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Name

Class

Index
Number



BROADRICK SECONDARY SCHOOL
SECONDARY 4 NORMAL (TECHNICAL)
PRELIMINARY EXAMINATION 2021

SCIENCE SYLLABUS T

5148/01

Paper 1

August 2021

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Write your name, index number and class on the Answer Sheet in the spaces provided unless this has been done for you.

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

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 question paper.

The use of an approved scientific calculator is expected, where appropriate.

Target Grade:	
Actual Grade:	
For Examiner's Use	
Total	40

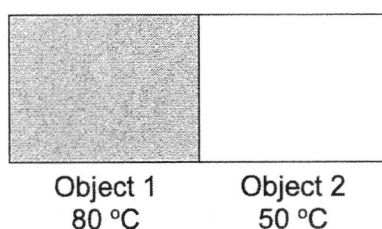
This document consists of **18** printed pages.

Setter : Mr Simon Yap

- 1 A tree was struck by lightning and it started to burn.
Which of the following shows the energy conversion of the burning tree?

- A chemical potential energy to electrical energy
- B chemical potential energy to thermal energy
- C gravitational potential energy to sound energy
- D gravitational potential energy to thermal energy.

- 2 Two objects of different temperatures are placed side by side.



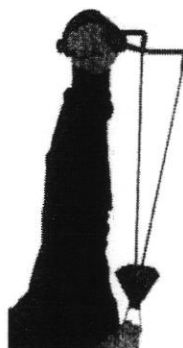
Which row correctly shows the possible temperatures of both objects after two minutes?

	temperature of object 1 /°C	temperature of object 2 /°C
A	80	50
B	90	60
C	75	55
D	75	45

- 3 Which electrical device uses the most electrical energy when it is switched on for the duration shown?

- A A 100 W iron in 150 s
- B A 500 W oven in 300 s
- C A 800 W power supply in 10 s
- D A 1000 W heater in 100 s

- 4 A catapult has 600 J of elastic potential energy. It shoots a ball bearing straight up vertically.

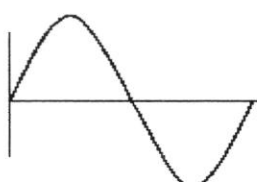


All the energy from the catapult is transferred to the ball bearing as kinetic energy and gravitational energy.

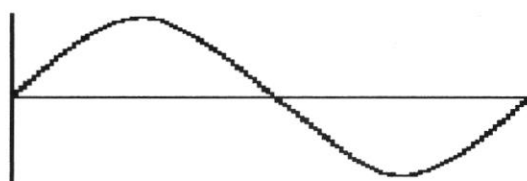
Which of the following shows the possible kinetic energy and gravitational energy of the arrow at a certain point?

	kinetic energy of ball bearing / J	gravitational energy of ball bearing / J
A	100	500
B	200	600
C	300	200
D	400	300

- 5 The diagram shows two waves.



Wave 1



Wave 2

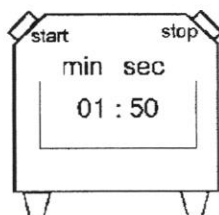
Which of the following statements about the two waves is **correct**?

- A Wave 1 has less energy than wave 2.
- B Wave 1 has a shorter wavelength than wave 2.
- C Wave 2 has more energy than wave 1.
- D Wave 2 has a shorter wavelength than wave 1.

- 6 A person switches on the television using the remote controller.
A scanner at the airport can detect if a person is hiding prohibited objects.
Which row correctly gives the names of the waves used in the remote controller and in the scanner?

	Wave used in remote controller	Wave used in airport scanner
A	gamma	infrared
B	infrared	X- rays
C	microwave	radio waves
D	visible light	gamma

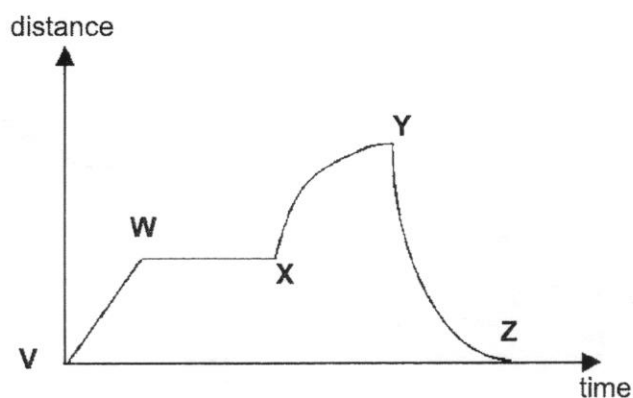
- 7 Hussain took part in a 400 m race.
His timing was recorded using a stopwatch shown below.



What was Hussain's speed?

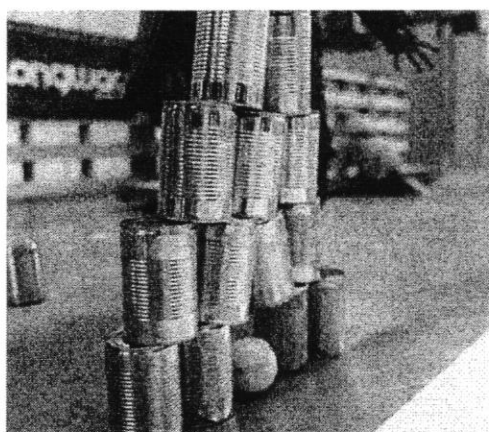
- A 0.275 m/s
B 3.636 m/s
C 4.000 m/s
D 8.000 m/s

- 8 The distance-time graph of a jogger is shown below.



Which segment of the distance-time graph shows the jogger at constant speed?

