

Creative and Critical Thinking (CCT) Practice Assessment – II

Classes IX and X

Time : 3 hours

Name: _____

Name of KV: _____

Class & Section: _____

Roll No. _____

GENERAL INSTRUCTIONS:

1. This paper contains 46 questions as under:
 - Reading Literacy (15 questions from page no. 1 to 6),
 - Mathematical Literacy (15 questions from page no. 7 to 14) and
 - Scientific Literacy (16 questions from page no. 15 to 23).
2. All questions are compulsory.
3. All answers must be written on the question paper itself.
4. Each question is of 2 Credits. Scoring for each will be as follows:

i. Full Credit	02
ii. Partial Credit	01
iii. No Credit	00
5. Please write the answers neatly and legibly.

Creative and Critical Thinking (CCT) Practice Assessment - II

Reading Literacy

Classes IX and X

Unit 1: Health Capsule [RESEU01]

Use the information in the clip below to answer the questions that follow:

HEALTH CAPSULES
by Bron Smith

IS BUTTERMILK A PROBIOTIC?

THE ONLY THING THAT TASTES WORSE THAN BUTTERMILK & CORDON ROUGE!

BUTTERMILK IS A PROBIOTIC FOOD. COMMERCIALY CULTURED BUTTERMILK STARTS AS MILK THAT HAS BEEN PASTEURIZED AND HOMOGENIZED. LIVE CULTURES ARE THEN ADDED TO STIMULATE THE FERMENTATION PROCESS. FERMENTATION CAUSES THE "CLABBERING," OR THICKENING, OF THE BUTTERMILK.

Health Capsules is not intended to be of a diagnostic nature.

1. [Q01] 'Health Capsules' intend to
 - a) educate people about common health myths.
 - b) provide diagnostic health information.
 - c) teach important facts to school children.
 - d) encourage use of traditional cuisines in diet.

2. [Q02] Pasteurized milk is
 - a) raw milk that has been chemically treated to make it safe for consumption.
 - b) raw milk that has been heated to a specific temperature and time to eliminate pathogens and extend shelf life.
 - c) standard milk which is preferred for consumption of children.
 - d) raw milk that is sterilized by applying low heat.

3. [Q03] Arrange the steps given below in the correct sequence for preparation of buttermilk
 - i. Addition of live culture
 - ii. Packaging
 - iii. Clabbering
 - iv. Procuring milk
 - v. Pasteurization & homogenation
 - vi. Fermentation
 - a) ii, iv, i, v, vi, iii
 - b) iv, i, v, vi, iii, ii
 - c) iv, i, v, iii, vi, ii
 - d) iv, v, i, vi, iii, ii

Unit 2: Play (An excerpt from 'Bulge' by Richard Stuart Dixon [RESEU02])

*** Act One, Scene 1: ***

(The Kilpatrick home. Wednesday morning in September. STAN, GERALDINE, and MAVIS have just finished breakfast.)

STAN KILPATRICK (*lying*): Great breakfast, Honey.

(*Checking his watch*)

What's keeping Devon? He should be down by now.

GERALDINE KILPATRICK: He's finishing his speech.

MAVIS KILPATRICK (*making her Dad anxious*): He's got to talk to the whole school, Dad.

STAN KILPATRICK: Gerry, the boy should eat a proper breakfast.

GERALDINE KILPATRICK: I know, Stanny, but he didn't want any. He must be nervous.

MAVIS KILPATRICK: I'd throw up if it was me.

(DEVON KILPATRICK enters.)

DEVON KILPATRICK: Sorry I'm late. Had to polish my speech.

STAN KILPATRICK: Feeling nervous, Devon?

DEVON KILPATRICK: Kind of. But it's a funny speech.

MAVIS KILPATRICK: Kids always vote for the one who's funniest.

GERALDINE KILPATRICK: Devon's funny.

STAN KILPATRICK: You bet he is. Remember what he did to your dolly, Mavis?

DEVON KILPATRICK (*not wanting to go there*): Dad, I don't think...

GERALDINE KILPATRICK (*interrupting*): Let's not spoil breakfast.

MAVIS KILPATRICK: Devon didn't eat any.

DEVON KILPATRICK (*wanting to please*): I'll get a danish and mocha java at the cafe.

STAN KILPATRICK: Mocha java? They sell coffee to kids?

MAVIS KILPATRICK: Devon drinks tons.

GERALDINE KILPATRICK: It's a special day. Devon needs a treat.

STAN KILPATRICK: Give 'em hell son.

DEVON KILPATRICK: You bet, Dad. Come on, Mavis, we'll miss the bus.

(He and Mavis exit.)

GERALDINE KILPATRICK: He really wants to win that election.

STAN KILPATRICK: And he's got the right stuff to win it.

GERALDINE KILPATRICK: And if he doesn't?

STAN KILPATRICK: Gerry, please try to be positive.

GERALDINE KILPATRICK: He's only sixteen, Stanny.

STAN KILPATRICK (*ready to explode with anxiety and repressed rage*): I was a man at sixteen, working a jackhammer, smashing up asphalt...

GERALDINE KILPATRICK: I know, Stanny, I know. (*Consulting her watch*) Goodness, look at the time!

STAN KILPATRICK: Damned commute. Freaking gridlock every freaking day.

GERALDINE KILPATRICK: Perhaps if you select an easy-listening station...light pop or soft rock favourites....

