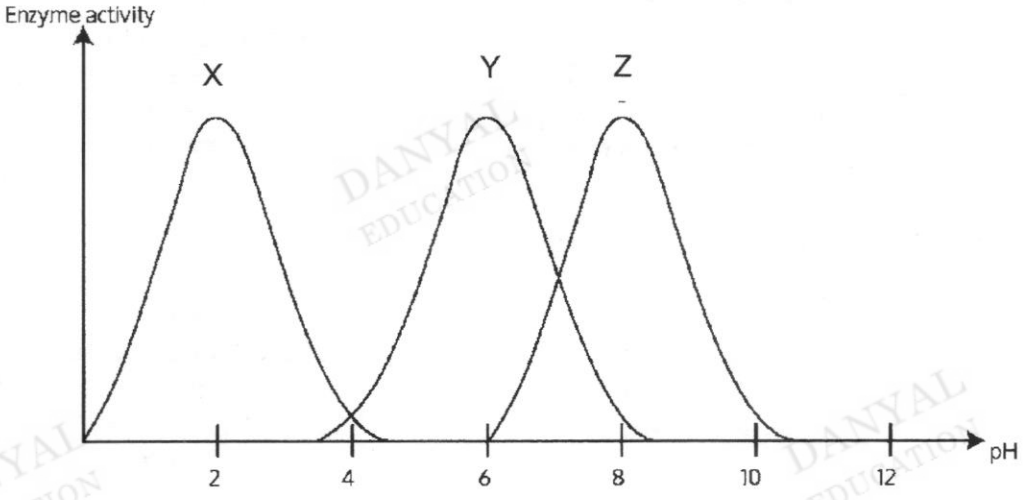
Which preservation techniques were used?

A reduced water content and reduced pH level
B reduced oxygen supply and reduced pH level
C reduced temperature and increased pH level
D reduced oxygen supply and increased pH level

27 Which of the following statements about bile is correct?

A Bile is stored in the liver.
B Bile is produced in the gall bladder.
C Bile is used to help break down fats and oils.
D Bile is removed by the acids in the stomach.

28 The diagram below shows how three enzymes work at different pH.



Which enzyme(s) work(s) best in the stomach?

A X only
B Y only
C X and Y only
D X and Z only

29 Which parts of the respiratory system move to cause inhalation?

A diaphragm moves down and ribcage moves downwards
B diaphragm moves down and ribcage moves upwards
C diaphragm moves up and ribcage moves downwards
D diaphragm moves up and ribcage moves upwards

30 Inhaled air contains 0.04% carbon dioxide, 20% oxygen and 79% nitrogen.

Which row shows the approximate composition of exhaled air?

	carbon dioxide / %	oxygen / %	nitrogen / %
A	0	16	79
B	0.04	24	50
C	4	16	79
D	9	16	50

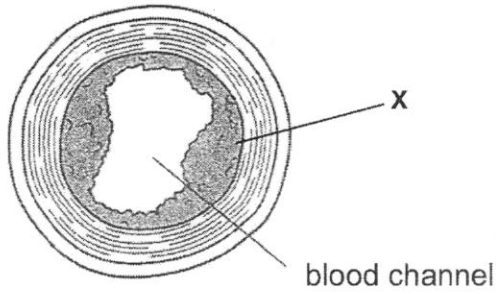
31 Which shows the correct chemical test for carbon dioxide and water?

	carbon dioxide	**water**
A	cobalt chloride turns pink	limewater turns cloudy
B	cobalt chloride turns blue	limewater turns clear
C	limewater turns cloudy	cobalt chloride turns pink
D	limewater turns clear	cobalt chloride turns blue

32 Which is true during exercise?

	pulse rate	**reason**
A	decreases	to reduce blood pressure
B	decreases	to reduce the stress on the heart
C	increases	to transport more oxygen
D	increases	to transport more water

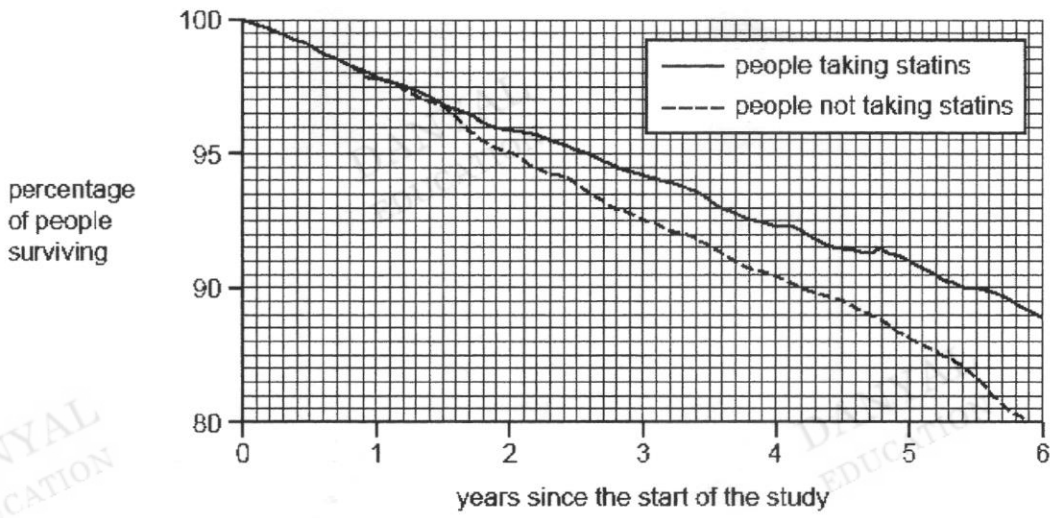
33 The diagram below shows the cross section of an artery of a person who has a habit of eating food high in fats and cholesterol.