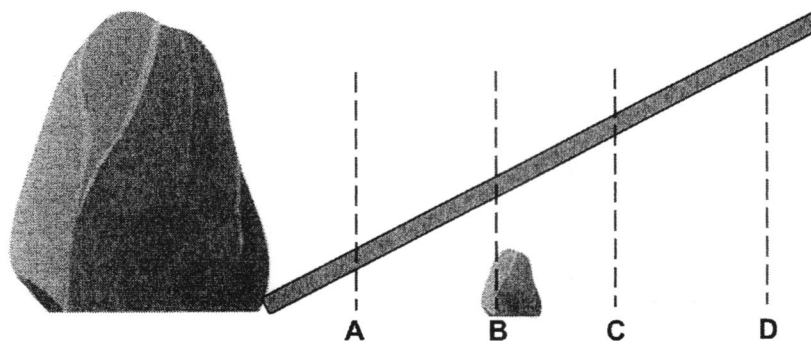
- A VW
 - B WX
 - C XY
 - D YZ
- 9 At a fun fair, a ball is thrown at empty metal tins cans.



What happens to the mass and shape of the metal tins when it is hit?

- A The mass decreases and shape remains the same.
- B The mass decreases and the shape changes.
- C The mass increases and the shape remains the same.
- D The mass remains the same and the shape changes.

- 10 A person wants to move a heavy rock with a wooden plank and a small rock as shown.

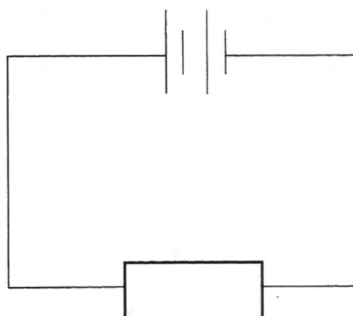


Which position should the small rock be placed such that only a small force is required to lift the heavy rock?

- 11 In an electrical appliance, where must the fuse always be connected to?

- A the earth wire
- B the live wire
- C the metal case
- D the neutral wire

- 12 The diagram shows an electric circuit.



What can be done to decrease the resistance of the circuit?

- A add another resistor in parallel to the first resistor.
- B add another resistor in series to the first resistor.
- C add an ammeter in parallel to the first resistor.
- D add an ammeter in series to the first resistor.

- 13 The diagram shows a potential electrical danger.



What might this lead to?

- A electric shock
 - B explosion
 - C higher current
 - D loose connection
- 14 Which row shows electrical appliances which make use of batteries?
- A iron, hair dryer, water heater
 - B laptop, remote control, iron
 - C torchlight, laptop, smartphone
 - D torchlight, microwave oven, iron
- 15 Which statement about transformers is true?
- A Transformers only work with alternating current.
 - B Transformers only work with direct current.
 - C Transformers only work with power.
 - D Transformers only work with voltage.

- 16 A student dips a piece of red litmus paper into a beaker of liquid. The red litmus paper remained red.

What can be concluded from this experiment?

- A The liquid could be acidic or neutral.
 B The liquid could be alkaline or neutral..
 C The liquid has a pH value of 1.
 D The liquid has a pH value of 8.
- 17 A student wanted to obtain dry salt crystals from a mixture of sand and salt.
 Which row correctly lists the sequence of steps needed?
- A dissolving, filtration, evaporation
 B evaporation, dissolving, filtration
 C evaporation, filtration, dissolving
 D filtration, dissolving, evaporation
- 18 Three unknown substances, **P** and **Q**, were added to an acid and the observations were recorded in the table below.

substance	reaction with acid
P	Produces a gas that turns limewater chalky
Q	Produces a gas that gives a 'pop' sound with a lighted splint

What could be the possible identities of **P** and **Q**?

	substance P	substance Q
A	alkali	carbonate
B	carbonate	metal
C	metal	alkali
D	metal	carbonate

19 Which of the following is an application of neutralisation?

- A boiling a pot of water
- B brushing teeth with toothpaste
- C cooking a piece of chicken thigh
- D painting a wall black in colour

20 What is the benefit of eating food rich in carbohydrates?

- A It helps our body fight against infections.
- B It helps to keep our body warm.
- C It protects our gums against diseases.
- D It provides us with energy.

21 Four food substances, **R**, **S**, **T** and **U** were tested and the results are shown in the table.

Food	test and observations		
	Iodine solution added	added to biuret solution	blotted on paper
R	remained yellowish brown	remained blue	no mark
S	turned blue - black	remained blue	no mark
T	turned blue - black	turned violet	stain present
U	remained yellowish brown	turned violet	stain present

Which food contains carbohydrates but **no** proteins and fats?

- A food **R**
- B food **S**
- C food **T**
- D food **U**

22 Which of the following is true about the effect of microbes on food?

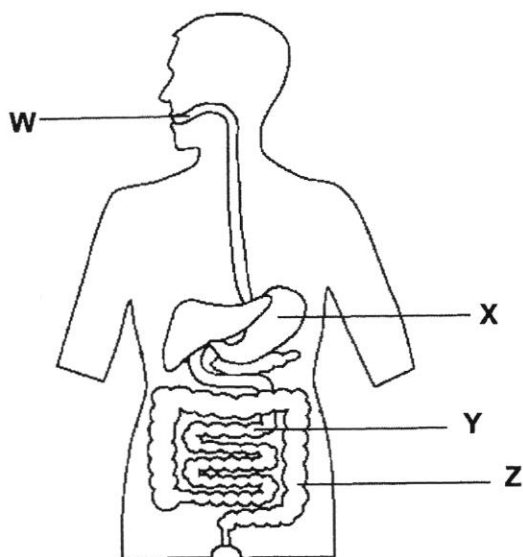
- A** It allows food to last longer.
- B** It can cause food contamination.
- C** It gives food a nice taste.
- D** It gives food a pleasant smell.

