MOCK TEST # 01

PART- II

SECTION - I

QUESTION NO. 02

(a) Climate	Environment
Climate is the composite or generally prevailing weather conditions of a particular region, as temperature, air pressure, humidity, sunshine, precipitation, cloudiness and winds, throughout the year, averaged over a series of years.	The term environment has been derived from a French word "Environia" means surround. More precisely, it is defined as the physical and biological habitat that surrounds us. According to P. Gisbert, "Environment is anything immediately surrounding an object and exerting a direct influence on it.
According to Koppen climate classification system, climates can be classified as: 1- Tropical moist climates 2- Dry Desert	The two major classifications of environment are: 1- Physical Environment 2- Living Environment.

Moist ~~Climate~~

3- Moist Sub-tropical Mid-latidude Climate
4- Polar climates
5- Mid-latidude continental
6- Highland.

The two major categories of air pollution sources are stationary sources that have fixed location and mobile sources that include trucks, automobiles, buses, trains, airplanes and anything that pollutes the air as it moves from place to place. Following are the causes of air pollution:

1- Exhaust from transportation vehicles.
2- Power stations (thermal energy)
3- Agricultural activities (fertilizers and Pesticides)
4- Chemical industries
5- Wildfires and volcanic activity.

(b) VITAMINS

"Vitamins is any of the organic compounds that the body require in small amounts to maintain health and function properly."

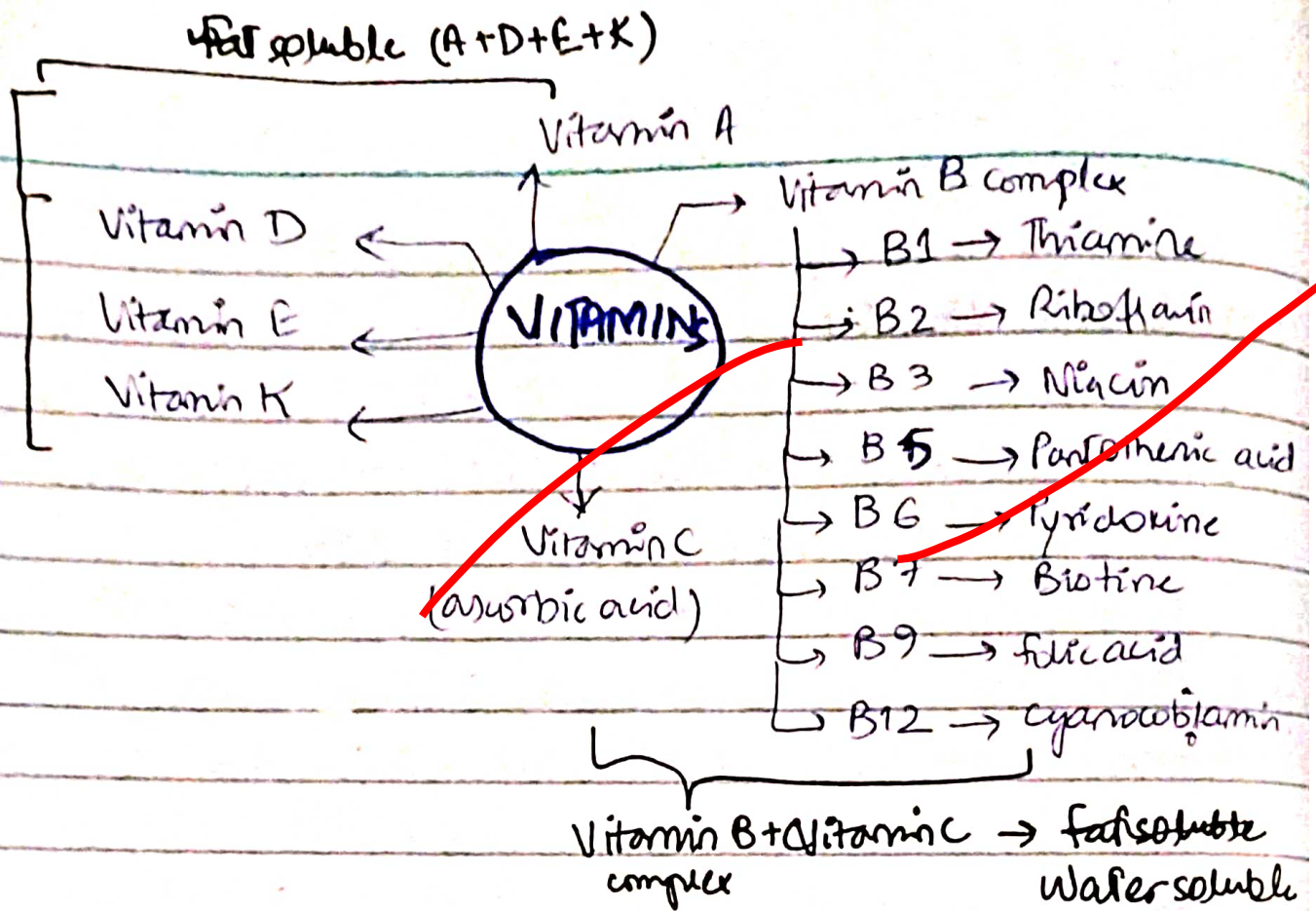Vitamins can be classified into two groups:

