

Mock CAT 2014 - 09

Section I: QA & DI

1. Rozy, who is the class teacher of IV standard in Vidya Public School, wrote the first 4000 natural numbers in a row, starting with 1, on a blackboard. She then called four students, namely P, Q, R and S, of the class and asked each one of them to perform a different operation, one after another. P was asked to erase every 5th number of the row starting from the left; Q was asked to erase every 4th number, out of the remaining numbers, starting from the left; R was asked to erase every 3rd number, out of the remaining numbers, starting from the left; and S was asked to erase every 2nd number, out of the remaining numbers, starting from the left. If they performed the operations in the given order, find the 4th number from the left, at the end of all the operations.

(a) 14

(b) 16

(c) 21

(d) 19

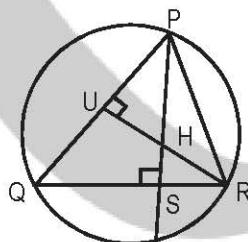
1. b Divide the 4000 numbers in the groups of 5 consecutive numbers each, as given below:

(1, 2, 3, 4, 5), (6, 7, 8, 9, 10), (11, 12, 13, 14, 15),

(16, 17, 18, 19, 20) ..., (3996, 3997, 3998, 3999, 4000)

It can be noted that when the given operations have been performed, the 1st number of the fourth bracket will be the 4th number from the left, i.e. 16.

2. In the figure given below, PS, an altitude of $\triangle PQR$, meets the circumcircle of the triangle at T. If H is the orthocentre of the triangle and ST = 3 cm, then what is the length of the line segment HT?



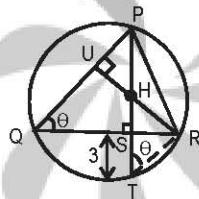
(a) 4.5 cm

(b) 5 cm

(c) 6 cm

(d) 4 cm

2. c In the figure given below, join TR.



$$\angle PQR = \angle PTR = \theta \text{ (Say)}$$

(angles made by the same chord on in the same segment.)

$$\therefore \angle URQ = 90^\circ - \theta$$

In $\triangle RHS$, $\angle S = 90^\circ$, $\angle HRS = 90^\circ - \theta$ and hence $\angle RHS = \theta$

In $\triangle RSH$ and $\triangle RST$

SR is common to both the triangles.

$$\angle HSR = \angle TSR = 90^\circ$$

$$\angle RHS = \angle RTS = \theta$$

\therefore The triangles are congruent.

$$\Rightarrow HS = ST$$

$$\Rightarrow HT = HS + ST = ST + ST = 2ST = 2 \times 3 = 6 \text{ cm.}$$

3. A function $f(n)$ is defined for all positive real values of 'n' such that $f(n + 2) = f(n + 1) + f(n)$. If $f(1) = f(2) = 1$, then find the highest common factor of $f(12)$ and $f(30)$.
- (a) $f(11)$ (b) $f(4)$ (c) **$f(6)$** (d) $f(3)$
3. c The function $f(n)$ is nothing but the Fibonacci Series 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89... Here if we find the HCF of any two numbers in the series, we get an interesting pattern. Lets find the HCF of $f(6)$ and $f(9)$, i.e. 8 and 34 respectively. The HCF of 8 and 34 is 2, which is also equal to $f(3)$. Similarly lets find the HCF of $f(10)$ and $f(5)$, i.e. 55 and 5 respectively. The HCF of 55 and 5 is 5, which is also equal to $f(5)$. After checking for other numbers as well we can conclude that the HCF of $f(a)$ and $f(b)$ is $f(h)$, where 'h' is the HCF of 'a' and 'b'. Therefore, the HCF of $f(12)$ and $f(30)$ is $f(\text{HCF of } 12 \text{ and } 30)$, i.e. $f(6)$.

Directions for question 4: Answer the questions on the basis of the information given below.

Mr. Contractor hires some workers on daily wage basis. The hired workers are categorized under three different grades viz. Non-Skilled, Skilled and Supervisory. Following table gives the number of workers in each grade. Using three different formulae, as given in the table, he calculates the daily wage payable to the workers.

Grade of the Worker	Total number of Workers	Daily Wage of a Worker (in Rs.)
Non - Skilled	x	$w(x) = \max(75, 153 - 3x)$
Skilled	y	$w(y) = \max(120, 310 - 10y)$
Supervisory	$\max\left(1, \left[\frac{(x+y)}{10}\right]\right)$	$w(s) = 2w(x) + w(y)$

Note: [x] denotes the greatest integer less than or equal to x.

4. What is the minimum possible number of workers, excluding the number of supervisors, that can be hired by Mr. Contractor so that a Non-Skilled worker gets as much amount of money as his daily wage as a Skilled worker gets?

(a) 45 (b) 30 (c) 27 (d) **17**

4. d According to the question, $w(x) = w(y)$.
 $\Rightarrow \max(75, 153 - 3x) = \max(120, 310 - 10y)$

As $75 \neq 120$, the remaining three possibilities are—

Case I: $75 = 310 - 10y$

$\Rightarrow y = 23.5$; is not possible as y must be an integer.

Case II: $153 - 3x = 120 \Rightarrow x = 11$

$\Rightarrow y \geq 19 \Rightarrow (x+y)_{\min} = 11+19=30$

Case III: $153 - 3x = 310 - 10y \Rightarrow 10y - 3x = 157$

The minimum positive integral value of $(x+y)$ for which x and y satisfy the above equation, is obtained when $y = 16$ and $x = 1$.

$\Rightarrow (x+y)_{\min} = (16+1) = 17$.

Hence, the required minimum number is 17.

5. Tania plans to prepare for the CAT examination over a span of 100 days, by practicing some questions on each day. Each day she solves at most 20 problems. If on any day, she solves more than 12 problems, then she solves at most 6 problems each on the next two days. What is the maximum number of problems that she can solve over the period of 100 days?

(a) 1200

(b) 1208

(c) 1220

(d) 1120

5. b If Tania solves more than 12 problems on any day then in three days period she can solve a maximum of $20 + 6 + 6 = 32$ problems. On the other hand she could have solved 36 problems over this span by solving 12 problems each day. So to achieve the maximum she must not solve more than 12 problems on any day except possibly the last day. So, maximum number of problems she could have solved = $99 \times 12 + 20 = 1208$

6. 20% of the students in a class failed in an examination. Out of the students who failed, 75% were males. Male students who failed constitute 90% of the economically poor students in the class. What is the ratio of the number of economically poor students to the total number of students in the class?

