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West Spring Secondary School

PRELIMINARY EXAMINATION 2020

SCIENCE SYLLABUS T Paper 1 Multiple Choice

5148/1

SECONDARY 4 Normal (Technical)

Name _____ () Date 18 Aug 2020

Class 4G Duration 1 hr

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on all the work you hand in.
You may use a HB pencil for any diagrams, graphs, tables or rough working.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

There are **forty** questions in 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.

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.

FOR EXAMINER'S USE	
Total	/40

This document consists of **12** printed pages including the cover page.

Setter(s)

Mr Colin Teo

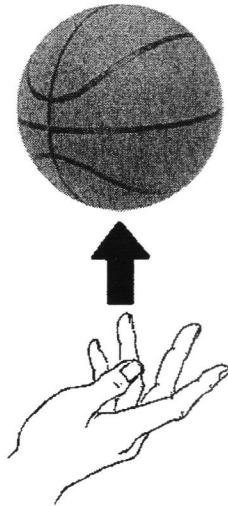
[Turn over

1 Which of the following is a form of energy?

- A force
- C mass

- B light
- D time

2 A ball is thrown up in the air.



Which type of energy is decreasing as the ball rises to its highest point?

- A chemical potential energy
- C kinetic energy

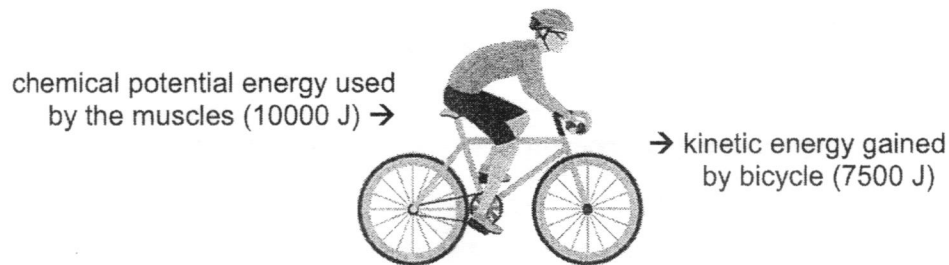
- B gravitational potential energy
- D sound energy

3 A student accidentally touched an electric kettle filled with hot water. As a result, she burnt her finger.

Which of the following statements correctly describes the process that took place when she touched the electric kettle?

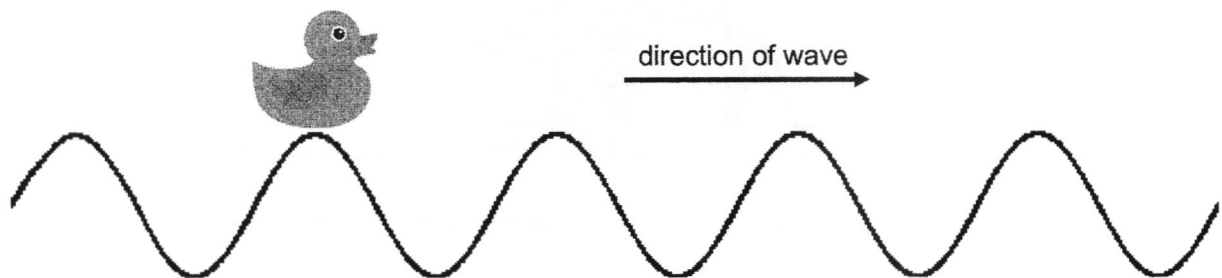
- A Thermal energy is produced in the kettle.
- B Thermal energy is produced in the student's finger.
- C Thermal energy is transferred from the student's finger to the kettle.
- D Thermal energy is transferred from the kettle to the student's finger.

- 4 A cyclist pedals hard on his bicycle on a flat ground. The chemical potential energy in his muscles is released to assist him in the activity as shown.



What is the possible reason for the kinetic energy gained by the bicycle to be lower than the amount of chemical potential energy used by his muscles?

- A 2500 J of the chemical potential energy is converted to gravitational potential energy.
 B 2500 J of the chemical potential energy is converted to sound energy only.
 C 2500 J of the chemical potential energy is converted to thermal energy only.
 D 2500 J of the chemical potential energy is converted to thermal and sound energy.
- 5 A rubber ducky is resting on the surface of a pond. As a water wave travels from left to right on the pond, the rubber ducky will



- A move from left to right
 B move left and right
 C move up and down
 D remain stationary
- 6 Which of the following are units for the amplitude, frequency and wavelength of a wave?

	amplitude	frequency	wavelength
A	Hz	m	m
B	m	Hz	m/s
C	m/s	Hz	m
D	m	Hz	m

- 7 Which of the following is **not** an electromagnetic wave?

- A infra-red rays B sound wave
 C ultra-violet wave D visible light

- 8 A patient's cancerous cells are growing out of control. What kind of electromagnetic waves would the doctors use to kill those cells?

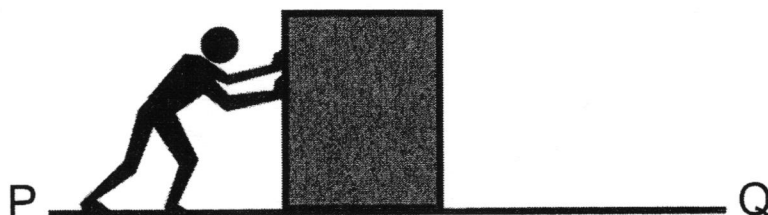
A gamma rays
 B microwaves
 C radio waves
 D x-rays

- 9 Which of the following does **not** change when the baseball bat hits the ball during a game?



A density of the ball
 B mass of the ball
 C shape of the ball
 D speed of the ball

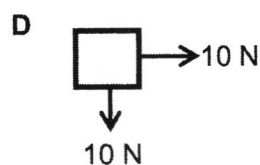
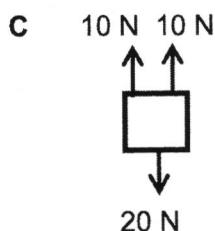
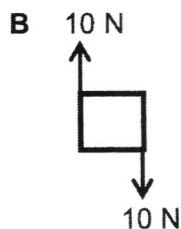
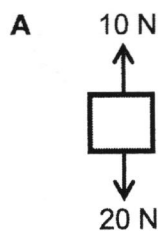
- 10 A person is pushing a box from P to Q, which is a distance of 200 m. He pushed it for the first 100 m and took 30 s. He rested for 15 s and then pushed the box the remaining distance to Q in 35 s.



