| Class | Register Number | Name |
|---|---|---|
| | | |

南洋女子中学校

# NANYANG GIRLS' HIGH SCHOOL

## End-of-Year Examination 2012
## Secondary Three

**Physics** **45 minutes**

**Paper 1** Multiple Choice **8:45 – 9:30**

**Monday** **15 Oct 2012**

Additional materials: Multiple Choice Answer Sheet

**READ THESE INSTRUCTIONS FIRST**

**Do not open this booklet until you are told to do so.**

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and register number on the Multiple Choice Answer Sheet provided.

There are **thirty** 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 answer sheet.

**INFORMATION FOR CANDIDATES**

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.

Take the acceleration due to gravity, g, to be 10 m $s^{-2}$ or 10 N $kg^{-1}$

**1** Which of the following shows a base physical quantity with its correct SI unit?

| | Base Physical Quantity | SI unit |
|---|---|---|
| **A** | electric current | volt |
| **B** | mass | gramme |
| **C** | temperature | degree celsius |
| **D** | amount of substance | mole |

**2** The unit newton (N) is equivalent to

**A** kg m $s^{-1}$. **B** kg m $s^{-2}$.

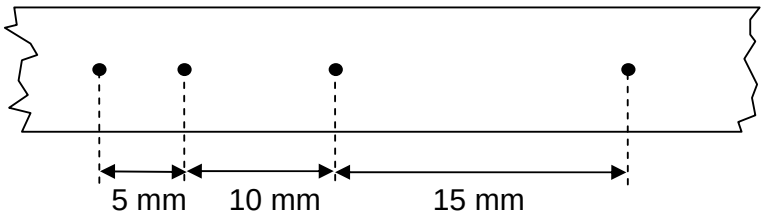
**C** kg $m^{-1}$ $s^{-1}$. **D** kg $m^{-1}$ $s^{-2}$.

**3** Acceleration can be calculated using

**A** change in velocity ÷ time taken. **B** distance ÷ time.

**C** force x mass. **D** average speed x time.

**4** A ticker-timer tape is attached to a trolley that is accelerating down an inclined runway at 0.50 m $s^{-2}$. The diagram shows part of the tape and the distance between successive dots.




What is the vibrating frequency of the ticker-timer?

**A** 5 Hz **B** 10 Hz

**C** 50 Hz **D** 100 Hz

**5** The table below shows the variation with time ***t*** of the distance ***s*** travelled by an object along a straight level surface.

| ***t*** / s | 0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
|---|---|---|---|---|---|---|
| ***s*** / m | 0 | 2.0 | 6.0 | 12.0 | 20.0 | 30.0 |

Which of the following statements about the motion of the object is **correct**?

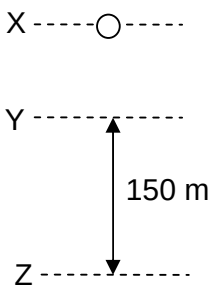
**A** The velocity of the object is increasing with decreasing acceleration.

**B** The velocity of the object is increasing with constant acceleration of 1.0 m $s^{-2}$.

**C** The velocity of the object is increasing with constant acceleration of 2.0 m $s^{-2}$.

**D** The velocity of the object is increasing with increasing acceleration.

**6** A body is dropped from rest at height X and falls freely past height Y. 2.0 s after passing height Y, it passes height Z. If the difference in height between Y and Z is 150 m, find the time for the body to fall from X to Z.

