

聖嬰中學  
HOLY INNOCENTS' HIGH SCHOOL

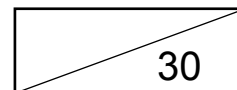


Candidate Name

Class

Index Number

**END OF YEAR EXAMINATION 2023**  
**SECONDARY 2**  
**SCIENCE (Booklet A)**



**Date:** 9<sup>th</sup> Oct 2023

**Duration:** 1h 45 min

**Additional Materials: Optical Answer Sheet**

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

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

Write your name, class and index number on the Answer Sheet in the spaces provided.

There are **thirty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 2.

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

**You should not spend more than 50 mins on this booklet.**

**Set by:** Mrs Cynthia Chan

**Vetted by:** Ms Woo Wei Shan and Mr Damien Lee

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

## The Periodic Table of Element

| Group                      |                             |                                                                                                                           |                                     |                             |                              |                             |                              |                              |                                    |                               |                               |                             |                             |                             |                               |                              |                           |
|----------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|---------------------------|
| 1                          | 2                           |                                                                                                                           |                                     |                             |                              |                             |                              |                              |                                    |                               |                               | 13                          | 14                          | 15                          | 16                            | 17                           | 18                        |
|                            |                             |                                                                                                                           |                                     |                             |                              |                             | 1<br>H<br>hydrogen<br>1      |                              |                                    |                               |                               |                             |                             |                             |                               |                              | 2<br>He<br>helium<br>4    |
| 3<br>Li<br>lithium<br>7    | 4<br>Be<br>beryllium<br>9   | <div>Key</div> <div>proton (atomic) number</div> <div>atomic symbol</div> <div>name</div> <div>relative atomic mass</div> |                                     |                             |                              |                             |                              |                              |                                    |                               |                               | 5<br>B<br>boron<br>11       | 6<br>C<br>carbon<br>12      | 7<br>N<br>nitrogen<br>14    | 8<br>O<br>oxygen<br>16        | 9<br>F<br>fluorine<br>19     | 10<br>Ne<br>neon<br>20    |
| 11<br>Na<br>sodium<br>23   | 12<br>Mg<br>magnesium<br>24 |                                                                                                                           |                                     |                             |                              |                             |                              |                              |                                    |                               |                               | 13<br>Al<br>aluminium<br>27 | 14<br>Si<br>silicon<br>28   | 15<br>P<br>phosphorus<br>31 | 16<br>S<br>sulfur<br>32       | 17<br>Cl<br>chlorine<br>35.5 | 18<br>Ar<br>argon<br>40   |
| 19<br>K<br>potassium<br>39 | 20<br>Ca<br>calcium<br>40   | 21<br>Sc<br>scandium<br>45                                                                                                | 22<br>Ti<br>titanium<br>48          | 23<br>V<br>vanadium<br>51   | 24<br>Cr<br>chromium<br>52   | 25<br>Mn<br>manganese<br>55 | 26<br>Fe<br>iron<br>56       | 27<br>Co<br>cobalt<br>59     | 28<br>Ni<br>nickel<br>59           | 29<br>Cu<br>copper<br>64      | 30<br>Zn<br>zinc<br>65        | 31<br>Ga<br>gallium<br>70   | 32<br>Ge<br>germanium<br>73 | 33<br>As<br>arsenic<br>75   | 34<br>Se<br>selenium<br>79    | 35<br>Br<br>bromine<br>80    | 36<br>Kr<br>krypton<br>84 |
| 37<br>Rb<br>rubidium<br>85 | 38<br>Sr<br>strontium<br>88 | 39<br>Y<br>yttrium<br>89                                                                                                  | 40<br>Zr<br>zirconium<br>91         | 41<br>Nb<br>niobium<br>93   | 42<br>Mo<br>molybdenum<br>96 | 43<br>Tc<br>technetium<br>– | 44<br>Ru<br>ruthenium<br>101 | 45<br>Rh<br>rhodium<br>103   | 46<br>Pd<br>palladium<br>106       | 47<br>Ag<br>silver<br>108     | 48<br>Cd<br>cadmium<br>112    | 49<br>In<br>indium<br>115   | 50<br>Sn<br>tin<br>119      | 51<br>Sb<br>antimony<br>122 | 52<br>Te<br>tellurium<br>128  | 53<br>I<br>iodine<br>127     | 54<br>Xe<br>xenon<br>131  |
| 55<br>Cs<br>caesium<br>133 | 56<br>Ba<br>barium<br>137   | 57–71<br>lanthanoids                                                                                                      | 72<br>Hf<br>hafnium<br>178          | 73<br>Ta<br>tantalum<br>181 | 74<br>W<br>tungsten<br>184   | 75<br>Re<br>rhenium<br>186  | 76<br>Os<br>osmium<br>190    | 77<br>Ir<br>iridium<br>192   | 78<br>Pt<br>platinum<br>195        | 79<br>Au<br>gold<br>197       | 80<br>Hg<br>mercury<br>201    | 81<br>Tl<br>thallium<br>204 | 82<br>Pb<br>lead<br>207     | 83<br>Bi<br>bismuth<br>209  | 84<br>Po<br>polonium<br>–     | 85<br>At<br>astatine<br>–    | 86<br>Rn<br>radon<br>–    |
| 87<br>Fr<br>francium<br>–  | 88<br>Ra<br>radium<br>–     | 89–103<br>actinoids                                                                                                       | 104<br>Rf<br>rutherfordiu<br>m<br>– | 105<br>Db<br>dubnium<br>–   | 106<br>Sg<br>seaborgium<br>– | 107<br>Bh<br>bohrium<br>–   | 108<br>Hs<br>hassium<br>–    | 109<br>Mt<br>meitnerium<br>– | 110<br>Ds<br>darmstadtii<br>m<br>– | 111<br>Rg<br>roentgenium<br>– | 112<br>Cn<br>copernicium<br>– |                             | 114<br>Fl<br>flerovium<br>– |                             | 116<br>Lv<br>livermorium<br>– |                              |                           |