1- Fat-Soluble Vitamins:

These include Vitamins A, D, E and K which are usually absorbed with the help of foods that contain fat. Fat containing these vitamins is broken down by a liquid released by the liver, bile, and is absorbed by the body. Excess amounts of fat-soluble vitamins are stored in the body's fat, liver and kidneys due to which they do not need to be consumed every day to meet the body's needs.

2- Water Soluble Vitamins:

These include Vitamin C (ascorbic acid) and Vitamin B complex. Vitamin B is composed of 8 vitamins ex which are grouped together to form Vitamin B-complex. The B-complex vitamins are B1, B2, B3, B5, B6, B7, B9 and B12. These vitamins cannot be stored in the body and if taken in larger quantity that the body can't take, these cannot rapidly leave the body in urine. That's why food containing water soluble vitamins need to be taken daily to replenish the body's needs.

Fat soluble (A+D+E+K)

Vitamin A

Vitamin D ←
Vitamin E ←
Vitamin K ←

VITAMINS

→ Vitamin B complex
→ B1 → Thiamine
→ B2 → Riboflavin
→ B3 → Niacin
→ B5 → Pantothenic acid
→ B6 → Pyridoxine
→ B7 → Biotine
→ B9 → Folicacid
→ B12 → cyanocobjamin

↓
Vitamin C
(ascorbic acid)

Vitamin B+Vitamin C → ~~fatsoluble~~
complex   Water soluble

Role of Vitamins in Human Body :

1 - The main function of Vitamins is that it acts as a
cofactor and enhance the body's metabolism.

2 - They are critical in the formation of blood cells, hormones,
nervous system chemicals (neurotransmitters) and genetic
material deoxyribonucleic acid (DNA).

3 - These donot provide a single calorie rather they regulate
the metabolism and ensure the supply of energy to
the body.

Vitamin	Role
A	- essential for maintaining healthy vision, skin and immune function.

Vitamin	Role
A	- Important for cell differentiation, particularly in epithelial tissues. Sources: Good sources of Vit A are liver, carrots, sweet potatoes, and spinach.
B complex	- Play vital role in metabolism, energy production, nerve function and cell blood cell formation. Sources: Good sources include whole grains, meat, dairy products, nuts, seeds, leafy green vegetables.
C	- Antioxidant that helps protect cells from damage caused by free radicals. - Plays an important role in collagen synthesis, wound healing and absorption of iron. Sources: Fruits and vegetables; Citrus fruits, Strawberries, Kiwi, Broccolli.
D	- Crucial for maintaining bone health and promoting calcium absorption in intestines. - helps in immune function, cell growth and inflammation regulation. Sources: Sunlight exposure, milk, fatty fish, egg yolks.

Vitamin	Role
E	- powerful antioxidant that protects cells from oxidative damage. - Important for immune function, skin health, & blood vessel dilation. Sources: Nuts, seeds, vegetable oil and leafy green vegetables.
K	- Essential for blood clotting and bone metabolism - involved in synthesis of proteins that regulate calcium binding in bones and other tissues. Sources: Sources include leafy green vegetables, broccoli, Brussels sprouts, and soybean oil.