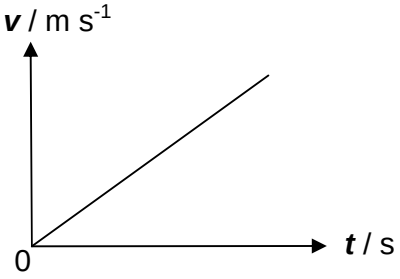



**A** 5.5 s **B** 6.5 s

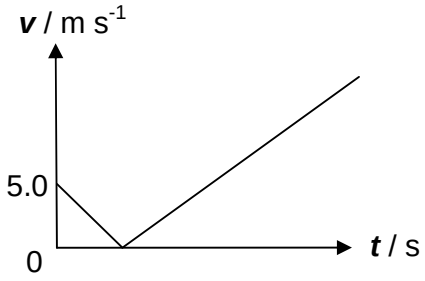
**C** 7.5 s **D** 8.5 s

**7** A bag is dropped out from a hot air balloon when the balloon is ascending at a velocity of 5.0 m $s^{-1}$. Which of the following graphs best shows how the velocity ***v*** of the bag varies with time ***t*** ?

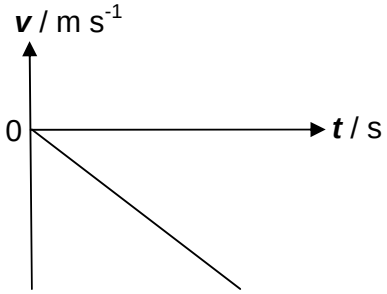
**A**



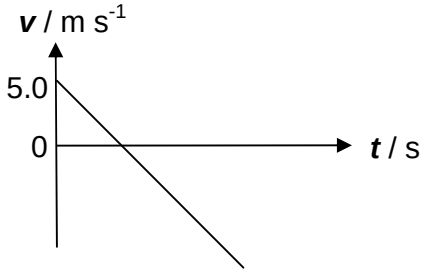

**B**




**C**

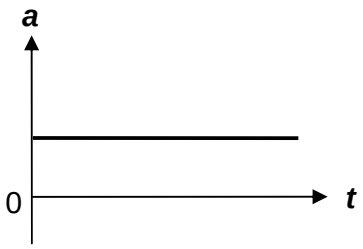



**D**

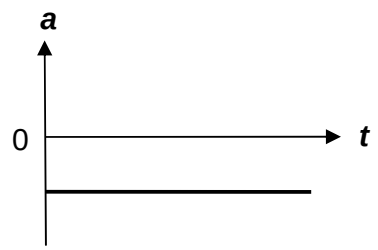


**8** An object is thrown vertically upwards in air. Taking velocity in the upwards direction as positive, which of the following graphs best represents the variation of acceleration ***a*** with time ***t*** for the object before it hits the ground?

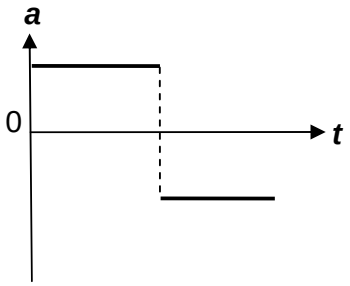
**A**



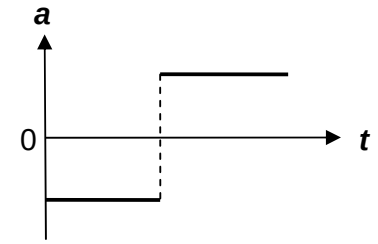

**B**




**C**




**D**

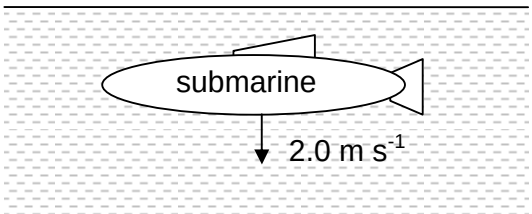



**9** A body is moving in a straight line under the action of a constant force. What change will occur to the body?

**A** Change in kinetic energy. **B** Change in mass.

**C** Change in acceleration. **D** Change in inertia.

**10** A small submarine of mass 1000 kg sinks in water with a uniform speed of 2.0 m $s^{-1}$.




What is the upward force acting on the submarine as it sinks?

**A** 0 N **B** 500 N

**C** 1000 N **D** 10 000 N

**11** A block of mass 20.0 kg is placed on a horizontal surface. When a horizontal force of 40 N is applied on the block, it moves with a constant velocity of 2.0 m $s^{-1}$. What is the acceleration of the block if the applied force is increased to 140 N?

