

# GAMSAT Prognostic Test

- Preparatory Tool from PrepGenie

## Reasoning in Humanities and Social Sciences

## Unit 1

## Question 1



1 The illustration above suggests which of the following?

- A In the midst of movement and chaos, keep stillness inside of you.
- B Workers are often paid peanuts.
- C There are people who get paid for doing almost nothing.
- D Unemployment gives rise to labour movements.

## Unit 2

## Questions 2–6

Read the following excerpt and answer the questions on the basis of your understanding of it.

“Yes Of course, if it’s fine tomorrow,” said Mrs. Ramsay. “But you’ll have to be up with the lark,” she added.

To her son these words conveyed an extraordinary joy, as if it were settled, the expedition were bound to take place, and the wonder to which he had looked forward, for years and years it seemed, was, after a night’s darkness and a day’s sail, within touch. Since he belonged, even at the age of six, to that great clan which cannot keep this feeling separate from that, but must let future prospects, with their joys and sorrows, cloud what is actually at hand, since to such people even in earliest childhood any turn in the wheel of sensation has the power to crystallise and transfix the moment upon which its gloom or radiance rests, James Ramsay, sitting on the floor cutting out pictures from the

illustrated catalogue of the Army and Navy Stores, endowed the picture of a refrigerator, as his mother spoke, with heavenly bliss. It was fringed with joy. The wheelbarrow, the lawnmower, the sound of poplar trees, leaves whitening before rain, rooks cawing, brooms knocking, dresses rustling- all these were so coloured and distinguished in his mind that he had already his private code, his secret language, though he appeared the image of stark and uncompromising severity, with his high forehead and his fierce blue eyes, impeccably candid and pure, frowning slightly at the sight of human frailty, so that his mother, watching him guide his scissors neatly round the refrigerator, imagined him all red and ermine on the Bench or directing a stern and momentous enterprise in some crisis of public affairs. "But," said his father, stopping in front of the drawing-room window, "it won't be fine."

Had there been an axe handy, or a poker, any weapon that would have gashed a hole in his father's breast and killed him, there and then, James would have seized it. Such were the extremes of emotion that Mr. Ramsay excited in his children's breasts by his mere presence; standing, as now, lean as a knife, narrow as the blade of one, grinning sarcastically, not only with the pleasure of disillusioning his son and casting ridicule upon his wife, who was ten thousand times better in every way than he was (James thought), but also with some secret conceit at his own accuracy of judgement. What he said was true. It was always true. He was incapable of untruth; never tampered with a fact; never altered a disagreeable word to suit the pleasure or convenience of any mortal being, least of all of his own children, who, sprung from his loins, should be aware from childhood that life is difficult; facts uncompromising; and the passage to that fabled land where our brightest hopes are extinguished, our frail barks founder in darkness (here Mr. Ramsay would straighten his back and narrow his little blue eyes upon the horizon), one that needs, above all, courage, truth, and the power to endure.

"But it may be fine- I expect it will be fine," said Mrs. Ramsay, making some little twist of the reddish-brown stocking she was knitting, impatiently.

2 Which of the following best describes the feelings of James Ramsay for his father?

- A James resented and detested his father.
- B James felt his father was playing a spoilsport.
- C James felt his father was sarcastic and unsupportive.
- D James thought his father could be combated with a sharp weapon.

3 Which of the following best depicts Mrs. Ramsay's nature?

- A She is indomitable, impatient and spoils her kids.
- B She is lovable but nervous and impatient at times.
- C She is devoted to family, relies on her emotions and optimistic.
- D She is too meek to stand up to anything her husband says.

4 Which of the following suggests James' nature?

- A Is pretentious and gullible at the same time.
- B Is hardworking and always hopeful of good results of his work.
- C Is an idealist who fantasises and gets violent when met with opposition.
- D Is a daydreamer and tends to be a pessimist when he encounters failure.

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5 Which of the following best suggests Mrs. Ramsay's role in the above excerpt?

- A She was trying to pacify Mr. Ramsay's wrath.
- B She was trying to keep the hope alive for her son.
- C She was trying to win over her son by supporting him.
- D She was trying to bridge a gap between the father and the son.

6 What was "fringed with joy" as mentioned in second paragraph?

- A James' mother's voice which comforted him.
- B James' own voice as he started thinking aloud.
- C The nature around James which made him happy.
- D James' escapist thoughts which made him fantasise.

### Unit 3

#### Questions 7-11

*Read the following verse and answer the questions on the basis of your understanding of it.*

Two roads diverged in a yellow wood,  
 And sorry I could not travel both  
 And be one traveller, long I stood  
 And looked down one as far as I could  
 To where it bent in the undergrowth;  
 Then took the other, as just as fair,  
 And having perhaps the better claim,  
 Because it was grassy and wanted wear;  
 Though as for that the passing there  
 Had worn them really about the same,  
 And both that morning equally lay  
 In leaves no step had trodden black.  
 Oh, I kept the first for another day!  
 Yet knowing how way leads on to way,  
 I doubted if I should ever come back.  
 I shall be telling this with a sigh  
 Somewhere ages and ages hence:  
 Two roads diverged in a wood, and I--  
 I took the one less travelled by,  
 And that has made all the difference.

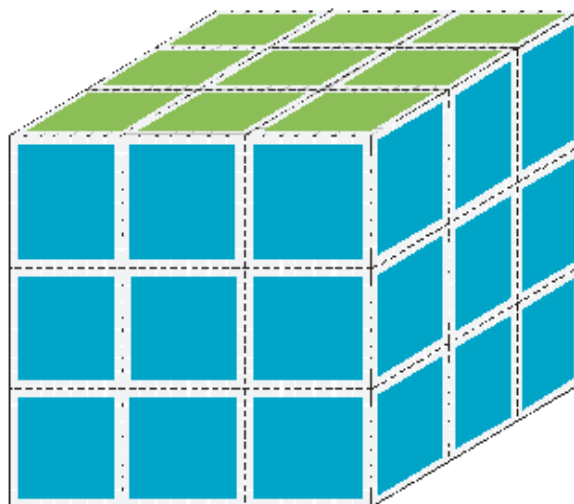
7 In this poem the poet is promoting

- A patience and virtue.
- B individualism and non-conformity.
- C clarity of mind which helps in vision.
- D sense of direction which leads to the goal.

- 8 Which of the following best describes the poet's position in the first stanza?
- A The poet has been walking through the woods unable to take a decision.
  - B The poet feels sorry because he is unable to travel the road he did not take.
  - C The poet is unable to choose between two roads so he keeps staring at the bending.
  - D The poet is disturbed by the fact that he can't decide between the roads so he starts walking.
- 9 In the second stanza the poet
- A is confused to find both the roads looking about the same.
  - B decides to take the less travelled road though both are about the same.
  - C wanted the road which he took to be grassy and weary at the same time.
  - D wanted to take the road that will be fair to him and let him make a better claim.
- 10 Which of the following best suggests the tone in the last stanza of the poem?
- A The poet is proud to declare he decided to take the less travelled road.
  - B The poet is nostalgic about the time he took the decision in a yellow wood.
  - C The poet is regretting the sad outcome of his decision to take the less travelled road.
  - D The poet is looking ahead to the time when he shall know the outcome of his decision.
- 11 What does the poem convey?
- A A decision taken is invariably wrong and thus leads to mourning and sighs.
  - B One must blindly follow the road less travelled since it is likely to reduce competition.
  - C Choice is inevitable but one never knows what the choice will mean unless one has lived it.
  - D More than one option always confuses and one gets lost and starts doubting one's potential.