What is part **X**?

A fiber
B plaque
C phlegm
D sugar

34 Scientists think that a type of drug called *Statins* might help prevent heart disease. The graph shows the results of a drug trial.



Which conclusion can be made from the results?

A All patients who took Statins survived after six years.
B Participants do not get heart disease if they take Statins.
C There is a higher percentage of survival for participants who took Statins.
D There is no difference in the death rate of the two groups.

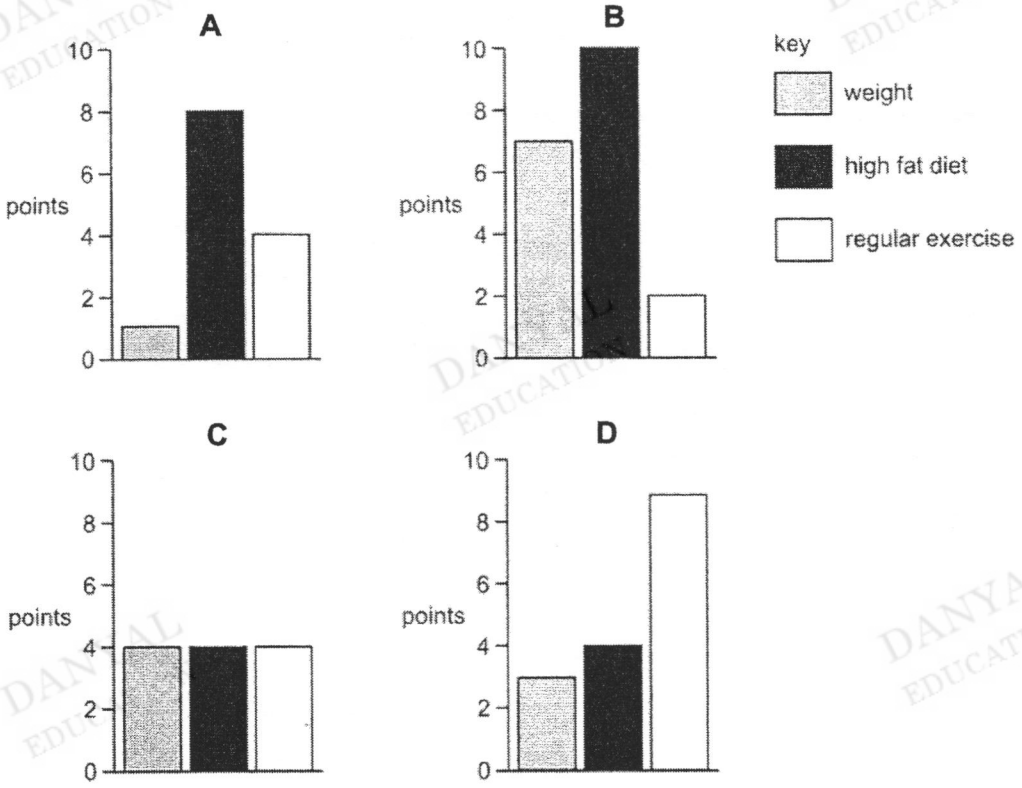
35 Which option correctly matches the functions of the different components of blood?

	platelets	red blood cells	white blood cells
A	clot blood	destroy bacteria	transport oxygen
B	clot blood	transport oxygen	destroy bacteria
C	destroy bacteria	clot blood	transport oxygen
D	destroy bacteria	transport oxygen	clot blood

36 The lifestyle profiles of four 18-year old boys, **A**, **B**, **C** and **D** were examined. Each lifestyle component was scored from 1-10.

For weight, 1 = normal weight.
For diet, the larger the number, the higher the amount of fat eaten.
For exercise, the larger the number, the more exercise taken.

Which boy has the highest risk of developing heart disease?



37 Which component in cigarette smoke causes addiction?

A carbon monoxide
B irritants
C nicotine
D tar

38 Which of the following diseases is not passed from parent to child?

A bronchitis
B colour blindness
C thalassaemia
D sickle cell anaemia

39 A doctor decides to treat an infection using antibiotics.

Based on the above statement, what can we deduce about the infection?

A The infection is caused by virus
B The infection is caused by bacteria
C The infection is caused by lack of white blood cells
D The infection cannot be cured

40 A man weighs 90 kg and has a height of 1.82 m.

What is his Body Mass Index, BMI?

A = 1.82 / (90 × 90)
B = 90 / (1.82 × 1.82)
C = (1.82 × 1.82) / 90
D = (90 × 90) / 1.82

END OF PAPER

SERANGOON SECONDARY SCHOOL
MID-YEAR EXAMINATION
SECONDARY 4 NORMAL TECHNICAL

CANDIDATE NAME		INDEX NUMBER	
CLASS			

SCIENCE SYLLABUS T

5148/02

Paper 2

13 Aug 2021
1 hour 15 minutes

Candidates answer on the Question Paper.
No Additional Materials are required

Setter(s): Mr Sng Tze Kun

READ THESE INSTRUCTIONS FIRST

Write your Centre number, index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any graphs.
The use of an approved scientific calculator is expected, where appropriate.
Do not use staplers, paper clips, glue or correction fluid.