(a) 1 : 6

(b) 1 : 4

(c) 1 : 5

(d) 5 : 6

6. a Let the total number of students in the class be 'x' and the total number of students in the class who are economically poor be 'p'.

$$\text{Total number of students who failed} = \frac{x}{5}$$

Total number of male students who failed

$$\Rightarrow \frac{3}{4} \times \frac{x}{5} = \frac{9}{10} \times p \Rightarrow \frac{p}{x} = \frac{1}{6}$$

7. $f(x) = \frac{ax + d}{cx + b}$, $x \neq -\frac{b}{c}$ and $f[f(x)] = x$ for all real values of x . If c and d are positive real numbers, which of the following conditions is true?

(a) $cx^2 + x(b - a) - d = 0$

(b) $a + b = 0$

(c) At least one of (a) and (b)

(d) $c + d = 0$

$$7. c \quad f(x) = \left(\frac{ax + d}{cx + b} \right)$$

$$f[f(x)] = f\left(\frac{ax + d}{cx + b}\right) \Rightarrow \frac{a \times \frac{ax + d}{cx + b} + d}{c \times \frac{ax + d}{cx + b} + b} = x$$

$$\frac{a^2x + ad}{cx + b} + d = x \left(\frac{cax + cd}{cx + b} + b \right)$$

$$\frac{a^2x + ad + cdx + bd}{cx + b} = \frac{acx^2 + cdx + bcx^2 + b^2x}{cx + b}$$

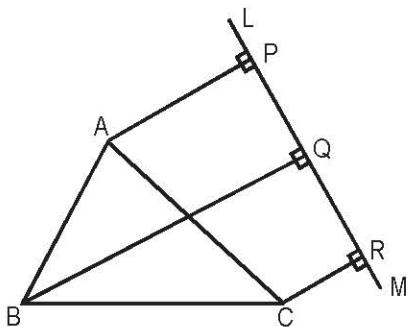
$$x^2(c + bc) + x(b^2 - a^2) - ad - bd = 0$$

$$cx^2(a + b) + (a + b)x(b - a) - d(a + b) = 0$$

$$(a + b)(cx^2 + x(b - a) - d) = 0$$

So, at least one of $(a + b)$ and $(cx^2 + x(b - a) - d) = 0$.

8. The perpendiculars AP, BQ and CR are dropped from the vertices A, B and C of triangle ABC on a line LM in the same plane as shown in the figure given below. The perpendiculars meet the line LM at points P, Q and R respectively, where PQ = a and QR = b. If AP = x, BQ = y, and CR = z. Find the area of triangle ABC.



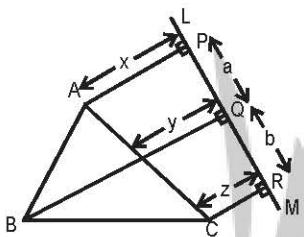
(a) $\frac{a(y-z)+b(y-x)}{2}$ square units

(c) $\frac{a^2(y-z)+b^2(y-x)}{a+b}$ square units

(b) $\frac{a(y-x)+b(y-z)}{2}$ square units

(d) $\frac{b^2(y-z)+a^2(y-x)}{b+a}$ square units

8. a



Area of quadrilateral APQB = $\frac{1}{2} a(x+y)$

Area of quadrilateral BQRC = $\frac{1}{2} b(y+z)$

Area of quadrilateral APRC = $\frac{1}{2}(a+b)(x+z)$

\therefore Area of triangle ABC

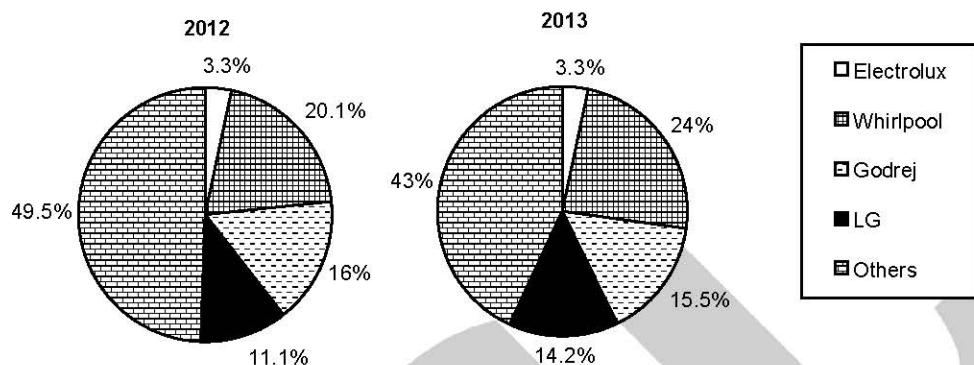
$$= \frac{1}{2} a(x+y) + \frac{1}{2} b(y+z) - \frac{1}{2}(a+b)(x+z)$$

$$= \frac{a(y-z)+b(y-x)}{2} \text{ square units.}$$

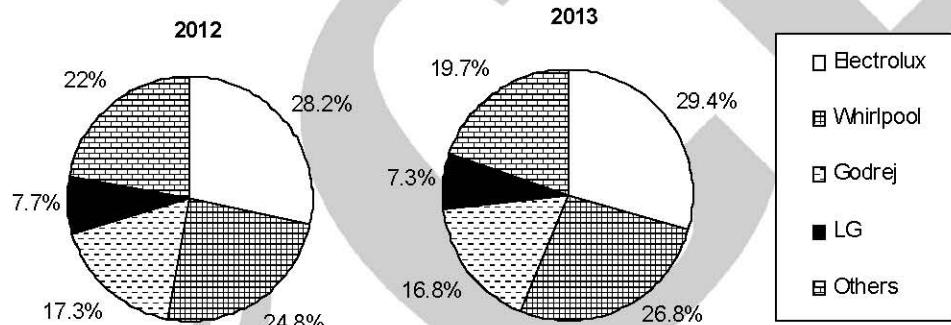
Directions for questions 9 to 11: Answer the questions on the basis of the information given below.

The data given below represents the market share details for refrigerators in India.

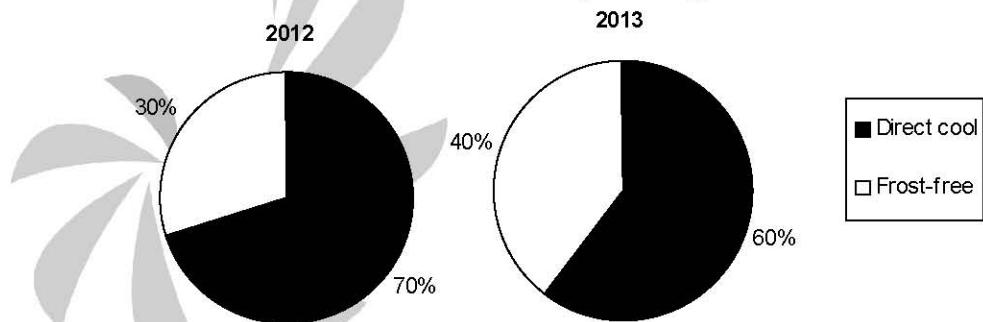
Volumewise distribution of market share of frost-free refrigerators



Volumewise distribution of market share of direct-cool refrigerators



Total market break-up of refrigerators



In 2012, the total market size of refrigerators was 7,50,000 units and in 2013, the market size grew by 10%.