#### Unit 4

#### Questions 12-15



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A wooden cube is painted blue on all the four adjoining sides and green on two opposite sides i.e, top and bottom. It is then cut at equal distances at right angles four times vertically (top to bottom) and two times horizontally (along the sides) as shown in the figure, where the dotted lines represents the cuts made. Study the diagram and answer the following questions.

**12** How many cubes will have only one face painted in Blue?

- A** 1
- B** 2
- C** 3
- D** 4

**13** How many cubes will have at least three sides painted?

- A** 12
- B** 8
- C** 6
- D** 3

**14** How many cubes will have no face painted at all?

- A** 1
- B** 2
- C** 3
- D** 4

**15** How many cubes are formed in all?

- A** 16
- B** 24
- C** 27
- D** 32

## Unit 5

### Questions 16-22

#### Passage 1

It can be argued that much consumer dissatisfaction with marketing strategies arises from an inability to aim advertising at only the likely buyers of a given product. There are three groups of consumers who are affected by the marketing process. First, there is the market segment—people who need the commodity in question. Second, there is the program target—people in the market segment with the “best fit” characteristics for a specific product. Lots of people may need trousers, but only a few qualify as likely the buyers of very expensive designer trousers. Finally, there are the program audiences. All people who are actually exposed to the marketing program without regard to whether they need or want the product. These three groups are rarely identical. An exception occurs occasionally in cases where customers for a particular industrial product may be few and easily identifiable. Such customers, all

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sharing a particular need, are likely to form a meaningful target, for example, all companies with a particular application of the product in question, such as high-speed fillers of bottles at breweries. In such circumstances, direct selling (marketing that reaches only the program target) is likely to be economically justified, and highly specialized trade media exist to expose members of the program target—and only members of the program target—to the marketing program.

- 16** The passage suggests which of the following about highly specialised trade media?
- A** They are used only for very expensive products.
  - B** They should be used only when direct selling is not economically feasible.
  - C** They are rarely used in the implementation of marketing programs for industrial products.
  - D** They can be used to exclude from the program audience people who are not part of the program target.
- 17** According to the passage, most consumer-goods markets share which of the following characteristics?
- I** Customers who differ significantly from each other
  - II** Large numbers of potential customers
  - III** Customers who each represent a small percentage of potential sales
- A** I only
  - B** II only
  - C** I and II only
  - D** I, II, and III
- 18** The passage suggests which of the following about direct selling?
- A** It is used in the marketing of most industrial products.
  - B** It is not economically feasible for most marketing programs.
  - C** It is often used in cases where there is a large program target.
  - D** It is used only for products for which there are many potential customers.
- 19** The author mentions “trousers” in the lines “Lots of people may need trousers, but only a few qualify as likely buyers of very expensive designer trousers.” most likely in order to
- A** compare the program target and the program audience.
  - B** clarify the distinction between the market segment and the program target.
  - C** emphasise the similarities between the market segment and the program target.
  - D** provide an example of the way three groups of consumers are affected by a marketing program.

## Passage 2

Most consumer-goods markets are significantly different. Typically, there are many rather than few potential customers. Each represents a relatively small percentage of potential sales. Rarely do members of a particular market segment group themselves neatly into a meaningful program target. There are substantial differences among consumers with similar demographic characteristics. Even with all the past decade’s advances in information technology, direct selling of consumer goods is rare, and mass marketing—a marketing approach that aims at a wide



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audience—remains the only economically feasible mode. Unfortunately, there are few media that allow the marketer to direct a marketing program exclusively to the program target. Inevitably, people get exposed to a great deal of marketing for products in which they have no interest and so they become annoyed.

- 20** Which of the following best exemplifies the situation described in the last two sentences of the passage?
- A** A product suitable for men aged 60 and over is advertised in a magazine read by adults of all ages.
  - B** A product suitable for women aged 21-30 is marketed at meetings attended only by potential customers.
  - C** A company develops a new product and must develop an advertising campaign to create a market for it.
  - D** An idea for a specialised product remains unexplored because media exposure of the product to its few potential customers would be too expensive.
- 21** The passage suggests that which of the following is true about the marketing of industrial products like those discussed?
- A** The market segment and program target are identical.
  - B** Mass marketing is the only feasible way of advertising such products.
  - C** More customers would be needed to justify the expense of direct selling.
  - D** The marketing program cannot be directed specifically to the program target.
- 22** It can be inferred from passage 1 and 2 that which of the following is true for most consumer-goods markets?
- A** The program audience is smaller than the market segment.
  - B** The market segment and the program target are usually identical.
  - C** The program audience and the market segment are usually identical.
  - D** The program target and the program audience are not usually identical.

## Unit 6

### Questions 23-24

Carbon monoxide (CO) is a colorless, odorless and tasteless toxic gas produced by incomplete combustion of fuel. Although many people suffer from carbon monoxide poisoning, most of them tend to overlook the symptoms. In Perth, a total of 981 cases of unintentional CO poisoning was reported. The cases, first classified by sources of exposure, were further divided into fatal and nonfatal. The number of cases occurring in each of the categories is shown in Table 1.



Source of Exposure	Fatal	Non-Fatal	Total
Fire (FI)	63	53	116
Auto Exhaust (AU)	60	178	238
Furnace (FU)	18	345	363
Kerosene Heater (K)	9	18	27
Appliance (AP)	9	63	72
Other gas motor (OG)	3	73	76
Fireplace (FP)	0	16	16
Other (O)	3	19	22
Unknown (U)	9	42	51
<b>Total</b>	<b>174</b>	<b>807</b>	<b>981</b>