100N = 20(a)
a = 5

**A** 3.0 m $s^{-2}$ **B** 5.0 m $s^{-2}$

**C** 6.0 m $s^{-2}$ **D** 25 m $s^{-2}$

**12** What is the tension of the cable holding a lift of mass 450 kg that is ascending with a deceleration of 2.0 m $s^{-2}$?

**A** 900 N **B** 3600 N

**C** 4500 N **D** 5400 N

$T-W=ma$

$T-4500=450(-2)$

$T=3600N$

**13** Which of the following phenomena can be explained using Newton's 3rd Law of Motion?

**(i)** A man swims across a pool by pushing the water with his limbs.

**(ii)** A passenger in a car moves forward when the car suddenly stops.

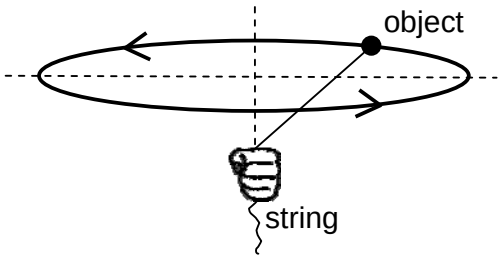
**(iii)** A coin and a feather fall with the same acceleration in a vacuum.

**(iv)** A space shuttle travels through space to the moon by ejecting the burning fuel.

**A** **(i)** only **B** **(i)** and **(iii)** only

**C** **(i)** and **(iv)** only **D** **(i)**, **(ii)** and **(iv)** only

**14** An object is attached to the end of a string and rotated at a constant speed in a horizontal plane.




Which of the following statements correctly describes the motion of the object?

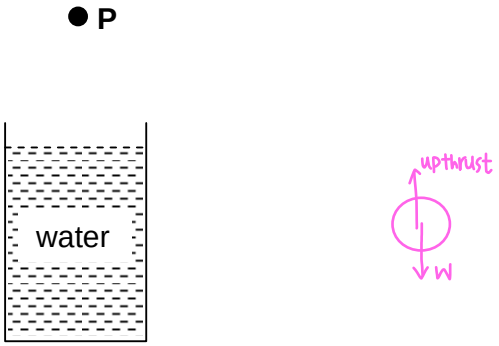
**A** The acceleration of the object is constant.

**B** The direction of travel of the object is constant.

**C** The displacement of the object after 1 complete revolution is zero.

**D** The force acting on the object is along the circumference of the circle.

**15** A sphere of density 1.0 g $cm^{-3}$ is dropped from position **P** into a container of water.




Assuming that the density of the water is 1.0 g $cm^{-3}$, which of the following outcomes is not possible?

**A** The sphere will rest at the bottom of the container.
**B** The sphere will float in the middle of the container.
**C** The sphere will float just under the surface of the water.
**D** The sphere will hit the bottom of the container with a non-zero speed.