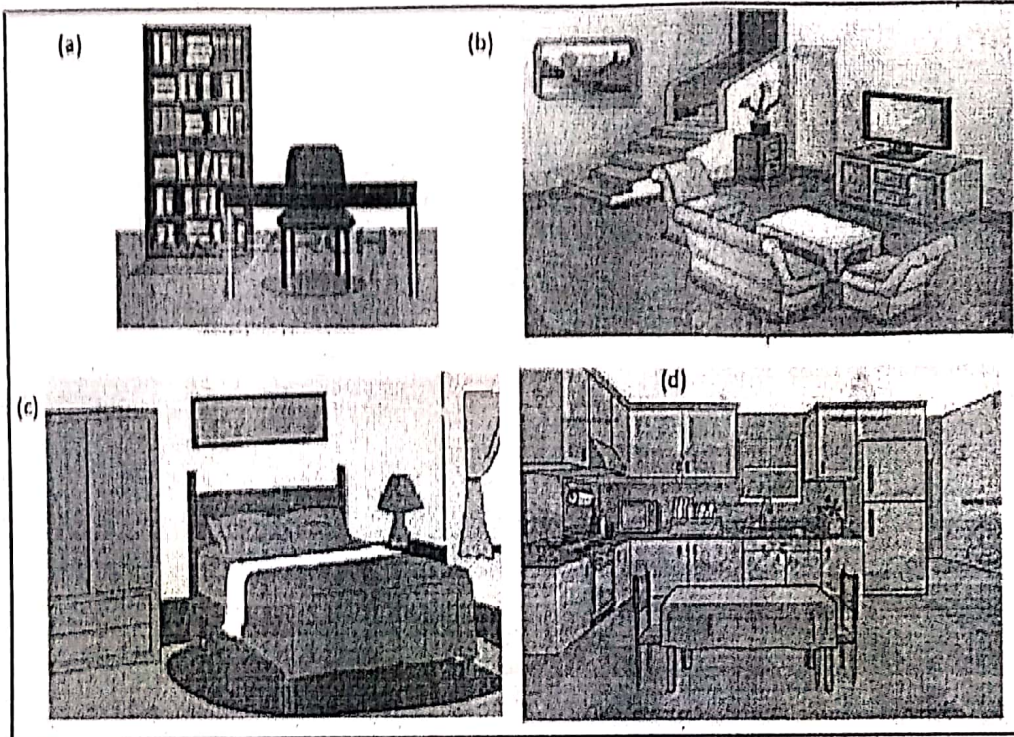
STAN KILPATRICK: Gimme the golden oldies anyday.

(They exit.)

*** End of Act One, Scene 1. ***

4. [Q01] People around the world usually like coupling a bakery item with a beverage. In this play Devon says, "I'll get a danish and a mocha java at the cafe." Devon assures his parents that he would have:
- A cup of coffee with a pastry at the school snack shop.
 - Coffee flavoured milk & a sandwich at the school canteen
 - A cup of coffee with pancakes at the neighborhood café.
 - Coffee flavoured cake and cold milk at a local restaurant.

5. [Q02] Pick the image that best captures the relevant setting of Act1, Scene 1.



- Image (a)
- Image (b)
- Image (c)
- Image (d)

6. [Q03] Pick one fact and one opinion from the following, about Devon's speech.

(i) Candidates with funny speeches are preferred by kids.

(ii) Speech still needs to be edited.

(iii) It is written from the point of view of a candidate contesting the election.

(iv) It is meant only for ears of the school faculty.

(v) The speech content needs a nod of approval from parents.

(vi) Coffee would help to remove nervousness related to the speech delivery.

Fact: _____

Opinion: _____

7. [Q04] Read the dialogues of Stan and Geraldine.

Damned commute.
Freaking gridlock every
freaking day.

Stan

Perhaps if you select an easy-
listening station... light pop
or soft rock favourites...

Geraldine

What was Stan's grumble & Geraldine's advice?

Grumble: _____

Advice: _____

8. [Q05] According to the play, chose the option that best indicates Stan's job when he was a teen. Also, provide evidence from the text to support the reason for your choice.

- a) Landscaper
- b) Carpenter
- c) Heavy Vehicle Driver
- d) Construction Worker

Evidence from the text:

9. [Q06] Match the character to their correct set of traits as deduced from Act 1, Scene 1 of this play.

Character	Traits
I. Stan	(i) Forbearing & Level-headed
II. Geraldine	(ii) Supportive & Tattle-tale
III. Devon	(iii) Purposeful & Dedicated
IV. Mavis	(iv) Sullen & Encouraging

- a) I-ii, II-iii, III-i, IV-iv
- b) I-iii, II-ii, III-iv, IV-i
- c) I-iv, II-i, III-iii, IV-ii
- d) I-i, II-iv, III-ii, IV-iii

Unit 3: Play (Continued....) [RESEU03]

10. [Q01] Based on your reading of Act 1, Scene 1, circle the correct options of the features of this play

Features	Options		
Setting	historical	suburban	dystopian
Viewing Suitability	general audience	school-going audience	adults only
Dialogues	includes heavy allegorical references	congruent with the tone and setting	uses clichéd and predictable language
Style	farcical	satirical	tragic

Unit 4: Geotagging [RESEU04]

Use the information in the article below to answer the questions that follow:

Is geotagging on Instagram ruining natural wonders?

Laura M. Holson

Sorry, Instagrammers. You are ruining Wyoming.

Last week, the Jackson Hole Travel & Tourism Board asked visitors to stop geotagging photographs on social media in an effort to protect the US state's pristine forests and remote lakes. Explaining the campaign, Brian Modena, a tourism-board member, suggested the landscape was under threat from visitors drawn by the beautiful vistas on Instagram.

Delta Lake, a remote refuge surrounded by the towering Grand Teton mountains, has become "a poster child for social media gone awry," Modena said. "Influencers started posting from the top of the lake. Then it started racing through social media." (Influencers, if you don't know, are people with huge social media followings who sometimes make a living posting about places and products.)

A few years ago, one or two hikers a day would make the nine-mile trek up to Delta Lake. Now, he said, as many as 145 people are hiking there each day to shoot engagement photos and hawk health supplements. Little-known trails are heavily trafficked and eroding in some places, taxing park resources.

"We want people to have a real connection to nature," Modena said, "not just a page with a pin on it."

This isn't the first time photo-tourism has led to protests by locals. Complaints about travelers taking selfies abound. In Hong Kong, public housing developments have become popular backdrops for photographers, much to the ire of



A creek along a hiking trail in the Grand Teton National Park in Wyoming, US

residents. A Canadian sunflower farmer recently barred visitors after they damaged his field. And visitors to the Louvre spend more time photographing themselves in front of the Mona Lisa than looking at it.

Now, conservationists are concerned that photographers who post their precise locations are putting fragile ecosystems and wild animals at risk. As a defense, they are urging tourists to stop.

In parts of south Africa, signs are attached to fences along safari routes, requesting photographers not share the location of rhinos, which are the target of poachers. Six months ago, US-based Leave No Trace, an organization that promotes ethical use of public lands, pub-

lished new social media guidelines that discourage geotagging. In Jackson Hole, the tourism board has suggested that visitors use the generic location tag, "and Responsibly Keep Jackson Hole Wild."

