

# SCIENCE (PHYSICS/BIOLOGY) ENTRANCE TEST SAMPLE PAPER

Sample paper only provides:

5 MCQ + 1 SAQ for Physics

5 MCQ + 1 SAQ for Biology

Actual Paper

Total 30 MCQ + 4 SAQ

15 MCQ and 2 SAQ for Physics

15 MCQ and 2 SAQ for Biology

Each MCQ is 2 marks

Each SAQ is 10 marks

## Instructions

1. This is a **closed-book** test.
2. It has a time limit of **90 minutes** and allows for only **ONE attempt (submission)**.
3. Alert the invigilator if you are facing technical difficulties.
4. You are to **ensure** that:
  - your laptops, computers and any other devices used for this test is in good functioning order and have uninterrupted power supply and internet connection throughout the duration of the test.
  - you are in a conducive environment throughout the duration of the test.
  - your answers are correctly saved by the end of the test.
5. You are **allowed** to use:
  - a scientific calculator.
  - a blank piece of paper (no larger than A4 size) for rough work. The paper will not be accepted for submission at the end of the test.
6. You are **not allowed** to:
  - leave the test or leave your devices throughout the duration of the test.
  - use the washroom throughout the duration of the test.
  - communicate with any person, either face-to-face or through any communication device, other than the invigilator.
  - refer to any references, e.g. textbooks, resources from a laptop or smart devices etc.
  - share materials (e.g. electronic calculator) during the test.
  - use any communication devices such as mobile phones, tablets, smart watches, headsets during the test.
7. Enter the password provided by the invigilator to start Test paper.

## SECTION A - ANSWER ALL QUESTIONS ( 20 Marks )

### Question 1

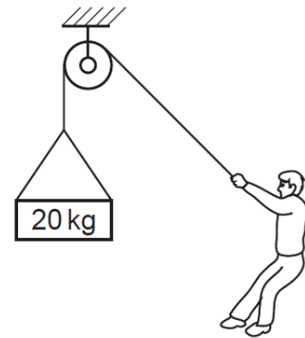
An object is falling under gravity with terminal velocity. Its speed is \_\_\_\_\_.

- A increasing
- B staying constant
- C decreasing to zero
- D decreasing to a lower value

### Question 2

A person supports a mass of 20 kg suspended from a rope. What is the tension in the rope?

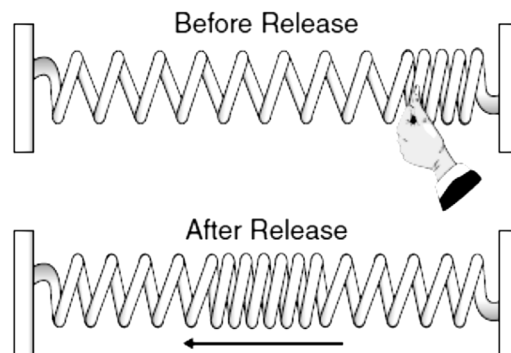
- A 0 N
- B 10 N
- C 20 N
- D 200 N



### Question 3

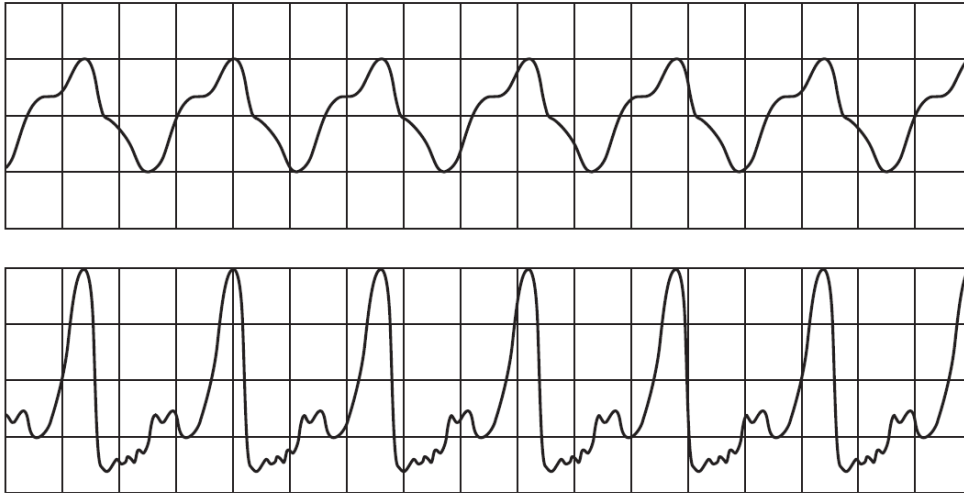
A stretched spring attached to two fixed points is compressed on one end and released, as shown below. The resulting wave travels back and forth between the two fixed ends of the spring until it comes to a stop. This mechanical wave is an example of a \_\_\_\_\_.