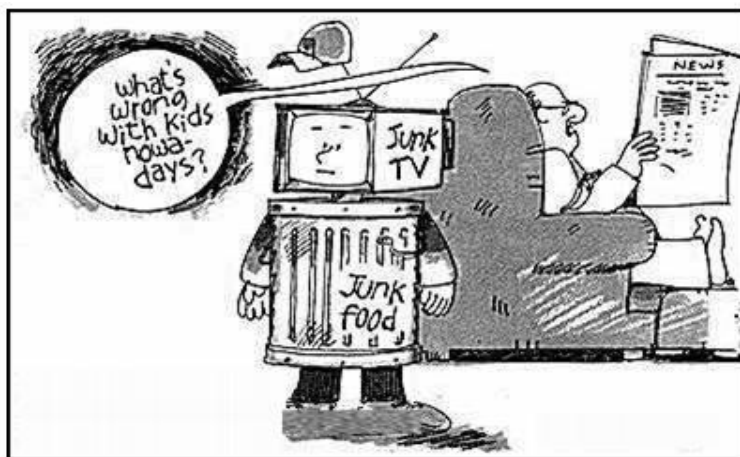
Table 1

- 23 If 'A > B' means poisoning by A is relatively safer than that by B, then which is the most plausible scenario?
- A FP > FU > OG > O  
 B FP > OG > FU > AP  
 C FP > OG > K > O  
 D FP > O > K > OG
- 24 If it is known that a random sample from the 981 cases is nonfatal then, which of the following is true?
- A The probability that the cause of poisoning is FP is 0.82.  
 B The probability that the cause of poisoning is due to auto exhaust is 0.22.  
 C The probability that the cause of poisoning is unknown is 0.09.  
 D The probability that the cause of poisoning due to FP or AP is 0.08

## Unit 7

## Question 25-28

## Comment 1



- 25 The man in the cartoon is most likely indignant at the fact that
- A the boy has dressed up in cartons representing junk food and television.
  - B the boy has no apparent interest in the newspaper.
  - C kids today are engrossed in mindless television and unhealthy food.
  - D kids today do not bother to spend time with their families.
- 26 The cartoon suggests that
- A despite his disapproval, the man shows no initiative in guiding the young boy.
  - B the man is unaware of a kid in his home similar to the ones he disapproves of.
  - C despite being together, the tastes of father and son has no congruency.
  - D lack of proper guidance leads children to make wrong choices.

## Comment 2

TV programmes often explore controversial or sensitive issues, which can make it easier for parents and kids to discuss them.

News, current events, and historical programming can help make young people more aware of other cultures and people.

Shared viewing gives family members of all ages an opportunity to spend time together.

- 27 What certainly CANNOT be concluded from the above comments?
- A Television programmes are the best way to broach controversial issues with children.
  - B In the present age, shared TV viewing is a very good way to spend some family time.

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- C Television programmes can often be educational in nature.  
D Television is the best possible medium of intercultural awareness.

28 What can be concluded most correctly after studying both Comment 1 and Comment 2?

- A Despite having ample choice of useful programmes, kids today prefer 'junk TV.'  
B Parents generally disapprove of the good effects television has on kids.  
C The usefulness of a product lies in the hands of the user.  
D Reading newspapers is certainly more profitable than watching television.

## Unit 8

### Questions 29-31

Australia is a large country with a population of more than 20 million, Lesotho and Samoa are tiny in comparison, each with a population of less than a million, and Jamaica is also comparatively small with a population of less than 3 million. A large proportion of the Australian population is made up of immigrants from diverse backgrounds and a small proportion consists of aboriginals, who are now marginalized in social and economic terms. The society has a multicultural nature, and different languages are spoken at home. It is a high-income country with a high level of human development and gender equality, yet it has pockets of inequalities in terms of socio-economic development as well as education. Lesotho, a landlocked African country, and Samoa, a country consisting of two large and six small islands in the Pacific, are relatively homogenous in terms of the nature of their populations and languages. Lesotho is a low-income country with a low rank in human development and gender equality as measured by the Human Development Report (UNDP, 2005). Below given are the data for development as well as educational indicators for these four commonwealth countries. On the basis of the information given below answer the following questions.

Table 1 Selected Development Indicators for  
Australia, Jamaica, Lesotho and Samoa

	Australia	Jamaica	Lesotho	Samoa
Income category	High	Lower-middle	Low	Lower-middle
Population (millions)	20.1	2.7	0.8	0.2
Per capita GDP (\$)	29,632	4,104	2,561	5,854
Human Development Index (HDI)	0.955 (3)	0.738 (98)	0.497 (149)	0.776 (74)
Gender-related Development index (GDI)	0.954 (2)	0.736 (75)	0.487 (114)	NA

Notes:

1. HDI is a composite index based on life expectancy at birth, adult literacy rate, combined enrolment ratio for primary, secondary and tertiary education and per-capita gross domestic product (GDP).
2. GDI is based on life expectancy, education index and income index.
3. Figures in parentheses in Rows 3 and 4 represent the respective world ranking.
4. Per capita GDP=Total GDP/Total Population
5. GDP of a country is the total value of goods and services produced over a specific time period within the geographical boundary of that country expressed in monetary terms.
6. Gender Related Development Index [GDI] is an indicator of standard of living which aims to show the inequalities between men and women in life expectancy, education and standard of living.

TABLE 2 Selected Educational Indicators for  
Australia, Jamaica, Lesotho and Samoa (percentages)

	Australia	Jamaica	Lesotho	Samoa
Adult literacy rate (male)	NA	79.8	73.7	98.9
Adult literacy rate (female)	NA	80.2	90.3	98.4
Gender parity index (GPI) in literacy rate (Females/ males)	NA	1.00	1.22	1.00
Net enrolment ratio (NER) – primary (male)	96.4	94.4	82.9	98.6
NER – primary (female)	97.2	94.8	88.6	96.4
GPI in NER – primary (females/ males)	1.01	1.00	1.07	0.98
NER – secondary (male)	87.0	73.9	17.8	59.1
NER – secondary (female)	89.1	77.0	27.2	65.4
GPI in NER – secondary (females/ males)	1.02	1.04	1.53	1.11

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Notes:

1. The Gender Parity Index (GPI) is a socioeconomic index usually designed to measure the relative access to education of males and females. In its simplest form, it is calculated as the quotient of the number of females by the number of males enrolled in a given stage of education (primary, secondary, etc.). It is used by international organizations, particularly in measuring the progress of developing countries

Analyse the two tables given above to answer the following questions:

**29** “Under-participation” in education is a major issue for boys in \_\_\_\_\_

- A** Lesotho
- B** Australia
- C** Jamaica
- D** Samoa

**30** Some statements about the economic and educational indicators of these four countries are provided:

- I** Racial discrimination is one of the major driving factors for slowing down the economic development for Jamaica, Lesotho and Samoa.
- II** Jamaica is closer to Samoa in economic indicators as compared to Australia and Lesotho.
- III** Although Lesotho is a low-income country, it holds a comparatively good ranking in human development.
- IV** These four commonwealth countries provide a diverse picture of social features and economic development.

Which one of the following options hold true?

- A** I
- B** II & III
- C** III
- D** II & IV

**31** Samoa is close to Australia in terms of:-

- A** Gender Parity index in terms of Net Enrolment Ratio (NER) in primary education levels
- B** Literacy for both male and female, with a GPI of 1
- C** Per capita GDP in percentage terms
- D** Levels of pockets of inequalities in terms of overall economic development as well as education



## Unit 9

## Questions 32-34

**SHOULD CORPORAL PUNISHMENT BE REINTRODUCED IN SCHOOL?**

Corporal Punishment as described by the Collins Dictionary and Thesaurus (in one volume -1990) is "punishment of a physical nature such as caning". The term mainly relates to children being punished at school, but can also refer to children being punished at home. As of 2008 corporal punishment has been banned in 24 countries, including Germany, Greece and the Netherlands. Nevertheless, it is still widely used by parents in homes. In the UK, corporal punishment has been banned in schools for numerous years. However, a debate is now arising as to whether the decision to ban corporal punishment in schools was the right decision and hence, whether corporal punishment should be reintroduced?