Some Instagram users, too, have adopted the hashtag #nogeotag. "There is a debate right now among photographers," in part, because they don't want to give up favorite spots, said Brent Knipper, who publishes nature photography on Instagram.

But Dana Watts, executive director of Leave No Trace, said: "There are a lot of reasons people want to showcase where they've been. Bragging rights. It's an unusual place." But, she said, "We just want people to stop and think before they share a location. While tagging can seem innocent, it can lead to significant impact."

Of particular concern, she said, are Instagram influencers hired by brands to promote a particular place or product.

Some people wonder, though, whether asking people not to geotag will have much impact in the long run.

"This is a little alarmist," said Cathy Dean, the chief executive of Save the Rhino International, a conservation group based in London. "If you go to any park or reserve's website, they often proudly tell you that they've got white and/or black rhinos."

Modena said it could take years for behavior to change because smartphones are not going away. "We want to start a responsible conversation now about social media and conservation," he said. "Selfies there are lakes I've seen that are beautiful that I am not going to name but

11. [Q01] Choose the answer that indicates the meaning of geotagging and displays the image which is relevant to it.

- I. The process of attaching warnings of climate changes in various geographic locations.
- II. The process of sharing latitudes and longitudes of famous organizations in different parts the world.
- III. The process of identifying the coordinates of natural wonders and sharing them in closed forums.
- IV. The process of adding geographical identifications, metadata to various media.

(i)



(ii)



a) I-ii
b) II-I

c) III-I
d) IV-ii

12. [Q02] Match these Organizations/ Groups/ Personal to what they believe.

Organizations/ Groups/ Personnel	Beliefs
I. Save the Rhino International	i. I wonder if spreading awareness of geotagging would be of much use.
II. Public housing residents	ii. It is irritating that people use our property as backdrops for selfies.
III. Tourism Board	iii. A harmless activity like geotagging can have harmful effects over a period of time.
IV. Leave no Trace	iv. Geotagging puts natural wonders at a risk due to excessive number of tourists.

- a) I-iii, II -i, III -iv, IV-ii
- b) I-ii, II -i, III -iii, IV- iv
- c) I- iv, II -iii, III -i, IV-ii
- d) I-i, II-ii, III -iv, IV-iii

13. [Q03] Give two reasons why people choose to 'hawk health supplements' on the trek up Delta Lake.

14. [Q04] Choose which of the following statements support responsible Geotagging.

- i. Unfollow accounts that don't match responsible outdoor etiquettes' photographs.
- ii. Support brands that advocate clicking photos despite rules about permit requirements.
- iii. Share pictures of the wild that showcase photography at clever angles that is done without disturbing the fauna.
- iv. Amplify stories of organizations that geotag rare natural wonders for commercial purposes.
- v. Share pictures of places visited with a few and not as toxic digital frustration.
- vi. Consider adding a few lines of precautions to be followed, alongside tagged picture.

- a) i, ii, iii and iv
- b) i, iii, v and vi
- c) ii, iv, v and vi
- d) iii, iv, v, and vi

15. [Q05] What is Laura. M. Holson's opinion about geotagging on Instagram?

Creative and Critical Thinking (CCT) Practice Assessment – II

Mathematical Literacy

Classes IX and X

Unit 01: Electricity Bill (MASEU01)

Alex sat down to pay his bills for the month and realised that the bi-monthly (once every 2 months) electricity bill payment was due this month. His electricity consumption over the billing period was 465 units. The table below shows the tariff for his electricity consumption:

First 100 units are free of cost		
Consumption above 100 units and upto 200 units bi-monthly	Energy charges after Government's subsidy (Rs./unit)	Fixed charges for two months after Government's subsidy (Rs.)
First 100 units	0	0
101 - 200 units	1.50	20.00
Consumption above 200 units and upto 500 units bi-monthly	Energy charges after Government's subsidy (Rs./unit)	Fixed charges for two months after Government's subsidy (Rs.)
First 100 units	0	0
101 - 200 units	2.00	30.00
201 - 500 units	3.00	
Consumption above 500 units bi-monthly	Energy charges after Government's subsidy (Rs./unit)	Fixed charges for two months after Government's subsidy (Rs.)
First 100 units	0	0
101 - 200 units	3.50	50.00
201 - 500 units	4.60	
Above 500 units	6.60	

Question 1 [Q01]:

Based on the tariff, how much does Alex have to pay? Show your working and calculation clearly.

Question 2 [Q02]:

Which of the following is the correct formula to calculate the bill for consumption above 500 units?

- A. $6.60x - 1420$
- B. $6.60x + 5080$
- C. $6.60x - 1520$
- D. $6.60x + 1420$

Question 3 [Q03]:

In the previous billing cycle, Alex paid a bill of Rs.1115. What was his electricity consumption during that billing period? Explain how you arrived at your answer and show your working clearly.

Unit 02: Zaza's House [MASEU02]

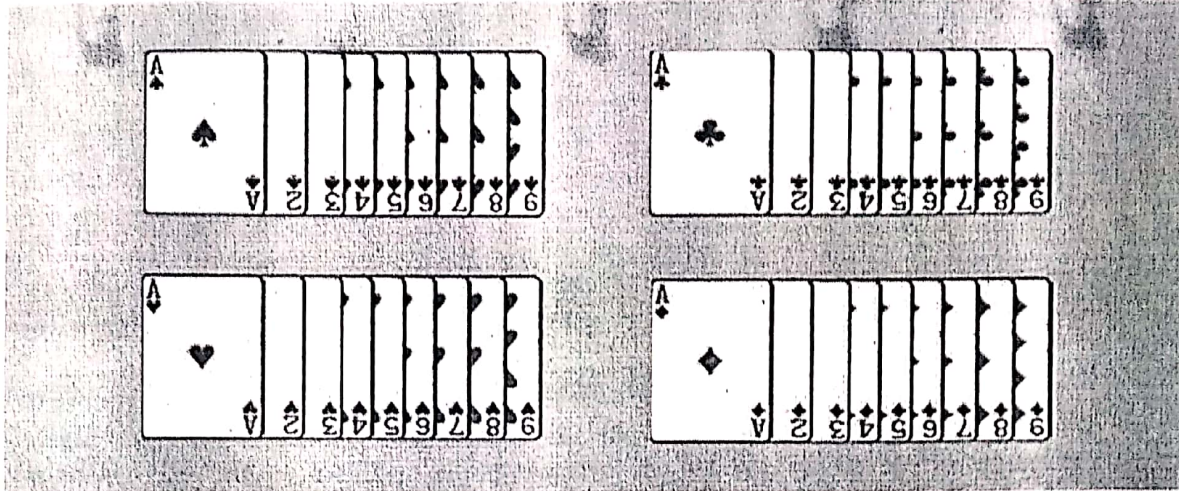
Ravi's friend Zaza is from Zedland. In Zedland, there are no words for "right" or "left", and hence everyone gives directions using the four cardinal directions - North, South, East and West. One day, when Zaza called Ravi over for dinner, Zaza's mother gave the following directions to Ravi: Proceed West from your house for 300 m. Turn to the South and go 800 m. After that, go East 1.6 km. Walk South for 800 m and then go West 100 m where you will find the little blue house.