lanthanoids

|                              |                            |                                 |                              |                             |                             |                             |                               |                            |                               |                              |                           |                               |                              |                              |
|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 57<br>La<br>lanthanum<br>139 | 58<br>Ce<br>cerium<br>140  | 59<br>Pr<br>praseodymium<br>141 | 60<br>Nd<br>neodymium<br>144 | 61<br>Pm<br>promethium<br>– | 62<br>Sm<br>samarium<br>150 | 63<br>Eu<br>europium<br>152 | 64<br>Gd<br>gadolinium<br>157 | 65<br>Tb<br>terbium<br>159 | 66<br>Dy<br>dysprosium<br>163 | 67<br>Ho<br>holmium<br>165   | 68<br>Er<br>erbium<br>167 | 69<br>Tm<br>thulium<br>169    | 70<br>Yb<br>ytterbium<br>173 | 71<br>Lu<br>lutetium<br>175  |
| 89<br>Ac<br>actinium<br>–    | 90<br>Th<br>thorium<br>232 | 91<br>Pa<br>protactinium<br>231 | 92<br>U<br>uranium<br>238    | 93<br>Np<br>neptunium<br>–  | 94<br>Pu<br>plutonium<br>–  | 95<br>Am<br>americium<br>–  | 96<br>Cm<br>curium<br>–       | 97<br>Bk<br>berkelium<br>– | 98<br>Cf<br>californium<br>–  | 99<br>Es<br>einsteinium<br>– | 100<br>Fm<br>fermium<br>– | 101<br>Md<br>mendelevium<br>– | 102<br>No<br>nobelium<br>–   | 103<br>Lr<br>lawrencium<br>– |

actinoids

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.**

**1** Which of the following statements about energy is/are true?

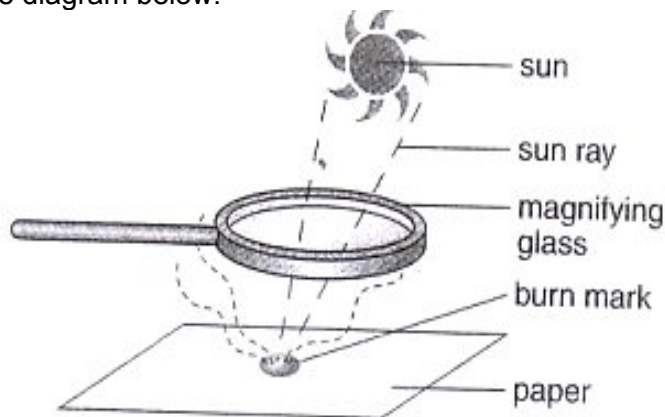
- I Energy is the ability to do work.
- II The SI unit for energy is kilowatt-hour.
- III Energy cannot be converted from one form to another.
- IV Energy can be created and destroyed.