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#### **All the YES points**

1. Bad behaviour is on a rise in the class room.
2. There has been an increase in juvenile crime.
3. There is a lack of father figure at home.
4. Previous rulings against corporal punishment were ineffective.
5. Human Rights culture needs to be impeded.
6. Improvement in the lives of those who are bullied.

#### **All the NO points**

1. It has been made illegal in so many countries for a reason.
2. It increases the rate of crime and violence.
3. It has negative psychological effects.
4. It is wrong and inappropriate.
5. Harms children with genuine behavioural disorders or other disabilities.
6. Currently legal in 21 states. Where is the betterment?

**32** It can be inferred from the above reasoning that if corporal punishment is reintroduced in schools, then in years to come

- A** children will think twice before playing any prank.
- B** students in general can walk more safely in the campus.
- C** the country will have more culture-conscious people.
- D** less importance will be given to the demands by Rights group.

**33** A study has found that among the majority of mainstream state secondary schools, caning (usually across the seat of a bending student's trousers) had been particularly prevalent in boys-only schools of all types. It also suggests that caning in general is less prevalent in girls-only schools. Keeping in mind the information, it can be speculated that

- A** gender distinction prevails in case of corporal punishment.
- B** girls can be easily discouraged from committing mischief.
- C** generally boys are more prone to commit mischief than girls.
- D** Corporal Punishments for girls are different from those for boys.

**34** A supporter of corporal punishment in school, when shown the above cartoon, will most likely justify the act by saying that

- A** the beating was necessary to make the child feel the pain that violence inflicts.
- B** even if the cartoon makes fun of corporal punishment, it is necessary for kids.
- C** it is the most effective method of regulating naughty students in schools.
- D** the memory of hard caning would keep the student away from further mischief.



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## Unit 10

### Questions 35-39

#### Comment 1

*The following quotes by eminent personalities present different views on education.*

- 1 I had a terrible education. I attended a school for emotionally disturbed teachers.  
-Woody Allen
  - 2 I have never let my schooling interfere with my education.  
-Mark Twain
  - 3 Education is an admirable thing, but it is well to remember from time to time that nothing worth knowing can be taught.  
-Oscar Wilde
  - 4 Education... has produced a vast population able to read but unable to distinguish what is worth reading.  
-G.M. Trevelyan
  - 5 What does education often do? It makes a straight-cut ditch of a free, meandering brook.  
-Henry David Thoreau
  - 6 The modern world belongs to the half-educated, a rather difficult class, because they do not realize how little they know.  
-William R. Inge
  - 7 Education enables a man to get along without the use of his intelligence.  
-Albert Edward Wiggam
- 35** What do quotes 2 and 3 say about the education system?
- A** Formal schools can never teach to anyone what is really required in life.
  - B** Experience, and not schooling, imparts real knowledge.
  - C** Formal education more often ends up dulling the mind instead of honing it.
  - D** Schooling is actually useless when it comes to real education.

#### Comment 2

*The following is a famous song by Pink Floyd, a famous English rock band.*

We don't need no education.  
We don't need no thought control.  
No dark sarcasm in the classroom.  
Teachers leave them kids alone.  
Hey, teacher leave the kids alone!  
All in all it's just another brick in the wall.  
All in all you're just another brick in the wall.

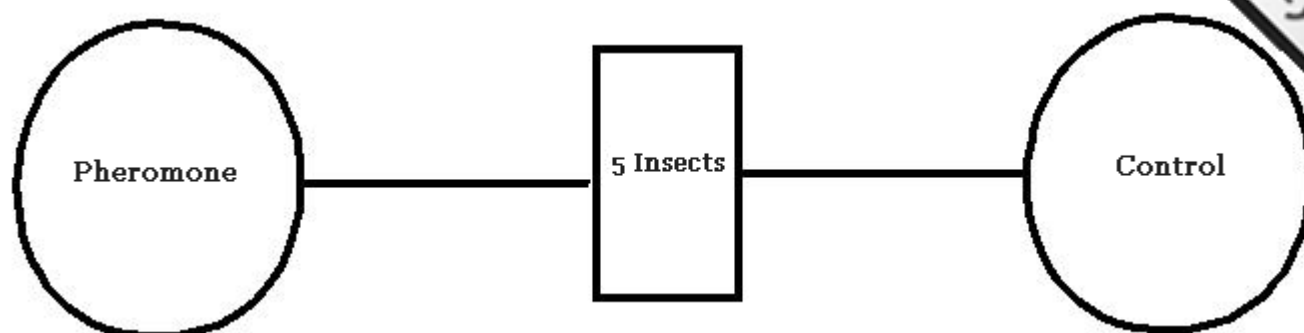
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- 36** The phrase “another brick in the wall” points to the idea that the education system
- A** is turning pupils into identical beings with no ingenuity whatsoever.
  - B** is ineffective in really imparting to the students any real knowledge.
  - C** fails to teach students anything of any real importance.
  - D** is given ridiculously high importance considering its inefficiency.
- 37** Which of the following phrases points at the methods used by the present education system?
- A** Another brick in the wall
  - B** Thought control
  - C** Dark sarcasm
  - D** Leave the kids alone
- 38** Which of the quotes best points at the effect of the kind of education described in the song?
- A** The modern world belongs to the half-educated, a rather difficult class, because they do not realize how little they know.
  - B** Education... has produced a vast population able to read but unable to distinguish what is worth reading.
  - C** What does education often do? It makes a straight-cut ditch of a free, meandering brook.
  - D** Education enables a man to get along without the use of his intelligence.
- 39** Which of the following quotes best describes an ideal education system as opposed to what has been said in the quotes and the song?
- A** Education is the transmission of civilization.
  - B** Education is not filling a pail but the lighting of a fire.
  - C** The whole purpose of education is to turn mirrors into windows.
  - D** Education is the key to unlock the golden door of freedom.

## Unit 11

### Question 40

An entomologist is studying the effect of a chemical sex attractant (pheromone) on insects. Several insects are released at a site equidistant from the pheromone under study and a control substance. If the pheromone has an effect, more insects will travel towards it rather than towards the control. Otherwise, the insects are equally likely to travel in either direction.



