

## SECTION A

## QUESTION 1

1.1

- 1.1.1 B✓✓
- 1.1.2 C✓✓
- 1.1.3 A✓✓
- 1.1.4 D✓✓
- 1.1.5 D✓✓
- 1.1.6 D✓✓
- 1.1.7 A✓✓

7 X 2 (14)

1.2

- 1.2.1 Peristalsis✓
- 1.2.2 Substrate✓
- 1.2.3 Lactic acid✓
- 1.2.4 Territoriality✓
- 1.2.5 Magnesium✓
- 1.2.6 Dark phase✓
- 1.2.7 Beri-beri✓
- 1.2.8 Co-factor✓

(8)

1.3

- 1.3.1 A only✓✓
- 1.3.2 B only✓✓
- 1.3.3 A only✓✓
- 1.3.4 B only✓✓
- 1.3.5 (Both) A & B✓✓
- 1.3.6 A only✓✓
- 1.3.7 A only✓✓

7 X 2 (14)

1.4

- 1.4.1 (i) Starch✓ (1)
  - (ii) Proteins✓ (1)
  - (iii) Fats✓ (1)
  - (iv) Glucose/fructose/galactose/monosaccharides/maltose/lactose✓ (1)
  - 1.4.2 The substance did not contain any nitrogen✓✓ which is present in proteins (2)
  - 1.4.3 (i) Blue-black✓ (1)
  - (ii) Brick-red/purple/violet ✓ (1)
  - (iii) Orange/yellow/red-brown✓ (1)
  - 1.4.4 Lipase✓ (1)
- (10)**

1.5

- 1.5.1 carrots✓  
(Mark first ONE only) (1)
- 1.5.2 table salt & seafood✓  
(Mark first TWO only) (2)
- 1.5.3 carrots✓ / oranges✓ / potatoes✓  
(Mark first ONE only) (1)
- 1.5.4 wholewheat bread✓  
(Mark first ONE only) (1)
- 1.5.5 egg-yolk / seafood✓  
(Mark first ONE only) (1)
- (6)**

1.6

- 1.6.1 To demonstrate the mechanism of breathing✓ (1)
- 1.6.2 (i) Trachea✓ (1)  
(ii) Thoracic cavity✓ (1)  
(iii) Lungs ✓ (1)
- 1.6.3 (i) Balloons will deflate✓ / reduce in size / become smaller (1)  
(ii) Decrease✓ (1)
- 1.6.4 Ribs and intercostals muscles are flexible in humans but the bell jar is fixed ✓✓ / lungs fill up the thoracic cavity in humans but there is space in bell jar between the balloons and the bell jar ✓✓ / diaphragm in humans is convex but in the bell jar the rubber sheet (part D/E) is flat ✓✓  
(Mark first reason only) (2)

**(8)****TOTAL SECTION A: 60**

**QUESTION 2**

2.1

- 2.1.1 (i) A - amylase✓  
C - maltase✓ (2)
- (ii) B - maltose✓  
D - glucose✓ (2)
- (iii) E - columnar epithelium✓  
F - venule✓ (2)
- 2.1.2 Water✓ (1)
- 2.1.3 - through passive diffusion✓ / with a diffusion gradient  
- or active transport✓ / against the diffusion gradient when there  
is a higher concentration✓ of glucose in the epithelium cells than  
in the intestine using energy (3)
- 2.1.4 - bile ✓ neutralizes the acid ✓ of the stomach  
- bicarbonate ions ✓ secreted by the Brunner's glands / in the  
pancreatic juice✓ (4)
- 2.1.5 Hepatic portal vein✓ (1)
- stored as glycogen✓  
- used during cellular respiration to form ATP✓  
- converted into fats✓ (3)
- 2.1.6 - (very) long small intestine✓  
- surface area is increased/ by folds of the mucosa/ millions of  
villi and microvilli✓  
- movement of the intestine wall and villi ensures close contact of  
food with absorption area✓  
- absorption surface is thin-walled/only a single layer of columnar  
epithelium cells✓  
- absorption surface is moist✓ because of the digestive juices and  
mucin  
- well supplied with blood capillaries/lacteals✓  
**(Mark first three only)** (3)  
**(21)**
- 2.2
- 2.2.1 Between 07:00 ✓ – 08:00 ✓ (2)
- 2.2.2 08:45 ✓✓ (2)
- 2.2.3 (i) glucose level rose from 60 to 70 mg/ 100ml in 15 minutes✓  
(ii) no effect ✓ (2)