What is the average speed that the person achieved throughout this task?

A 1.25 m/s
 B 2.5 m/s
 C 100 m/s
 D 200 m/s

- 11 In which of the following is the net resultant force zero?

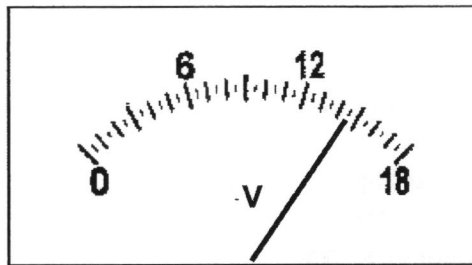


- 12 What is the time indicated by the stopwatch?



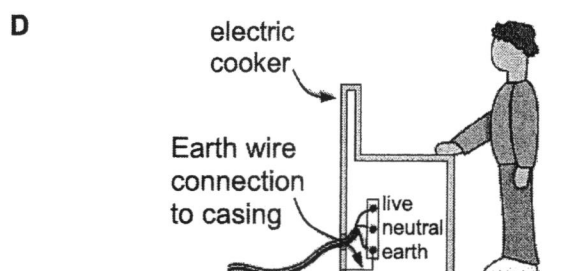
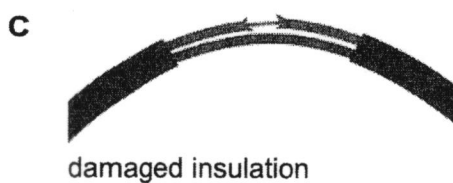
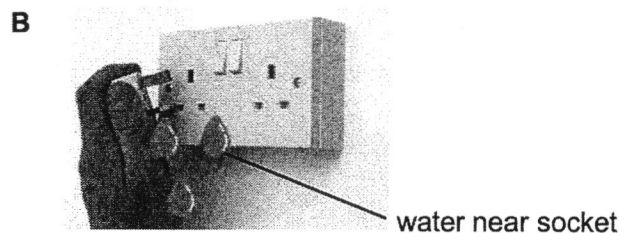
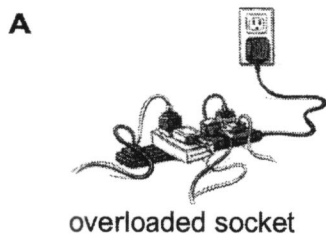
- A 1 hour, 23 minutes and 47 seconds
 B 1.52 hours and 47 seconds
 C 1 minute and 23.47 seconds
 D 1.23 minutes and 47 seconds

- 13 What is the reading on the voltmeter?

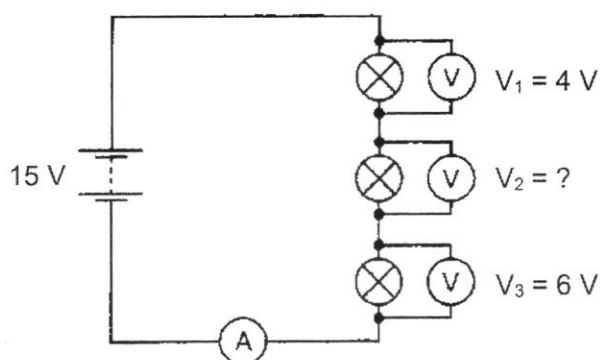


- A 12.5 V
 B 13.0 V
 C 13.5 V
 D 14.5 V
- 14 A mobile tablet charger operates on 5 V and 2.4 A.
 What is the power rating of the charger?
- A 0.48 W
 B 2.08 W
 C 7.40 W
 D 12.00 W

- 15 Which of the following is **not** considered an electrical hazard?



- 16** The total potential difference in the circuit is 15 V.



What is the value of V_2 ?

- A** 4 V
B 5 V
C 6 V
D 10 V

- 17 Compared to dry cells, the mains electrical supply is

- A** portable and higher in voltage.
B portable and lower in voltage.
C not portable and higher in voltage.
D not portable and lower in voltage.

- 18** A step-down transformer has an input voltage of 110 V.

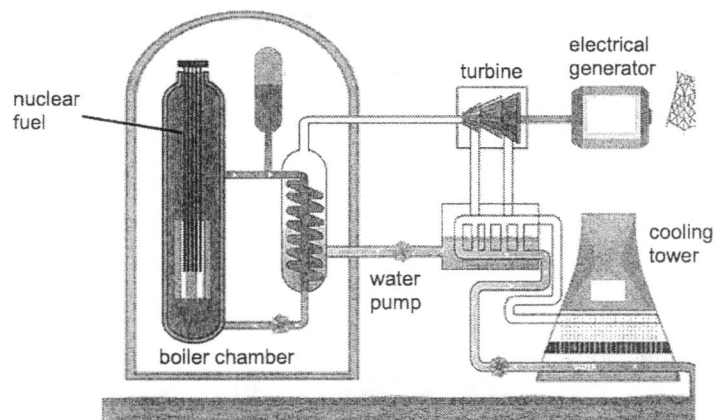
Which of the following is a possible output voltage of the transformer?

- A** 0 V **B** 11 V
C 110 V **D** 1100 V

- 19** Which of the following best describes an electrical transformer?

- A** It works on an A.C. power supply.
B It works on a D.C. power supply.
C The core is made of copper.
D The number of turns at the primary and secondary coils are the same.

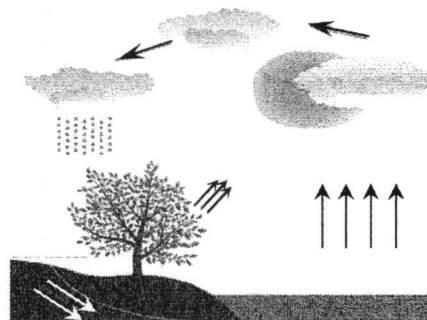
- 20 A nuclear power station works in almost the same way as an oil or natural gas power station, except that it uses a radioactive chemical as its fuel.



