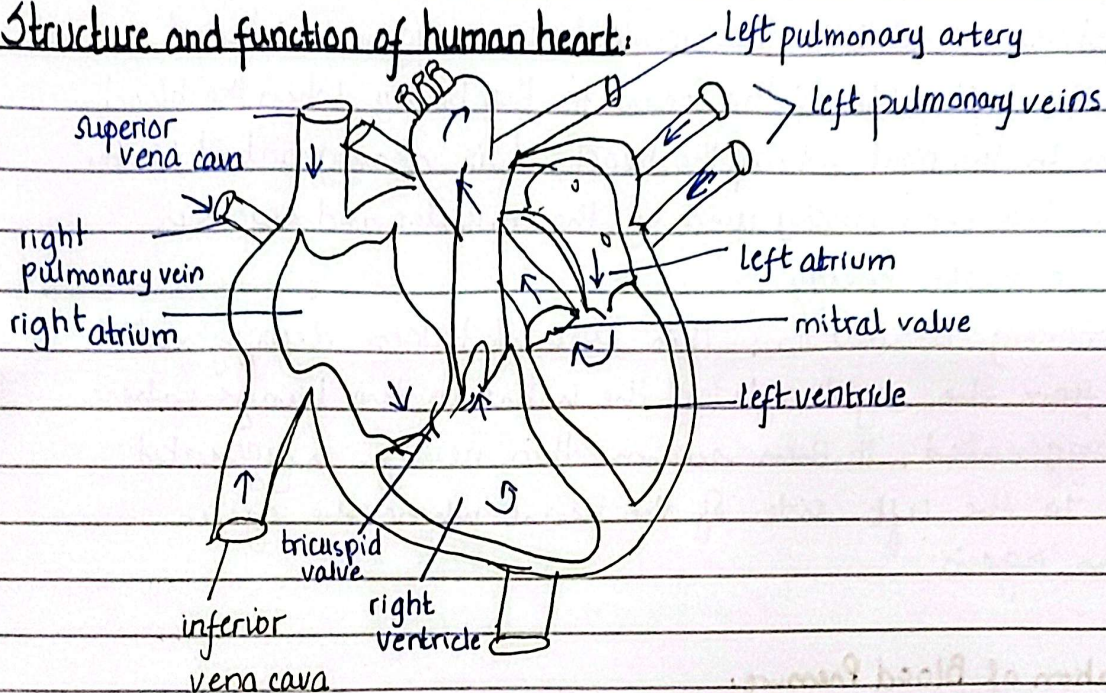


Q3(a)

Structure and function of human heart:



One of the primary functions of heart is to pump blood throughout the body. Blood delivers oxygen, hormones, glucose and other components to various parts of the body, including the human heart. The heart also ensures that adequate blood pressure is maintained in the body.

Role of cardiac cycle and blood circulation:

The cardiac cycle is defined as a sequence of alternating contraction and relaxation of the atria and ventricles in order to pump blood throughout the body. Each cardiac cycle has a diastolic phase (diastole) where the heart chamber is in a state of relaxation and fills with blood that is received from veins and a systolic phase (systole) where the heart chambers are contracting and pumps the blood towards the periphery via the arteries. Both the atria and ventricles undergo alternating states of systole and diastole.

Blood circulation can be divided into ² parts / circuits. These two circuits are :

1- Systemic circulation: The circuit takes oxygenated blood from the left side of the heart to the body. When the blood returns to the right side of the heart, it is deoxygenated, as the oxygen has been mostly used by the muscles and organs in order to make energy.

2- Pulmonary circulation: This circuit takes deoxygenated blood from the right side of the heart to the lungs where it is oxygenated. It then returns this newly-oxygenated blood to the left side of the heart where the cycle begins again.

Regulation of Blood Pressure:

The heart helps control blood pressure by changing how fast it beats (heart rate) and how much blood it pumps with each beat (stroke volume). Together, these make up the cardiac output, which is the total amount of blood the heart pumps every minute. If the heart beats faster or pumps more blood, more blood is pushed into arteries, and blood pressure increases. If the heart beats slower or pumps less blood, blood pressure goes down.