Answer **all** questions in the spaces provided.
The number of marks is given in brackets [ ] at the end of each question or part question.

60

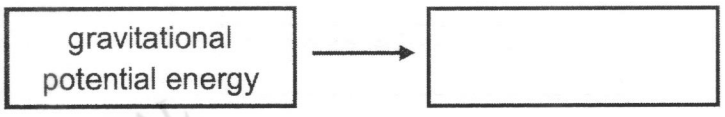
This question paper consists of **14** printed pages, including this **cover** page.

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

1 Complete the following energy conversions, using the following words.
You may use each term once, more than once, or not at all.

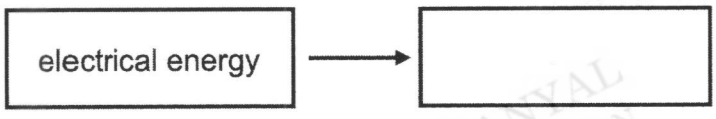
electrical energy	chemical potential energy
thermal energy	kinetic energy
light energy	elastic potential energy

(a) **(i)** A man jumping off a diving board.

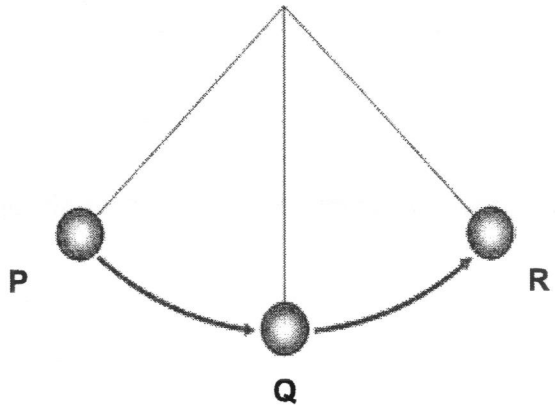


(ii) Using a battery to light a bulb.

(iii) Charging the handphone battery.



(b) The diagram below shows a pendulum swinging.



State the position(s) of the pendulum with the greatest

(i) kinetic energy: ..... [1]

(i) gravitational potential energy: ..... [1]

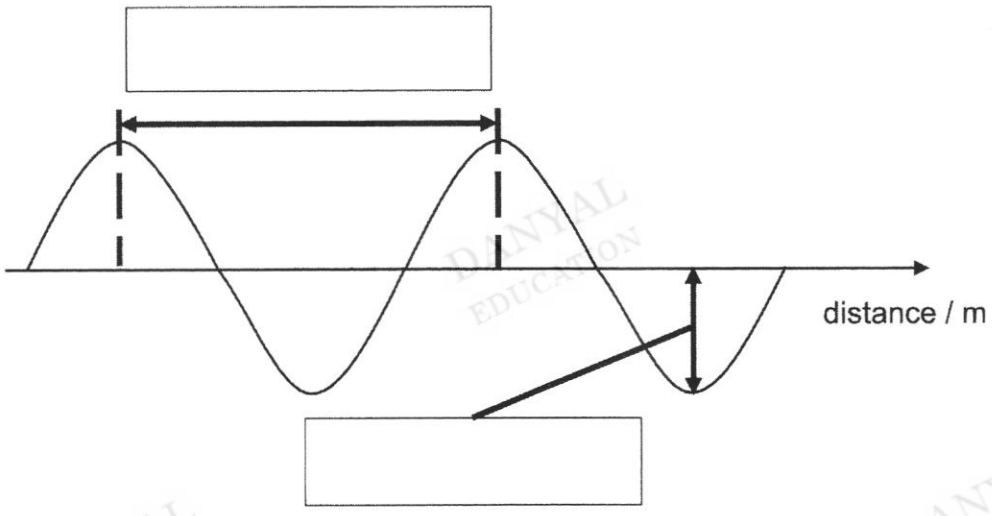
2 Draw a straight line to connect each wave to its use

(a)

wave	use
ultraviolet	television remote control devices
infra-red	baggage scanner at airports
X-rays	sterilisation of drinking water

[3]

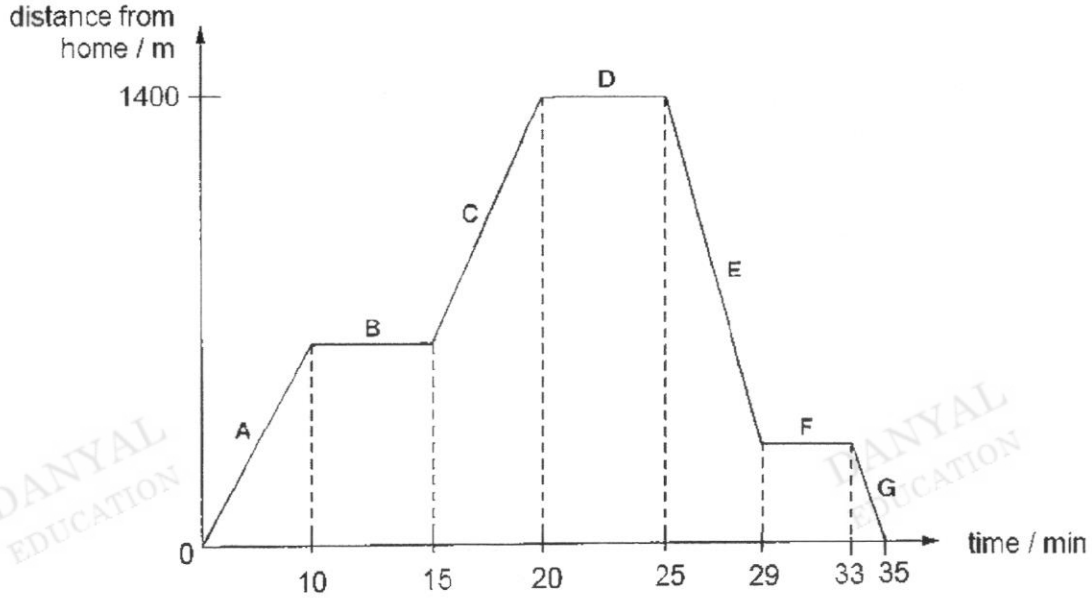
(b) The diagram shows part of a wave.