What is the main conversion of energy taking place in the nuclear power station?

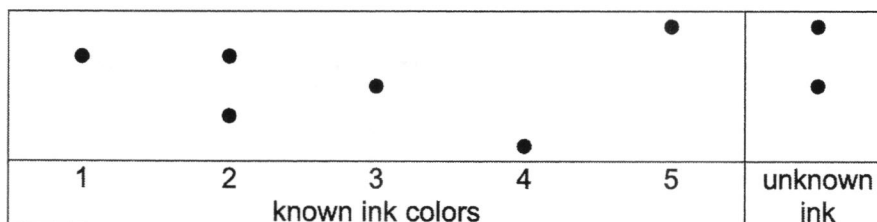
- A chemical potential energy $\rightarrow$ thermal energy $\rightarrow$ kinetic energy $\rightarrow$ electrical energy
 B chemical potential energy $\rightarrow$ light energy $\rightarrow$ electrical energy
 C kinetic energy $\rightarrow$ thermal energy $\rightarrow$ electrical energy
 D light energy $\rightarrow$ chemical potential energy $\rightarrow$ electrical energy

- 21 The diagram shows a water cycle that produces fresh water from salt water.



Which separation technique is water cycle similar to?

- A distillation
 B evaporation
 C filtration
 D mixing
- 22 The diagram shows a chromatogram used to identify colorings in an unknown ink.



Which two ink colors are in the unknown ink?

- A 1 and 2
 B 2 and 4
 C 3 and 5
 D 4 and 5

- 23** What is the gas given off when acids react with metals?
- A** carbon dioxide **B** hydrogen
C nitrogen **D** oxygen
- 24** What is the pH of a solution when an acid is neutralized?
- A** 1 **B** 5
C 7 **D** 14

Questions 25 to 27 refer to the nutrition label shown.

Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container About 8

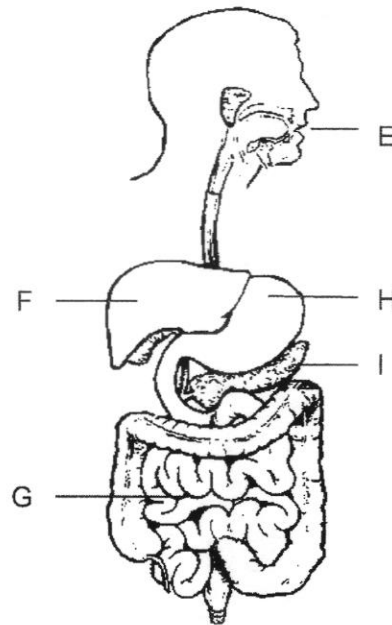
Amount Per Serving		
Calories 230	Calories from Fat 72	
		% Daily Value*
Total Fat 8g		12%
Saturated Fat 1g		5%
Trans Fat 0g		
Cholesterol 0mg		0%
Sodium 160mg		
Total Carbohydrate 37g		12%
Dietary Fiber 4g		16%
Sugars 12g		
Protein 3g		
Vitamin A		10%
Vitamin C		8%
Calcium		20%
Iron		45%

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

- 25** What is the number of calories provided by the food in each serving?
- A** 55 calories **B** 72 calories
C 230 calories **D** 2000 calories
- 26** Which of the following minerals found in the food helps produce more red blood cells?
- A** calcium **B** iron
C vitamin A **D** vitamin C
- 27** Calculate the percentage Daily Value of sodium in one serving for a 2000 calories diet.
- A** 0 % **B** 6.7 %
C 160 % **D** 2400 %

John had fish fillet burger for dinner. The burger also had lettuce and mayonnaise. Use this information to answer questions 28 and 29.



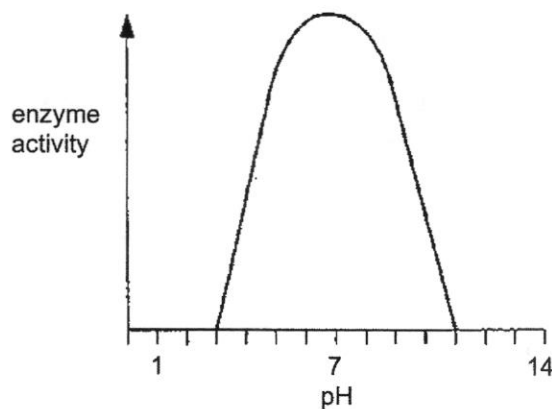
28 In which part of the digestive system does the fish fillet burger get digested completely?

- | | |
|------------|------------|
| A E | B F |
| C G | D H |

29 Which organ produces insulin?

- | | |
|------------|------------|
| A E | B G |
| C H | D I |

30 The graph shows the enzyme activity at a range of pH.



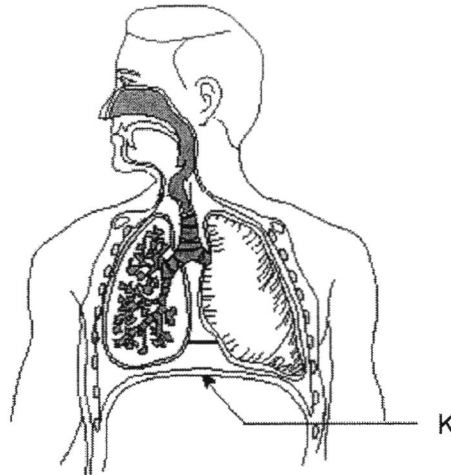
What can you conclude about the activity of this enzyme?

- A** It is destroyed by high temperatures.
- B** It is most active in acidic conditions.
- C** It is most active in neutral conditions.
- D** It is unaffected by pH.

31 Which of the following set of food tests is used to identify starch, protein and fat respectively?

	starch	protein	fat
A	Biuret test	blot test	iodine test
B	Biuret test	iodine test	blot test
C	iodine test	blot test	Biuret test
D	iodine test	Biuret test	blot test

32 The diagram shows the human respiratory system.



Which is the correct function of part K?