- A** I only
- B** III only
- C** I and II
- D** I and IV

**2** Which of the following examples shows no work done?

- A** pulling out weed in a garden
- B** climbing down a ladder
- C** jumping across a hurdle
- D** pushing with one's body against a large tree

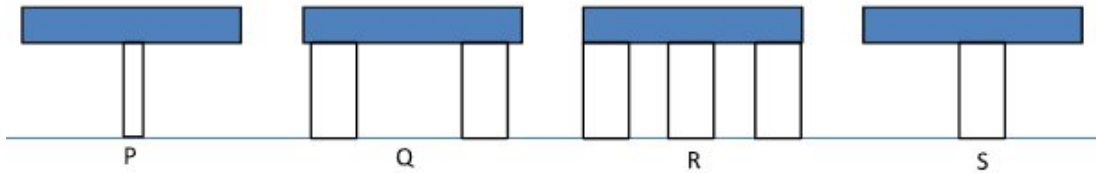
**3** Look carefully at the diagram below.



What energy change is occurring because of the presence of the magnifying glass?

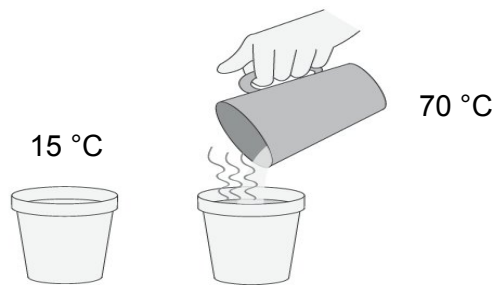
- A** heat energy is changed to light energy
- B** light energy is changed to heat energy
- C** light energy is changed to chemical energy
- D** solar energy is changed to light energy

- 4 The diagram below shows four blocks of identical wood. Each block of wood is shaded and weighs 100 N. Each block of wood is supported by different number of supports of different thickness.



The amount of pressure exerted by each block of wood on the supports is different. Which of the arrangements show the blocks of wood exerting the largest pressure to the smallest pressure on the supports?

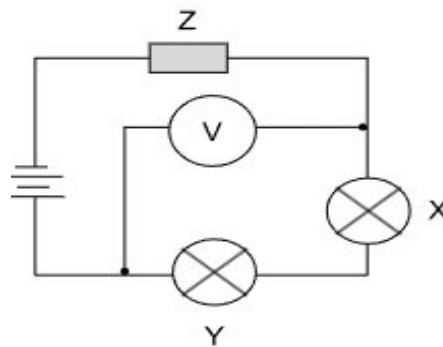
- A P, Q, R, S  
 B R, Q, S, P  
 C P, S, Q, R  
 D Q, R, S, P
- 5 The temperature of the water in the beaker is 15 °C. Some water at 70 °C is poured into the beaker.



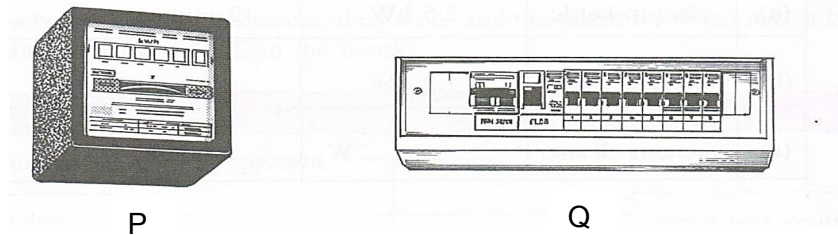
What is the final temperature of the water in the beaker?