23 Large insoluble food molecules must be broken down into small soluble food molecules.

Which substances helps to achieve this?

- A** acid
- B** bile
- C** enzymes
- D** fats

24 The diagram shows the digestive system.



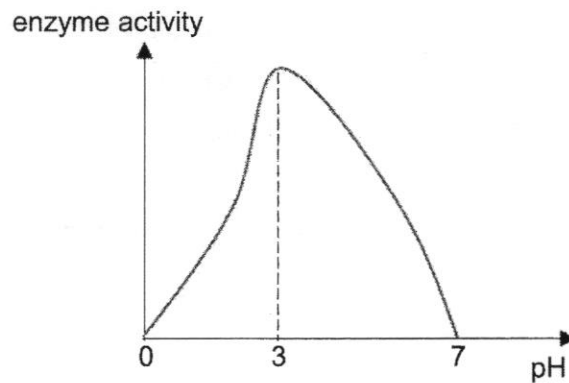
Which part of the digestive system are proteins chemically digested?

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

25 What is the function of the gall bladder?

- A It produces bile.
- B It produces digestive enzymes.
- C It stores and releases bile.
- D It stores gastric juices.

26 The diagram shows how the rate of reaction of an enzyme changes with pH.



What happens to the enzyme when it is placed in an environment with pH 5?

- A The enzyme becomes inactive.
 - B The enzyme is destroyed.
 - C The enzyme has optimum activity.
 - D The enzyme works at a slower rate.
- 27 What happens to the diaphragm and ribcage during exhalation?

	diaphragm	ribcage
A	contracts	move inwards
B	contracts	move outwards
C	relax	move inwards
D	relax	move outwards

28 Which component in cigarette smoke causes heart diseases?

- A carbon dioxide
- B carbon monoxide
- C nicotine
- D tar

29 Two samples of gas, **X** and **Y**, were tested using dry cobalt chloride paper. The results were recorded in the table.

Sample	Observation with dry cobalt chloride paper
X	turns from blue to pink
Y	remains blue

Which of the following statements can be said about samples **X** and **Y**?

- A only sample **X** contains water vapour
- B only sample **Y** contains water vapour
- C sample **X** contains less water vapour than sample **Y**
- D sample **Y** contains less water vapour than sample **X**

30 Which of the following is true about breathing and respiration?

- I Breathing produces energy and respiration uses energy.
- II Respiration takes places in all cells.
- III Breathing involves the exchange of gases.

- A I and III
- B II only
- C II and III
- D I, II and III

- 31 The table shows the health descriptions of three working adults.

adult	description
I	• Smokes 1 pack of cigarette daily • Exercises every 2 days • Does not drink alcohol
II	• Drinks alcohol regularly • Smokes 10 sticks of cigarettes a day • Eats fried and oily food daily
III	• Drinks alcohol once in a while • Exercises every day • Does not smoke

Which working adult is likely to suffer from heart disease?

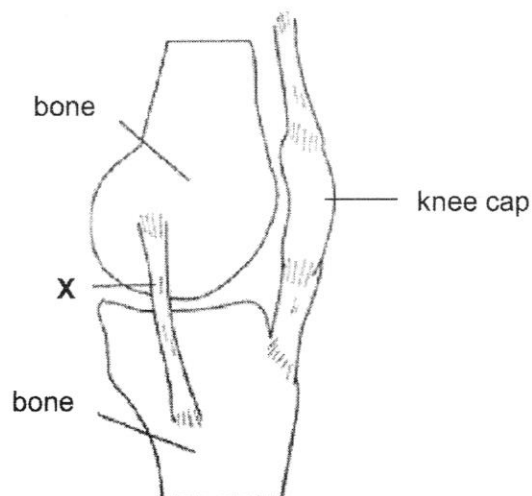
- A I and II
 B I and III
 C II and III
 D I, II and III
- 32 Which component in blood causes clotting?

- A plasma
 B platelets
 C red blood cells
 D white blood cells

- 33 During exercising, the heart beats faster.
Which of the following best explains this?

- A It is to allow more carbon dioxide to reach different parts of the body.
 B It is to allow more nitrogen to reach different parts of the body.
 C It is to allow energy to reach different parts of the body.
 D It is to allow more oxygen to reach different parts of the body.

- 34 The diagram below shows part of the knee.



Which of the following happens when **X** is damaged?

- A The person suffers from arthritis.
 - B The person suffers from a dislocation.
 - C The person suffers from a fracture.
 - D The person suffers from a sprain.
- 35 The table shows the BMI range for different weight categories.

BMI	weight category
< 18.5	Underweight
18.5 – 22.9	Normal
23.0 – 27.4	Overweight
> 27.5	obese

Sam is 175 cm tall and has a mass of 70 kg.

Which weight category does Sam belong to?

- A underweight
- B normal
- C overweight
- D obese

36 Which of the following should be applied to treat a fungal infection on the foot?

- A antibiotics
- B antiseptics
- C disinfectants
- D vaccination

37 An unknown disease was found to have the following traits.

- passed down from parent
- causes red blood cells to be destroyed
- causes anaemia in patients

Which disease is this likely to be?