**16** A student made a balancing toy using wires and plasticine and pivoted it on a stand as shown in **Diagram 1**.

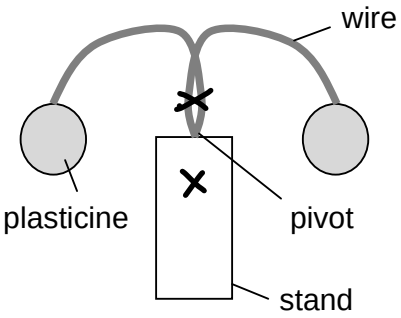



**Diagram 1**

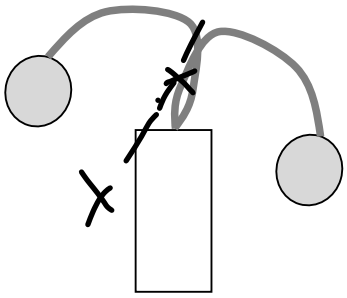


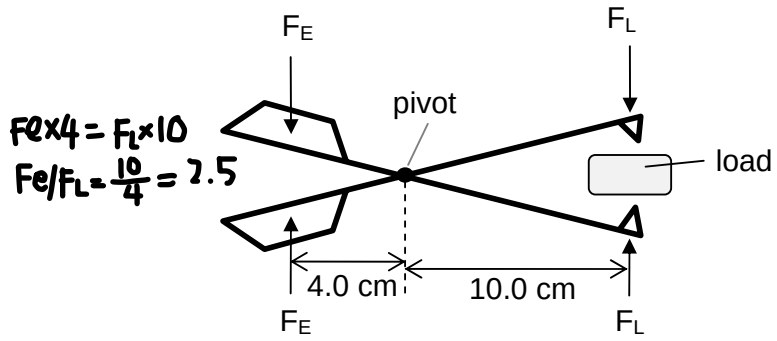
**Diagram 2**

When the toy was tilted slightly as shown in **Diagram 2**, the toy stayed at that tilted position and neither toppled nor returned to the position shown in **Diagram 1**.

This was because the centre of gravity of the toy is

**A** exactly at the pivot.
**B** vertically above the pivot.
**C** vertically below the pivot.
**D** inside the plasticine.

**17** The diagram below shows a pair of tongs that can be used to pick up a load. A force $F_E$ is applied at the handle to exert a force $F_L$ on the load.




$F_E \times 4 = F_L \times 10$

$F_E / F_L = \frac{10}{4} = 2.5$

The tongs will exert force $F_L$ on the load that is

**A** equal in magnitude to $F_E$.

**B** 0.40 times the magnitude of $F_E$.

**C** 2.0 times the magnitude of $F_E$.

**D** 2.5 times the magnitude of $F_E$.

**18** It seems easier to climb to the top of a steep hill using a zigzag path instead of climbing in a straight line from the bottom directly to the top of the hill. This is because

**A** less time is needed.

**B** less friction has to be overcome.

**C** less energy is needed.

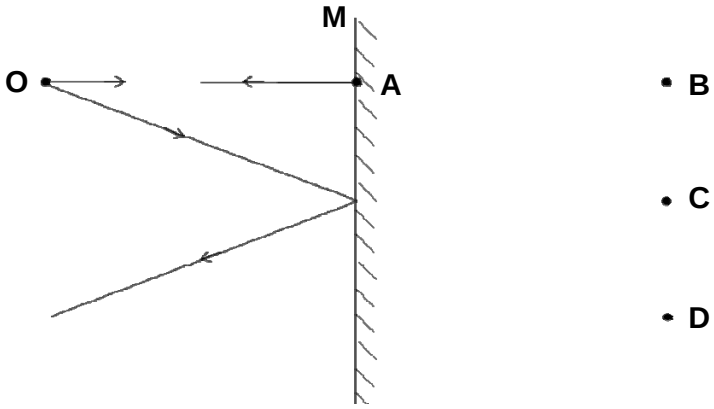
**D** less power is needed.

**19** A 60 W lamp converts 75 % of its electrical energy into light energy. What is the amount of light energy given out in 2.0 minutes?

**A** 90 J **B** 1800 J

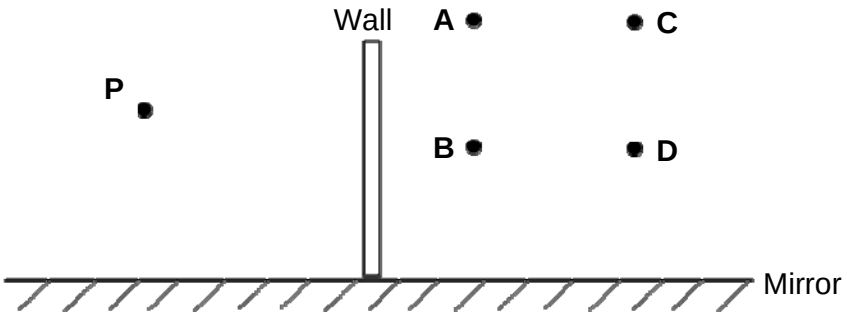
**C** 5400 J **D** 7200 J

**20** The diagram shows two divergent rays of light from an object **O** reflected from a plane mirror **M**.




At which position will the image be formed?