(c)

Goals of COP27	Goals of COP28
COP-27 was the 27th United Nations climate change conference held in Sharm-el-Sheikh, egypt on 7-8 November, 2022. Egypt's vision was to "move from negotiation and planning to implementation." During his address to	COP-28 was 28th United Nations climate change conference held in Dubai, United Arab Emirates on 1-2 December 2023. In his address to COP-28 plenary, President CharlesMichel called for increased and

COP 27 plenary, President Michel urged stressed the urgency of acting now on climate change and underscored the EU's commitment to :

- Net zero greenhouse gas emmissions.
- Climate neutrality

This climate action comes with three obligation:
- to developing countries
- to next generation
- to our citizens.

Goals of COP-27 :
The goals of COP-27 were:
1- Mitigation: keep the 1.5 degrees global warming target, compared with pre-industrial levels.
2- Adaption: Witness an enhanced global agenda for action on adaption.

rapid "global action" to keep the global temperature rise within 1.5 degrees. He highlighted that EU has already reduced greenhouse emissiong by 30% compared to 1990s levels and has a determination to:

- triple renewable energy
- double energy efficiency

He also emphasized the need to end our dependence on fossil fuels as soon as possible. and insisted on the need to catalyse investments since strong climate action requires solid financing.

Goals of COP-28 :
The goals of COP-28 include.
1- fast tracking the energy transition.
2- fixing climate finance.
3- Putting nature, people, lives and livelihoods at the head of climate action.

Goals of COP-27	Goals of COP-28
2-Finance: Review progress on the delivery of USD 100 B per year by 2025 to help developing countries deal with adverse effects of climate change.	1. Underpinning everything with full inclusivity.
4-Collaboration: ensure adequate representation from all relevant stake-holders in COP-27, especially vulnerable communities.	The EU council stressed that goal ambition must increase substantially to keep 1.5°C objective within reach, and called for:
The EU council stressed that the good global ambition must increase substantially to keep 1.5°c objective within reach & called for:	• Collective strengthening of nationally determined contributions (NDC)
	• a global phase-out of unabated fossil fuels and a peak in their consumption in this decade
• Collective strengthening of nationally determined contributions.	• all combines to scale up efforts to f mobilise finance to support climate action.
• End inefficient fossil fuel subsidies and close the book on unabated coal through phasedown.	• a fully or predominantly decarbonised global power system in 2030s.
• Scale up efforts to mobilise finance to support climate action.	• Global action towards tripling of installed renewable energy capacity and doubling the rate of improvement in energy efficiency by 2030.
	• Make greater efforts to integrate climate change adaption-

(d) Active Sensors and Passive sensors :

These are the types of remote sensing technologies used to gather information about Earth's surface and atmosphere from a distance. **Passive sensors** detect and measure natural energy (radiation) emitted or reflected by objects in the environment without actively emitting any energy themselves. These sensors capture sunlight reflected or emitted by Earth's surface or atmosphere in different wavelengths such as visible, infrared and micro-wave. These sensors are used to study features like land cover, vegetation health, soil moisture and atmospheric composition. Examples of passive sensors include cameras, radiometers and spectrometers.

Active sensors emit energy, such as microwave or lasers and measure the energy that is reflected back (backscatter) or returned (echo) from objects in environment. Radar sends out microwave pulses and measures the time it takes for the pulses to reflect back from objects on Earth's surface, providing information about their location, shape and movement. Similarly, Lidar emits laser pulses and measures the time it takes for pulses to return after reflecting off surfaces, providing a detailed 3D almost information about terrain, vegetation structure and atmospheric particles. These sensors are used to study, map terrain, detecting changes in topography.

and vegetation structure. Examples of active sensor include the devices mentioned above Radar and Lidar (light Direction and Ranging).