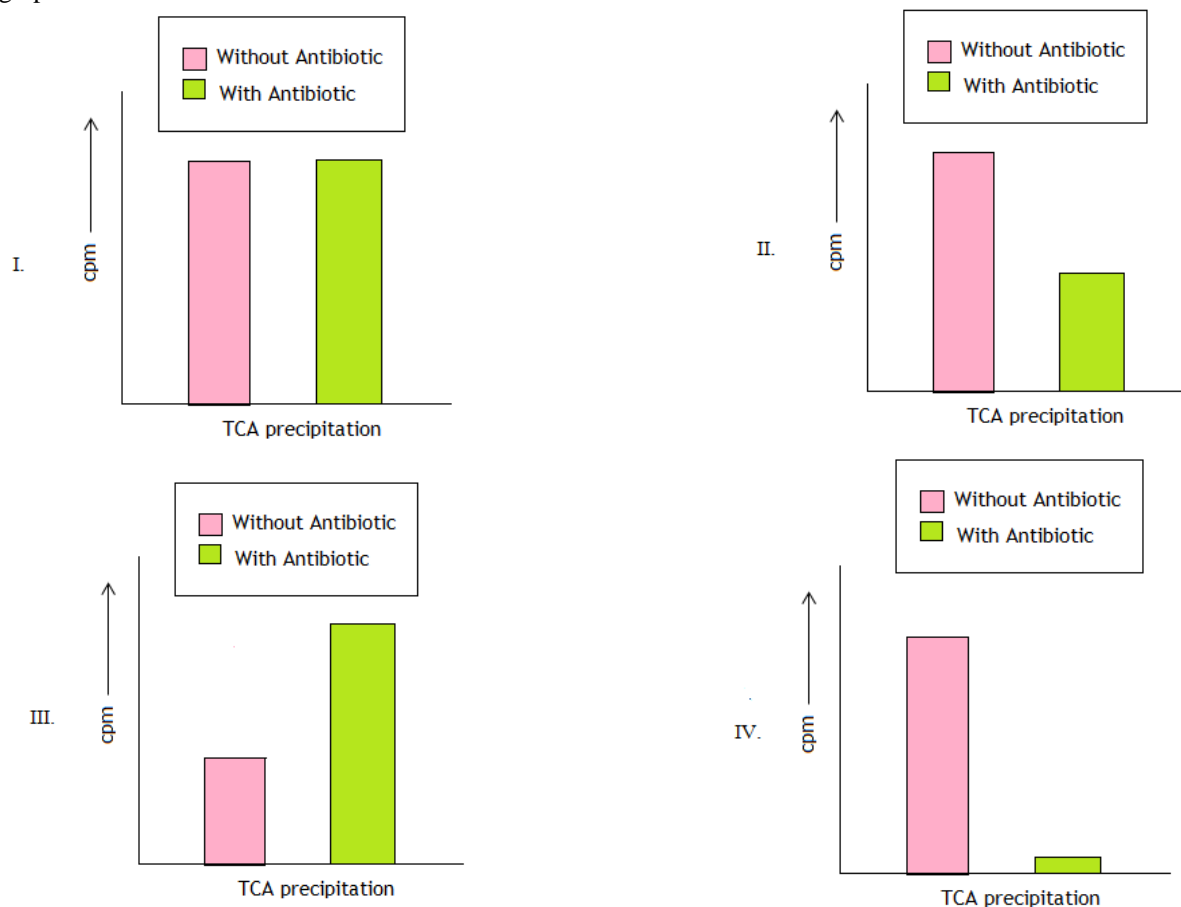
- 40 Suppose the pheromone under study has no effect, such that it is equally likely that an insect will move towards the pheromone or towards the control. Suppose five labeled insects are released. In how many ways can the insects travel?
- A 120 ways
  - B 24 ways
  - C 32 ways
  - D 25 ways

## Reasoning in Biological and Physical Sciences

### Unit 1

#### Question 1-5

In vitro translation experiments can be performed in various cell free extracts, e.g. rabbit reticulocyte lysate, wheat germ extract, E.coli cell free systems etc. In vitro translation, which involves initiation, elongation and termination steps, can be carried out by linked or coupled transcription-translation systems. Linked translation system, which is prevalent in eukaryotic systems, exploits DNA as a template, which is transcribed into mRNA in the first step. In the second step, this mRNA is used as a template to produce the protein. In the bacterial systems, transcription and translation can occur simultaneously in the same tube, known as coupled transcription-translation. The peptide produced can be assayed as TCA perceptible counts per minute (cpm), which results from the incorporation of radiolabelled amino acids. The effect of various antibiotics on TCA precipitation has been represented by following graphs.



- 1 Graph IV shows the results of an antibiotic, if added at the start of assay to bacterial in vitro translation system. However, if this antibiotic is added at a later stage, its results are shown in graph II. Which of the following deduction can be made about this antibiotic?

A This antibiotic blocks the transcription process.

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- B** This antibiotic inhibits proper termination of translation.  
**C** This antibiotic interferes with the elongation mechanism of translation.  
**D** This antibiotic blocks the initiation of translation.
- 2** If a mutation changes the stop codon in mRNA, which is produced as a result of in vitro transcription of bacterial DNA, which of the following graphs is expected to be observed?
- A** Graph I  
**B** Graph II  
**C** Graph III  
**D** Graph IV
- 3** In vitro translation was carried out in the presence of an antibiotic. Cpm obtained after TCA precipitation resulted in graph I. Which of the following statements can be interpreted from these results?
- A** The antibiotic caused the cleavage of normally formed protein.  
**B** The antibiotic inhibited the enzymes involved in elongation of protein.  
**C** The antibiotic promoted the synthesis of proteins other than the required one.  
**D** The antibiotic affected the translation process only for small duration.
- 4** It is recommended to use  $\text{Ca}^{2+}$ -dependent nuclease in the above described assay method for rabbit reticulocyte lysate in vitro translation system. However,  $\text{Ca}^{2+}$ -dependent nuclease can be inactivated by chelation of the  $\text{Ca}^{2+}$  by EGTA. Which of the following could be the best advantage of using this process?
- A**  $\text{Ca}^{2+}$ -dependent nuclease can degrade any incoming foreign nucleic acids.  
**B** Endogenous mRNA can be eliminated by incubation with  $\text{Ca}^{2+}$ -dependent nuclease.  
**C**  $\text{Ca}^{2+}$ -dependent nuclease will cleave all the nucleic acids and only proteins will be retained in the cell.  
**D** Amount of nucleic acids can be controlled by varying the concentration of  $\text{Ca}^{2+}$ .
- 5** A special sequence was added in the template DNA to enhance the expression of protein in the bacterial cell free system for in vitro translation. If the antisense strand had the sequence, 5'--CTCCTTC--3', what will the sequence of primary RNA transcript?
- A** 5'--GAGGAAG--3'  
**B** 5'--GAAGGAG--3'  
**C** 5'--CTTCCTC--3'  
**D** 5'--CTCCTTC--3'

## Unit 2

### Questions 6-10

Alcohol is the generic name for a large group of organic chemical compounds. There are many kinds of alcohols which are derivatives of hydrocarbons, which one or more of the hydrogen atoms have been replaced by a hydroxyl

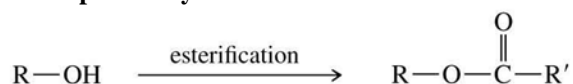
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(-OH) functional group. The hydroxyl functional group imparts certain properties to the radical, to which it is attached. Alcohols can undergo various reactions as given below:

**Nucleophilic Substitution** → OH acts as the leaving group, or -OH or -O<sup>-</sup> can function as the Nu

**Nucleophilic Addition** → OH acts as the Nu forming hemiacetals (a functional group consisting of one OH group and one OR group bonded to the same carbon) with aldehydes or ketones

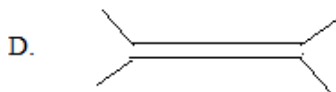
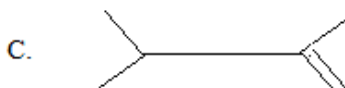
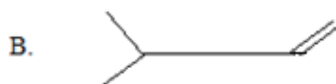
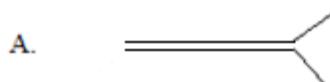
**Nucleophilic Acyl Substitution** → OH acts as the Nu forming esters with carboxylic acids and derivatives.