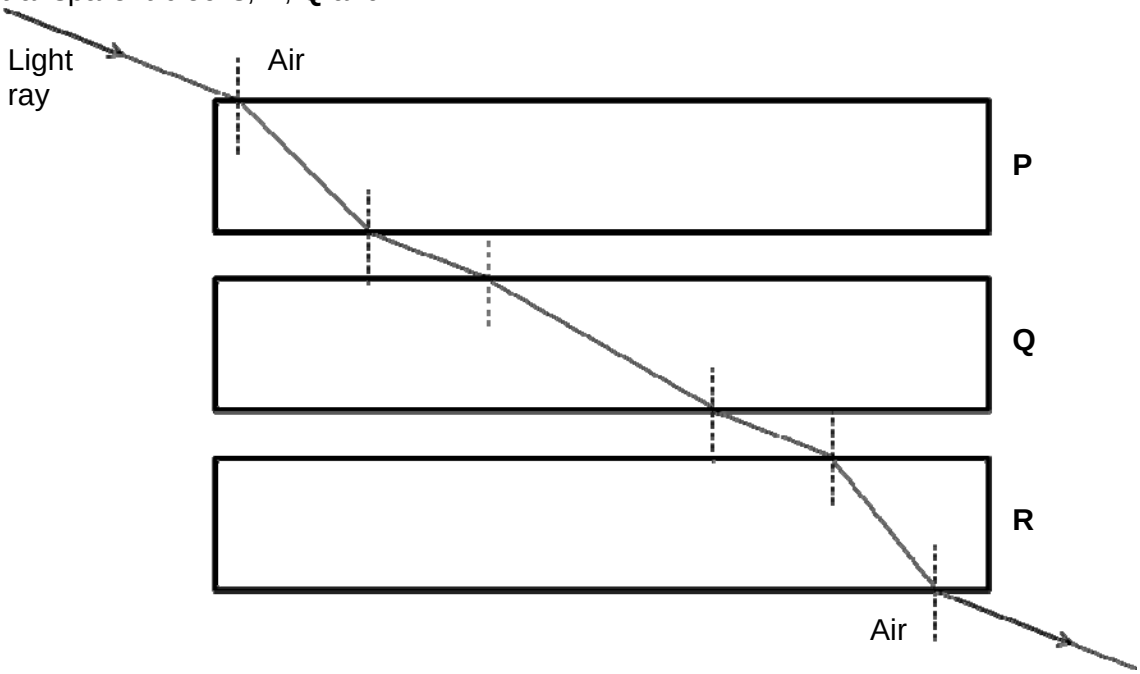
**21** A man stands next to a mirror at a point labelled **P** as shown in the diagram below. Four objects **A**, **B**, **C** and **D** are placed behind an opaque wall.




Which of the four objects will the man be able to see in the mirror?

**A** None of the objects
**B** Object A only
**C** Objects A, B and C.
**D** All four objects

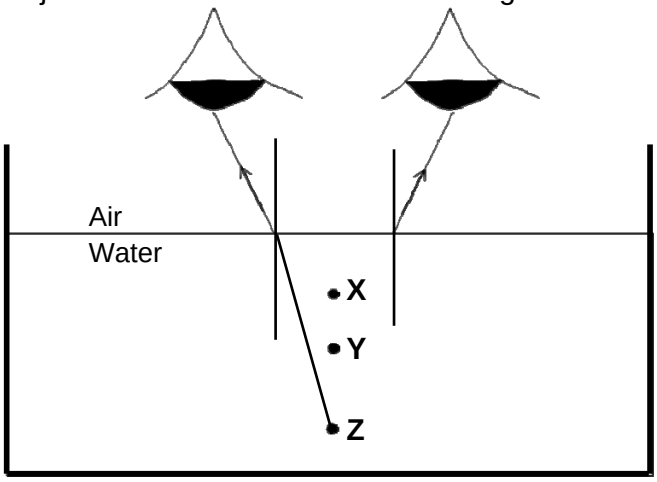
**22** The diagram shows the path of a ray of light that passes from air through three transparent blocks, **P**, **Q** and **R**.