In the boxes above, label the amplitude and wavelength of the wave. [2]

3 John leaves home to go to a park 1400 m away before returning home.

The distance-time graph for this journey is shown below.



(a) How long did John spend at the park?

..... minutes [1]

(b) Each section of the graph (**A, B, C, D, E, F, G**) may be used once, more than once, or not at all.

State all the sections of the graph that:

(i) shows John has stopped

sections ..... , ... and ..... [1]

(ii) shows John moving at constant speed towards the park.

sections ..... and ..... [1]

(c) Calculate the average speed of John's entire journey to and from the park.

Show your working.

average speed = ... m/min [2]

4 A circuit consists of the following:

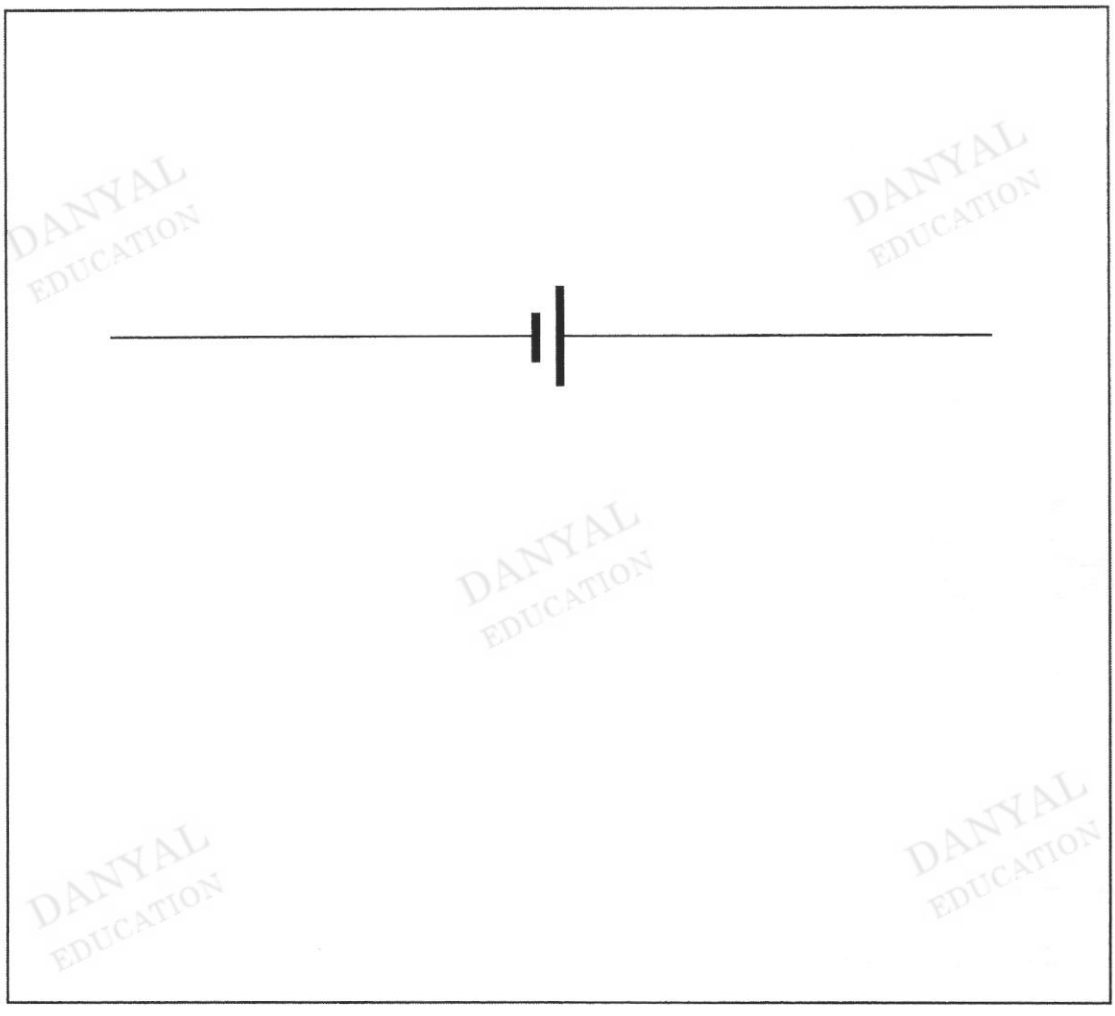
(i) one cell connected to two bulbs in parallel

(ii) an ammeter that reads the **total** current in the circuit

(iii) a switch able to turn off **one** bulb but **not** the other bulb

(iv) a voltmeter that can determine the voltage of the cell

(a) In the box below, draw the circuit described.