- 2.2.4 - The increased blood glucose concentration ✓ has to first stimulate the pancreas ✓ to secrete insulin (2)
- 2.2.5 - More glucose available for oxidation and release of energy ✓  
- as a result less/no need for fatty acids to be oxidized ✓  
- fatty acids reconverted to fats ✓ Any 2 X 1 (2)
- 2.2.6 - When the glucose concentration increases ✓  
- the islets of Langerhans ✓ / pancreas is stimulated  
- to secrete insulin ✓  
- which stimulates the liver ✓  
- to convert ✓ the excess glucose into glycogen ✓  
- glucose concentration decreases ✓ Any 4 x 1 (4)  
(14)

**Total Question 2: 35**

**QUESTION 3**

3.1

- 3.1.1 A - Palisade ✓ mesophyll  
 C - Chloroplasts ✓ (2)

3.1.2

- (i) - It is waxy/water proof ✓ to prevent excessive loss of moisture/thus ensuring that water is available for photosynthesis ✓  
 - It is transparent ✓ thus allowing light to pass through ✓  
**Mark first ONE only (2)**

- (ii) - contains an abundance of chloroplasts ✓ for sufficient photosynthesis to take place ✓ / maximum absorption of light  
 - small intercellular spaces ✓ which facilitate gaseous exchange ✓  
 - cells are elongated ✓ and therefore more cells are exposed to light ✓ / allowing diffusion of gases into and out of the cells  
 - they are arranged with their long axis perpendicular to the surface ✓ which allows most of the incoming light to be absorbed ✓  
 - are found just below the epidermis ✓ to capture sunlight effectively ✓  
 - are in close contact with the xylem and the phloem ✓ to transport water and products of photosynthesis ✓  
**Mark first TWO only (4)**

3.1.3

Cells B (epidermal cells)	Cells D (guard cells)
evenly thickened walls ✓	inner walls much thicker than outer walls ✓
no chloroplasts ✓	contains chloroplasts ✓
brick-shaped / isodiametric/irregular shape ✓	bean-shaped/ kidney-shaped ✓

any 2 x 2  
 + 1 for table (5)  
**(13)**

3.2

- 3.2.1 - selected areas must have chloroplasts ✓ ✓ / must be green/ the mid-rib and larger veins should be avoided (2)

- 3.2.2 - To determine the effect of light intensity ✓ on the rate ✓ of photosynthesis (2)

- 3.2.3 - the discs produced gas/es ✓  
 - making them buoyant/float ✓ (2)

- 3.2.4 - hydrogen carbonate is a source of carbon dioxide ✓  
 - thus ensuring that it does not become a limiting factor / keeping the CO<sub>2</sub> concentration constant ✓ (2)

3.2.5 - using batches of five and calculating the averages ✓  
 - reduces/eliminates errors ✓ (2)

3.2.6 (i) The rate of photosynthesis increased ✓ due to the increased light intensity ✓  
 OR  
 The increased light intensity ✓ would have increased the temperature for enzyme activity ✓ (2)

(ii) - Decrease ✓ in photosynthetic rate  
 - because of other limiting ✓ factors/other requirements (e.g. CO<sub>2</sub>) are exhausted (2)  
**(14)**

3.3

3.3.1 The higher the alcohol concentration ✓ in the blood, the lower the enzyme activity ✓ therefore less food will be digested ✓ (3)

OR

The lower the alcohol concentration ✓ in the blood, the higher the enzyme activity ✓ therefore more food will be digested ✓

3.3.2 30 ✓ % ✓ (2)

3.3.3 
$$\frac{60 - 45}{60} \times 100 \%$$
  
 = 25 ✓ % (3)  
**(8)**

**Total Question 3: 35**

**QUESTION 4**

4.1

4.1.1 A - columnar/ciliated/epithelium✓  
B - goblet cells✓ (2)

4.1.2 - Traps dust/germs/particles✓  
- Produces mucus – antiseptic✓ (2)  
**Mark first TWO only**

4.1.3 - Trachea✓  
- Bronchus✓  
- Bronchioles✓  
**Mark first TWO only** (2)