- A** It causes the volume of the lungs to change during breathing.
- B** It protects the lungs and the heart.
- C** It provides oxygen to the red blood cells.
- D** It traps dust and bacteria.

33 Which of the following correctly describes breathing in humans?

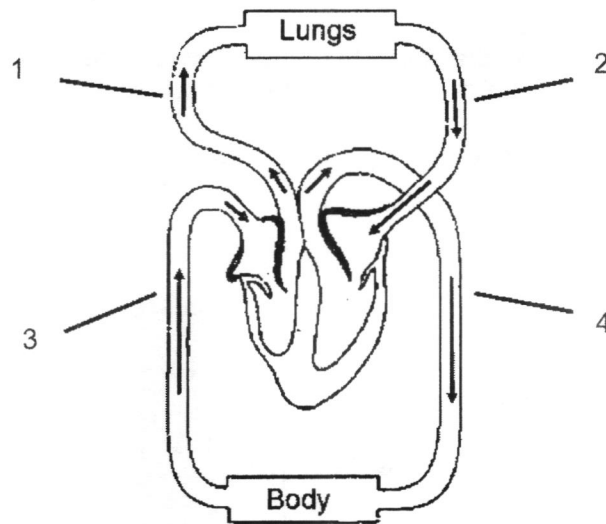
- I Air that is breathed in contains 20% oxygen.
- II Air that is breathed out contains 0.04% carbon dioxide.
- III The ribcage moves upwards and outwards during inhalation.
- IV The diaphragm moves downward during exhalation.

- A** I and III
B II and III
C I and IV
D all of the above

34 What happens when choking occurs?

- A** Food or water enters the bronchi instead of the gullet.
B Food or water enters the lungs instead of the gullet.
C Food or water enters the nostrils instead of the gullet.
D Food or water enters the windpipe instead of the gullet.

The diagram shows part of the human circulatory system. Answer questions 35 and 36 using the diagram.



35 Which two blood vessels carry deoxygenated blood?

A 1 and 2

B 1 and 3

C 2 and 3

D 3 and 4

36 Which of the blood vessels will experience the highest blood pressure?

A 1

B 2

C 3

D 4

37 A runner's pulse rate was measured with a reading of 30 beats for 15 seconds.

What was the runner's pulse rate?

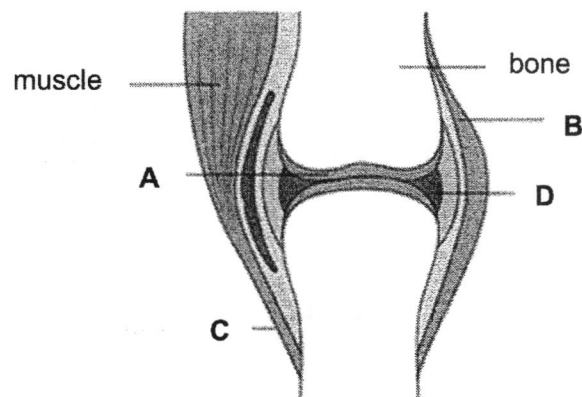
A 90 bpm

B 110 bpm

C 120 bpm

D 130 bpm

38 Which of these parts is the cartilage?



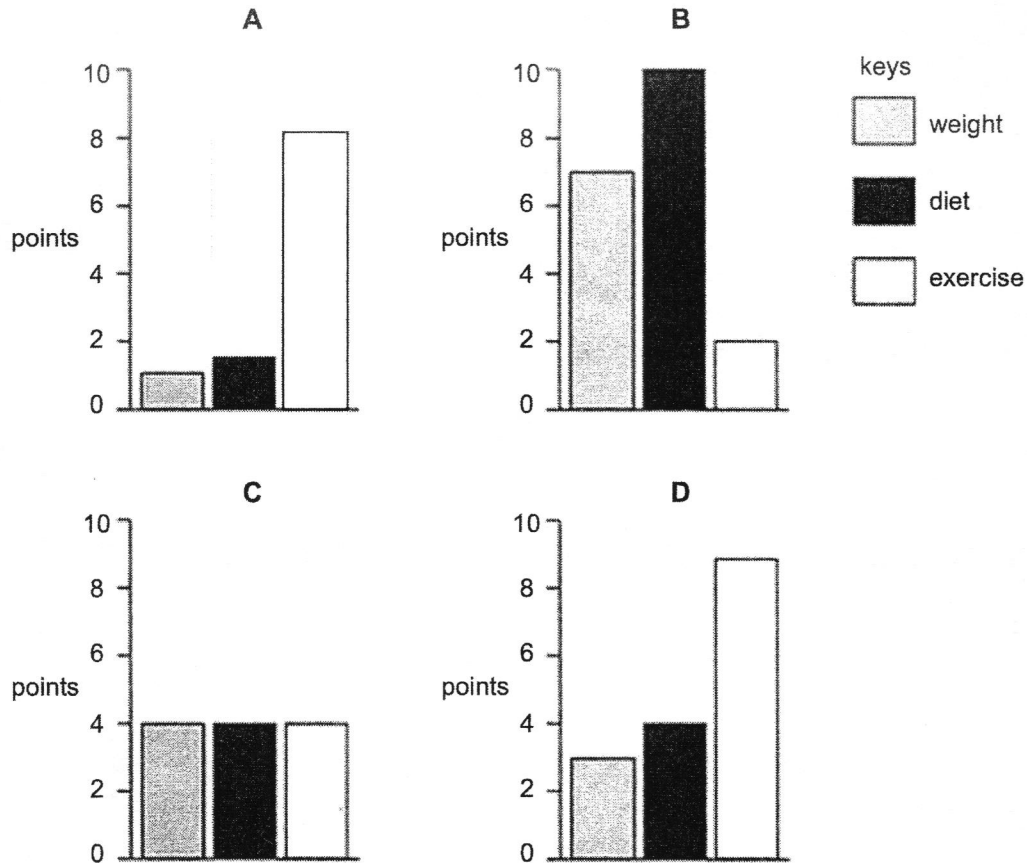
- 39 The lifestyle profiles of four 18-year old boys, **A**, **B**, **C** and **D** were examined. Each lifestyle component was scored from 1-10.