9. In 2012, the per unit price of frost-free refrigerators was twice that of direct-cool refrigerators and the per unit price of direct cool refrigerators of Godrej and LG were in the ratio $1.5 : 1$. The sales revenue of Godrej was how many times that of LG in 2012?

(a) 2.7

(b) 1.8

(c) 0.37

(d) Data insufficient

9. a In 2012, the volumes of LG and Godrej are given below. Let LG direct cool unit price be x.

	Frost-free		Direct cool		Total sales
	Units	Sales	Units	Sales	
LG	24975	49950x	40425	40425 x	90375x
Godrej	36000	108000x	90825	136240x	244240x

Hence, Godrej total sales than that of LG = $\frac{244240x}{90375x} = 2.7$ times

Alternate method:

Assume total market size of refrigerator be 100 units.

	DC = 70 units		FF = 30 units	
	Number of units	Turnover	Number of units	Turnover
Godrej	$17.3\% \times 70 = 12.11$	18.16	$16\% \times 30 = 4.8$	14.4
LG	$7.7\% \times 70 = 5.39$	5.39	$11.1 \times 30 = 3.33$	6.66

Hence, sales turnover of Godrej to LG refrigerator in 2012 = $\frac{32.56}{12.05} = 2.7$

10. What was the ratio of the growth rates of direct-cool to that of frost-free refrigerators in 2013 over 2012?

(a) 0.122 : 1

(b) -0.15 : 1

(c) -0.122 : 1

(d) 0.15 : 1

10. c Growth rate of direct cool = $\frac{495 - 525}{525} = -\frac{2}{35}$

Growth rate of frost-free = $\frac{330 - 225}{225} = \frac{7}{15}$

\therefore Ratio = $\frac{-2}{35} \times \frac{7}{15} = -0.122 : 1$.

11. Which company registered the highest percentage growth in its sales volume of direct-cool refrigerators in 2013 over the same in 2012?

(a) Electrolux

(b) Whirlpool

(c) Godrej

(d) LG

11. b The percentage growth in 2013 over 2012 in volume of direct cool refrigerators

	2012	2013
Electrolux	$0.282 \times 525000 = 148050$	$0.294 \times 495000 = 145530$
Whirlpool	$0.248 \times 525000 = 130200$	$0.268 \times 495000 = 132660$
Godrej	90825	$0.168 \times 495000 = 83160$
LG	40425	$0.073 \times 495000 = 36135$

Only Whirlpool showed positive growth.

12. Three distinct numbers are randomly selected from the first 20 natural numbers. Find the probability that the selected numbers are in a geometric progression.

(a) $\frac{2}{285}$

(b) $\frac{11}{1140}$

(c) $\frac{3}{285}$

(d) $\frac{1}{114}$

12. b Number of ways in which three numbers can be selected from the first 20 natural numbers = ${}^{20}C_3 = 1140$.

Case I: Common ratio of the G.P. is 1 = 0 ways

Case II: Common ratio of the G.P. is 2 = 5 ways [(1, 2, 4); (2, 4, 8); (3, 6, 12); (4, 8, 16); (5, 10, 20)]

Case III: Common ratio of the G.P. is 3 = 2 ways [(1, 3, 9); (2, 6, 18)]

Case IV: Common ratio of the G.P. is 4 = 1 way [(1, 4, 16)]

Case V: Common ratio of the G.P. is $\frac{3}{2} = 2$ ways [(4, 6, 9); (8, 12, 18)]

Case VI: Common ratio of the G.P. is $\frac{4}{3} = 1$ way [(9, 12, 16)]

Required Probability = $\frac{11}{1140}$.

Alternate method:

If the three numbers are in GP, then the product of the first and the last will be equal to the square of the second. So, we have to figure out a pair of such numbers, whose product is a perfect square. They are – (1, 4) (1, 9) (1, 16) (2, 8) (2, 18) (3, 12) (4, 9) (4, 16) (5, 20), (8, 18), (9, 16).

Thus, required probability = $\frac{11}{{}^{20}C_3} = \frac{11}{1140}$.

13. When a number, which is the cube of a natural number, is divided by 7, the remainder obtained is 5. How many values can the number assume?

(a) 3

(b) 0

(c) 2

(d) 1

13. b Let the natural number be n and its cube be n^3 .

So, $n^3 = 7k + 5$, where 'k' is the quotient

Now, n is of one of the following forms:

$7x \pm 1, 7x \pm 2, 7x \pm 3, 7x$

Case I: $n = 7x \pm 1$

In this case n^3 leaves in remainder of ± 1 when divided by 7.

Thus, not possible.

Case II: $n = 7x \pm 2$

In this case n^3 leaves in remainder of ± 1 when divided by 7.

Thus, not possible.

Case III: $n^3 = 7x \pm 3$

In this case n^3 leaves in remainder ∓ 1 when divided by 7.

Thus, not possible.

Case IV: $n^3 = 7x$

In this case n^3 is divisible by 7

Thus, not possible.

Therefore, no such number is possible.

14. How many integral values of x satisfy the inequality $\left| 1 - \left| \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right| \right| < 2$, where 'x' is a real number?

(a) 6

(b) 7

(c) 8

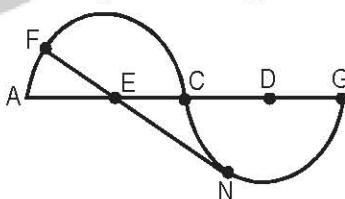
(d) 9

14. c

$$\begin{aligned}
 & \left| 1 - \left| \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right| \right| < 2 \\
 \Rightarrow & -2 < \left\{ 1 - \left| \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right| \right\} < 2 \\
 \Rightarrow & -1 < \left\{ \left| \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right| \right\} < 3 \\
 \Rightarrow & 0 < \left\{ \left| \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right| \right\} < 3 \\
 \Rightarrow & -3 < \left\{ \frac{1}{2} - \left| \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right\} < 3 \\
 \Rightarrow & -\frac{7}{2} < \left\{ \frac{1}{3} - \left| \frac{1}{4} - \left| \frac{1}{5} - x \right| \right| \right\} < \frac{7}{2} \\
 \Rightarrow & -\frac{19}{6} < \left\{ \frac{1}{4} - \left| \frac{1}{5} - x \right| \right\} < \frac{23}{6} \\
 \Rightarrow & -\frac{23}{6} < \frac{1}{4} - \left| \frac{1}{5} - x \right| < \frac{23}{6} \\
 \Rightarrow & 0 < \left| \frac{1}{5} - x \right| < \frac{49}{12} \\
 \Rightarrow & -\frac{49}{12} < \frac{1}{5} - x < \frac{49}{12} \\
 \Rightarrow & -\frac{233}{60} < x < \frac{257}{60} \\
 \therefore & -3.8 < x < 4.28
 \end{aligned}$$

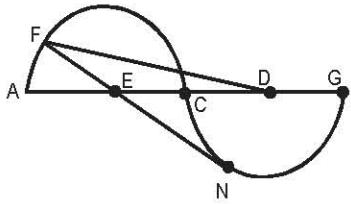
8 integral values of x satisfy the inequality.