(b) Biofuels are fuels made from living organisms or their waste products. They are a type of renewable energy. They are produced by two ways.

1- Bioethanol

Made by fermenting sugars. Yeast is used to break down sugars into ethanol and carbon dioxide. The ethanol is then purified and used as fuel.

2) Biogas

Made by anaerobic respiration of waste material like animal manure, dead plants and food waste.

Bacteria break down the material and produce a gas mixture, mostly methane, which can be burned for energy.

Advantages	Disadvantages
1- Renewable	Can take up land for food crops
2- Reduce reliance on fossil fuels	Environmental degradation
3- Can reduce waste	High initial costs
4- Reduced greenhouse gas emission	Lower Energy Output
5- Biodegradable	

Biofuels generally produce lower carbon emissions compared to fossil fuels, as the CO_2 released during combustion is partly offset by the CO_2 absorbed by plants during growth.

(c) Key factors that determine food quality

are:

- 1- Sensory factors (Appearance, texture, aroma and flavour)
- 2- Nutritional value
- 3- Food Safety and Hygiene
- 4- Freshness and Shelf life
- 5- Processing and Storage methods
- 6- Packaging and Labelling

Importance of food safety:

- 1- Protection of public health
- 2- Economic stability
- 3- Compliance with national and international standards
- 4- Consumer Confidence

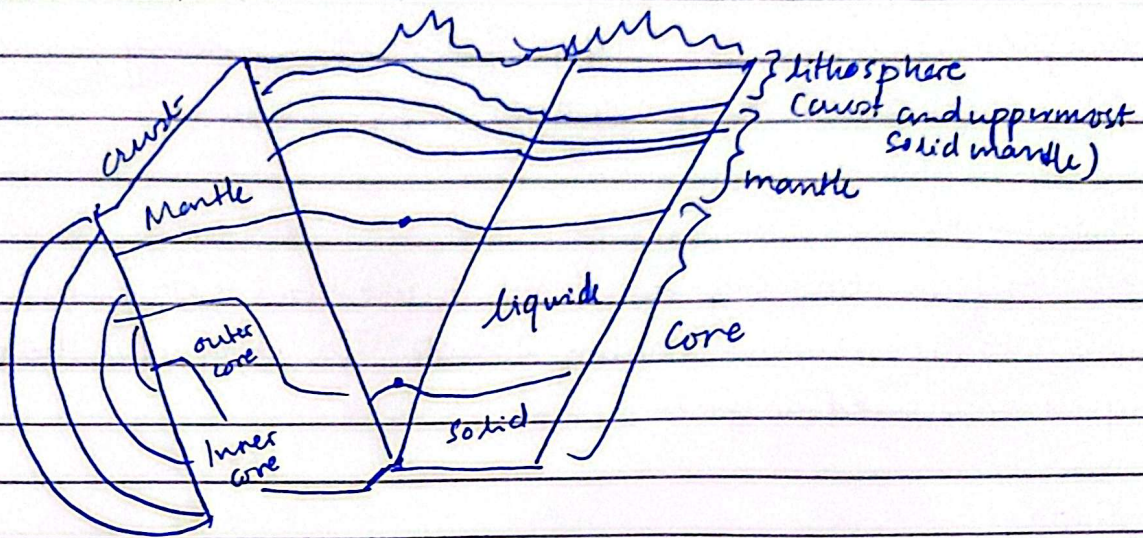
Food quality control measures are systems, protocols and regulations designed to monitor, evaluate, and maintain the safety and quality of food products. These play a vital role in prevention.

- 1- Hazard Analysis, Regular Inspection and testing, Proper labelling and traceability, Personal hygiene and sanitation practices Safe Storage and temperature control

Consumers can ensure ^{consuming} purchasing safe and healthy food by:

- 1- Purchasing from reliable Sources
- 2- Checking food labels
- 3- Proper Storage and handling at home
- 4- Safe Cooking Practices
- 5- Maintaining kitchen hygiene

d) Earth's structure



Crust is the outermost, thinnest layer of earth. It forms the Earth's landmasses and ocean floors.