- A colour blindness
- B HIV
- C sickle cell anaemia
- D thalassemia

38 Jill's liver is starting to malfunction and needs to undergo a liver transplant. The table below shows four possible donors who can donate part of their liver to Jill.

donor	description of donor
1	Jill's cousin
2	Jill's best friend
3	Jill's uncle
4	Jill's twin sister

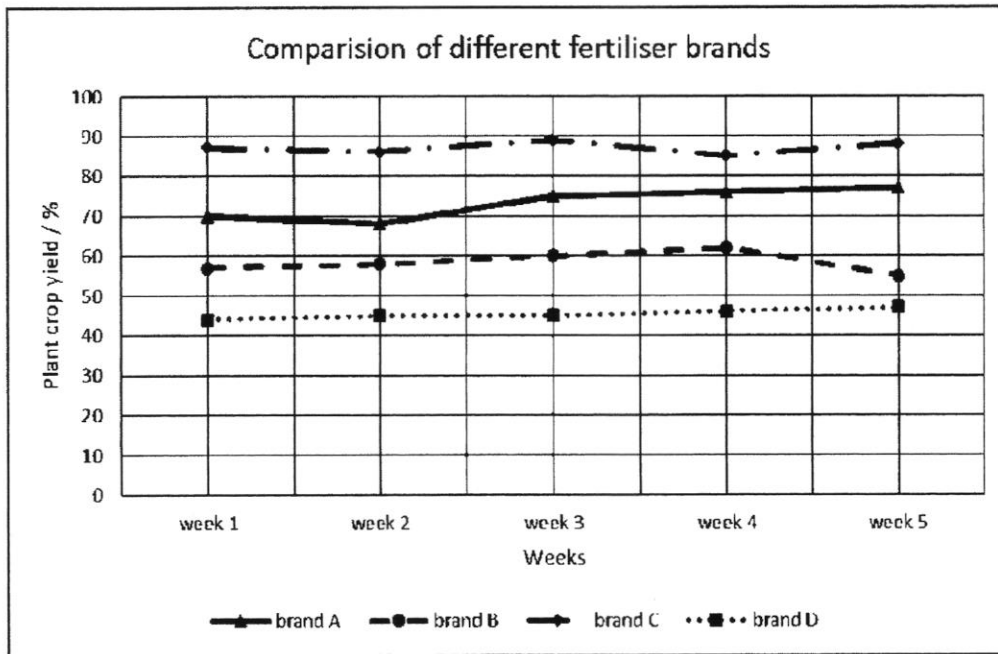
Which donor is most likely to be selected to donate part of their liver to Jill?

- A donor 1
- B donor 2
- C donor 3
- D donor 4

39* What is the reason for the need to have intensive food production methods?

- A Intensive food production reduces the use of pesticides.
- B Intensive food production reduces the use of fertilisers.
- C The amount of space to grow crops is limited.
- D The population of the world is decreasing.

40* The following graph shows how four brands of fertilisers affect crop yield.



Which brand of fertiliser should farmers avoid buying?

- A brand A
- B brand B
- C brand C
- D brand D

----- End of Paper 1 -----

Name	Class				Index Number			
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BROADRICK SECONDARY SCHOOL

SECONDARY 4 NORMAL (TECHNICAL)

PRELIMINARY EXAMINATION 2021

SCIENCE SYLLABUS T

5148/02

Paper 2

August 2021

1 hour 15 mins

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class on all the work you hand in.

Write in dark blue or black pen.

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

You may use a soft pencil for any diagram or rough working.

The use of an approved scientific calculator is expected, where appropriate.

You may lose marks if you do not show your working or if you do not use appropriate units.

Answer **all** questions in the spaces provided on the question paper.

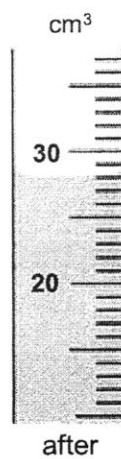
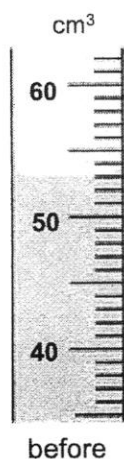
The number of marks is given in brackets [] at the end of each question or part question section.

Target Grade:	
Actual Grade:	
For Examiner's Use	
Total	60

Setter : Mr Simon Yap

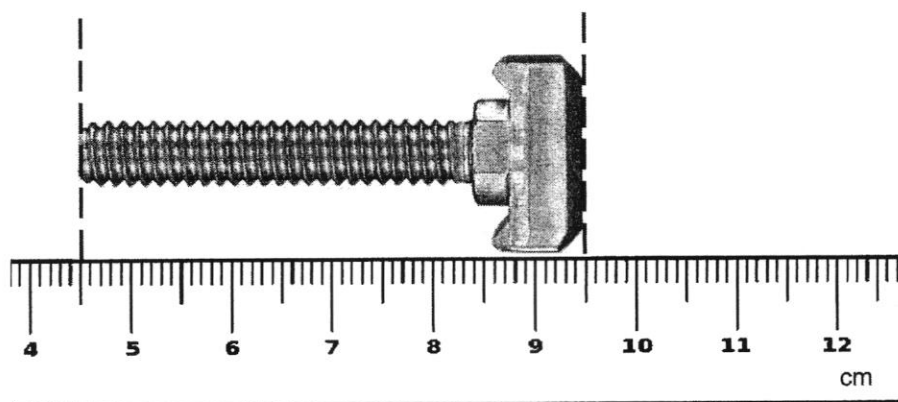
This document consists of **14** printed pages.

- 1 (a) What is the volume of the liquid used?