15. Two identical semicircles, with unit radius each, are drawn with AC and CG as their diameters, as shown in the figure given below. E and D are the centers of the semicircles. F and N are points on the circular arcs such that F, E and N are collinear as shown in the figure. If the length of the line segment CN is 1 unit, then find the length of line segment FD.



- (a) $\sqrt{4+3\sqrt{3}}$ units (b) $\sqrt{5+3\sqrt{3}}$ units (c) $\sqrt{4+2\sqrt{3}}$ units (d) $\sqrt{5+2\sqrt{3}}$ units

15. d



Since, $CD = CN$, a semicircle with radius equal to CD and center C can be drawn passing through N and E .

$$\therefore \angle END = 90^\circ$$

$$AE = EC = CD = DG = 1 \text{ unit}$$

$$\text{In } \triangle END, EN^2 + ND^2 = ED^2$$

$$\Rightarrow EN^2 = 2^2 - 1^2 = 3$$

$$\therefore EN = \sqrt{3}.$$

$$FN = FE + EN = (1 + \sqrt{3})$$

$$\text{In } \triangle FND, FN^2 + ND^2 = FD^2$$

$$\Rightarrow FD^2 = 1^2 + (4 + 2\sqrt{3}) = (5 + 2\sqrt{3})$$

$$\therefore FD = (\sqrt{5 + 2\sqrt{3}}) \text{ units.}$$

16. The roll numbers of the three students in a class is ' x ', ' y ' and ' z ' respectively. If $\frac{x}{y} = \frac{2}{7}$, then which

of the following can be the value of $\left(\frac{x}{y} + \frac{x}{z} + \frac{z}{y} + \frac{z}{x} + \frac{y}{x} + \frac{y}{z} \right)$?

(a) $\frac{30}{7}$

(b) $\frac{61}{7}$

(c) 6

(d) $\frac{41}{7}$

16. b Given that $\frac{x}{y} = \frac{2}{7}$

$$\Rightarrow \frac{y}{x} = \frac{7}{2}$$

Since A.M \geq G.M

$$\frac{\frac{x}{z} + \frac{z}{x}}{2} \geq \sqrt{\frac{x}{z} \times \frac{z}{x}} \Rightarrow \frac{x}{z} + \frac{z}{x} \geq 2$$

Similarly,

$$\frac{y}{z} + \frac{z}{y} \geq 2$$

$$\text{Thus, } \frac{x}{y} + \frac{y}{x} + \frac{x}{z} + \frac{z}{x} + \frac{y}{z} + \frac{z}{y} \geq \frac{2}{7} + \frac{7}{2} + 2 + 2$$

$$\geq \frac{109}{14}.$$

Only option (b) $\geq \frac{109}{14}$.

Directions for questions 17 to 19: Answer the questions on the basis of the information given below.

Larry has a huge collection of shirts. The shirts with him are of four brands namely Caterpillar, Diesel, Lacoste and Dockers. The color of the shirts with him is either black or white. Out of the shirts with him, Larry has bought only few of them, whereas the rest have been gifted to him by six of his friends namely Anjana, Ravneet, Urvashi, Heena, Simar and Sarah. Larry does not know the exact number of shirts gifted to him but he knows that the number of white shirts of each brand gifted to him by each of his mentioned friends is at least 3 and at most 18. Further, the number of black shirts of each brand gifted to him by each of his mentioned friends is at least 7 and at most 25.

Larry asked his mother to help him determine the number of shirts gifted to him by each of his mentioned friends. In turn Larry's mother provided him with the information listed in the table given below.

	Number of Shirts							
	Caterpillar		Diesel		Lacoste		Dockers	
	Black	White	Black	White	Black	White	Black	White
Anjana	> 9	< 4	> 17	> 8	< 11	< 7	< 23	> 10
Ravneet	> 18	< 6	< 24	< 9	> 10	> 12	> 14	< 10
Urvashi	< 21	> 10	> 14	< 7	< 19	> 9	> 10	< 12
Heena	> 15	< 9	> 19	< 6	< 21	< 13	< 18	< 5
Simar	> 9	< 4	< 19	> 14	< 8	< 5	> 12	> 12
Sarah	< 15	< 9	> 20	< 7	< 8	> 14	> 23	< 5

17. Out of the white shirts gifted to Larry by Ravneet, Heena and Sarah the number of white shirts of brand Caterpillar is definitely less than the number of white shirts of brand(s)
(a) Diesel (b) Dockers (c) Lacoste (d) Both (b) and (c)

17. c The following table lists down the range of the total number of white shirts of each brand gifted to Larry by his mentioned friends.

	Number of white shirts			
	Caterpillar	Diesel	Lacoste	Dockers
Ravneet	3 - 5	3 - 8	13 - 18	3 - 9
Heena	3 - 8	3 - 5	3 - 12	3 - 4
Sarah	3 - 8	3 - 6	15 - 18	3 - 4
Total	9 - 21	9 - 19	31 - 48	9 - 17

Since, the maximum possible number of white shirts of brand Caterpillar gifted to Larry is less than the minimum possible number of white shirts of brand Lacoste gifted to Larry, therefore the number of white shirts of brand Caterpillar gifted to Larry is definitely less than the number of white shirts of brand Lacoste gifted to Larry.

18. d The following table lists down the range of the number of white and black shirts of each brand gifted by Anjana to Larry

Caterpillar		Diesel		Lacoste		Dockers	
Black	White	Black	White	Black	White	Black	White
10 - 25	3	18 - 25	9 - 18	7 - 10	3 - 6	7 - 22	11 - 18
68 - 127							

Given that the number of shirts bought by Larry is same as the total number of shirts gifted to him by Anjana. Therefore, at least $750 - 2 \times 127 = 496$ shirts are there with Larry that are neither bought by him nor gifted to him by Anjana.

Alternate method:

Let the number of shirts bought by Larry be x .

\Rightarrow Number of shirts gifted by Anjana = x

\Rightarrow Number of shirts neither bought by him nor gifted by Anjana = $750 - 2x$ = an even number.

Only option (d) is an even number.

19. If the total number of shirts of each of the mentioned brands gifted to Larry by Urvashi and Simar is the same, then which of the following can be the total number of shirts gifted to Larry by Urvashi and Simar put together?