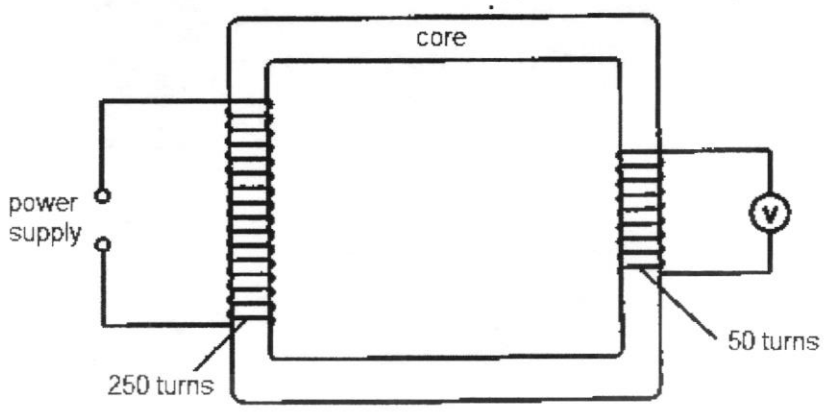


[4]

(b) Name a component that can be connected in series to the circuit so that the current may be changed.

..... [1]

5 The diagram below shows a transformer. In order to use electrical appliances, this transformer has to be connected between the appliance and the power supply.



(a) Name this type of transformer.

..... [1]

(b) State the function of this transformer

..... [1]

(c) State the material that is used to make the core of the transformer.

..... [1]

6 The figure below shows a traditional method to clear plots of forest land.

(a) This method is used to clear land for farming. State the method being used.

..... [1]

(b) List two disadvantages of using the above method of clearing land.

1. .....

2. ..... [2]

(c) Pesticides and herbicides are used as chemical controls to get rid of pests and weeds in farmland. Explain how overuse of these chemicals can have a negative impact on humans.

.....

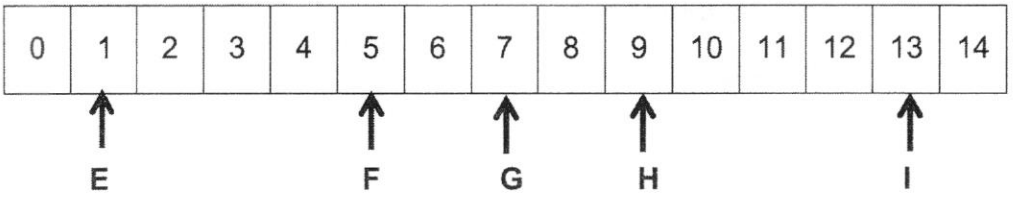
..... [1]

(d) Grasshoppers are a nuisance to farmland.
Describe how farmers can use biological control to destroy the pests.

.....

..... [1]

7 The diagram below shows the pH scale and solutions **E** to **I**.



Complete the following sentences.

(a) Solution ..... is a strong acid. [1]

(b) Solutions ..... and ..... will turn red litmus paper blue. [1]

(c) Solution ..... added to solution ..... will produce a salt and water. [1]

This process is known as ..... [1]

(d) Give a possible example of solution G. ..... [1]

8 Reducing activity of microbes helps prevent food from getting spoilt.
Mould is an example of a microbe.

(a) (i) State what is meant by microbes.

..... [1]

(ii) Give another example of a microbe.

..... [1]

(b) Sterilisation is one method of preventing food from getting spoilt.
Complete the table by choosing methods from the list.
Use each method once only.

canning **dehydration** **use of vinegar** **freezing**

description	method
reducing water content	
using high temperatures	
using low temperatures	
lowering the pH	

[4]

9 Two students debating on the topic of digestion.

Albert confidently said to Charles that "having dietary fiber is an important nutrient that must be included in the diet". Charles disagreed by saying that "dietary fiber is not a nutrient but agrees it is important to keep us healthy."

(a) Who is correct? Support with a reason.

.....

..... [1]

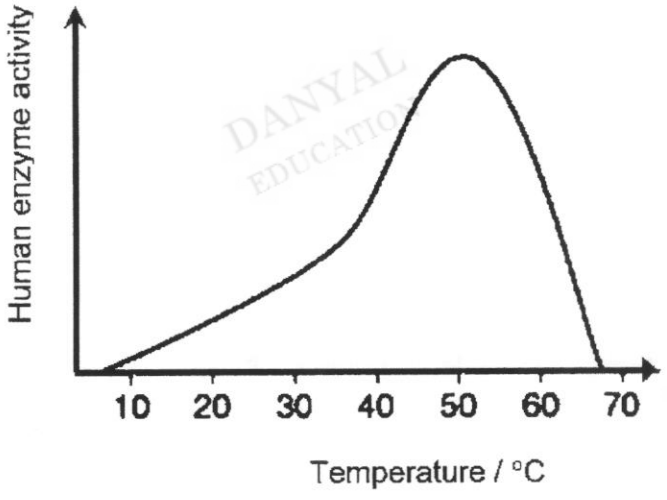
(b) **(i)** When there is a lack of dietary fiber in the diet, what unhealthy condition will happen?

..... [1]

(ii) To prevent the condition in part (b)(i), state a food source that contains dietary fiber.

..... [1]

(c) A typical graph of human enzyme activity with temperature is shown below



On the graph, mark the optimum temperature for enzyme activity with a **'X'**. [1]

10 An experiment was carried out to determine how far smoking areas should be placed away from common areas, such as bus stops, taxi stands and public toilets, to minimise the effect of passive smoking.