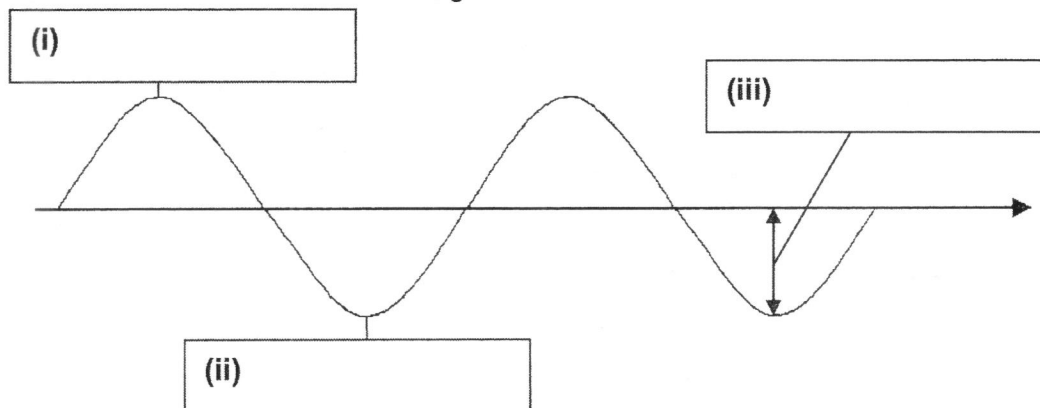
volume of liquid used = cm³ [1]

- (b) What is the length of the bolt?



Length of bolt = cm [1]

- 2 Part of a wave is shown in the diagram below.



- (a) Label parts (i), (ii), (iii) of the wave in the diagram above. [3]

- (b) State the number of complete waves shown in the diagram.

Number of complete waves = [1]

- (c) State what happens to the number of complete waves when the frequency is increased.

..... [1]

- 3 The diagram shows a device that is used to identify counterfeit dollar notes.



- (a) State the type of waves that this device uses to perform its function.

..... [1]

(b) State another example for the use of the type of wave in part (a).

..... [1]

4 Convert the following physical quantities.

(a) 7250 m = km [1]

(b) 0.2 h = mins [1]

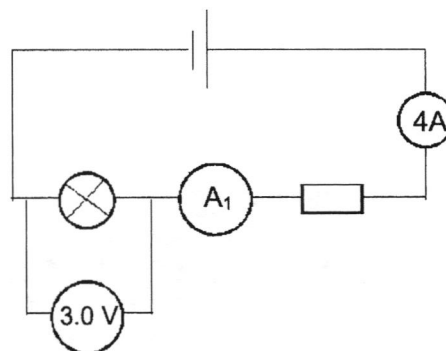
5 A motorcyclist accelerates to 15 m/s from rest in 3 seconds.

Calculate the acceleration of the motorcyclist. Show your working in the space below.

Acceleration = [1]

Units: [1]

6 The diagram shows an electric circuit.



(a) State the value of A_1 .

A_1 = [1]

- (b) Calculate the power drawn by the light bulb.

Power = W [2]

- (c) Calculate the amount of energy used by the light bulb for 1 min.

Energy = J [2]

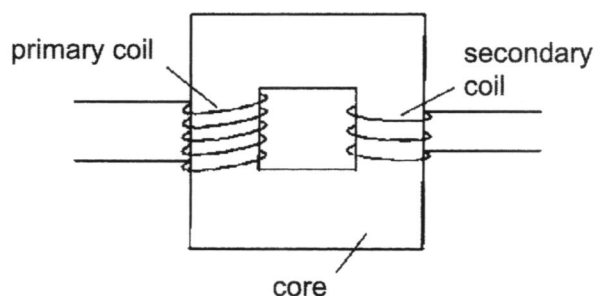
- (d) What is the type of circuit shown in the diagram?

..... [1]

- (e) Give an example of the type of circuit in part (d) that can be found in everyday life.

..... [1]

- 7 The diagram shows a transformer.



- (a) What is the core of the transformer made of?

..... [1]

(b) State the type of transformer shown in the diagram.

..... [1]

(c) Electricity is transmitted at high voltages from the power station. Explain why this is done.

..... [1]

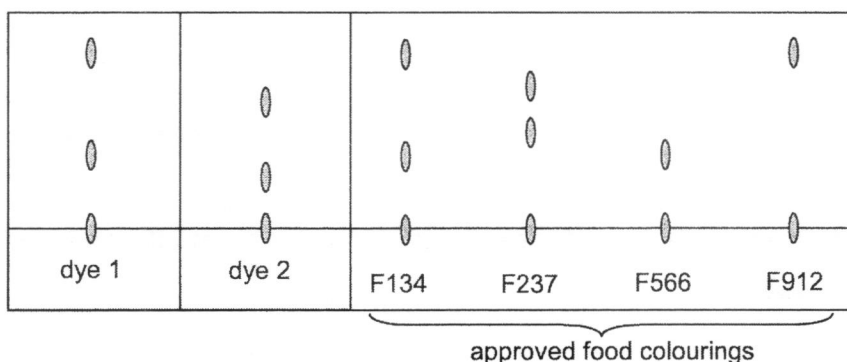
8 In agriculture, a method called 'slash and burn' is often used by 'countryside' farmers.

State one benefit and one problem for the use of 'slash and burn' method in agriculture.

benefit

problem [2]

- 9 The diagram shows a chromatogram of four approved food dyes and two unknown food dyes.



- (a) State which colouring(s) is/are found in dye 1.

[1]

- (b) Should dye 2 be used for consumption? Explain your answer.

[2]

- 10 The diagram shows the nutritional label from a packet of hot chocolate.