(a) 184

(b) 192

(c) 196

(d) 158

19. a The following table lists down the range of the total number of shirts of each brand gifted to Larry by his mentioned friends.

Number of Shirts								
Caterpillar		Diesel		Lacoste		Dockers		
Black	White	Black	White	Black	White	Black	White	
Urvashi	7 - 20	11 - 18	15 - 25	3 - 6	7 - 18	10 - 18	11 - 25	3 - 11
Simar	10 - 25	3	7 - 18	15 - 18	7	3 - 4	13 - 25	13 - 18
Total	17 - 45	14 - 21	22 - 43	18 - 24	14 - 25	13 - 22	24 - 50	16 - 29
	31 - 56		40 - 67		27 - 47		40 - 79	

We can conclude from the table that the range of the total number of shirts of each brand gifted to Larry is 40 to 47. So, the range of the total number of shirts gifted to Larry will be $(40 \times 4$ to $47 \times 4) = (160$ to $188)$

Only, option (a) lies within the permissible range.

20. $N_1 + N_2 + N_3 + \dots + N_n = 100$, where $N_1, N_2, N_3, \dots, N_n$ are n ($n > 1$) consecutive natural numbers such that $N_1 < N_2 < N_3 < N_4 < \dots < N_n$. How many values of n are possible?

(a) 4

(b) 5

(c) 2

(d) 3

20. c N_1, N_2, \dots, N_n are ' n ' numbers in Arithmetic Progression with common difference 1.

$$\therefore N_n = N_1 + (n-1)1 = N_1 + n - 1$$

$$N_1 + N_2 + \dots + N_n = \frac{n}{2} [N_1 + N_n] = \frac{n}{2} [2N_1 + (n-1)]$$

$$\text{Now, } N_1 + N_2 + \dots + N_n = 100$$

$$\therefore n(2N_1 + n - 1) = 200$$

200 can be broken into factors in the following ways:

$$200 = \begin{cases} 1 \times 200 \\ 2 \times 100 \\ 4 \times 50 \\ 5 \times 40 \\ 10 \times 20 \\ 25 \times 8 \end{cases}$$

Only for $n = 5$ and $n = 8$ we get integral values of N_1

$$\text{For, } n = 5 : 2N_1 + n - 1 = 40 \Rightarrow 2N_1 = 36, N_1 = 18$$

$$\text{For, } n = 8 : 2N_1 = 18 \Rightarrow N_1 = 9$$

Hence, possible number of values of n is 2.

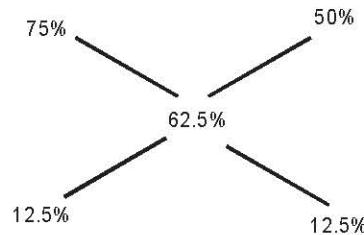
21. A milk vendor has two cans – C1 and C2 – of capacity of 300 litres each. Both the cans are full to the brim with milk-water solution. The concentration of milk in C1 is 75% and that in C2 is 50%. How much quantity of solution should the vendor mix from the C1 and C2 such that he gets 180 litres of solution having water and milk in the ratio of 3:5?

(a) 90 litres, 90 litres (b) 72 litres, 108 litres (c) 45 litres, 135 litres (d) 40 litres, 140 litres

21. a Concentration of milk in the first can is 75%.
Concentration of milk in the second can is 50%.

Required concentration of milk is $\left(\frac{5}{8}\right) \times 100 = 62.5\%$.

Using alligation, we get



⇒ Ratio of the quantity of the milk solution from the two cans is 1:1.

22. Let $(1 + x + x^2)^n = a_0 + a_1x + a_2x^2 + \dots + a_{2n}x^{2n}$, where n is a natural number. If $a_0 + a_2 + a_4 + \dots + a_{2n} = 365$, then n =

(a) 5 (b) 6 (c) 7 (d) Cannot be determined

22. b $(1 + x + x^2)^n = a_0 + a_1x + a_2x^2 + \dots + a_{2n}x^{2n}$, n being a natural number.
Putting x = 1 and -1 successively, we get

$$3^n = a_0 + a_1 + a_2 + \dots + a_{2n} \quad \dots \text{(i)}$$

$$1 = a_0 - a_1 + a_2 - \dots + a_{2n} \quad \dots \text{(ii)}$$

Adding equations (i) and (ii), we get

$$3^n + 1 = 2(a_0 + a_2 + a_4 + \dots + a_{2n}) = 2 \times 365$$

$$\Rightarrow 3^n + 1 = 730$$

$$\Rightarrow 3^n = 729 \Rightarrow n = 6.$$

23. The cost of 1 dozen apples and the cost of 1 kg oranges is Rs.20 and the cost of 1 dozen oranges and 1 kg of apples is Rs.16. Also, the cost of an apple and the cost of an orange is Rs.3. If 1 kg of apple or orange has m or n (an integral number) of the same kind of fruits, then the minimum value of 'm' is

(a) 6 (b) 7 (c) 8 (d) Data inconsistent

23. d According to the information given in the question,
Cost of 1 dozen apple + cost of 1 kg orange = Rs.20
Cost of 1 dozen orange + cost of 1 kg apple = Rs.16

$$\text{Cost of 1 dozen orange + cost of 1 dozen apple} = \text{Rs.36}$$

∴ Cost of 1 kg orange + cost of 1 kg apple = 0, which is not possible.

Hence, the data is inconsistent.

24. A function f(x) is defined for all real numbers x. For all non-zero values of x, $3f(x) + 2f\left(\frac{1}{x}\right) = 2x + 1$.

If S is the sum of all of the values of x for which f(x) = 350, then find the value of S.

(a) 285.5 (b) 291.5 (c) 293.5 (d) 287.5

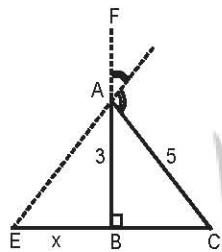
$$\begin{aligned}
 24. \text{ b} \quad & 3f(x) + 2f\left(\frac{1}{x}\right) = 2x + 1 \\
 & \therefore 3f\left(\frac{1}{x}\right) + 2f(x) = \frac{2+x}{x} \\
 & \Rightarrow \frac{3}{2} \left(3f(x) + 2f\left(\frac{1}{x}\right)\right) - \left(3f\left(\frac{1}{x}\right) + 2f(x)\right) = \frac{5}{2}f(x) \\
 & \Rightarrow \frac{3}{2}(2x+1) - \frac{2+x}{x} = \frac{5}{2}f(x) \\
 & \therefore f(x) = \frac{2}{5} \left(3x - \frac{2}{x} + \frac{1}{2}\right) = 350 \\
 & \Rightarrow 6x^2 - 1749x - 4 = 0
 \end{aligned}$$

Sum of the roots of this equation is $\frac{1749}{6} = 291.5$

Therefore, sum of all the values of x for which $f(x) = 350$ is 291.5.