- A transverse wave
- B refracted wave
- C longitudinal wave
- D super-positioned wave



#### Question 4

The sounds produced by two musical instruments are directed towards a microphone connected to an oscilloscope. The waveforms produced on the screen are shown.

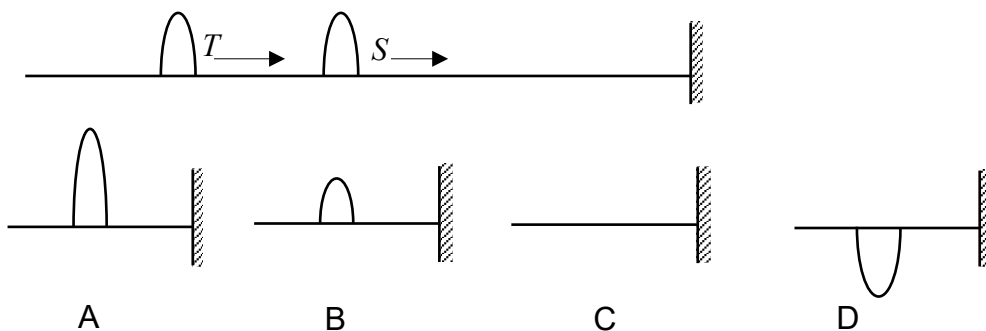


The waveforms show that the sounds produced have a different property. What is the property?

- A Speed
- B Frequency
- C Wavelength
- D The quality of sound

#### Question 5

Two pulses of the same amplitude move on a string to the right as shown below. When pulse S reflects from the fixed end of the string and interferes with T, the shape of the resultant pulse is best described by:



### Question 6

Which of the following options describes "Diffusion"?

Key: "✓" = True; "x" = False

	Occurs in any substances, e.g., gas and liquid	Takes place through a partially permeable membrane	Substances move down a concentration gradient
A	x	x	✓
B	✓	x	✓
C	✓	✓	x
D	x	✓	✓

### Question 7

Figure 1 shows the effect of varying light intensity and CO<sub>2</sub> level on the rate of photosynthesis.

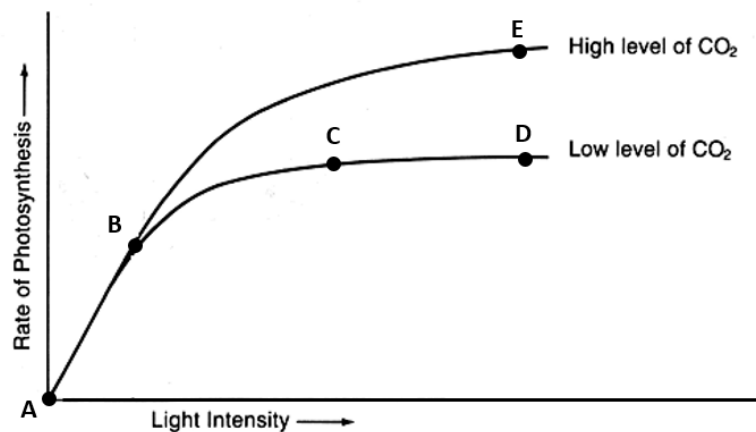


Figure 1

What is limiting the rate of photosynthesis?

( )

- A. Light intensity between Point A to B
- B. Light Intensity between Point C to D
- C. CO<sub>2</sub> level between Point A to B
- D. CO<sub>2</sub> level between Point B to C

### Question 8

Which of the following events would directly increase the area of carbon sinks in an ecosystem?

- A. Burning more plants
- B. Humans eating more meat
- C. Increasing soil stability
- D. Draining lakes

### Question 9

Which of the following options shows the characteristics of deoxyribonucleic acid (DNA)?