Mantle lies beneath the crust, extending to a depth of about 2900 km. Responsible for convection currents that drive plate tectonics.

Core is divided into Outer core and Inner Core. Movements in Outer core generate the Earth's magnetic field. Inner core is extremely hot.

Oceanic Crust

Composed of basaltic rocks
Much thinner 5-10 km thick
More dense
Recycled into mantle at subduction zones

Continental crust

Composed of granitic rocks
Much thicker 30-70 km
Less dense
Permanent

Plate tectonics shape the Earth's surface by:

- 1- Mountain building
- 2- Volcano formation
- 3- Earthquakes
- 4- Rift valleys

Q5:

a) $\frac{2 \times 48}{3} = 32$

$$5x = x + 400$$

$$5x - x = 400$$

$$\frac{20}{100} \times x = \frac{x}{5}$$

$$4x = 400$$

$$x = 100$$

$$\frac{x + 48 + 32}{5}$$

$$x = \frac{x + 48 + 32}{5}$$

$$x = \frac{x + 80}{5}$$

b) Rashid age = x

Father current age = $4x$

After 8 years =

$$\text{Rashid's age} = x + 8$$

$$4x + 8 = 2.5x + 20$$

$$\text{Father's age} = 4x + 8$$

$$4x - 2.5x = 20 - 8$$

$$4x + 8 = 2.5(x + 8)$$

$$1.5x = 12$$

$$x = 8$$

$$= 4x + 8$$

$$4(8) = 32$$

After 8 years =

$$\text{Rashid} = 8 + 8 = 16$$

$$\text{Father} = 32 + 8 = 40$$

$$\text{SO } \frac{40}{16} = 2.5$$

(c) Possible outcomes =

$$6 \times 6 = 36$$

Prime numbers = 2, 3, 5, 7, 11

Total outcomes =

$$P = \frac{15}{36} = \frac{5}{12}$$

$$1 + 2 + 4 + 6 + 2 = 15$$

(d)

Average age of team = x

Total age = $11x$

Captain + Wicketkeeper's age = $26 + 29 = 55$

Total age of 9 players:

$$11x - 55$$

$$\text{Average age} = \frac{11x - 55}{9}$$

$$\frac{11x - 55}{9} = x - 1$$

$$11x = 55 + 9(x - 1)$$

$$11x - 9x = -9 + 55$$

$$\begin{array}{l} 2x = 46 \\ \hline x = 23 \end{array}$$

Q6(a)

Cost price = $\$x$

Selling price = $\$y$

original profit = $\$y - \x

New SP = $\$2y$

New profit = $2y - x$

$$2y - x = 3(y - x)$$

$$2y - x = 3y - 3x$$

$$2y - x = 3y + 3x = 0$$

$$-y + 2x = 0$$

$$y = 2x$$

$$2x - x = x \text{ Profit}$$

$$\text{Profit} = 100\%$$

(b) Y's pay = $\$y$

$$X's \text{ pay} = \frac{120 \times 100}{100} \text{ of } y = 1.2y$$

$$y + 1.2y = 550$$

$$2.2y = 550$$

$$y = 250$$

$$(c) \frac{P}{b} = \frac{5}{1}$$

$$\text{so } p = 5b$$

$$P = 2(1+b)$$

$$5b = 2 + 2b$$

$$d = \frac{3}{2}b$$

$$A = l \times b = 216$$

$$l = \frac{3}{2}b \therefore \frac{3}{2}b \times b = 216$$

$$\frac{3}{2}b^2 = 216$$

$$b = \sqrt{144} = 12 \text{ cm}$$

$$l = \frac{3}{2}(12) = \boxed{18 \text{ cm}}$$

(d) Multiples of 3 =

(3, 6, 9, 12, 15, 18)

Multiples of 5:

(5, 10, 15, 20)

Common multiple = 15

Possible outcomes = 20

$$\frac{9}{20}$$