25. In a triangle ABC right-angled at B, the bisector of the external angle CAF, when produced, intersects the base CB (extended) at E. If AB = 3 cm and AC = 5 cm, then find the length of the line segment AE.
 (a) 5 cm (b) $4\sqrt{3}$ cm (c) $5\sqrt{2}$ cm (d) $3\sqrt{5}$ cm

25. d



Let, the length of BE be 'x' cm.

$$BC = \sqrt{AC^2 - AB^2} = 4 \text{ cm}$$

Using the external angle bisector theorem in $\triangle ABC$, we get

$$\frac{AB}{AC} = \frac{BE}{CE} \Rightarrow \frac{3}{5} = \frac{x}{x+4} \Rightarrow x = 6 \text{ cm}$$

$$\Rightarrow AE = \sqrt{AB^2 + BE^2} = \sqrt{45} \text{ cm} = 3\sqrt{5} \text{ cm.}$$

Directions for questions 26 to 28: Answer the questions on the basis of the information given below.

Five teams participated in the recently played Premier Hockey League. As per the scheme of the tournament, every team has to play every other team 5 times, i.e. a total of 20 matches per team and then points were awarded for Win (W), Lose (L) and Tie (T). The following chart gives the number of matches won, matches lost and matches tied by five teams. The number of matches won, lost and tied by Assam is denoted by X, Y, Z.

Team	W	L	T
Haryana	2	15	3
Maharashtra	7	9	4
Punjab	6	12	2
Bengal	10	8	2
Assam	X	Y	Z

For questions 26 to 28:

Total number of losses = 44 + Y

$$\text{Total number of ties} = \frac{11+z}{2}$$

Total matches played = number of losses + number of ties
and total number of wins = Total number of losses

$$\text{So, } 50 = 44 + Y + \frac{11+Z}{2} \Rightarrow 2Y + Z = 1$$

Since Y and Z are non-negative integers

Z = 1 Y = 0

$$\text{So } X = 19$$

26. c As shown above the value of X = 19.

27. a As shown above the value of Y = 0.

28. b As shown above the value of Z = 1.

29. Single copy of a book costs \$16, but purchasers of 20 or more books pay only \$13 per book. How many values of n ($n \neq 0$) exist for which one could buy 20 copies at a lower total cost than one could buy exactly n copies of that book?
(a) 3 **(b) 4** **(c) 5** **(d) None of these**

29. a n has to be less than 20.
 $20 \text{ copies bought} \Rightarrow \text{total cost} = \13×20
 $n \text{ copies bought} \Rightarrow \text{total cost} = \$16 \times n$
Now, $\$13 \times 20 < \$16 \times n$
 $\Rightarrow n > 16.$
Hence, n can take three values 17, 18 and 19.

30. A can complete a piece of work in 60 days, B in 30 days, C in 20 days, D in 15 days, E in 12 days and F in 10 days. Now these 6 people make two groups, one of 2 members and the other of 4 members, in such a way that one team takes twice the time to complete the work as compared to the other team. How many such pairs of groups are possible?
(a) 1 **(b) 3** **(c) 6** **(d) 6C_2**

30. b Let the work be divided into 60 equal units, then
A does 1 unit per day
B does 2 units per day
C does 3 units per day
D does 4 units per day
E does 5 units per day and

F does 6 units per day

∴ Total work per day when all are working in two different group = 21 units

Say, the team of two does x units of work

⇒ The team of four does $2x$ units of work

$$\therefore x + 2x = 21$$

$$\Rightarrow x = 7$$

∴ The team of two individuals does 7 units of work per day, for which there are three possibilities—

(i) $1 + 6$

(ii) $2 + 5$

(iii) $3 + 4$

In each case, the remaining four people will do 14 units of work per day.

31. A parallelogram is inscribed in a circle. If the area of the circle is $42\frac{1}{4}\pi \text{ cm}^2$ and one of the sides of the parallelogram is 12 cm, what is the area of the parallelogram?

(a) **60 cm²** (b) 40 cm^2 (c) 80 cm^2 (d) Cannot be determined

31. a A parallelogram inscribed in a circle has to be a rectangle. The diagonal of the rectangle will be the diameter of the circle and is of length 13 cm. Since one side of the rectangle is 12 cm and diagonal is 13 cm, the adjacent side has to be 5 cm and the area of the rectangle is $12 \times 5 = 60 \text{ sq. cm.}$

32. 'N' is a two-digit number more than 35 such that when the units digit of 'N' is erased, the resulting number is a factor of 'N'. What is the sum of all the possible values of 'N'?

(a) **942** (b) 552 (c) 934 (d) 994

32. a Let 'N' = AB, where A and B are digits.

$$N = 10A + B.$$

Now, since A is a factor of AB, therefore A should divide $10A + B$ completely.

This also means that A should divide B completely.

B = 9: The possible values of A are 1, 3 and 9.

B = 8: The possible values of A are 1, 2, 4 and 8.

Similarly, when the value of B is 7, 6, 5, 4, 3, 2 and 1 the values of A are the number of factors of each of the possible values of B.

B = 0: The possible values of A are 1, 2, 3 8 and 9.

Let the sum of all such two-digit numbers more than 35 = S

$$\Rightarrow S = 40 + 50 + 60 + 70 + 80 + 90 + 44 + 55 + 36 + 66 + 77 + 48 + 88 + 39 + 99 = 942.$$

33. The HCF of two natural numbers a, b is k, where k is an element of set S of natural numbers given by {2, 3, 4, 5 ... 126, 127}. If the product of a, b and their LCM is a perfect square, then how many maximum possible elements of S can k represent?

(a) 8 (b) 9 (c) **10** (d) 11

33. c Let $a \times b \times \text{LCM of } (a, b) = z^2$

We know that, for two numbers a, b we have

$a \times b = \text{HCF of } (a, b) \times \text{LCM of } (a, b)$

$$\Rightarrow \text{HCF of } (a, b) \times [\text{LCM of } (a, b)]^2 = z^2$$

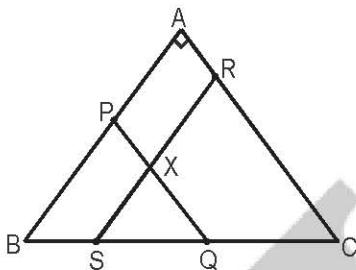
$$\Rightarrow k \times [\text{LCM of } (a, b)]^2 = z^2$$

So, k must be a perfect square and hence in the given set S we need to check for the perfect squares.

So, k is 4, 9, 16 ... 121 which are total 10 in number.

34. In the given $\triangle ABC$, $AR : RC = 1 : 4$ and $AP : PB = 2 : 3$. SR is parallel to AB and PQ is parallel to AC .