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 least risk of developing heart disease?



- 40 Which of the following are anti-bacterial agents?

- I antiseptics
- II disinfectants
- III vaccines

A I only

C I and III only

B I and II only

D II and III only

☺ END OF PAPER ☺



West Spring Secondary School

PRELIMINARY EXAMINATION 2020

SCIENCE SYLLABUS T

5148/2

Paper 2

SECONDARY 4 Normal (Technical)

Name _____ () **Date** 18 Aug 2020

Class 4G **Duration** 1 hr 15 min

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on the cover page.

You may use a HB pencil for any diagrams, graphs.

Write in dark blue or black pen.

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

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

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

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

FOR EXAMINER'S USE	
Total	/60

This document consists of 9 printed pages including the cover page.

Setter(s)

Mr Colin Teo

[Turn over

- 1 Two households with the same number of family members compare their energy usage in the table shown.

household A	household B
Bedrooms, living room and dining room are air-conditioned all the time.	Bedrooms are air-conditioned only during warm weather while the living room and dining room use fans only.
Washing machine is used whenever there are dirty clothes, even when the laundry basket is not full.	Washing machine is used only when a full load of dirty clothes is ready to be washed.
Large 600 W refrigerator with separate 300 W freezer.	Small 200 W refrigerator with built-in freezer.

- (a) Which household uses more energy?

..... [1]

- (b) Give **two** advice to the household that uses more energy.

.....

 [2]

- (c) (i) State the power rating of the refrigerator that uses less energy.

power = kW [1]

- (ii) Calculate the energy used by the refrigerator in (c) (i) in 24 hours.

energy = kWh [2]

- (iii) The unit cost of electrical energy is \$0.25 per kWh. Calculate the cost of the electrical bill from the usage of the refrigerator in (c) (ii) in a 30 day month.

cost = \$ [2]

- 2 Electromagnetic waves can transfer energy as vibrations through a vacuum.



- (a) Draw and label on the diagram, the length of one wavelength on any part of the wave. [1]
- (b) Arrange the following waves in the correct order of decreasing wavelength. The first one has been done for you.

Microwave Radio waves Visible Light X-Ray
Ultra-violet Gamma rays Infra-red

Radio waves

..... [2]

- (c) Name a use for ultra-violet rays.

..... [1]

- (d) A scientist is studying a wave that makes 80 waves every 4 s.
Determine the frequency of this wave.

frequency = Hz [2]

- 3 A force between the wheels of a bike and the ground can act on a moving bike to slow it down.

- (a) Name the force that was used to slow down the bike.

..... [1]

- (b) Suggest **one** effect of the force in (a) that would affect the bike besides slowing it down.

..... [1]

- (c) If the bike decelerated from 60 m/s to 10 m/s in a time of 5 s, calculate its deceleration.

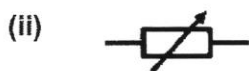
deceleration = m/s² [2]

- 4 (a) Name the following electrical components.



.....

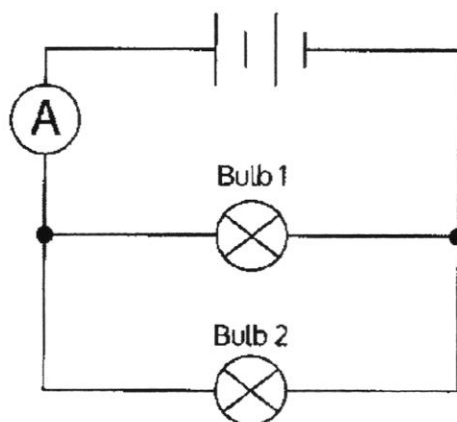
[1]



.....

[1]

- (b) The diagram shows a circuit diagram of two bulbs, Bulb 1 and Bulb 2. Both bulbs are 30 Ω each.



- (i) Circle which is the likely total resistance of both bulbs.

less than 30 Ω

30 Ω

more than 30 Ω

[1]

- (ii) What is the advantage of connecting both bulbs in parallel?

.....

.....

[1]

- (iii) If the current measured by the ammeter is 2 A, state the current flowing through of Bulb 1.

current flowing through Bulb 1 = A

[1]

- (iv) Draw a measuring instrument in the circuit above to measure the potential difference across Bulb 2.