- Examples of passive remote sensing

In Geographic Information system, both active and passive sensors are used to gather spatial data about Earth's surface and information about atmosphere. This data can include Imagery, elevation models, land cover maps, and environmental parameters. GIS integrates remote sensing data with other geospatial data sources to analyze and visualize spatial patterns, relationships and changes over time. It is then processed, analyzed and integrated into GIS software to create maps, conduct spatial analysis, and support decision making in various fields like agriculture, forestry, urban planning development, environmental monitoring and disaster management.
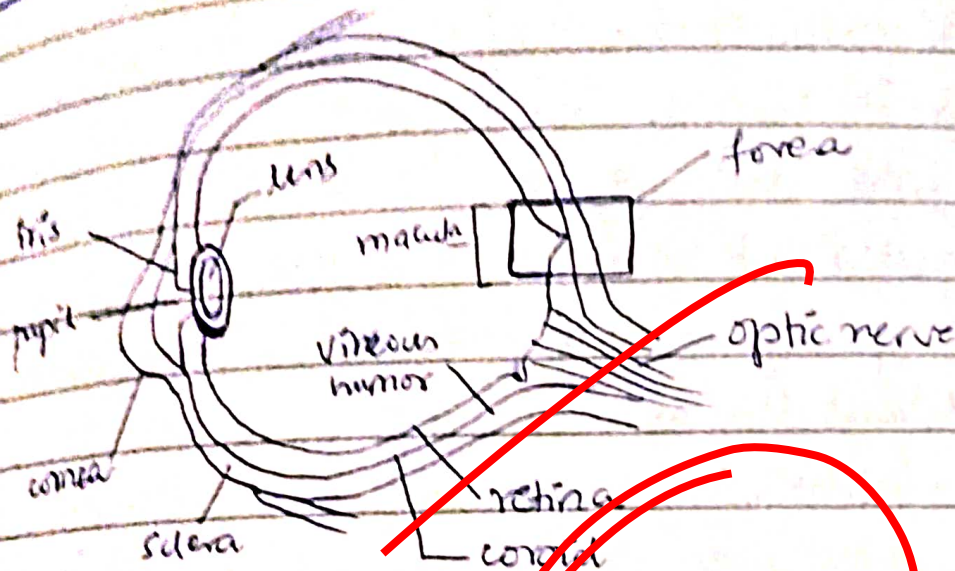
- Examples of active remote sensing platforms include synthetic aperture radar (SAR) satellites and airborne lidar systems.

- Examples of passive remote sensing platform include satellites like Landsat and MODIS, which captures images of earth's surface in various spectral bands.

QUESTION NO. 01

(a) STRUCTURE OF EYE :

The human eye is a slightly asymmetrical globe, about one inch (2.5cm) in diameter. The front part of the eye includes :

Iris the colored part of the eye. Which controls the size of pupil. It is the dark circle inside centre of the eye. The cornea is the clear covering over iris and pupil. The sclera is the white part of the eye that becomes pink or red when we are tired. This eye part is the protective, outer layer of the eye and is made of elastic-like fibers called elastin or collagen.

(b)

cell is the unit of structure and function of all living things. The cells make up our body and are so small that cannot be seen with naked eye.

An organelle is a membrane bond structure found within a cell. These mini organs are bond in a double layer of phospholipid to insulate their little compartments within larger cells. These organelles are found in the cytoplasm, a viscous liquid found within the cell membrane that houses the organelles and is the location of most of the action happening in a cell.

1- Cell nucleus:

A cell's nucleus - the information center, is the most conspicuous organelle found in a human cell. It contains the cell's genetic material, DNA. The size of nucleus is typically measured in micrometers or nanometers.

2- Chromosomes:

Chromosomes are large strands of DNA wound across the proteins called histones. They contain the genetic information essential for cell function and inheritance. The length of chromosome is measured in base pairs or kilobase pair, representing the number of nucleotide base pairs along the DNA molecule.

3- Ribosomes:

Ribosomes are cellular structures responsible for protein synthesis. They are composed of ribosomal RNA (rRNA) and proteins. The size of ribosomes is typically measured in nanometers or angstroms

with ribosome being around 20 to 30 nanometers in diameter.

1- Mitochondria:

These are often referred as the "powerhouse" of the cell because they generate energy in the form of adenosine triphosphate (ATP) through cellular respiration. The size of mitochondria is typically measured in micrometers (μm) or nanometers (nm).

5- Endoplasmic Reticulum (ER):

It is a network of membranous tubules and sacs involved in protein and lipid synthesis, as well as calcium storage and detoxification. The size is typically measured in nanometers (nm) or micrometers (μm).

6- Golgi Apparatus:

The golgi apparatus is involved in modifying, sorting, and packaging proteins and lipids for transport within the cell or secretion outside the cell. It consists of flattened membrane-bound sacs called cisternae & cisternae.