- A 15 °C  
 B 70 °C  
 C 85 °C  
 D between 15 °C and 70 °C
- 6 Divers wear rubber or nylon suits to stay warm. Which of the following best explains the reason?
- I The materials are light and allow heat loss through perspiration.  
 II The materials are good heat insulators.  
 III The layer of air trapped beneath the materials is a good insulator of heat.  
 IV The materials' smooth surface is a poor conductor of heat.
- A I and IV only  
 B II and III only  
 C I, II and III only  
 D all of the above

- 7 The main reason for the presence of the vacuum is to prevent heat transfer due to
- A convection and conduction.
  - B convection and radiation.
  - C conduction and radiation.
  - D conduction, convection and radiation.
- 8 In the circuit , the below, voltmeter measures the potential difference across



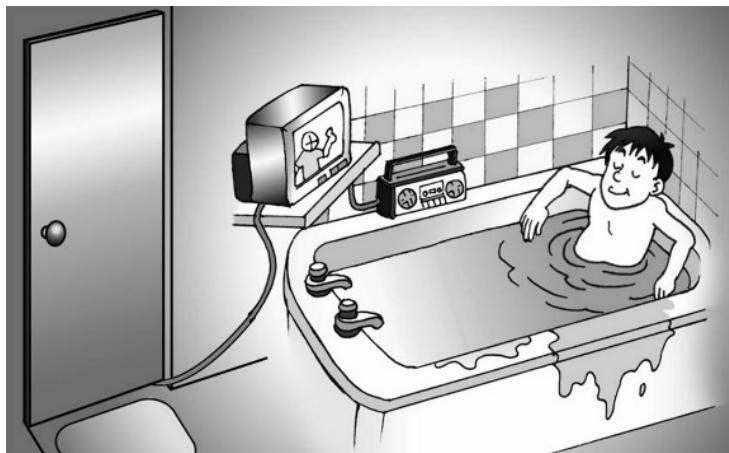
- A X only.
  - B Y only.
  - C X and Y.
  - D Z only.
- 9 The diagram below shows two common electrical fixtures in a household.



Which of the following comparisons between P and Q is true?

|   | P                                                                           | Q                                                                              |
|---|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| A | for measuring how much electricity has been used                            | all the switches will turn off automatically when no electricity is being used |
| B | for measuring how much electricity has been used                            | the switch will turn off by itself when the current is too large               |
| C | to save electricity, meter will reset to zero when the current is too large | for measuring how much electricity has been used                               |
| D | the switch will turn off by itself when the current is too large            | to save electricity, meter will reset to zero when the current is too large    |

- 10 John did not want to miss his favourite television series and music so he brought both his television set and radio into the bathroom. He watches the television and listens to the radio at the same time while he is in the bath. As his best friend, what should you advise him?



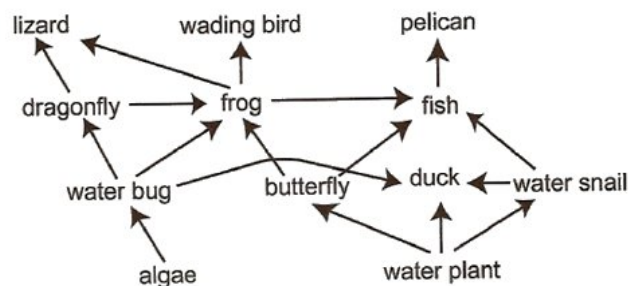
- A never watch the television and listen to the radio at the same time  
B never use the television and radio in the bathroom because the signal reception is poor  
C never use the television and radio in the bathroom because the sound effect is bad  
D never use the television and radio in the bathroom because it is dangerous to use electrical appliances in wet places
- 11 Which of the following changes are caused by exposure to heat?
- I boiling of alcohol  
II burning of charcoal  
III decomposition of silver bromide on X-ray film  
IV producing glucose by green plants
- A I and II only  
B II and IV only  
C II, III and IV only  
D all the above
- 12 Which of the following is a reversible change?
- A burning of a matchstick  
B mercury rises in the thermometer  
C heating of sugar to form carbon  
D frying of an egg
- 13 The diagram shows the pH ranges of three indicators, methyl orange, bromothymol blue and

methyl red.

| indicator \ pH   | 2      | 3 | 4      | 5 | 6      | 7    | 8 |
|------------------|--------|---|--------|---|--------|------|---|
| methyl orange    | red    |   | yellow |   |        |      |   |
| methyl red       | red    |   |        |   | yellow |      |   |
| bromothymol blue | yellow |   |        |   |        | blue |   |

What colour would be observed if a few drops of all three indicators are added to a sample of distilled water?