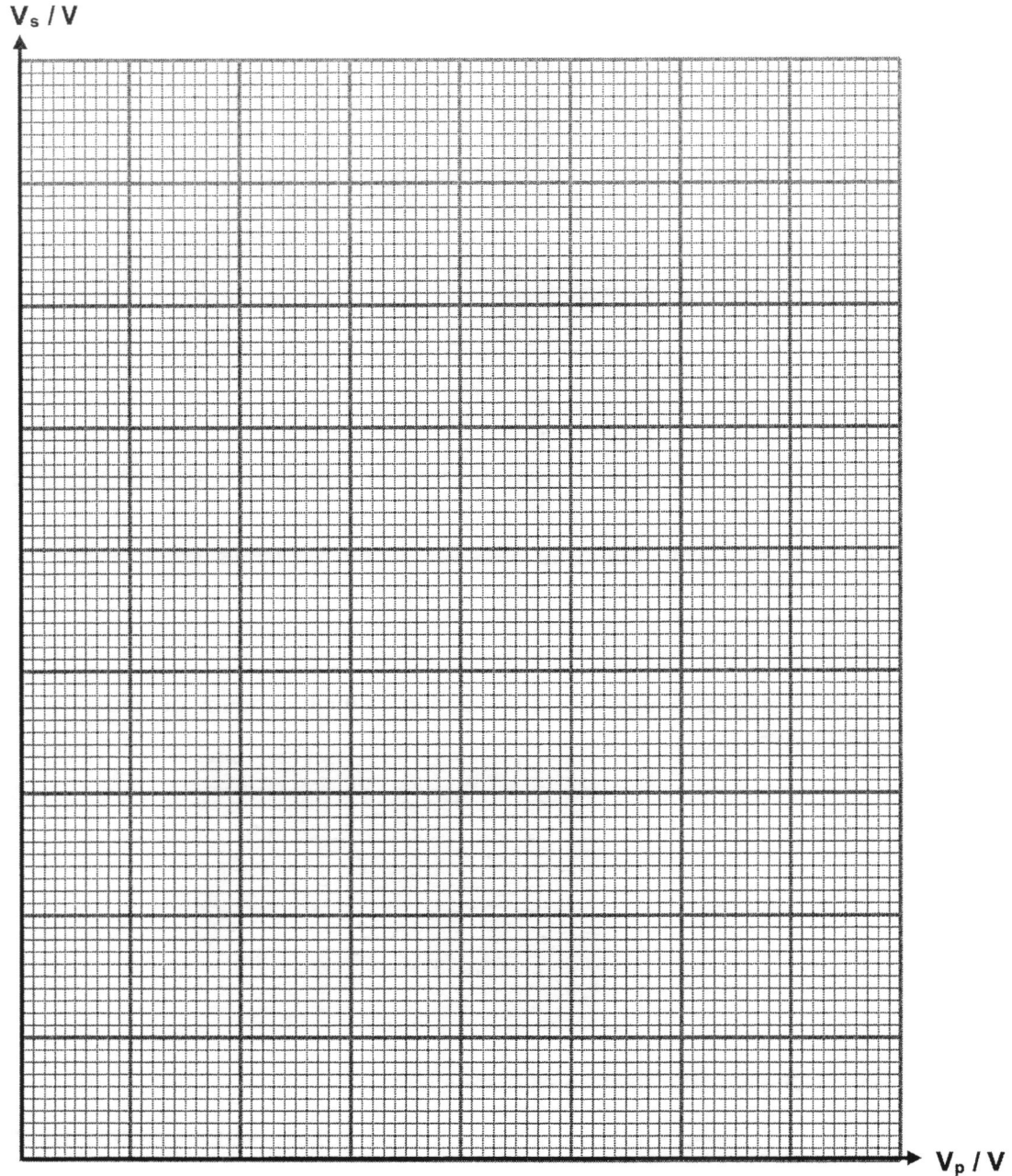
[1]

- 5 V_p and V_s are the primary and secondary voltages of a transformer.

V_p / V	10	20	30	40	50
V_s / V	16	32	48	64	80

- (a) Plot a graph of V_s (vertical axis) against V_p (horizontal axis) on the graph paper.

[3]

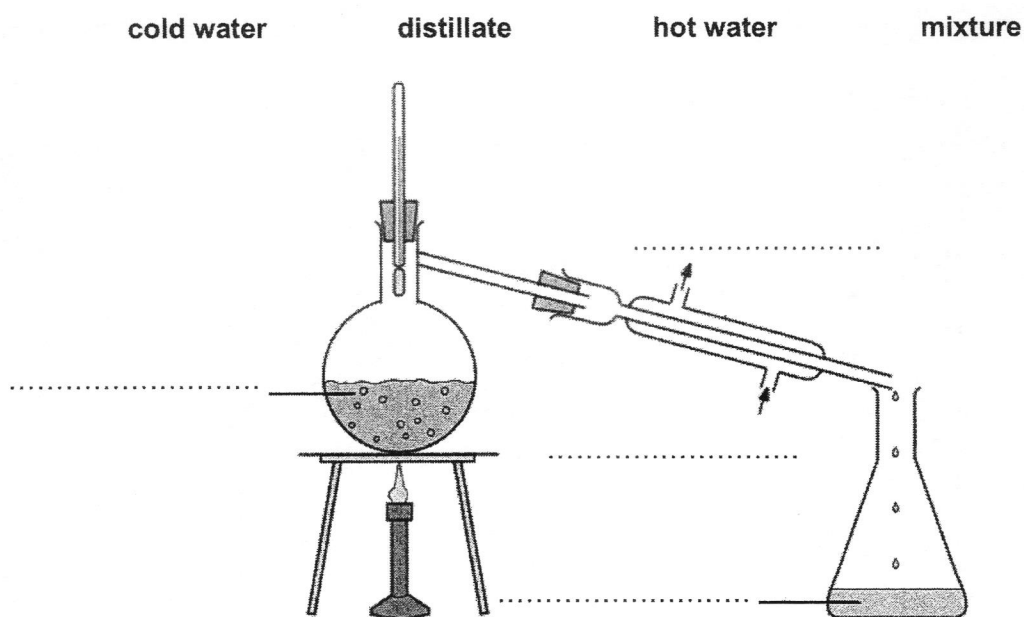


- (b) Determine the value of V_s when V_p is 25 V.

$V_s = \dots\dots\dots V$ [1]

- 6 (a) A mixture of alcohol and water was separated through the apparatus as shown below.

- (i) Label the following in the diagram.



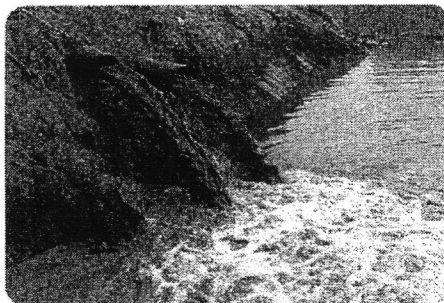
[2]

- (ii) Describe what would be observed when red litmus paper is used to test the distillate.

.....

[1]

- (b) Sewage discharge was found to contain a high amount of phosphoric acid and phosphates.



- (i) Complete the following word equation.

acid + → salt + water + carbon dioxide

[1]

- (ii) Describe the effect of having too much phosphates entering the water.

.....

.....

[1]

- 7 (a) The urine of a person was suspected to be high in sugar level.

(i) What class of food does sugar belong to?

..... [1]

(ii) State the health condition where the blood sugar in a person cannot be properly controlled.

..... [1]

- (b) Microbes can cause food to spoil.

(i) Name one kind of microbe.

..... [1]

(ii) How does low temperature prevent food from spoiling?