Key: "✓" = True ; "x" = False

	The sugar unit is deoxyribose	It is a double stranded molecule	It is a temporary molecule and is made only when needed	Uracil is one of the nitrogen-containing bases
A	✓	✓	x	x
B	✓	x	✓	x
C	x	✓	✓	x
D	x	✓	x	✓

### Question 10

The \_\_\_\_\_ and \_\_\_\_\_ of a flowering plant contain haploid nuclei.

- A. pollen and ovum
- B. Ovule and Sepal
- C. Anther and Sepal
- D. Ovum and Ovule

**END OF SECTION A**

## SECTION B – ANSWER ALL QUESTIONS ( 20 Marks )

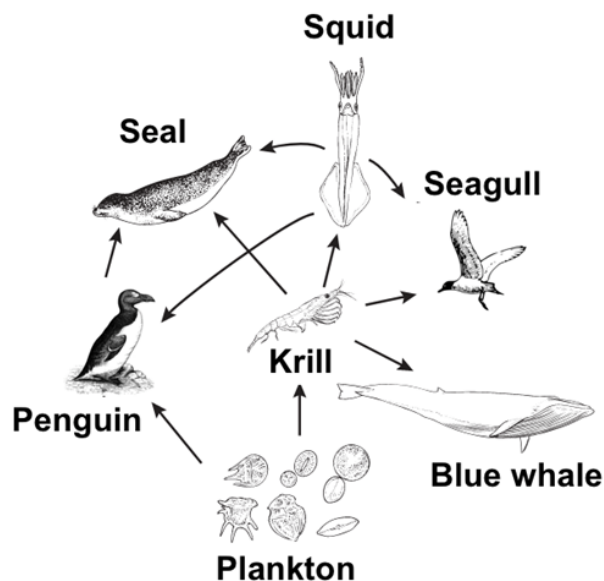
### Question 1

The density  $\rho$  and the pressure  $P$  of a gas are related by the expression  $c^2 = \frac{\gamma P}{\rho}$ .

- (a) Given Pressure  $P = \frac{\text{Force}}{\text{Area}}$ , where  $\text{Force} = \text{Mass} \times \text{Acceleration}$ , find the base units of  $P$ .  
( 4 marks )
- (b) If  $\gamma$  has no unit and the base units of  $\rho$  are  $\text{kg m}^{-3}$ , what are the base units of  $c$ ?  
( 4 marks )
- (c) Basing on your answer to (b), suggest what physical quantity may be represented by  $c$ ?  
( 2 marks )

### Question 2

Figure 4 shows an aquatic food web. Answer the following questions.



**Figure 4**

- a) Identify **ONE** producer and explain why it is a producer in the food web.  
(3 marks)
- b) Penguin is a secondary consumer. Explain if this statement is true.  
(3 marks)

c) A bacterial infection resulted in a drastic decrease in the number of krill. Explain how this will impact the aquatic food web.

(4 marks)

**END OF SECTION B**



## Formula Table

Equations of Kinematics	$v = u + at \qquad s = \frac{1}{2}(v + u)t$ $v^2 = u^2 + 2as \qquad s = ut + \frac{1}{2}at^2$
Force and Motion	$\sum F = ma \qquad F_{\text{Friction}} = \mu \vec{N}$
Work, Energy, Power	$W = (F \cos \theta) \Delta r$ $KE = \frac{1}{2}mv^2 \qquad PE = mgh$ $P_{\text{Average}} = \text{Work/Time} = \Delta \text{Energy/Time}$ $P = Fv$
Linear Momentum Impulse	$\vec{p} = m\vec{v}$ $\vec{I} = \vec{F}_{\text{Average}} \Delta t = m\vec{v}_f - m\vec{v}_i$
Torque, Moment	$\tau = rF \sin \theta = r_{\perp} F = rF_{\perp}$
Elasticity, SHM	$F = -kx \qquad PE_{\text{Elastic}} = \frac{1}{2}kx^2$ $\frac{F}{A} = Y \frac{\Delta L}{L} \qquad \frac{F}{A} = S \frac{\Delta x}{L}$
Heat and Temperature	$\Delta L = \alpha L_0 \Delta T \qquad \Delta V = \beta V_0 \Delta T$ $Q = mc\Delta T \qquad Q = ml$
Gravitational Acceleration	$g = 10 \text{ m/s}^2$