Samples of air were collected at various distances from a lighted cigarette and the concentration of nicotine in the air sample was measured. The results are shown in the table below.

distance from lighted cigarette / m	**concentration of nicotine in collected air sample / units**
0	190
2	164
4	127
6	75
8	48
10	40
12	38

(a) Describe what is meant by the term *passive smoking*.

.....

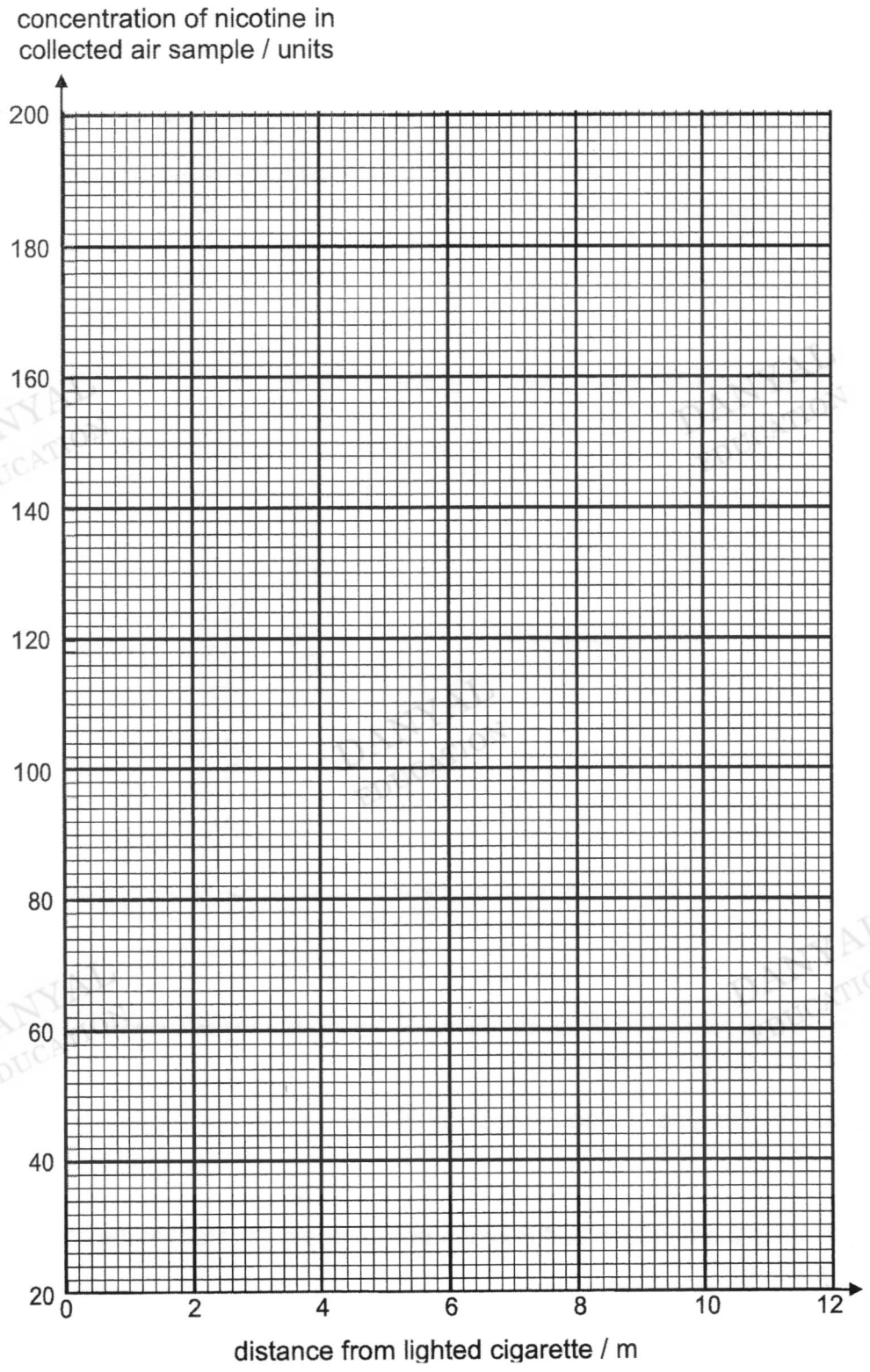
..... [1]

(b) State one harmful effect of nicotine on our body.

.....

..... [1]

(c) Plot the results of the experiment on the grid below. Use a smooth curve to connect the points. [2]



(d) **(i)** Use the graph to estimate the concentration of nicotine present in an air sample collected 5 m away.

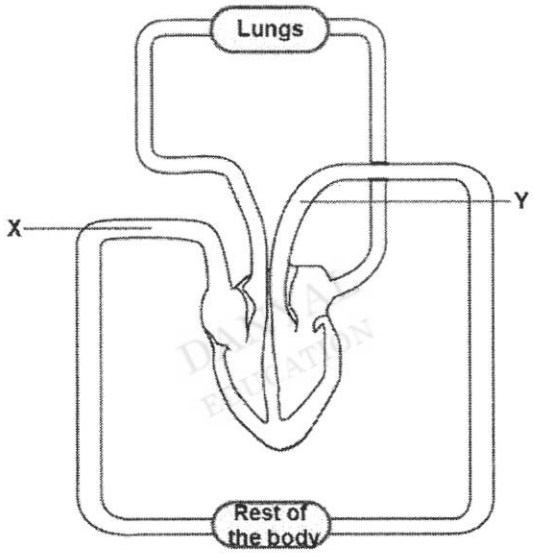
..... units [1]

(ii) The acceptable concentration of nicotine in a 'no smoking' zone is 44 units.