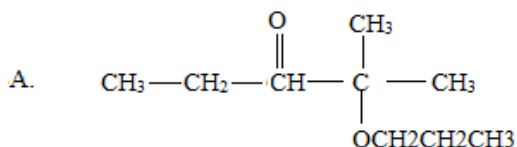
**Elimination** → OH is removed (as water), unsaturation is imparted

**Oxidation** → OH is converted to C=O

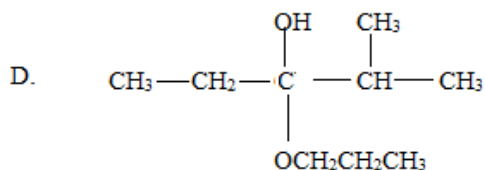
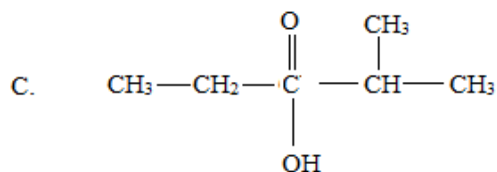
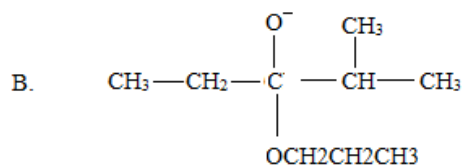
- 6 If 2,3-methyl-2-butanol undergoes dehydration, which of the following would be the product of this reaction?



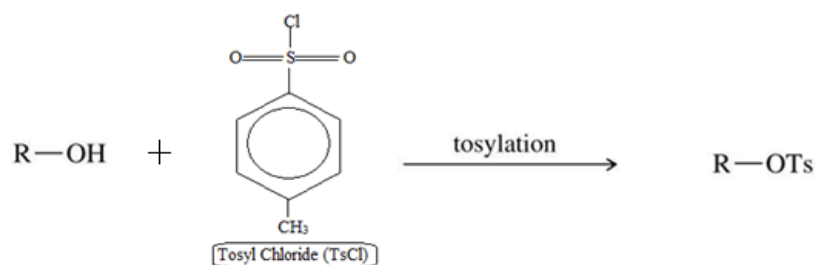
- 7 An organic compound 2-methyl-3-pentanol was oxidized, and the product was allowed to react with propanol. Which of the following could be a possible product of this reaction?



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8 Tosylation involves the reaction of tosyl chloride with an alcohol.



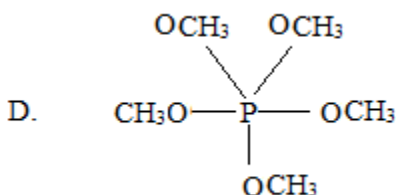
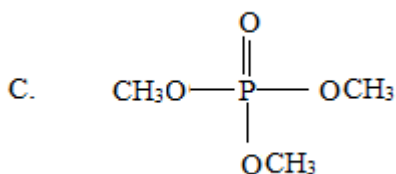
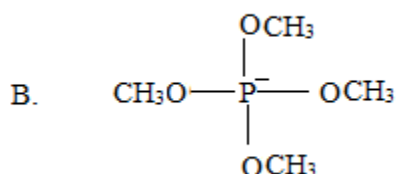
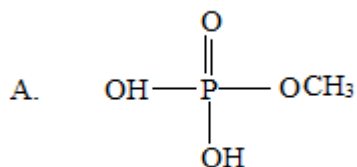
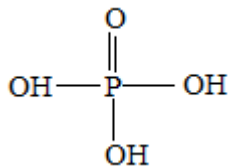
Which of the following statements is true about this reaction?

- A OH in this alcohol is good, leaving group and it is substituted by Ts.
- B OH in this alcohol acts as a nucleophile, and attacks the electrophilic Cl of TsCl.
- C OH in this alcohol acts as a nucleophile, and attacks the electrophilic S in TsCl.
- D O<sup>-</sup> in this alcohol acts as a nucleophile, and attacks the electrophilic S in TsCl.



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- 9 The chemical compound given below is allowed to react with methanol ( $\text{CH}_3\text{OH}$ ). This reaction can repeat five times under the same conditions. Which of the following diagrams represents the most stable product?



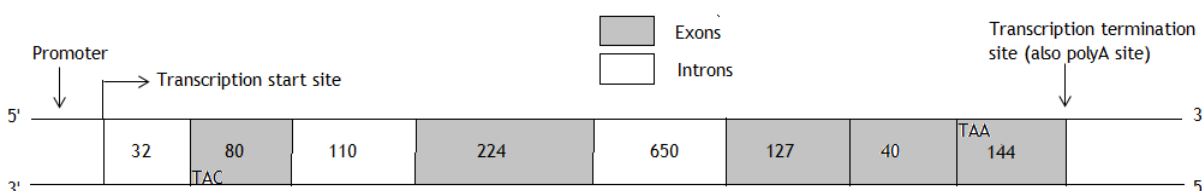
- 10 Which of the following alcohols can be esterified with acetic acid to form 1-Methylethyl acetate?
- A Primary alcohol
  - B Secondary alcohol
  - C Tertiary alcohol
  - D Both primary and secondary alcohol can give this product.

## Unit 3

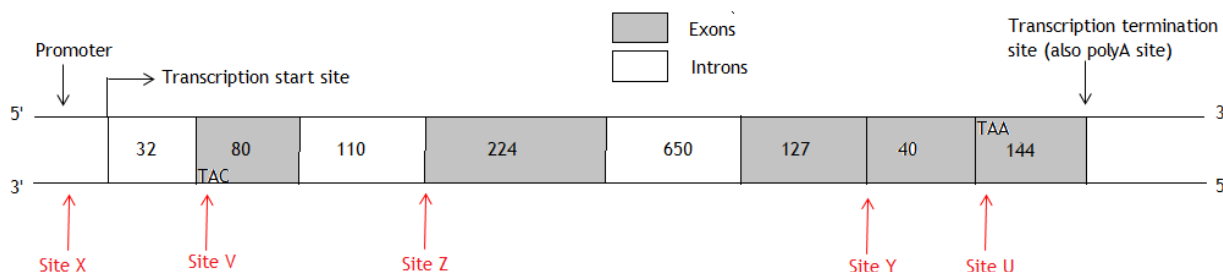
## Questions 11-13

The following figure refers to the myoglobin gene in whales. Myoglobin is a single chain protein found in the muscle fibres. It contains iron, and has higher affinity for oxygen than hemoglobin for oxygen. It acts as an oxygen store of about 10 mL/kg of muscle. It also allows whales to store sufficient oxygen to remain underwater for long periods of time.