Nutrition Facts	
1 servings per container	
Serving size	16 oz.
Amount Per Serving	
Calories	212
% Daily Values*	
Total Fat 4g	5%
Saturated Fat 2g	10%
Trans Fat 0g	
Cholesterol 16mg	5%
Sodium 66mg	
Total Carbohydrate 42g	15%
Dietary Fiber 0g	0%
Total Sugars 42g	
Includes 36g Added Sugars	72%
Protein 4g	8%
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

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

	Calories	2,000	2,500
Total Fat	less than	65g	80g
Saturated Fat	less than	20g	25g
Cholesterol	less than	300mg	300mg
Sodium	less than	2,400mg	2,400mg
Total Carbohydrate	less than	300g	375g
Dietary Fibre	less than	25g	30g

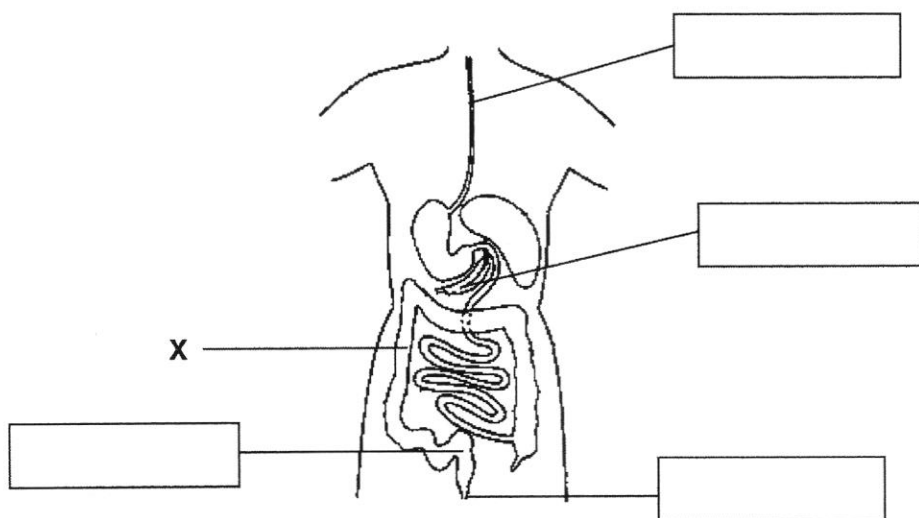
- (a) Calculate the % Daily Value for sodium based on a 2000 calorie diet. Show your working.

% Daily Value = % [2]

- (b) Is it advisable for a diabetic to drink this hot chocolate every day? Explain your answer.

.....
..... [2]

- 11 The diagram shows part of the digestive system.



- (a) In the boxes provided, label the parts of the organs shown in the diagram. [4]

- (b) State what happens at X.

..... [2]

- 12** The following table shows how the level of blood alcohol content is linked to the level of loss of function.

blood alcohol content	level of loss of function
0.0%	-
0.0 – 0.05%	Mild loss
0.06 – 0.15%	Increased loss
0.16 – 0.30%	Severe loss
0.31 – 0.45%	Life threatening

- (a)** A person was arrested after a party for drinking. His blood alcohol content was found to be at 0.09%.

- (i)** State the level of loss of function experienced by this person.

..... [1]

- (ii)** State how a person might be affected shortly after consuming some alcohol.

..... [1]

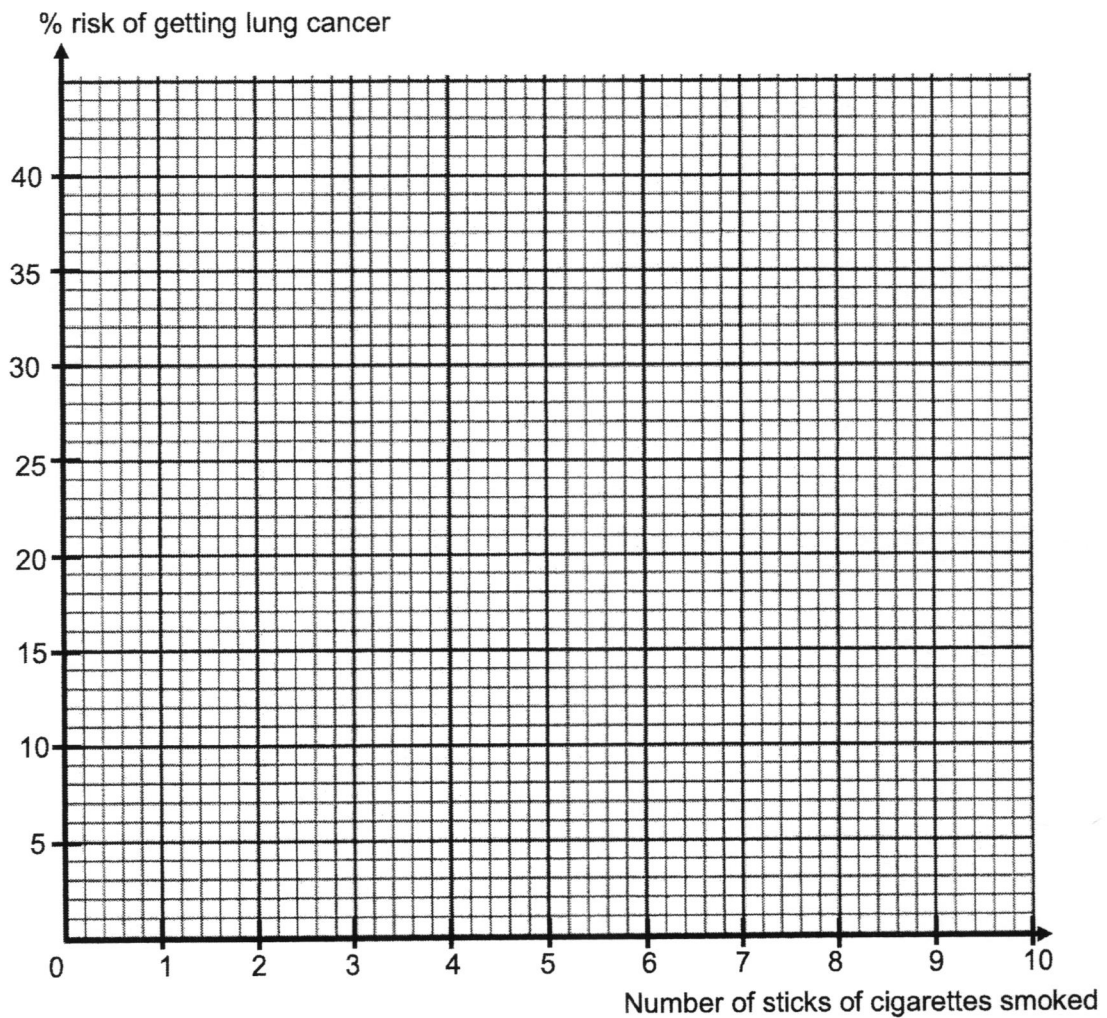
- (b)** How might drinking too much alcohol affect a person's health in the long run?