Question 4 [Q01]:

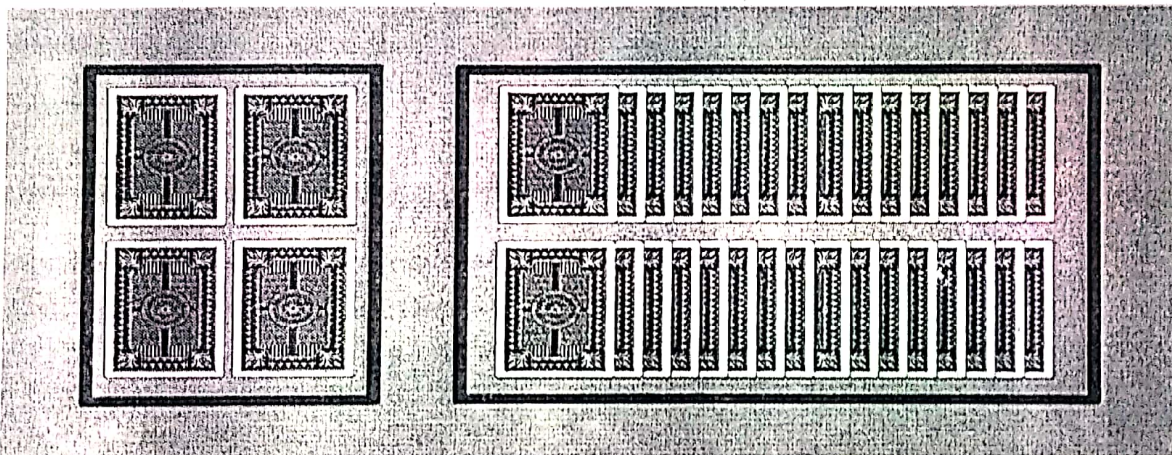
Ravi took his vehicle and followed Zaza's mom's instructions without taking any detours. If he took 12 minutes to reach Zaza's house, what was his average speed (in km/hr)?

Unit 03: Card Trick [MASEU03]

At Keshav's birthday party, he and his friends played card games. In one of the games, they used the following 36 cards.



They divided the 36 cards into two groups with the 4 Aces in one group and the remaining cards in the other group.



The rules of the game were as follows:

- A. You pick a card from the first group.
- B. a) If you pick a black ace, you lose.
b) If you pick a red ace, you choose a card from the second group.
- C. If you get an even number card from the second group, you win.

Question 5 [Q01]: If you tried the game, how likely is it that you would lose?

- A. Certain
- B. Very likely
- C. About 50% likely
- D. Not very likely
- E. Impossible

Question 6 [Q02]: If 200 people tried the game, approximately how many people would have won?

- A. 0
- B. 50
- C. 100
- D. 150
- E. 200

Unit 04: Age of Trees IMASEU04

One way of estimating the age of a tree is by counting the number of rings of wood growth.

A tree grows a new layer of bark about once a year and therefore one ring is equal to one year. The International Society of Arboriculture published a simple formula that also helps to approximately calculate the age of a tree.

First, the circumference of the chosen tree is measured at 54 inches from the ground level using a measuring tape. (Circumference = $2\pi r$ where r is the radius). Then, its age is estimated using the formula below:

Age of the tree = Diameter (measured in inches) \times Growth Factor (measured in rings per inch)

The growth factor of a tree gives an estimate of the width gained by the tree over a period of time and is dependent on a number of factors such as temperature, geography, climate, etc.

The following table gives the growth factor of a few species of trees, determined by scientists after a detailed study of their growth pattern.

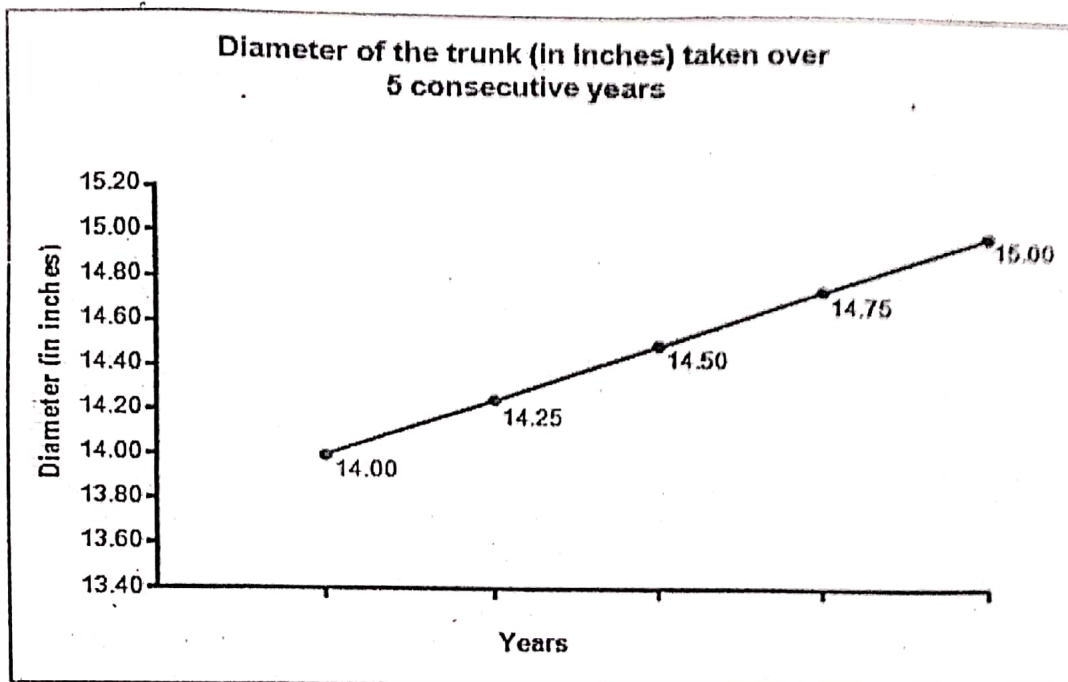
Species	Growth Factor
Red Pine	5.5
Silver Maple	3
White Oak	5
Black Walnut	4.5
Cottonwood	2
American Elm	4

Question 7 [Q01]: In how many years will the circumference of the trunk of the White Oak be about 69 inches?