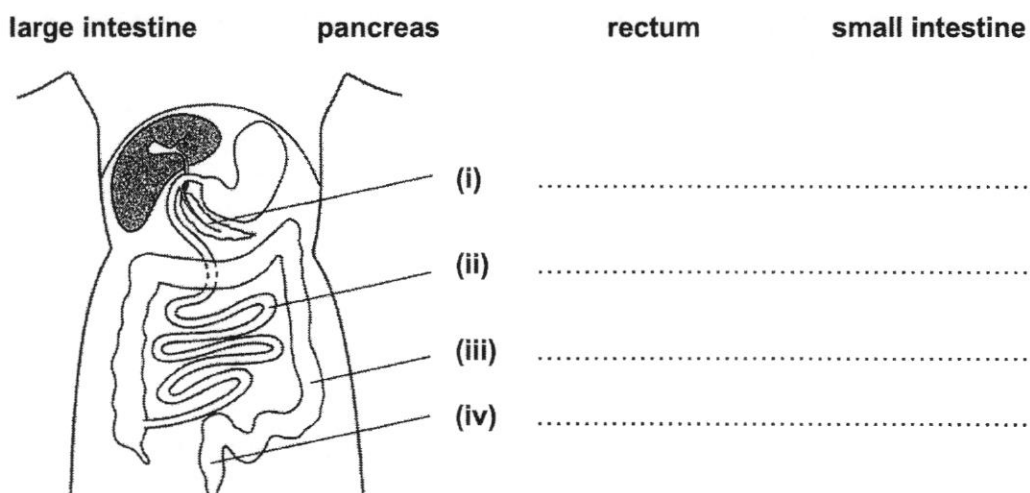
..... [1]

(iii) Name another method that slows down the growth of microbes.

..... [1]

- 8 (a) The diagram shows part of the human digestive system.

Label the parts (i) to (iv) with the following helping words.



[3]

- (b) What is the substance produced by the liver that helps the digestion of fats?

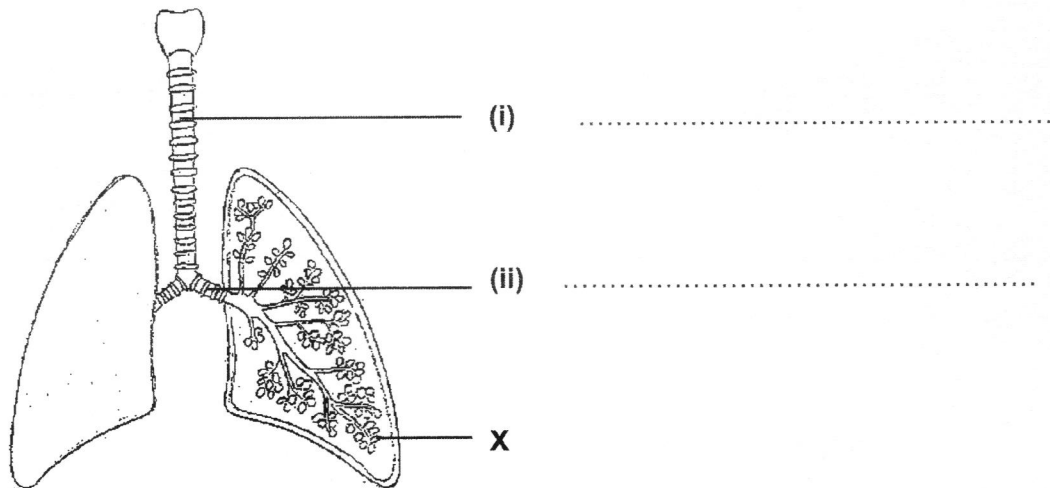
..... [1]

- (c) Predict the color of iodine when it is added to the fluid found in (a) (iii).

..... [1]

- 9 (a) The diagram shows part of the respiratory system

Label the parts (i) and (ii).



[2]

- (b) Describe **two** features of the part labelled X that help it to perform its function.

(i)

[1]

(ii)

[1]

- (c) Match the following substance found in cigarette smoke to the harmful effect to the body that it causes.

substance		harmful effect
nicotine	•	causes excessive coughing
carbon monoxide	•	causes addiction
irritants	•	prevents transport of oxygen

[2]

- 10 (a) Diseases can be caused either through bacteria or viral infections. However, some diseases are hereditary. Complete the table below by putting in a tick (✓) in the correct column to identify each type of disease.

disease	caused by bacteria	caused by virus	hereditary
color blindness			
COVID-19 / SARS			
urinary tract infection			

[2]

- (b) A doctor prescribed antibiotics for a patient with urinary tract infection. Explain why the patient is advised to finish the course of antibiotics

.....

.....

.....

[2]

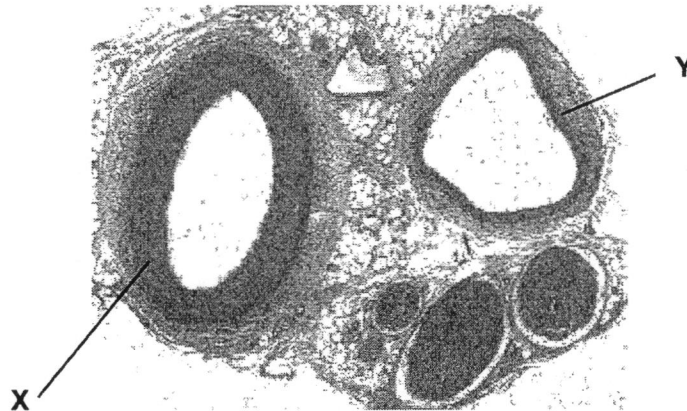
- (c) AIDS is a sexually transmitted infection that can not be easily treated with medication. Explain why AIDS cannot be cured with medication.

.....

.....

[1]

- 11 The diagram shows two different blood vessels indicated by X and Y.



- (a) Identify the blood vessels.

X :

Y :

[2]

- (b) What are the features of blood vessel X that allows it to withstand a higher blood pressure than blood vessel Y?

.....

.....

[2]

- (c) The blood pressure of blood vessel X can sometimes become too high.

Make an **additional** drawing to blood vessel X and **label** the substance that causes the blood pressure to become too high.