..... [1]

- 13 The following table shows how the number of sticks of cigarettes smoked increases the risk of getting lung cancer.

Number of sticks of cigarettes smoked	1	2	3	4	5	6	7	8	9	10
% risk of getting lung cancer	5	6	8	9	13	15	20	25	31	39

- (a) Plot a graph of the % risk of getting lung cancer against the number of sticks of cigarettes smoked in the grid below. [3]



- (b) Based on the graph, state the relationship between the number of sticks of cigarettes smoked in a day and the % risk of getting cancer.

.....
 [2]

- (c) From the graph, how many sticks of cigarettes smoked will result in the greatest increase in % risk of getting lung cancer?

..... [1]

- (d) State the main component in cigarette smoke that can cause bronchitis?

..... [1]

- (e) State one symptom of bronchitis.

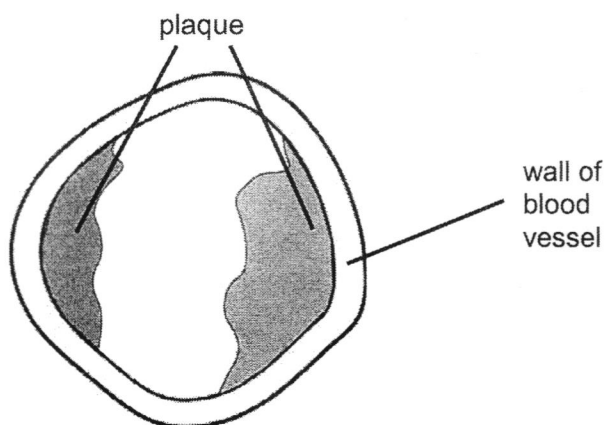
..... [1]

- 14 For each blank, write the name of the component of blood that matches the functions given.

Function	Component of blood
Transport of oxygen	
Destroys bacteria and other foreign bodies	
Transports food substances and carbon dioxide	

[2]

- 15 Blood vessels are part of the circulatory system. The diagram below shows the cross section of a blood vessel.



- (a) Suggest what could have caused the deposition of plaque.

..... [1]

- (b) Suggest two possible health risks a person might suffer from, as a result from having too much plaque in the blood vessels.

(i) [1]

(ii) [1]

- 16 Jane went to the doctor with a sore throat and the doctor prescribed her with some antibiotics.

Local Pharmacy
123 STREET

DR. C. JONES
DATE 06/23/09

0060023-08291

JANE SMITH
456 MAIN ANYTOWN, US

TAKE ONE CAPSULE BY MOUTH THREE
TIMES DAILY FOR 10 DAYS UNTIL ALL TAKEN

AMOXICILLIN 500MG CAPSULES

QTY MRG
NO REFILLS - DR. AUTHORIZATION REQUIRED

USE BEFORE 06/23/12
SLF/SLF

UNTIL
ALL
TAKEN

- (a) Jane noticed that the label had the words "UNTIL ALL TAKEN". Explain the importance of these words.

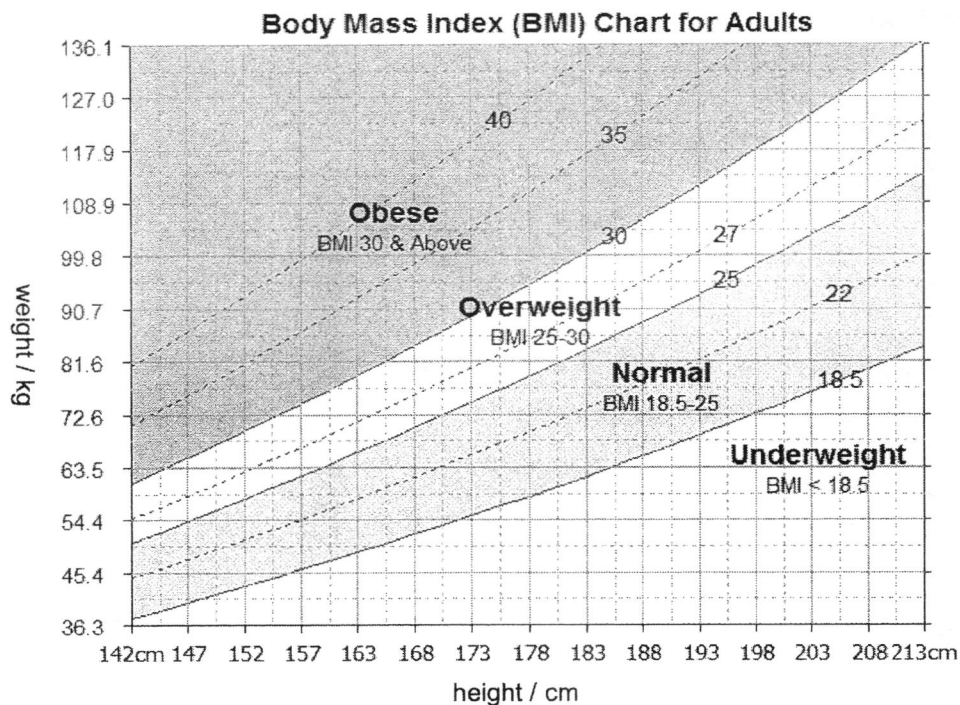
.....