- A. 15 years
- B. 110 years
- C. 55 years
- D. 30 years

Question 8 [Q02]:

The graph below shows the growth (in terms of diameter of the trunk) of one of the 5 species of trees. Which one do you think it is? Explain how you arrived at your answer



Question 9 [Q03]:

Complete the table for the graph shown above in Question 8:

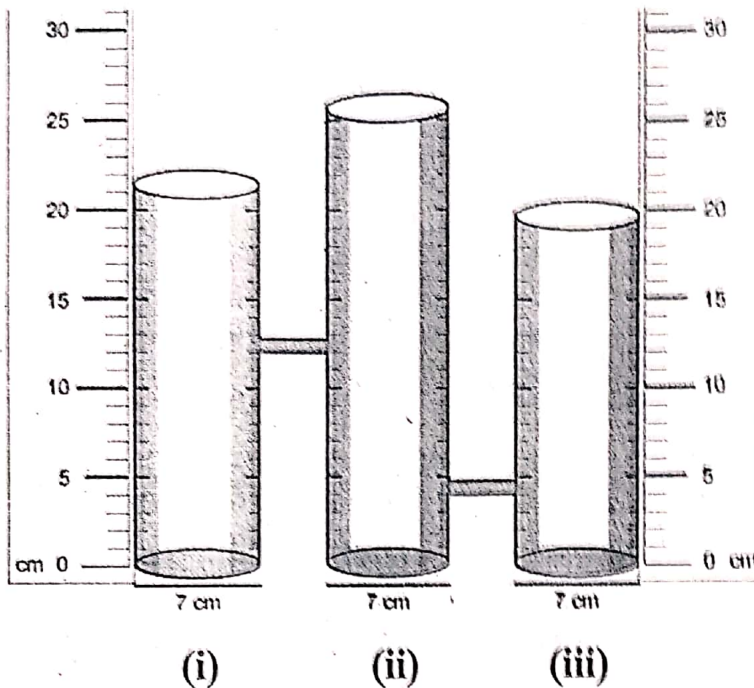
Diameter of the trunk (in inches)	Age (in years)
14.00	
16.00	
	75
30.00	

Unit 05: Measuring Jars [MASEU05]

Context: Surface Area and Volumes

Three open cylindrical jars are connected by small pipes as shown. The two connecting pipes can hold a total of 40 cm^3 of liquid. The first pipe is at a height of 12 cm from the bottom, while the second pipe is at a height of 4 cm . The volume of water in a cylinder can be calculated using the formula $V = \pi R^2 H$, where R is the radius of the base of the cylinder and H is the height to which water is filled in the cylinder.

[Use $\pi = \frac{22}{7}$]



Question 10 [Q01]:

One litre of water is poured into the first jar. [1 Litre = 1000 cm^3]. Volume of water would be the same in

- A. (i) and (ii) jars
- B. (ii) and (iii) jars
- C. (i) and (iii) jars
- D. (i), (ii) and (iii) jars

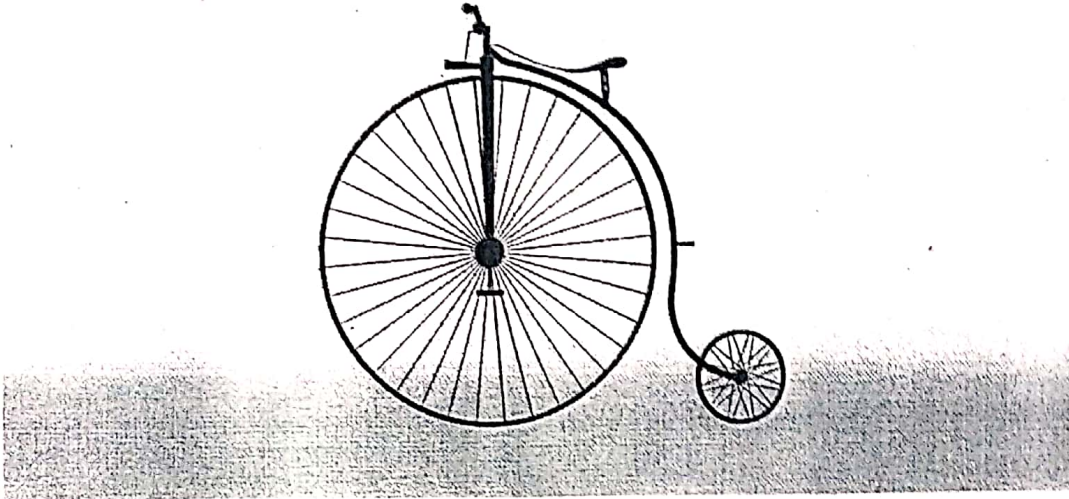
Question 11 [Q02]:

If water is poured into the first jar until the height of water level is 16 cm in each jar, what is the total volume of water (in cm^3) poured?

Unit 06: Penny-farthing [MASEU06]

Context: Circles

Penny-farthings are first generation bicycles which were popular in the 19th century.



In one particular model of this bicycle, the diameter of the front wheel is $2\frac{2}{3}$ times the diameter of the rear wheel.

Question 12 [Q01]:

When the bicycle travels 264 m, the rear wheel rotates 200 times. How many times does the front wheel rotate when the bicycle travels 264 m?

Question 13 [Q02]:

Using the information in Question 12 calculate the diameter (in cm) of the front wheel of the bicycle.