Find the value of $\left(\frac{PX}{XR}\right) \times \left(\frac{SX}{QX}\right)$.



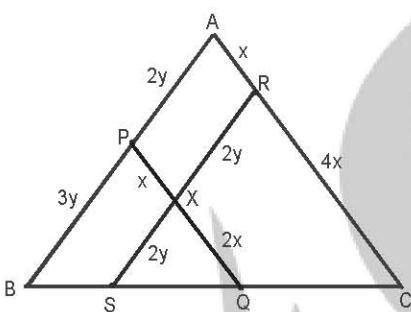
(a) $\frac{4}{7}$

(b) $\frac{5}{8}$

(c) $\frac{1}{2}$

(d) $\frac{3}{7}$

34. c



Let $AR = x$ units.

$\Rightarrow RC = 4x$ units and $AC = 5x$ units.

Also let $AP = 2y$ units.

$\Rightarrow PB = 3y$ units and $AB = 5y$ units.

Obviously $ARXP$ is a parallelogram.

Therefore $PX = x$ units and $XR = 2y$ units.

ΔBPQ and ΔBAC are similar.

$$\therefore \frac{PQ}{AC} = \frac{BP}{BA} = \frac{3}{5}$$

So, $PQ = 3x$ units.

$$\therefore XQ = PQ - PX = 2x \text{ units.}$$

Also ΔCRS and ΔCAB are similar.

$$\therefore \frac{RS}{AB} = \frac{CR}{CA} = \frac{4}{5}$$

So, $RS = 4y$ units.

$$\therefore SX = RS - RX = 2y \text{ units.}$$

$$\left(\frac{PX}{XR}\right) \times \left(\frac{SX}{QX}\right) = \left(\frac{PX}{QX}\right) \times \left(\frac{XS}{XR}\right) = \frac{1}{2} \times 1 = \frac{1}{2}$$

Directions for questions 35 to 38: Answer the questions on the basis of the information given below.

	A	B	C	D	E	F
A	1	3	5	2	5	3
B	3	1	2	4	3	5
C	5	2	1	5	4	3
D	2	4	5	1	1	2
E	5	3	4	1	1	2
F	3	5	3	2	2	1

Among 6 variables A, B, C, D, E and F, given in the table, only two kinds of arithmetic operations named 'Pontiplication' (denoted by ' \times ') and 'Civision' (denoted by ' \div ') are allowed. From the table given above, we can find the result of 'Pontiplication' or 'Civision' between any two variables by the following rules:

Rule I: 'Pontification' of B and D denoted by BD is the product of the first number in the row of B and the number common to the row of B and the column of D.

For example, $BD = B \times D = 3 \times 4 = 12$.

Rule II: Similarly the Civision of B and D denoted by $\frac{B}{D}$, is the ratio of the first number in the row of B to the number common to the row of B and the column of D.

For example, $\frac{B}{D} = B \div D = 3 \div 4 = 0.75$.

Rule III: Neither ‘Pontification’ nor ‘Civision’ is defined between the same variable. For example, $(B \times B)$ or $(B + B)$ is not defined.

In the following questions, X and Y denote two distinct variables out of A, B, C, D, E and F.

For questions 35 to 38:

From the given table, we can calculate the following results:

$$AB = 3, AC = 5, AD = 2, AE = 5, AF = 3$$

$$BA = 3 \times 3 = 9, BC = 6, BD = 12, BE = 9, BF = 15$$

$$CA = 25, CB = 10, CD = 25, CE = 20, CF = 15$$

$$DA = 4, DB = 8, DC = 10, DE = 2, DF = 4$$

$$EA = 25, EB = 15, EC = 20, ED = 5, EF = 10$$

$$FA = 9, FB = 15, FC = 9, FD = 6, FE = 6$$

35. d While checking all the possibilities, we see that

$$2AC - CA = 10 - 25 = -15 \text{ and}$$

$$2AE - EA = 10 - 25 = -15, \text{ gives the minimum value.}$$

36. c The sum of all the values of XY taken together

$$= 18 + 51 + 95 + 28 + 75 + 45 = 312$$

37. b Following are the possibilities for (X, Y) such that $\frac{X}{Y} \geq 1$

(X, Y) = (B, A) (B, C) (B, E), (C, A), (C, B) (C, D) (C, E) (C, F), (D, A), (D, E), (D, F), (E, A), (E, B), (E, C), (E, D), (E, F), (F, A), (F, C), (F, D), (F, E)
Total 20 ways.

38. d The following are the only possibility considering the fact that Y completely divides X;

$$BA + AB - \frac{B}{A} = 9 + 3 - 1 = 11$$

$$BE + EB - \frac{B}{E} = 9 + 15 - 1 = 23.$$

$$CA + AC - \frac{C}{A} = 25 + 5 - 1 = 29.$$

$$CD + DC - \frac{C}{D} = 25 + 10 - 1 = 34.$$

$$DA + AD - \frac{D}{A} = 4 + 2 - 1 = 5.$$

$$DE + ED - \frac{D}{E} = 2 + 5 - 2 = 5.$$

$$DF + FD - \frac{D}{F} = 4 + 6 - 1 = 9.$$

$$EA + AE - \frac{E}{A} = 25 + 5 - 1 = 29.$$

$$ED + DE - \frac{E}{D} = 5 + 2 - 5 = 2.$$

$$FA + AF - \frac{F}{A} = 9 + 3 - 1 = 11.$$

$$FC + CF - \frac{F}{C} = 9 + 15 - 1 = 23.$$

Clearly, the second highest value is 29.

39. How many distinct five-digit multiples of 11 can be formed using the digits 3, 4, 5, 6 and 7?

(a) 12

(b) 18

(c) 24

(d) 36

39. a Let abcde be the required multiple of 11, where a, b, c, d and e are 3, 4, 5, 6 and 7, not necessarily in that order.

$$(a + c + e) - (b + d) = 0 \text{ or } 11 \text{ or } -11$$

$$(I) (a + c + e) - (b + d) = 0$$

$$(a + c + e) + (b + d) = 2(b + d)$$

$$25 = 2(b + d); \text{ Not possible}$$

$$(II) (a + c + e) - (b + d) = -11$$

$$(a + b + c + d + e) + 11 = 2(b + d)$$

$$\Rightarrow b + d = 18 \text{ (each should be 9)}$$

So not possible

$$(III) (a + c + e) - (b + d) = 11$$

$$(a + b + c + d + e) = 11 = 2(b + d)$$

$$\Rightarrow b + d = 7$$

Therefore, the possible set of values of (b, d) are (3, 4) and (4, 3).

Other number 5, 6, 7 can be arranged in 6 ways.

So, $2 \times 6 = 12$ numbers are possible.