- A blue  
B green  
C orange  
D yellow
- 14 Poisonous carbon monoxide is found in the car exhaust fumes because
- A it is present in petrol.  
B it is present in the air taken in by the engine.  
C it is formed when petrol burns incompletely with insufficient supply of oxygen.  
D it is formed by the hot engine.
- 15 Which of the following is **not** an effect of acid rain?
- A Acid rain corrodes metal and stone, resulting in damaged buildings and statues.  
B Acid rain enables aquatic plants to grow better.  
C Fishes and plants in the water are killed by acid rain which flows into rivers and lakes.  
D Trees die gradually due to acid rain.
- 16 The diagram below shows a food web in a wetland ecosystem.



Which organism is both a primary and a secondary consumer?

- A** duck
- B** frog
- C** lizard
- D** water bug

**17** Which of the following shows the correct classification of physical and biotic factors?

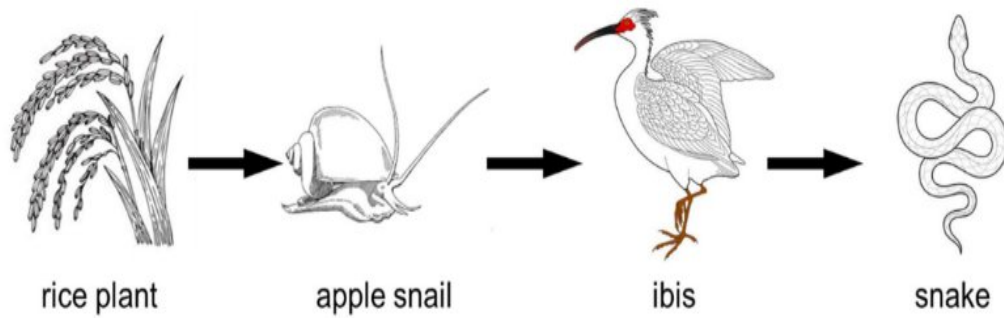
|          | physical                                           | biotic                                       |
|----------|----------------------------------------------------|----------------------------------------------|
| <b>A</b> | the amount of sunlight received                    | lion prey on the deers                       |
| <b>B</b> | bees extracted nectar from flowers                 | salmon swim up a stream to lay their eggs    |
| <b>C</b> | the area receives high volume of rainfall annually | the river has a pH of 7                      |
| <b>D</b> | cactus plant has needle-like leaves                | the area has an average temperature of 40 °C |

**18** Which row correctly shows the relationship between the organisms described in scenarios I, II and III?

- I Butterflies feed on nectar in flowers and help them in pollination.
- II Foxes hunt for rabbits.
- III Fleas hide in the fur of dogs and suck their blood.

|          | scenario I    | scenario II   | scenario III  |
|----------|---------------|---------------|---------------|
| <b>A</b> | mutualism     | parasitism    | predator-prey |
| <b>B</b> | mutualism     | predator-prey | parasitism    |
| <b>C</b> | parasitism    | predator-prey | mutualism     |
| <b>D</b> | predator-prey | mutualism     | parasitism    |

**19** A food chain consisting of four organisms is shown below.



Which option shows the correct organism matched to the amount energy transferred to it?

|          | greatest amount of energy transferred to it | least amount of energy transferred to it |
|----------|---------------------------------------------|------------------------------------------|
| <b>A</b> | ibis                                        | rice plant                               |
| <b>B</b> | snake                                       | rice plant                               |
| <b>C</b> | rice plant                                  | snake                                    |
| <b>D</b> | snake                                       | apple snail                              |

- 20** The diagram shows a food chain in a woodland ecosystem. Mice are hunted by snakes as food whereas snakes are hunted by eagles as food.