4.1.4 Cartilage rings✓ (1)

**(7)**

4.2

4.2.1 A - Lung✓  
B - Larynx✓  
C - Medulla oblongata✓  
D - Diaphragm✓ (4)

4.2.2 - rise in concentration of CO<sub>2</sub>/drop in pH ✓ in the blood  
- drop in concentration of oxygen in the blood✓ (2)

4.2.3 - when the CO<sub>2</sub> concentration of the blood increases, the sensory cells in the carotid arteries✓ in the neck and aorta✓ are stimulated  
- and impulses are sent to the cardiovascular✓ and respiratory centres✓ in the medulla✓  
- the medulla in turn send impulses to the  
• heart✓ causing it to beat faster  
• intercostals muscles, diaphragm and abdominal muscles causing breathing movements to speed up✓  
- thus, more carbon dioxide is removed quickly and more oxygen is taken up rapidly and supplied to the tissues✓  
- when the CO<sub>2</sub> concentration decreases, the breathing process slows down to normal✓

Any 6 x 1 (6)

**(12)**

4.3.1 To determine whether CO<sub>2</sub>✓ is released during cellular respiration✓ (2)

4.3.2 Absorbs CO<sub>2</sub> ✓from incoming air (1)

4.3.3 In flask A, the lime water is meant to show that there is no CO<sub>2</sub> coming in from the atmosphere✓  
In flask B, the lime water is used to determine whether the animal has released CO<sub>2</sub> ✓ (2)

4.3.4 - Lime water in flask B will turn milky✓  
- Flask A the lime water will stay clear✓ (2)

- 4.3.5 - set up a control without the mouse /set up a similar investigation with different living organisms to verify results✓✓  
- set up a number of samples / repeat the experiment✓✓  
**(Mark first TWO only)** (4)
- 4.3.6 Mitochondrion✓ (1)
- 4.3.7 - oxygen must be present✓  
- the pyruvic✓ acid produced during glycolysis✓ enters the mitochondrion✓  
- energized hydrogen✓ atoms, carbon dioxide molecules and some ATP✓ are released during the cyclic series of reactions  
- hydrogen atoms are picked up by co-enzymes✓ which act as hydrogen carriers✓ Any (4)  
(16)