The numbers in the boxes indicate the number of nucleotides in each region. The grey boxes refer to the exons, while the white boxes are intron sequences.



The myoglobin gene was exposed to different types of mutagens, which produced three different types of mutations on the four probable positions indicated by the red arrows on the figure below.



The following table shows the effect of each mutation on the length of pre-mRNA, length of mRNA, and number of amino acids in proteins.

Types of Mutations	Length of pre-mRNA (nucleotides)	Length of mRNA (nucleotides)	Number of amino acids in protein
Mutation1	Same as wild type	Increased	Increased
Mutation2	Same as wild type	Same as wild type	0
Mutation3	Decreased	Decreased	Decreased

11 Mutation2 has occurred at which of the following Sites?

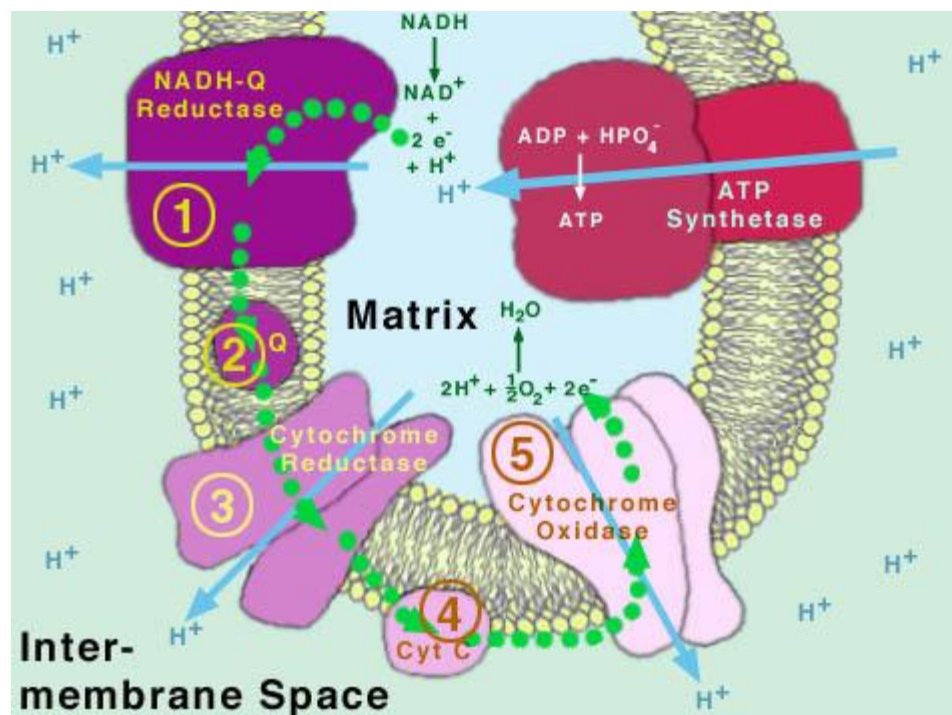
- A Site U
- B Site Z
- C Site X
- D Site V

- 12 Mutation1 has taken place at which of the following sites?
- A Site V
  - B Site Z
  - C Site Y
  - D Site U
- 13 Mutation at which of the two possible sites can produce myoglobin larger than normal?
- A Site Z and U
  - B Site V and Z
  - C Site Y and U
  - D Site V and U

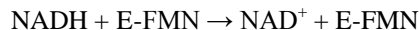
#### Unit 4

#### Questions 14-18

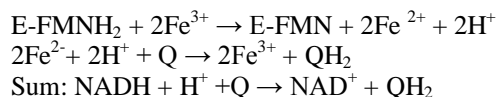
The following figure refers to the reactions taking place in actively respiring mitochondria.



Different enzyme complexes are numbered as 1,2,3,4 and 5. The mitochondrial respiratory chain has a NADH Dehydrogenase complex which promotes a series of oxidation-reduction reactions. In this dehydrogenase complex,  $\text{Fe}^{+3}$  and  $\text{Fe}^{+2}$  represents the iron in iron-sulphur centres. Q is ubiquinone and E is the enzyme.



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14 Which of the following represents the conjugate redox pair for reaction # 2?

- A  $\text{Fe}^{3+} / \text{Fe}^{2+}$ ; E-FMN / E-FMNH<sub>2</sub>
- B  $\text{Fe}^{3+} / \text{Fe}^{2+}$ ; E-FMNH<sub>2</sub> / E-FMN
- C E-FMNH<sub>2</sub> / 2H<sup>+</sup>;  $\text{Fe}^{2+} / \text{Fe}^{3+}$
- D  $\text{Fe}^{2+} / \text{Fe}^{3+}$ ; 2H<sup>+</sup> / E-FMNH<sub>2</sub>

15 An antibiotic was added to the normally surviving mitochondria. This antibiotic created a transporter across the mitochondrial membrane, which allowed the passage of protons through it. Which of the following cannot be the effect caused by this antibiotic?

- A ATP synthesis is decreased.
- B The rate of oxygen consumption increases.
- C Flow of electrons is disturbed.
- D Heat is released.

16 Due to some nutritional deficiencies, NADH was exhausted in the cell which possessed normal mitochondrial activity. However, the cell had normal O<sub>2</sub> concentration. Which of the following options hold true for mitochondrial enzyme complexes under these scenarios?

	Complex1	Complex2	Complex3	Complex4	Complex5
Option I	Oxidized	Oxidized	Oxidized	Oxidized	Oxidized
Option II	Oxidized	Oxidized	Oxidized	Reduced	Reduced
Option III	Reduced	Reduced	Reduced	Reduced	Oxidized
Option IV	Reduced	Reduced	Reduced	Reduced	Reduced

- A Option I
- B Option II
- C Option III
- D Option IV

17 Complex 5 is the last enzyme complex which allows the formation of water by the combination of oxygen and hydrogen. In the presence of an inhibitor of complex 5, which of the following would be true?