[Take $\pi = \frac{22}{7}$]

Unit 07: Currency Exchange Rates [MASEU07]

Context: Playing With Numbers

An exchange rate is how much it costs to exchange one currency for another. Exchange rates fluctuate constantly throughout the week as currencies are actively traded. This pushes the price up and down, like other assets such as gold or stocks.

The following table giving the bank rates for 100 units of various foreign currencies converted to Indian rupees.

S. No.	Currencies	Selling (₹)	Buying (₹)
1	Pound Sterling	8782	8800
2	US Dollar	7170	7192
3	Euro	7982	8000
4	Swiss Franc	7345	7365
5	Swedish Kroner	745	769
6	Australian Dollar	4840	4857
7	UAE Dirham	1952	1982

Question 14 [Q01]:

A man wants to convert ₹10,000 into foreign currency. He wants to buy the foreign currency which gives him the maximum number of units. Which currency should he buy?

- A. Pound Sterling
- B. U.A.E. Dirham
- C. Australian Dollar
- D. Swedish Kroner

Question 15 [Q02]:

Atul has 57 Australian dollars. Now that he is planning a trip to Sweden: Into how many Swedish Kroners can he convert his money?

- A. 400
- B. 365
- C. 363
- D. 242

Creative and Critical Thinking (CCT) Practice Assessment – II

Scientific Literacy

Classes IX and X

Unit 1: Vermi-composting [SCSEU01]

Vermi-composting is the process by which worms are used to convert organic materials (usually wastes) into a humus-like material. Vermi-compost appears to be generally superior to conventionally produced compost in a number of ways.

- It restores microbial population, which includes nitrogen fixers, phosphate solubilizers, etc.
- It provides major and micro-nutrients to the plants.
- It improves soil texture and water holding capacity of the soil.
- It provides good aeration to soil, thereby improving root growth and proliferation of beneficial soil microorganisms.
- It decreases the use of pesticides for controlling plant pathogens, improves structural stability of the soil, thereby preventing soil erosion.
- It enhances the quality of grains/fruits due to increased sugar content.

At the same time, the beginning of vermi-composting is a more complicated process than traditional composting.

- It can be quicker, but to make it so requires more labour.
- It requires more space because worms are surface feeders and will not operate in material more than a meter in depth.
- It is more vulnerable to environmental pressures, such as temperature, freezing conditions, and drought.
- Perhaps most importantly, it requires more start-up resources, either in cash (to buy the worms) or in time and labour (to grow them).

Use the information given in the above paragraph to answer the following questions.

Question 1 [Q01]

Rohita has the option to choose between Chandigarh, Shimla and Manali to start a vermi-composting unit. Which of these places would be more suitable and why?

.....

.....

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Question 2 [Q02]

Choose the correct statement(s) from the following:

- i. Due to Vermicomposting, the soil will be able to hold more water.
 - ii. Vermicomposting is an expensive process which is less labour intensive.
 - iii. Although the Vermicomposting process is quicker, it does not ensure healthy crops rich in nutrients.
 - iv. Vermicomposting in the long run helps to improve soil fertility.
- A. i and ii
 B. i and iv
 C. ii and iv
 D. iii and iv

Question 3 [Q03]

The availability of a special breed of worms which can burrow deep into the soil is being advertised aggressively. Should Rohita invest in procuring these worms for her Vermicomposting unit? State the reasons for your answer.

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.....

Question 4 [Q04]

Scientists have determined that the fastest way to produce fertile, sweet-smelling compost is to maintain a C:N ratio somewhere around 25 to 30 parts carbon to 1 part nitrogen, or 25-30:1. If the C:N ratio is too high (excess carbon), decomposition slows down. If the C:N ratio is too low (excess nitrogen) you will end up with a stinky pile. The table below depicts the soil composition of a particular land, after addition of vermicompost starters.

**TABLE I
 COMPOSITION OF RAW MATERIAL & VERMICOMPOST MIXTURE**

Number of days	0	45	90	135	180
pH	9.4	8.7	8.2	8	7.8
Ammonical Nitrogen (mg/Kg)	8.78	14.3	14.6	15.8	16
Nitrate Nitrogen (mg/Kg)	5.89	8.9	9.1	9.4	9.7
Available Phosphate (mg/Kg)	4.34	7.2	7.4	7.4	7.6
Total Potassium (mg/Kg)	6.14	8.1	8.5	8.7	8.9
TKN (%)	0.21	0.29	0.296	0.298	0.302
Total Organic Carbon (%)	9.84	8.82	8.65	8.59	8.38
C/N Ratio	46.85	30.41	29.2	28.85	27.74

The man wants to set up his soil for cultivation in a month's time. Based on the above data, justify whether he will be able to make the soil fertile enough to produce good crops in that time.

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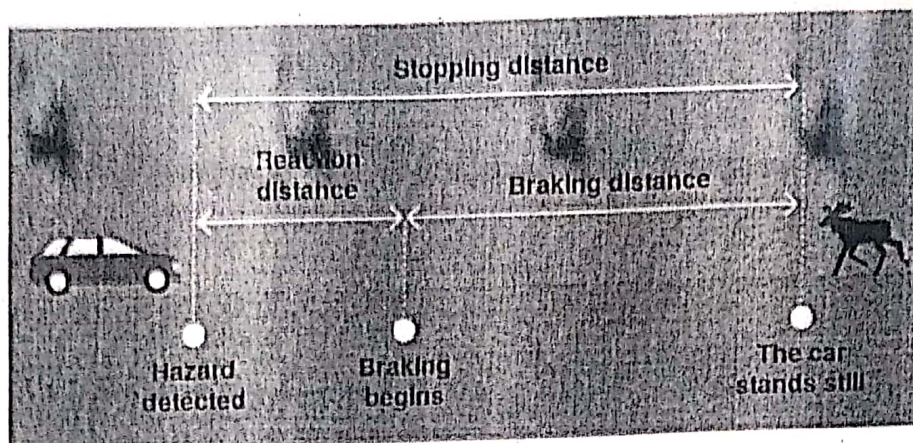
Question 5 [Q05]

Looking at the above data and table, explain whether the soil would become less or more alkaline during vermi-composting.

.....

.....

Unit 2: Motion and Braking [SCSEU02]



Reaction distance

The reaction distance is the distance you travel from the point of detecting a hazard until you begin braking or swerving.