**Total Question 4: 35**



**SECTION C**

**QUESTION 5**

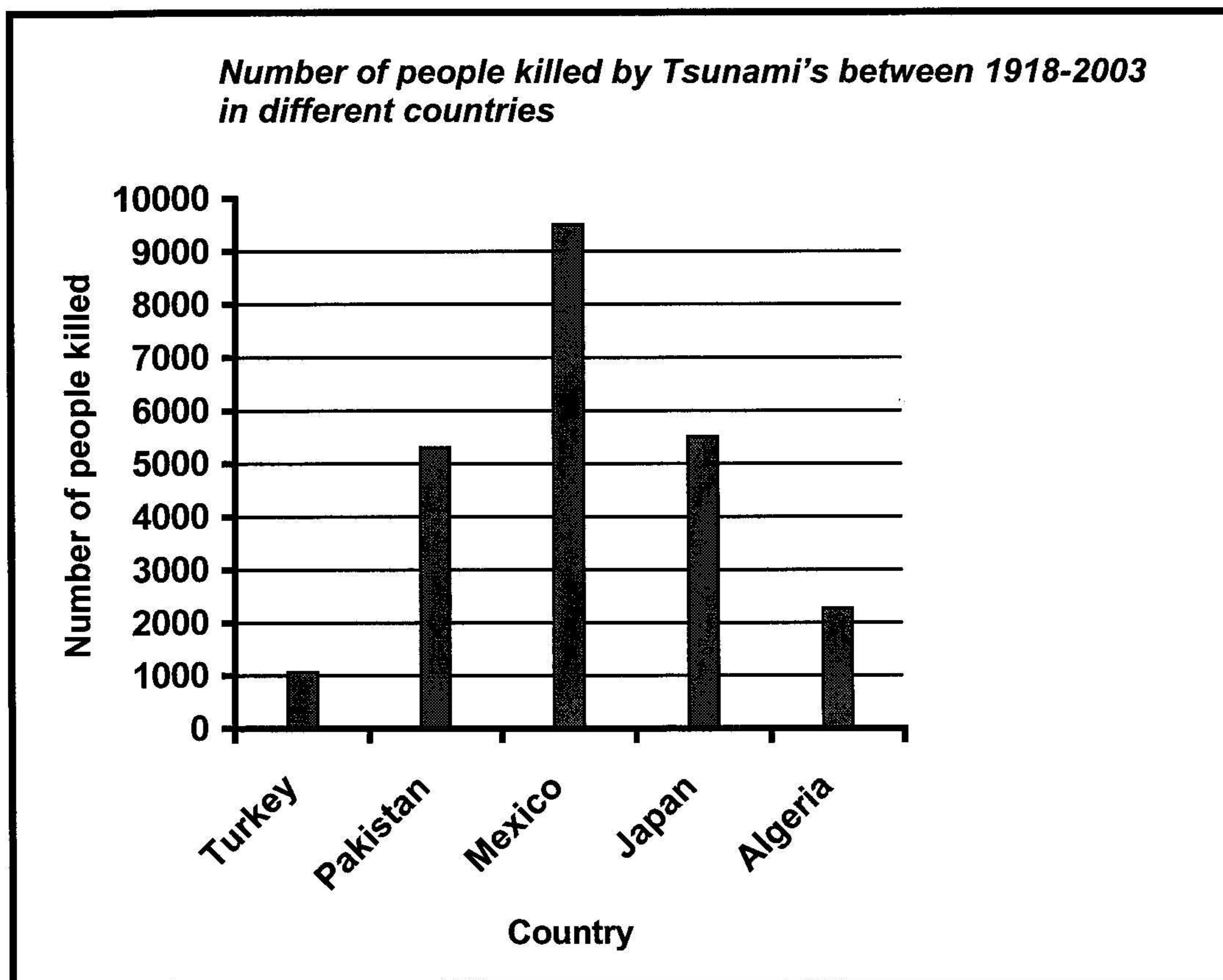
5.1

5.1.1 Density-independent ✓  
 not dependent on the size of the population/it is caused by  
 environmental factors ✓ (2)

5.1.2  $102 + 428 + 6\ 500$  ✓  
 $= 7\ 030$  ✓ (2)

5.1.3 earthquakes ✓ / landslides ✓ / volcanic eruptions ✓  
 (*Mark first TWO only*) (2)

5.1.4



**Rubric for the mark allocation of the graph**

Correct type of graph	1			
Title of graph	1			
Correct label for X-axis	1			
Correct label for Y-axis	1			
Appropriate scale for X-axis	correct width of bars: (1) equal intervals between bars: (1)			
Appropriate scale for Y-axis	correct values: (1) equal intervals between the values: (1)			
Plotting of the bars	3: draws all bars correctly	2: draws 3 or 4 bars correctly	1: draws 1 or 2 bars correctly	0: no bars drawn / drawn incorrectly

Wrong type of graph drawn: marks lost for "correct type of graph" as well as for drawing of the bars.

(11)  
(17)

## 5.2 Role of carrying capacity

- there is a limit to which a habitat can support a population✓
- this factor is responsible for the maximum number of individuals that can be supported by an environment ✓
- which prevents unlimited increase of natural populations ✓
- if there is a further increase in numbers, environmental resistance can build up✓
- once a population has reached its maximum size✓
- it fluctuates around the carrying capacity✓
- some fluctuate slowly, others rapidly, some regular other irregular✓

Any 5

## Role of competition

- this factor comes into play when animals compete for limited resources e.g. food✓
- interspecific ✓ competition - competition between organisms of the different species✓ - and intraspecific competition ✓ - competition between organisms of the same species✓
- lead to an increase in mortality✓
- and a decrease in natality of a population✓
- it can force organisms to occupy another space or food✓

Any 5

## Role of predation

- when one species kill and feed on members of another species✓
- the population size of the other species will decrease✓
- it includes carnivorism, herbivorism, cannabilism, etc.✓
- if the predator population grows, more food is needed✓
- therefore more prey is caught and killed✓
- this causes the prey population to decrease✓
- when there is less prey, the predator population have less food✓
- which causes the prey population to increase✓
- therefore there must be a balance in the predator-prey interaction✓
- to ensure natural stable populations✓

Any 5

**Synthesis**

<b>MARKS</b>	<b>DESCRIPTION</b>
0	Not attempted
1	Significant gaps in the logic and flow of the answer
2	Minor gaps in the logic and flow of the answer
3	Well structured – demonstrates insight and understanding of the question

Factual Content: 15  
Synthesis: 03  
**(18)**

**TOTAL QUSETION 5: (35)**