[2]

☺ END OF PAPER ☺

***** DO NOT PRINT WITH QUESTION PAPER *****

Answer Key – 2020 – Sec 4 NT – Prelim– Science

MCQ

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

Structured Questions

- 1 a Household A (1m)
- b Any two reasonable answers, eg. turn off air-conditioning when not in use, wash with a full load, turn off electrical appliances when not in use; not limited to info in the table (1m each)
- c (i) 0.2 kW (1m)
 (ii) 0.2×24 (1m for working)
 $= 4.8 \text{ kWh}$ (1m)
 (iii) $4.8 \times 30 \times 0.25$ (1m for working)
 $= \$ 36$ (1m)

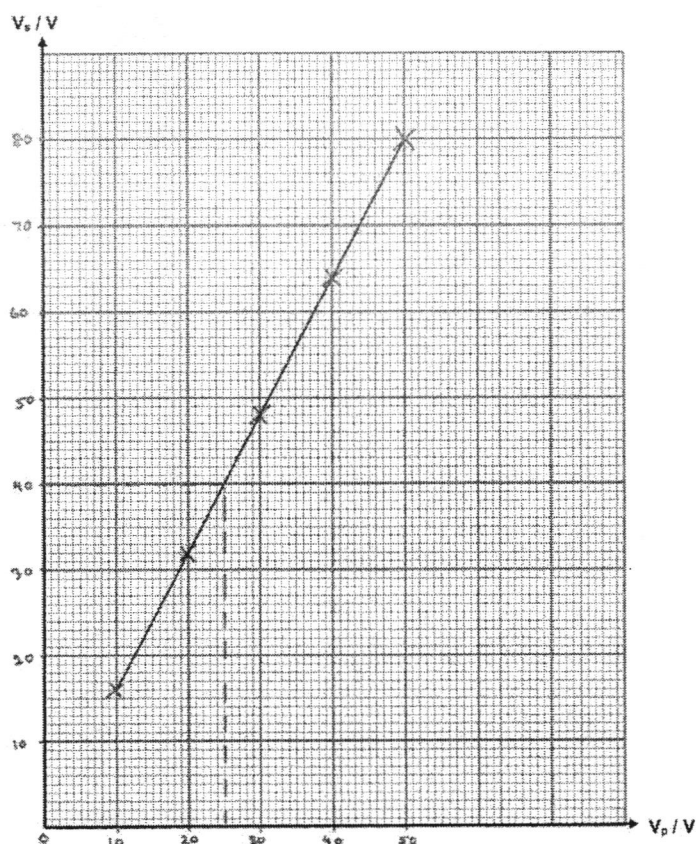
- 2 a wavelength (1m, can also be at trough, or any other part that depicts one wavelength)



- b Microwave, Infra-Red, Visible Light, Ultra-Violet, X-Ray, Gamma Rays
 (2m for all correct, 1m for 3 correct or at least 3 in correct order)
- c Detect forgery in bank notes / kill microbes / sterilize equipment (1m)
- d $f = 80 / 4$ (1m)
 $= 20 \text{ Hz}$ (1m)
- 3 a Friction (1m)
- b (i) Wear and tear (1m)
 (ii) Heat up the tires (1m) (can also be multiple specific examples of wear and tear)
- c $\text{acc} = (10 - 60) / 5$ (1m)
 $= -10 \text{ m/s}^2$
- deceleration = – acceleration
 $= 10 \text{ m/s}^2$ (1m)
- 4 a (i) voltmeter (1m)
 (ii) variable resistor (1m)

- b
- (i) less than $30\ \Omega$ (1m)
 - (ii) ... in case one bulb blows, the other can still light up ... (1m)
 - (iii) 1 A (1m)
 - (iv) Draw a voltmeter parallel to Bulb 2 (1m; also accept voltmeter across bulb / battery)

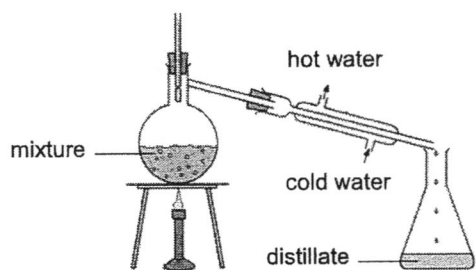
5 a



(1m each for axis, plots and line)

- b $V_s = 40\ V$ (1m)

6 a



(2m for 4 correct, 1m for at least 2 correct)

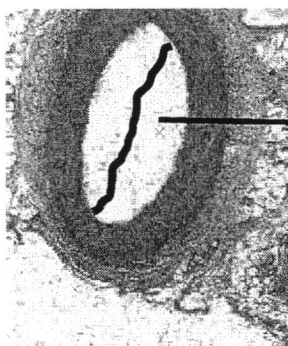
Red litmus remains red / unchanged (1m)

- b
- (i) carbonate (1m)
 - (ii) Algae bloom / rapid growth of algae (1m)

7 a

- (i) Carbohydrates (1m)
 - (ii) Diabetes (1m)
- b
- (i) bacteria / fungi (1m)
 - (ii) Causes microbe to grow slowly (1m)
 - (iii) High temperature / Pasteurization / Sterilization / Canning / Pickling / Vacuum Pack (1m)

- 8 a (i) pancreas
(ii) small intestine
(iii) large intestine
(iv) rectum
- b Bile (1m)
- c Yellow-Brown / Brown (1m)
- 9 a (i) windpipe / trachea (1m)
(ii) bronchus / bronchi (1m)
- b (i) large surface area / thin film of moisture
(ii) numerous blood capillaries (any of 2 answers for 1m each)
- c 1 → 2
2 → 3
3 → 1 (2m for all correct, 1m for one correct)
- 10 a Heredity
Virus
Bacteria (2m for all correct, 1m for one or two correct)
- b If the patient does not finish the course of antibiotics,
the remaining bacteria may still be alive and stronger (1m)
and subsequent treatment with antibiotics may not be able to kill the stronger bacteria. (1m)
- c AIDS is caused by a **virus** and there are **no known cures** for viruses (both points = 1m)
- 11 a X: Artery (1m)
Y: Vein (1m)
- b Thick elastic (1m) muscular walls (1m)
- c



fatty
deposit

(1m for drawing the line in the artery, 1m for label)