7- Lysosomes:

Lysosomes are membrane-bound organelles containing digestive enzymes that break down macromolecules and cellular debris.

8- Centrosomes:

These are the cytoskeleton organizer. The centrosome produces microtubules of a cell — a key component

of cytoskeleton. It directly transports through the ER and Golgi apparatus. Centrosomes are composed of two centrioles lying perpendicular to each other, on which separate during cell division and help the formation of the mitotic spindle.

(c) "A galaxy is a gravitational bound system of stars, stellar remnants, interstellar gas, dust, and dark matter."

The word "galaxy" is derived from the Greek galaxias literally "milky", a reference to the "Milky Way".

Types of Galaxies.

1- Elliptical : These have smooth ellipsoidal shape with little to no discernable structure such as spiral arms.

They are composed of older stars and contain relatively little interstellar gas and dust.

2- Spiral : These galaxies have a distinctive spiral arm structure radiating outwards from a central bulge

They contain a flattened, rotating disk of stars, gas and dust, surrounding a dense central nucleus. These include our galaxy, the Milky way.

3. **Irregular:** These galaxies lack distinct shape and don't fit into the classification of spiral and elliptical.

They often exhibit irregular and chaotic patterns of star formation, with prominent regions of gas and dust.

4. **Lenticular:** These galaxies have features of both, the spiral and elliptical galaxies.

They possess a disk-like structure like spiral galaxies but and donot have spiral arms as of elliptical galaxies.

As for the motion of galaxies the evidence suggests that galaxies within the universe are not stationary but are instead in a state of motion relative to each other. This motion can be attributed to the expansion of universe as well as gravitational interactions between galaxies and large scale structures.

1. **Expansion of Universe:**
Observations of distant galaxies show that they are moving away from us, and the further away a galaxy is, the faster it appears to be moving away. This phenomenon, known as "Hubbel's Law" indicates universe is expanding which causes galaxies to move away from each other over time.

2- Gravitational interactions:

Galaxies are bound together by gravity, and their motion is influenced by gravitational forces exerted by neighboring galaxies and large scale structures such as galaxy clusters and superclusters. These gravitational interactions cause galaxy to orbit around each other, merge together, or be pulled towards massive objects like galaxy clusters.

Thus galaxies are dynamic entities, constantly in motion and influenced by both phenomenas.

(d) Sun	Earth
1- Diameter of sun is 1391940 km (870,000 miles).	1- The diameter of Earth is 12756 km (7926 miles).
2- The density of the sun is 1.41 g/cm^3.	2- Earth is the denser planet, its density is 5.52 g/cm^3
3. Mass of sun is 1.989×10^{30} kg or 330,000 times of earth.	3- It is the third planet from and has mass about 0.0003 times that of sun.
4- Sun has very large and active magnetic field due to movement of charged particles within its interior.	4- Earth has a magnetic field generated by the motion of molten iron in its outer core.
5- Sun is composed of 74% H_2, 24% He and 2% heavy metals on the basis of percentage of total mass.	5- About 30% of Earth's surface is covered with land while 70% with water.

QUESTION - 06 :

(a)

radius of cylinder = r = 8cm
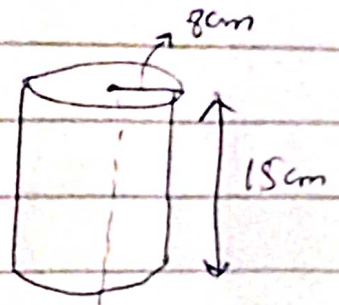
height of cylinder = h = 15cm

volume = ?

Let V be the volume of cylinder

$V = 2\pi r (r+h)$

$V = 2\pi (8)(8+15)$

$\because \pi = 3.14$

$V = (49.6 \times 23) \, cm^3$

$\boxed{V = 1140.8 \, cm^3} \neq 1141 \, cm^3$

(b)

Octagon → interior angle sum of 1080 degrees.