Of the three blocks, which has the highest refractive index?

**A** Block **P**.
**B** Block **Q**.
**C** Block **R**.
**D** It is not possible to tell.

**23** A man is looking into a tank of water as shown in the diagram below. Light rays travelling from an object in the water are shown entering the man's eyes.

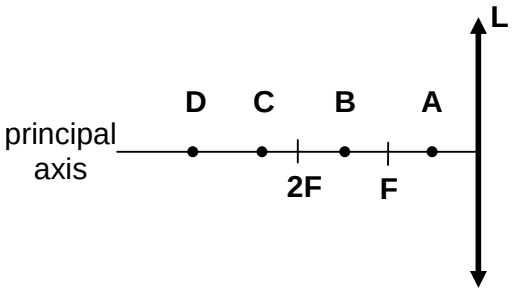



Which of the following options most likely represents the position of the **image** and the position of the **object**?

| | Position of the image | Position of the object |
|---|---|---|
| **A** | **X** | **Y** |
| **B** | **Y** | **X** |
| **C** | **Y** | **Z** |
| **D** | **Z** | **Y** |

**24** A student wishes to position an object in front of a lens **L** to produce an image suitable for use in an overhead projector. The principal focus of the lens is located at **F**.

At which positions, **A**, **B**, **C** or **D**, should an object be placed?




**25** Which of the following statements is **not** true about electromagnetic waves?

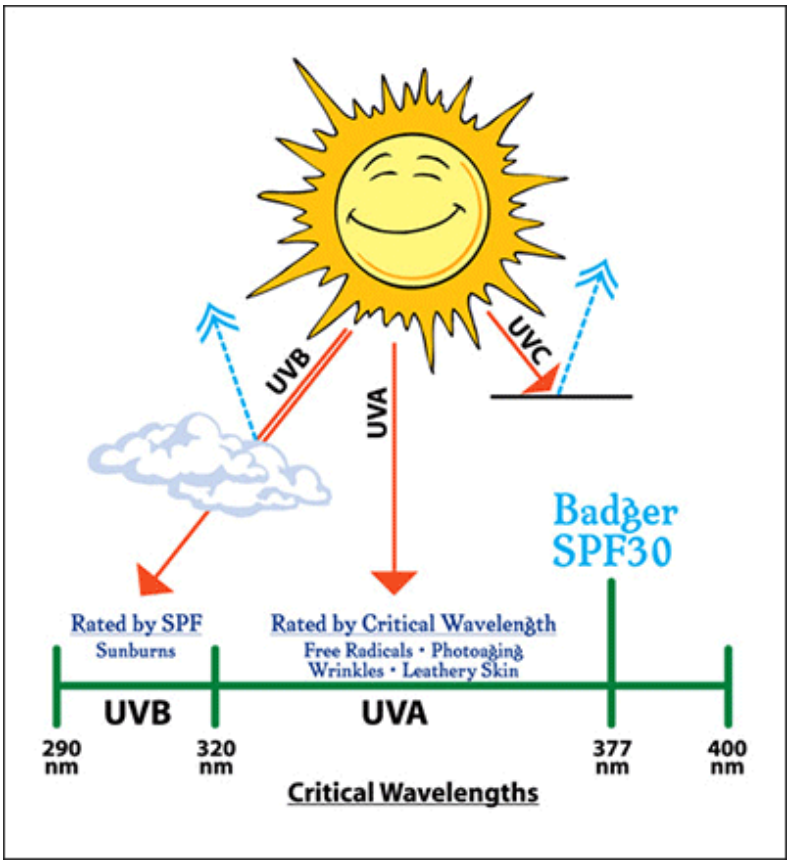
**A** They carry electric charge.