- A Option I
- B Option II
- C Option III
- D Option IV

18 Cells are sensitive to the concentrations of biological molecules in them. When the levels of certain biological molecules increase or decrease from the optimum values, the cell undergoes stress. Various normal activities in the cell are affected. This can be exemplified by the levels of oxygen in the cells. Electron transport chain is also sensitive to the level of bio-molecules in the cell. The results of an

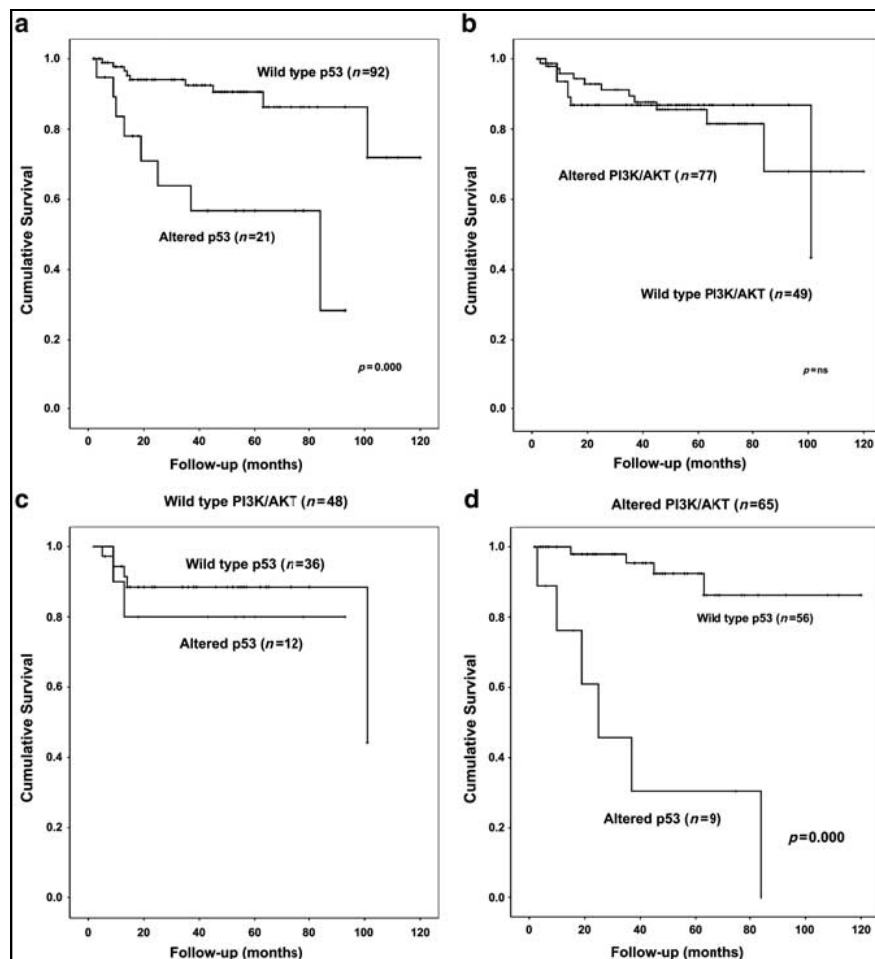
experiment depicted continued ATP synthesis, however, without oxidative phosphorylation. Which of the following conditions might be responsible for this result?

- A Hypoxia
- B Dehydration
- C Normoxia
- D Hyperoxia

## Unit 5

### Questions 19 – 21

The Kaplan-Meier method is often used in medical trials and research purposes for estimating the population survival curve from a sample. This method is used for division of patients into specific groups regarding treatment, specific gene status, and so on. In short, this analysis enables the estimation of survival over time. The picture shown below represents the results of the experiment. Researchers tried to establish the connection between survival time of endometrial carcinoma patients, and the mutational status of p53 and PI3K genes. Study the graphs below and answer the questions that follow.



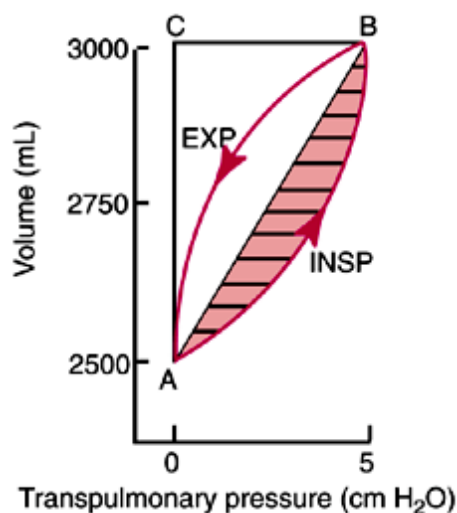
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- 19 The mutation of which gene significantly reduced overall survival?
- A p53
  - B PI3K
  - C Both of the genes
  - D None of the above
- 20 After 80 months of follow up, the rate of patients with altered p53 gene survival is
- A above 60%.
  - B 58%.
  - C 30%.
  - D 40%.
- 21 Which of the following statements is correct?
- A Patients with a concomitant p53 and PI3K mutations have lower survival rates than patients with p53 mutation alone.
  - B Patients with wild type p53 and an altered PI3K gene have lower survival rates than patients with p53 mutation alone
  - C Patients with wild type PI3K and an altered p53 gene have lower survival rates than patients with p53 mutation alone
  - D Patients with altered PI3K have a lower rate of survival than patients with altered p53.

## Unit 6

### Questions 22 – 24

Mammalian respiration is a mechanical function of pressure v/s volume. Below is a compliance diagram for a human lung. Inspiration of air is driven by the contraction of the diaphragm, which reduces the pressure within the chest. This results in air being drawn into the lungs.



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- 22 From the above diagram, the pressure change needed to inflate the lungs is
- A greatest for the volume between 2500 and 2750mL.
  - B greatest for the volume between 2750 and 3000mL.
  - C constant between 2500 and 3000mL.
  - D none of the above.
- 23 If compliance= $C$ , change in volume= $\Delta V$ , and change in pressure= $\Delta P$ , then compliance of the lungs can best be expressed as
- A  $C = \Delta V / \Delta P$
  - B  $C = \Delta P / \Delta V$
  - C  $C = \Delta P \times \Delta V$
  - D  $C = \Delta V \times \Delta P$
- 24 Assume the compliance is expressed as  $C = \Delta V / \Delta P$ . In conjunction with the above graph, we can assert that
- A compliance is uniform at all volumes.
  - B compliance is highest at high volumes.
  - C compliance is highest at low volumes.
  - D compliance cannot be commented upon based on this information.

**For question 25, refer to the additional information given below:**

The volume of the lungs never reaches 0 mL, due to a variety of physiological mechanisms-- the most important of which being surfactant. Water in the lungs will naturally try to collapse the alveolus (the small spheres responsible for gas transfer). Surfactant greatly reduces the surface tension, which will try to collapse the lung. This greatly reduces the effort of breathing. It is also responsible for some premature babies (who are born without surfactant), to develop respiratory distress syndrome. The formula for the pressure generated by an alveolus trying to collapse is given by the formula:

Pressure =  $2 \times \text{surface tension} / \text{radius of alveolus}$

- 25 From the above information we can conclude that
- A pressure is directly proportional to surface tension.
  - B pressure is inversely proportional to surface tension.
  - C pressure is inversely proportional to radius.
  - D both A and C.



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Other Contact Information:

Phone:	+91 33 4062 8001
	+91 33 6457 8322

Postal Address:	CF 30
	Sector I
	Salt Lake
	Kolkata – 700064
	India.