Use the graph to determine the shortest distance that the 'no smoking' zone must be from a lighted cigarette.

..... m [1]

11 The diagram shows the human circulatory system.



(a) Draw **4 arrows** on the diagram to show how blood moves between the heart, lungs and the rest of the body. [1]

(b) **(i)** Identify the type of blood vessel labelled **X**.

..... [1]

(ii) What is the type of blood (oxygenated or deoxygenated) in the blood vessel labelled **Y**?

..... [1]

(c) State the function of red blood cells.

.....

..... [2]

12 Complete the following sentences using the terms in the box.

You may use each term once, more than once or not at all.

medication	**urine**	**dialysis**	**transplant**
IV drip	**infection**	**rejection**	**blood**

When kidney failure occurs, the wastes in our ..... cannot be removed from the body and may harm other organs.

One option of treatment is kidney ..... .

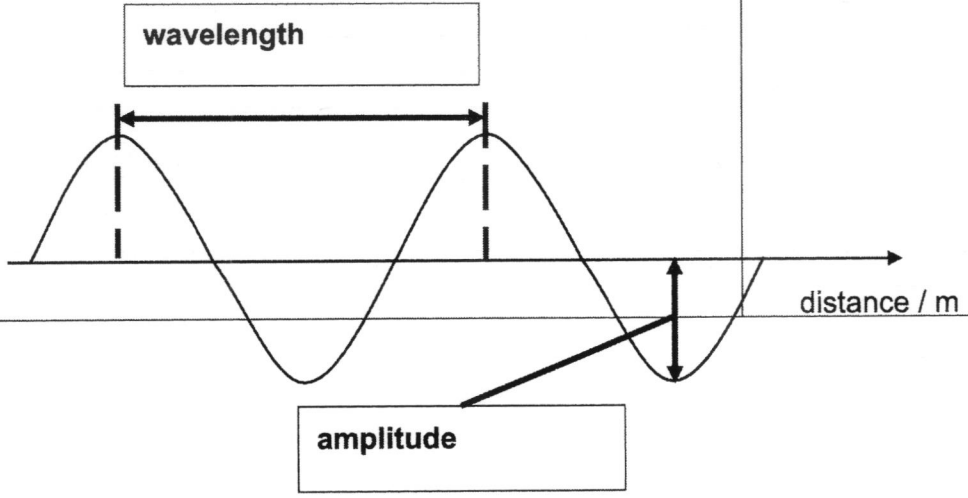
The patient is connected to a machine which acts as an artificial kidney during thrice-weekly sessions lasting several hours each time. Another option is kidney ....., which replaces the failed organ with a working one. The donor and the patient have to be carefully matched. After the operation, the patient has to be closely monitored and be on ..... to reduce the risks of organ ..... and ..... . [6]

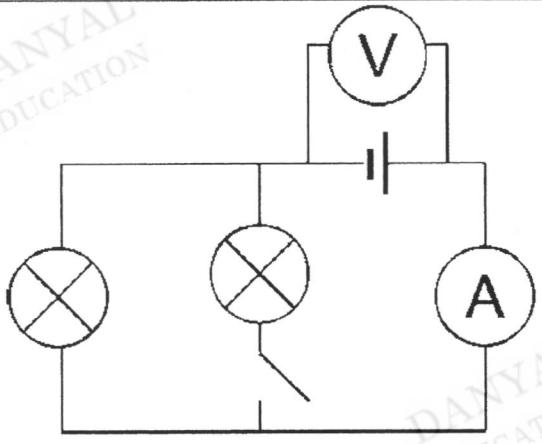
End of Paper

Prelim Exam 4NT Science

Answers

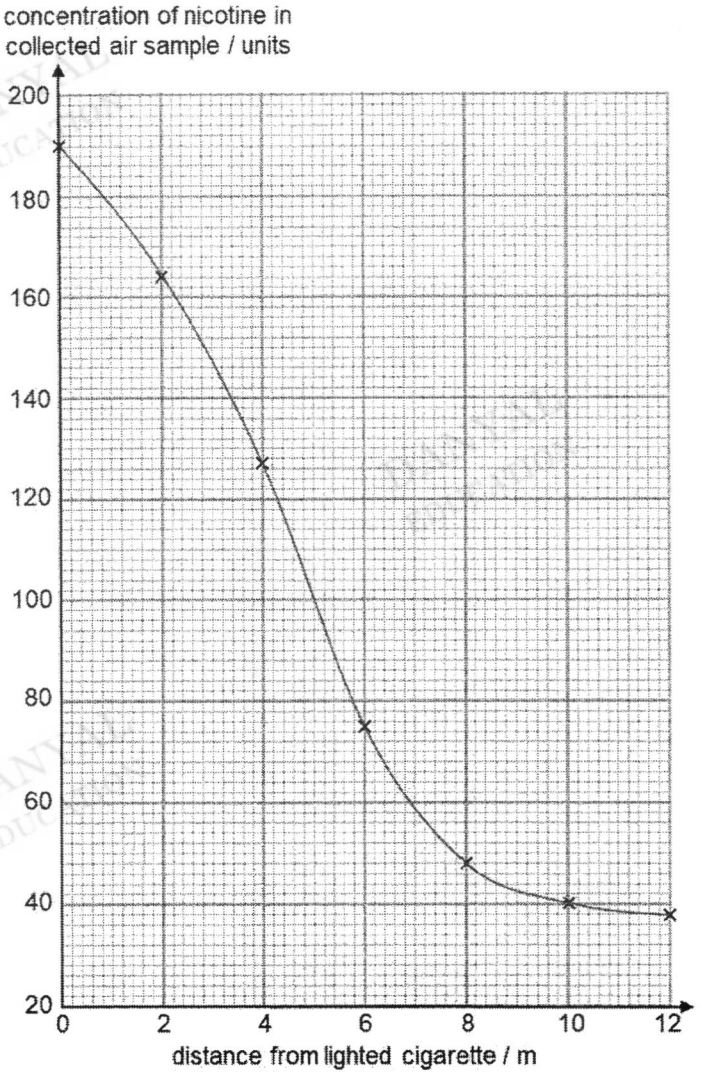
Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	11	A	21	C	31	C
2	B	12	C	22	C	32	C
3	B	13	D	23	D	33	B
4	D	14	C	24	C	34	C
5	D	15	A	25	B	35	B
6	B	16	A	26	B	36	B
7	B	17	A	27	C	37	C
8	A	18	C	28	A	38	A
9	C	19	B	29	B	39	B
10	D	20	D	30	C	40	B