How will the populations in the ecosystem be affected if the snake population decreases due to habitat loss?

|          | mouse population | eagle population |
|----------|------------------|------------------|
| <b>A</b> | Increase         | increase         |
| <b>B</b> | Increase         | decrease         |
| <b>C</b> | Decrease         | increase         |
| <b>D</b> | Decrease         | decrease         |

- 21** Alan had chicken burger for lunch. In which part of the digestive system did the chicken burger get digested completely?

- A** mouth
- B** stomach
- C** small intestine
- D** large intestine

- 22** Four samples of digestive enzymes were obtained from different organisms. The best temperature and pH for each enzyme to digest food was measured. Which of the following enzymes was obtained from the human stomach?

|          | temperature / °C | pH |
|----------|------------------|----|
| <b>A</b> | 15               | 3  |
| <b>B</b> | 25               | 11 |
| <b>C</b> | 37               | 2  |
| <b>D</b> | 40               | 10 |

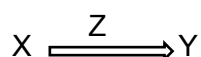
- 23** Enzymes are biological catalysts because

- A** they are produced by biological scientists and can control chemical reactions in our body.
- B** they are produced by our body and can slow down chemical reactions outside our body.
- C** they are produced by the food we eat and can speed up chemical reactions in our body.
- D** they are produced by our body and can speed up chemical reactions in our body.

- 24** What is the name of the process in which digested food is absorbed into the blood stream?

- A** diffusion
- B** osmosis
- C** muscular movement
- D** peristalsis

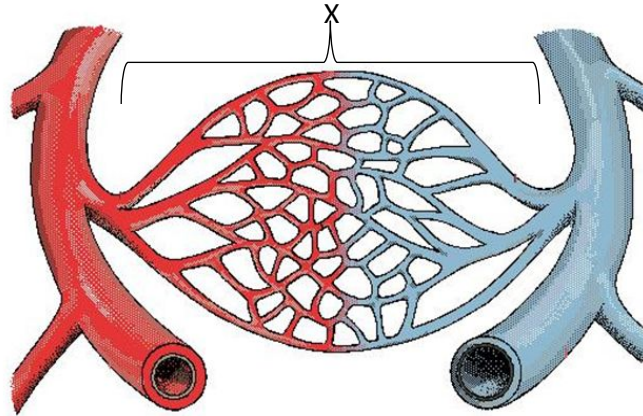
- 25** The process of digestion can be represented by the following equation.



Which of the following correctly identifies X, Y and Z?

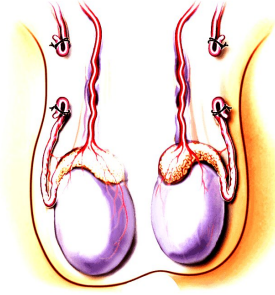
|          | X                      | Y                     | Z                      |
|----------|------------------------|-----------------------|------------------------|
| <b>A</b> | complex food molecules | digestive enzymes     | complex food molecules |
| <b>B</b> | complex food molecules | simple food molecules | digestive enzymes      |
| <b>C</b> | digestive enzymes      | simple food molecules | complex food molecules |
| <b>D</b> | simple food molecules  | digestive enzymes     | complex food molecules |

- 26** Which of the following accurately describe the structures labelled X?



- A** X are arteries and they are thin vessels.
  - B** X are capillaries and they are one cell thick.
  - C** X are veins and they are thickest of all the blood vessels.
  - D** X are arteries where diffusion of substances takes place.
- 27** The function of scrotum is to
- A** produce sperm.
  - B** produce sex hormones.
  - C** provide protection for testes.
  - D** store sperms.
- 28** Which of the following helps to prevent the spread of sexually transmitted infections?
- I. using condoms during sexual intercourse
  - II. abstaining from sexual intercourse before marriage
  - III. having sexual intercourse only during a woman's menstruation
  - IV. having sexual intercourse with only one uninfected partner
- A** I and II only
  - B** II and IV only
  - C** I, II and IV only
  - D** all of the above

- 29 A birth control method is shown below.



How does this birth control method work?

- A Semen will not be produced anymore.
  - B Sperms will not be produced anymore.
  - C Semen will not be released out of the body anymore.
  - D Sperms will not be released out of the body anymore.
- 30 Where does the fertilization process take place?
- A Oviduct
  - B ovary
  - C uterus
  - D vagina