The reaction distance is affected by

- The car's speed (proportional increase):
 - 2 x higher speed = 2 x longer reaction distance.
- Your reaction time.
 - Normally 0.5–2 seconds.
 - 45–54 year-olds have the best reaction time in traffic.

The distance the car travels as a driver's brain decides when the car needs to stop until the brakes are applied is called the **thinking distance (TD)**. The **braking distance (BD)** is the distance the car travels once the brakes are applied until it stops. The **stopping distance (SD)** is the thinking distance plus the braking distance, which is shown in the following equation; $SD = TD + BD$.

Thinking Distance (TD)

Let's first start with the thinking distance (TD), which is shown in the equation $TD = v_0 t_r$ (the reaction time of the driver (t_r), the car's initial speed (v_0)). The car's velocity can be thought of being constant during the short amount of time required for the driver's reaction, so all we require is *the speed times reaction time* to get the thinking distance.

Braking Distance (BD)

Deriving the equation for the braking distance is a little more involved. We start with the kinematic equation shown in the equation $v_f^2 = v_0^2 + 2ad$. Where:

v_f = final velocity, v_0 = initial velocity, a = acceleration, d = distance travelled.

We know the final velocity is zero because the car has stopped. The only unknown in this equation is the acceleration a . The car decelerates (accelerating in the opposite direction of its motion) because there is an unbalanced force on it.

Question 6 [Q01]

A type of tyre claims that if the car was running at a speed of 100 km/h, the stopping distance would be 36.63 m as the tyre after braking is capable of producing deceleration of 10.53 m/s^2 . Check whether their claim is correct or not?

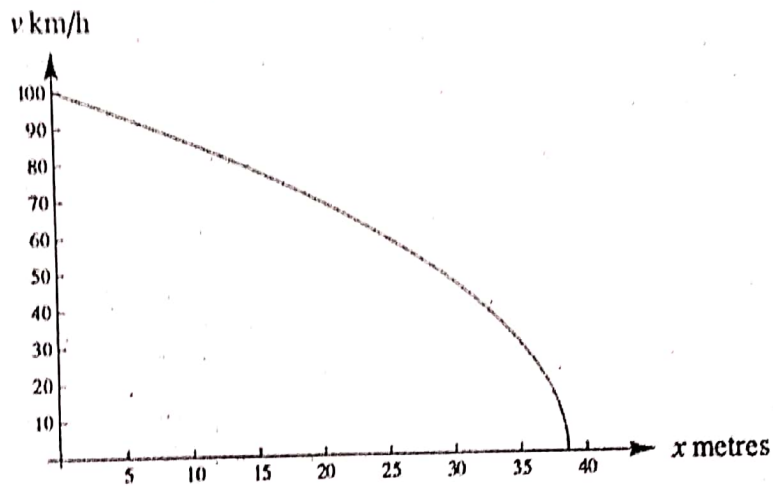
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Question 7 [Q02]



Graph showing speed versus distance travelled.

From this graph, which of the following statement/s are true?

- (i) The car slows more rapidly as it gets closer to stopping.
- (ii) Rate of decrease of speed with respect to distance $\propto \frac{1}{\text{Speed}}$
- (iii) The car slows less rapidly as it gets closer to stopping.
- (iv) Rate of decrease of speed with respect to distance $\propto \text{Speed}$.

- A. (i) and (ii)
- B. (i) and (iii)
- C. (ii) and (iv)
- D. (i), (ii) and (iv)

Question 8 [Q03]

The brakes of a car are applied when the car is running at the speed of 100 km/h. From the graph, estimate how far would have the car gone when the speed of the car was 50 km/h?

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Question 9 [Q04]

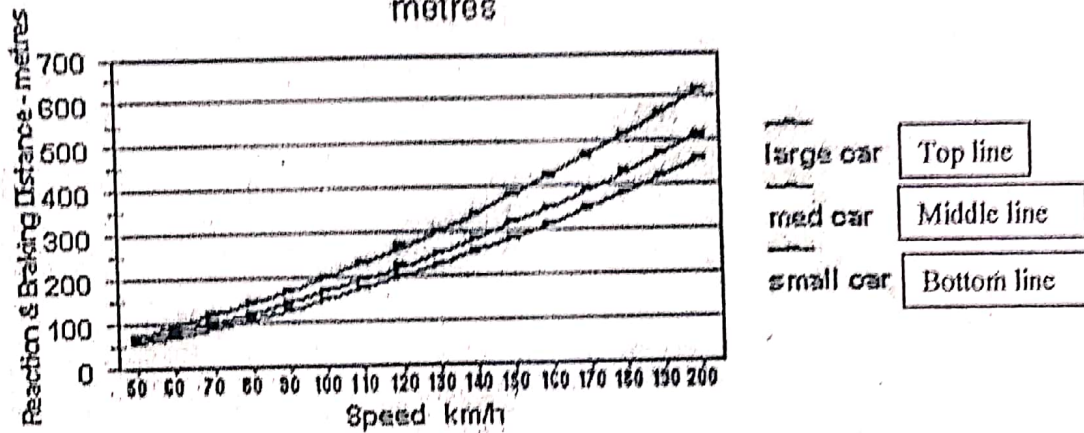
A car is travelling at 100 km/h when the driver sees something that requires rapid braking. Find the total distance (in metres) travelled by the car from the moment the driver first sees the problem until the car stops. (Approximate answer).

(An average thinking time is 0.68 seconds. A sensible choice of value for deceleration is 10 m/s^2 .)

- A. 70-72 m
- B. 57-58 m
- C. 60-62 m
- D. 45-47 m

Question 10 [Q05]

Observation-Decision-Reaction Distance
metres



From the data given in the above graph, estimate the relationship between the braking distance of a smaller car and a larger car travelling at the same speed.

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Unit 3: Tobacco Smoking [SCSEU03]

Tobacco is smoked in cigarettes, cigars and pipes. Research shows that tobacco-related diseases kill nearly 13 500 people worldwide every day. It is predicted that by 2020, tobacco-related diseases will cause 12% of all deaths globally. Tobacco smoke contains many harmful substances. The most damaging substances are tar, nicotine and carbon monoxide.

Some people use nicotine patches to help them to give up smoking. The patches are put on skin and release nicotine into the blood. This helps to relieve cravings and withdrawal symptoms when people have stopped smoking.