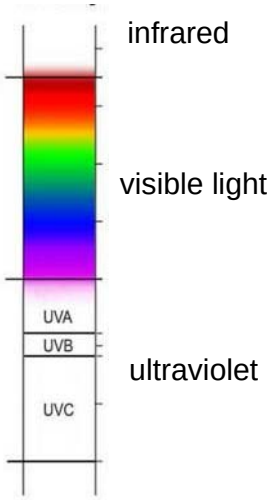
**B** They obey the Laws of Reflection.

**C** Their speed in vacuum is $3.0 \times 10^8$ m $s^{-1}$.

**D** Their frequencies do not change when they travel from one medium to another.

**26** Ultraviolet radiation from the sun can be divided into 3 bands, UVA, UVB and UVC. The diagrams below show the effects of ultraviolet radiation on human skin (Image courtesy of http://cityorganics.com.au) and a section of the electromagnetic spectrum.




Based on the information given above, which of following cannot be inferred about ultraviolet radiation?

**A** UVC has the shortest wavelength.
**B** The atmosphere does not stop UVA from reaching the earth.
**C** All forms of UV light can cause damage to human skin
**D** EM waves with frequency of $10^{15}$ Hz are classified as UVB rays.

**27** Low frequency X-rays are used to produce X-ray images of hard tissue like bones.

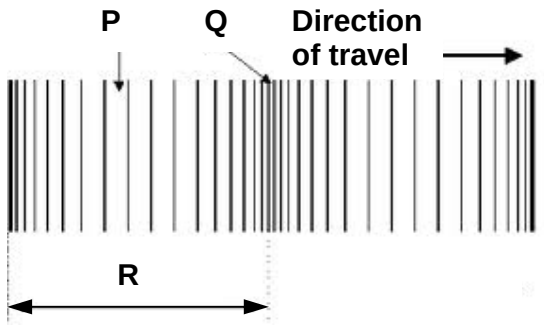
Why are high frequency X-rays not used for this purpose?

**A** High frequency X-rays can kill human tissue cells.
**B** High frequency X-rays are more difficult to produce.
**C** High frequency X-rays cannot produce X-ray images.
**D** High frequency X-rays will damage electrical equipment.

**28** Which of the following is transferred when a wave moves from one point to another?

**A** force. **B** energy.
**C** particles. **D** moments.

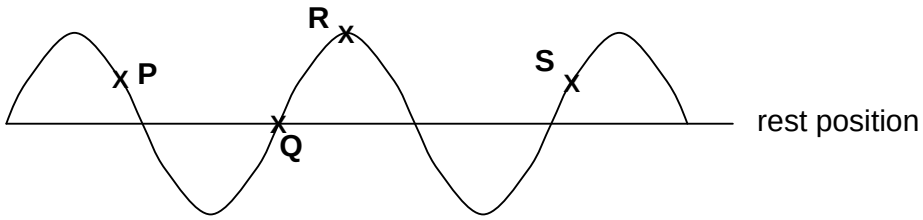
**29** The diagram below shows the positions of layers of air particles as a wave passes through.




Which of the following correctly names the parts **P**, **Q** and **R**?

| | P | Q | R |
|---|---|---|---|
| **A** | rarefaction | compression | Wavelength |
| **B** | trough | peak | Wavelength |
| **C** | compression | rarefaction | Frequency |
| **D** | peak | trough | Frequency |

**30** The diagram below shows a transverse wave as it travels from right to left.




Which of the following statements correctly describes the motion of the particles **P**, **Q**, **R** and **S** at the instant shown above?

| | **P** | **Q** | **R** | **S** |
|---|---|---|---|---|
| **A** | moving up | moving down | at rest | moving down |
| **B** | moving down | at rest | moving down | moving up |
| **C** | at rest | moving up | moving up | moving down |
| **D** | moving down | moving up | at rest | moving up |

End of paper