..... [2]

- (b) What are antibiotics used to treat?

..... [1]

17 The chart shows a BMI chart for adults.



(a) Bob has a BMI of 17.9.

State two health issues associated with Bob's weight range.

(i) [1]

(ii) [1]

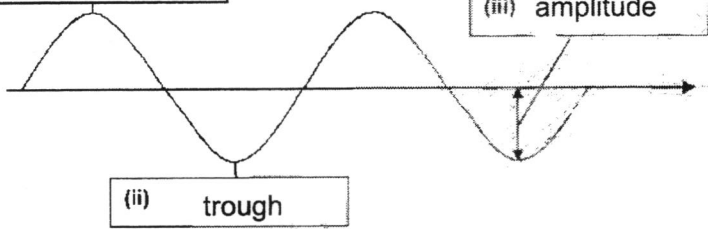
(b) What can Bob do to improve on his current weight range?

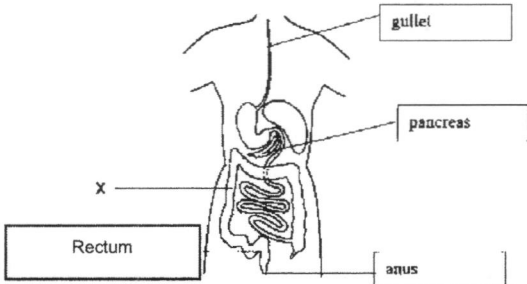
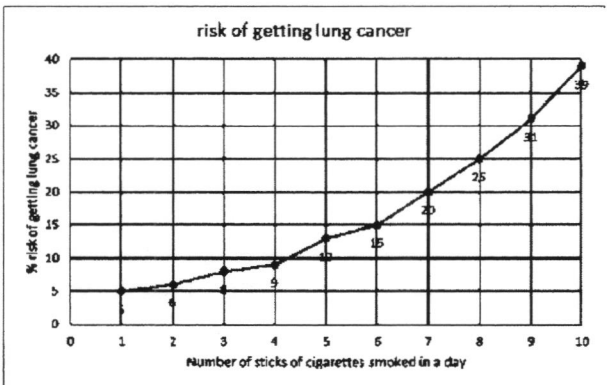
..... [1]

----- End of Paper 2 -----

4NT Prelims 2021 Mark Scheme

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

Question		Answer	Marks	Total
1	a	$53 - 28 = 25$	1	2
	b	$9.5 - 4.5 = 5$	1	
2	a	(i) crest  (ii) trough (iii) amplitude	1 1 1	5
	b	2 waves	1	
	c	increases	1	
3	a	Ultraviolet / UV ray	1	2
	b	Sun tanning beds / sterilisation of medical equipment	1	
4	a	7.25 km	1	2
	b	12 mins	1	
5		Acceleration = $(15 - 0) / 3 = 5 \text{ m/s}^2$ Units = m/s^2	1 1	2
6	a	4	1	7
	b	$P = V \times I = 3 \times 4 = 12 \text{ W}$	2	
	c	$P = E / T = 12 \times 60 = 720 \text{ J}$	2	
	d	Series	1	
	e	Torchlight Accept other possible answers	1	
7	a	Iron	1	3
	b	Step down	1	
	c	It is to reduce energy loss.	1	
8		Cheap and fast	1	2
		Causes haze / soil erosion / loss of habitat / destruction of species.	1	
9	a	F134, F566, F912	1	3

	b	No. It does not match any of the spots in the approved food dyes.	2	
10	a	% DV of sodium = $66 / 2400 \times 100\% = 2.75\%$ (round up to 3)	2	4
	b	No. The amount of sugar in the drink is extremely high.	1 1	
11	a		4	6
	b	Absorption of excess water and mineral salts. Undigested food is passed along to the rectum.	1 1	
12	a i	Increased loss	1	3
	ii	Reaction time Accept other possible answers	1	
	b	It can damage the liver.	1	
13	a	 1m – mark points with X 1m – all points marked 1m – all points joined using smooth curve/ straight line.	3	8
	b	As the number of sticks of cigarettes smoked increases [1], the risk of getting cancer increases [1].	2	
	c	10 sticks	1	
	d	tar	1	
	e	Chronic coughing / inflamed bronchus/ fatigue Any other symptom	1	
14		Red blood cells White blood cells Plasma All correct – 2m 2 correct – 1m 0 to 1 correct – 0m	2	2

15	a		Too much fatty food Accept smoking	1	3
	b	i	High blood pressure	1	
		ii	Strokes/ heart attack	1	
16	a		If Jane does not complete the course of antibiotics, some bacteria might remain and multiply [1], which can cause Jane to fall sick [1] again. Any other wording	2	3
	b		bacteria	1	
17	a	i	malnutrition	1	3
		ii	Feeling cold Any other answer	1	
	b		Bob should eat more healthy food to increase his body weight. Do not accept eat more.	1	