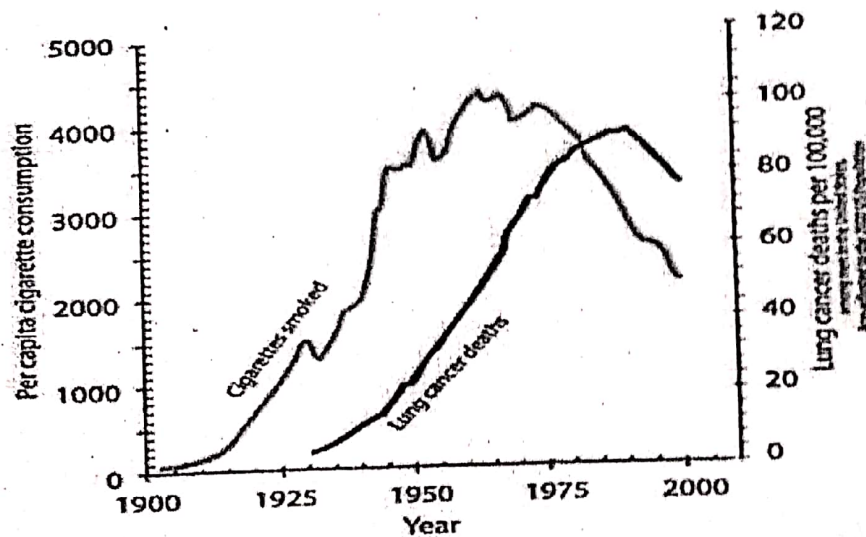
To study the effectiveness of nicotine patches, a group of 100 smokers who want to give up smoking is chosen randomly. The group is to be studied for six months. The effectiveness of the nicotine patches is to be measured by finding out how many people in the group have not resumed smoking by the end of the study.

Question 11 [Q01]

Which one of the following would be the best option in the study?

- A. All people in the group wear patches.
- B. All people wear patches except one who tries to give up smoking without them.
- C. Make it optional for people to wear patches
- D. Half are randomly chosen to use patches and the other half do not use them.

Question 12 [Q02]



The above graph shows per capita cigarette consumption w.r.t time and lung cancer deaths per 100000 w.r.t time on the same graph. From this graph, we can conclude that:

- A. Increase in cigarette smoking causes a decrease in deaths due to lung cancer.
- B. Increase in cigarette smoking has no effect on deaths due to lung cancer.
- C. Increase in cigarette smoking causes an increase in deaths due to lung cancer immediately.
- D. Increase in cigarette smoking causes an increase in deaths due to lung cancer after a time lag.

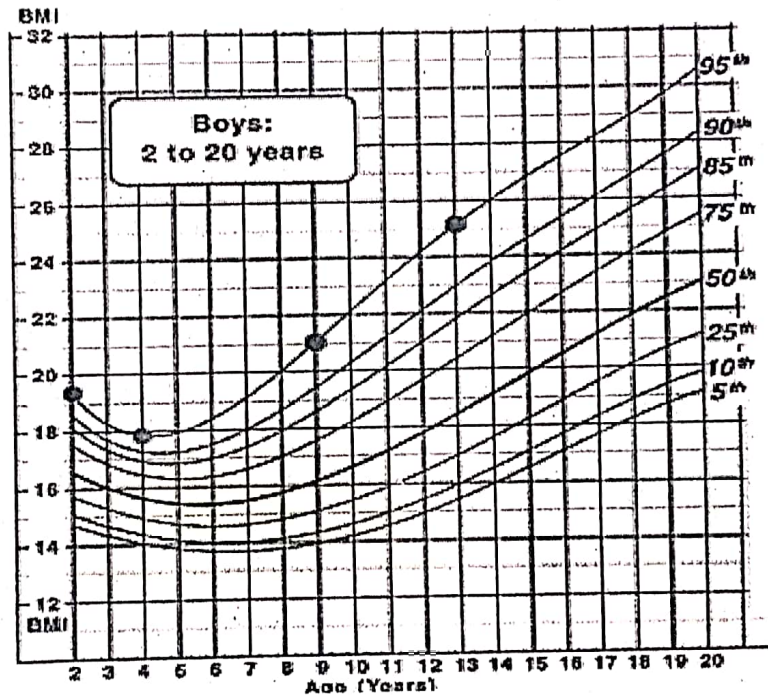
Question 13 [Q03]

The graph also shows the behavioural pattern of people in consuming cigarettes over time. Which of these statements can be inferred from the graph?

- (i) Both cigarettes smoked and lung cancer deaths peaked around the same time.
 - (ii) There has been a consistent increase in incidences of lung cancer over a period of time.
 - (iii) There has been a significant decrease in the number of cigarettes smoked and lung cancer deaths in the later periods.
 - (iv) The number of cigarettes smoked is directly proportional to the probability of getting lung cancer.
- A. (i) and (ii)
 B. (iii) and (iv)
 C. (i), (ii) and (iii)
 D. (ii), (iii) and (iv)

UNIT 4: BMI [SCSEU04]

Body mass index (BMI) is used as a measure to determine if a person is normal, obese, overweight or underweight. BMI is calculated by dividing a person's weight in kilograms by the square of the person's height in metres. BMI is age and gender specific. The chart shows BMI-for-age plots for boys of age between 2 and 20 years. BMI-for-age $\geq 95^{\text{th}}$ means overweight, BMI-for-age between 85^{th} and 95^{th} indicates risk of overweight, BMI-for-age between 85^{th} and 5^{th} is considered normal and BMI-for-age $< 5^{\text{th}}$ is underweight. Arun's BMI at 2, 4, 9 and 13 years are marked in the plot. Since the dots are on the 95^{th} line, it means that out of 100 boys of his age, less than 5% have BMI lower than him. You can also consider Arun as overweight.



Question 14 [Q01]

Arun's BMI reduced from 19.5 at the age of 2 years to 17.8 at the age of 4 years. What could be the possible reason for this?

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Question 15 [Q02]

As per the data given, in which of the following age is the BMI difference maximum between overweight & underweight people?

- A. 20 years
- B. 18 years
- C. 12 years
- D. 15 years

Question No. 16 [Q03]

What is the BMI of Nikhil who is $12\frac{1}{2}$ years old, weighs 45 kg and 1.5 m tall?

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