Using the formula of pentagon:

Interior angle = $180 \times (n-2)$

where,

n = number of sides of polygon, in case

of octagon : $n = 8$

Sum of interior angles = $180 \times (8-2)$

$= 180 \times (6)$

$= 1080$

for one angle divide by 8 sides:

Interior Angle = 1080/8

= 135°

$\boxed{\text{Each angle is of } 135°.}$

(c)

Length and Depth of lake = 4.6 miles
Width of lake = 2.2 miles
Surface Area = ?
Surface Area = length × Width
$$= 4.6 \text{ miles} \times 2.2 \text{ miles}$$
$$= 10.12 \text{ miles}^2$$

Therefore,

Surface Area of the lake is 10.12 squared miles

(d)

let the length of ladder
be 'h'.

Using pythagorean theorem:
$$(Hyp)^2 = (Base)^2 + (Perp)^2$$
Here,

Perp = 10m , Base = 3m
$$\Rightarrow (Hyp)^2 = (3m)^2 + (10m)^2$$
$$= 9 + 100$$
$$(Hyp)^2 = 109$$
$$\Rightarrow \sqrt{(Hyp)^2} = \sqrt{109}$$

Hyp = 10.44m

$$\Rightarrow Hyp = h = 10.44m = \text{length of ladder}$$
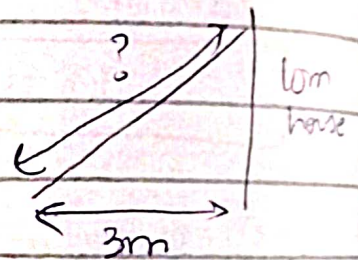
QUESTION NO. 07

(a) Let the person be x.

x is multiplied by $3/5 \Rightarrow \dfrac{3}{5}x$
" instead of "

x is multiplied by $5/3 \Rightarrow \dfrac{5}{3}x$

Error $=$ Correct result $-$ Incorrect result

$$= \dfrac{\overset{\times 5}{5}x}{3} - \dfrac{\overset{\times 3}{3}x}{5}$$

$$= \dfrac{25x - 9x}{15}$$

Error $= \dfrac{16x}{15}$

Percentage error $= \left(\dfrac{\text{Error}}{\text{Correct result}} \right) \times 100$

$$= \left(\dfrac{16x}{15} \div \dfrac{5x}{3} \right) \times 100$$

$$= \left(\dfrac{16x}{15} \times \dfrac{3}{5x} \right) \times 100$$

$$= \left(\dfrac{16}{25} \right) \times 100$$

| Percentage error $= 64\%$ |

(b) Given:

Chocolates : Icecream cones
   5   :   8

Ratio is : $\dfrac{5}{8}$

Number of chocolates = 30

Let Number of cones = x

$$\Rightarrow \frac{5}{8} = \frac{30}{x} \qquad \because \left[\frac{\text{chocolates}}{\text{icecream cones}} \right]$$

$$\Rightarrow \frac{5x}{8} = 30$$

$$\Rightarrow x = \frac{\overset{6}{30}}{\cancel{5}} \times 8$$

$$x = 6 \times 8$$

$$x = 48$$

$\Rightarrow$ ⟦ Number of icecream cones = 48 ⟧

(c)   1 tablet = 30 mg medication

Let x no. of tablets = 240 mg medication
   required

$\left[\dfrac{\text{Tablet}}{\text{medication}} \right] \Rightarrow \dfrac{1}{30\,mg} = \dfrac{x}{240\,mg}$

$$x = \frac{240\,mg}{30\,mg}$$

⟦ $x = 8$ tablets required for 240 mg medication. ⟧

(d)   Average of 50 numbers = 20

Number 1 = 37

Number 2 = 43

When number 1 & number 2 are discarded,

Let the average of remaining numbers be 'x'.

$$\therefore \text{Average} = \frac{\text{sum of numbers}}{\text{Total numbers}}$$

$$20 = \frac{\text{Sum of numbers}}{50}$$

$$\text{Sum of numbers} = 50 \times 20$$

$$= 1000$$

Since 37 and 43 are discarded from the sum

then :   Sum of numbers − number 1 − number 2

$$= 1000 - 37 - 43$$

$$= 920$$

When 2 numbers are discarded remaining numbers

are 48. Now the average will be :

$$x = \text{New Average} = \frac{\text{New sum of numbers}}{\text{New total numbers}}$$

$$= \frac{920}{48}$$

New Average
when number 1 &
number 2 are
discarded

$$x = 19.16$$