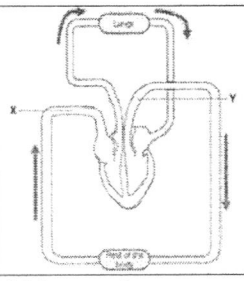
	Marking scheme	Remarks/markers report
1a)	(i) gravitational potential energy → **kinetic energy**	
	(ii) electrical energy → **light energy + thermal energy**	
	(iii) electrical energy → chemical potential energy	
b)	(i) **Q**	
	(ii) **P** and **R**	
2a)	**wave** ultraviolet; infra-red; X-rays — **use** television remote control devices; baggage scanner at airports; sterilisation of drinking water	
b)		

3		
a)	5 min	
bi)	sections **B** and **D** and **F**	
bii)	sections **A** and **C**	
c)	(1400 x 2) / 35 = 80 m/min	
4	 one cell connected to two bulbs in parallel an ammeter that reads the total current in the circuit a switch able to turn off one bulb but not the other bulb a voltmeter that can determine the voltage of the cell *Accept any other plausible answers.*	
b)	Variable resistor/rheostat	
5a)	Step down transformer	
b)	Lower the voltage	ECF from (a)
c)	Soft iron	

<table>
<tr><td>6a)</td><td>Slash and burn method.</td><td></td></tr>
<tr><td>b)</td><td>It causes haze.

Soil erosion takes place when the rain come.</td><td></td></tr>
<tr><td>c)</td><td>The toxic chemicals are passed to the human being.</td><td></td></tr>
<tr><td>d)</td><td>Farmers use the predators/enemies (birds) of the pests to control the population of the pests.</td><td></td></tr>
<tr><td>e)</td><td>Slash and burn method.</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>7a)</td><td>E</td><td></td></tr>
<tr><td>b)</td><td>H and I</td><td></td></tr>
<tr><td>c)</td><td>F and H or E and I
Neutralization</td><td></td></tr>
<tr><td>d)</td><td>water</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>8ai)</td><td>Microbes are microorganisms that cannot be seen with the naked eye.</td><td></td></tr>
<tr><td>aii)</td><td>Bacteria, or fungi</td><td></td></tr>
<tr><td>b)</td><td><table><tr><th>description</th><th>method</th></tr><tr><td>reducing water content</td><td>Dehydration</td></tr><tr><td>using high temperatures</td><td>Canning</td></tr><tr><td>using low temperatures</td><td>freezing</td></tr><tr><td>lowering the pH</td><td>Use of vinegar</td></tr></table></td><td>1 mark each</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>9</td><td></td><td></td></tr>
<tr><td>a)</td><td>Charles is correct, because only nutrients will be absorbed into bloodstream. Dietary fiber does not get absorbed. [1]</td><td></td></tr>
<tr><td>bi)</td><td>Constipation</td><td></td></tr>
<tr><td>bii)</td><td>Fruits or vegetables</td><td></td></tr>
</table>

c)	X marked at the peak/crest	
10		
a)	Non-smoker/people around smokers breathes in/inhales cigarette smoke/second-hand smoke and develop smoking-related illnesses/lung cancer/bronchitis.	
b)	- causes addiction - causes heart disease	
c)	Plotted points (allow for 2 mistakes) Smooth curve  	
di)	Depends on graph (100 units)	
dii)	Depends on graph (8.6 m)	

11a)		
b(i)	X is a vein.	
(b)(ii)	Y transports oxygenated blood	
(c)	Red blood cells transport oxygen from the lungs to all parts of the body.	
12	When kidney failure occurs, the wastes in our **blood** cannot be removed from the body and may harm other organs. One option of treatment is kidney **dialysis.** The patient is connected to a machine which acts as an artificial kidney during thrice-weekly sessions lasting several hours each time. Another option is kidney **transplant** which replaces the failed organ with a working one. The donor and the patient have to be carefully matched. After the operation, the patient has to be closely monitored and be on **medication** to reduce the risks of organ **rejection** and **infection** .	