40. a Let number of 25 paise coins in packet x be a and the number of 50 paise coins in packet y be b.

$$\Rightarrow \text{Total amount} = \frac{a}{4} + \frac{b}{2} = 80$$

$$\Rightarrow a + 2b = 320$$

Number of coins in packet x after n transfers = $a - 4n + 3n$

Number of coins in packet y after n transfers = $b - 3n + 4n$

$$\text{Now } a - 4n + 3n = b - 3n + 4n$$

$$\Rightarrow a - b = 2n$$

$$\text{Solving, we get } a = \frac{320 + 4n}{3}$$

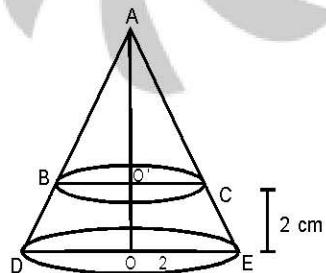
$$\Rightarrow a = \frac{4}{3} \times (80 + n)$$

Now from options, we see that only one value of n , i.e. $n = 16$ satisfies.

41. At a birthday party, a mischievous boy was wearing a hollow conical hat of radius of 2 cm and height of 6 cm . The birthday cake had cuboidal shape of dimensions $6 \text{ cm} \times 6 \text{ cm} \times 4 \text{ cm}$. The boy took the hat off his head and forced it onto the cake so that the cake rose up to 2 cm inside the hat. Find the volume of the cake inside the hat. (Assume the thickness of the hat to be negligible.)

- (a) $\frac{16}{27}\pi \text{ cm}^3$ (b) $\frac{152}{27}\pi \text{ cm}^3$ (c) $8\pi \text{ cm}^3$ (d) $\frac{64}{27}\pi \text{ cm}^3$

41. b



We have to find out the volume of BCED.

= Volume of (ADE) – Volume of (ABC)

ΔAOC and ΔAOE are similar.

$$\text{Then } \frac{\text{AO}'}{\text{AO}} = \frac{\text{O}'\text{C}}{\text{OE}} \Rightarrow \frac{4}{6} = \frac{\text{O}'\text{C}}{2} \Rightarrow \text{O}'\text{C} = \frac{4}{3} \text{ cm}$$

$$\text{Volume of cone } ADE = \frac{1}{3}\pi \times 2^2 \times 6$$

$$\text{Volume of cone } ABC = \frac{1}{3} \times \pi \times \left(\frac{4}{3}\right)^2 \times 4 = \frac{64\pi}{27} \text{ cm}^3$$

$$\text{Therefore, volume of frustum BCED} = \text{Volume of ADE} - \text{Volume of ABC} = \frac{24\pi}{3} - \frac{64\pi}{27} = \frac{216\pi - 64\pi}{27} = \frac{152}{27}\pi \text{ cm}^3.$$

Directions for question 42 and 43: Answer the questions on the basis of the information given below.

Decimal value of $100!$ is written and converted into some other integral base ' v '. Surprisingly, the no. of zeroes at the end were found to be same as that with the original number. ($v > 1$)

For questions 42 and 43

100! has 24 zeroes in the end.

$$\Rightarrow 100! = k \times 10^{24}$$

Where k is not having any trailing zero.

Or, k is not a multiple of 10.

In base v, $100!$ is having 24 zeroes

$$\Rightarrow 100! = P \times v^{24}$$

Where P is not a multiple of v.

Now,

Highest power of 2 in $100! = 97$

⇒ In base 2, $100!$ will have 97 trailing zeroes.

→ In base 2^2 , $100!$ will be having $\left\lfloor \frac{97}{2} \right\rfloor = 48$ trailing zeroes.

\Rightarrow In base $(2^2)^2$, $100!$ will be having $\frac{48}{2} = 24$ trailing zeroes.

So one possible value of v is 16.

Also, highest power of 3 in $100! = 48$

$$\Rightarrow \text{Highest power of } 3^2 \text{ in } 100! = \frac{48}{2} = 24$$

So one possible value of v is 9.

Again, highest power of 5 in $100! = 24$

So one possible value of v is 5.

And there is no prime number greater than 5 whose highest power in $100!$ is 24 or more.

42. a Since, 5, 9, 16 individually can be the bases; their product = $5 \times 9 \times 16 = 720$
 Also qualifies as a valid value for v.
 So the maximum value is 720.
 $\Rightarrow v_{\max} = 720.$

43. b Minimum possible base is $\min.(5, 9, 16) = 5$
 $\Rightarrow v_{\min} = 5.$

Directions for questions 44 to 46 : Each of the following questions is followed by two statements, I and II. Mark the answer using the following instructions:

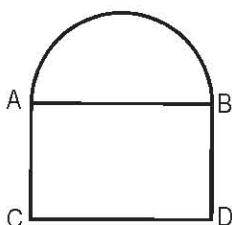
Mark (a) if the question can be answered by using one of the statements alone, but cannot be answered by using the other statement alone.

Mark (b) if the question can be answered by using either statement alone.

Mark (c) if the question can be answered by using both the statements together, but cannot be answered by using either statement alone.

Mark (d) if the question cannot be answered even by using both the statements together.

44. The figure given below shows the shape of a window. If arc AB is a semicircle and ABCD is a rectangle, then what is the perimeter of the window?



- I. The perimeter of the rectangle ABCD is 142 feet.
II. The length of the diagonal of the rectangle ABCD is 61 feet.

44. d Let the two sides of rectangle ABCD are 'x' and 'y'.

Using statement A:

$$x + y = 71$$

which is not sufficient to answer the question.

Using statement B:

$$x^2 + y^2 = 61^2$$

which is not sufficient to answer the question.

Combining statements I and II:

We get $(x + y)^2 = x^2 + y^2 + 2xy$

$$(x - y)^2 = x^2 + y^2 - 2xy = 71^2 - 1320 = 2401$$

$$x - y = 49 \quad \dots(i)$$

$$\text{also, } x + y = 71 \quad \dots(ii)$$

solving we get 'x' and 'y' as 60 feet and 11 feet respectively.

Since we do not know that AB is 60 feet or 11 feet, we cannot find the answer.

45. The marked price of an article is Rs. 250. Find the net profit percent on the sale of the article.

- I. Successive discounts of 20% and 25% were given on the sale of the article.
II. The article was sold at Rs. 200.

45. d The question cannot be answered even by using both statements together as nothing can be said about the cost price of the article.

46. If a, b and c are integers, then what is the value of $(a^2 + b^2 + c^2)$?

- I. $4a + 3b + 2c = 27$ and $1 < a < b < c < 8$.
II. $a + b + c = 9$ and $0 < a < b < c$.

46. a **Using statement I:**

Since it is given that $1 < a < b < c < 8$, it can be verified very easily that c cannot take values from the set {1, 2, 3}. Further checking 'c' for {4, 5, 6, 7}, there is only one set of values of a, b and c that satisfies $1 < a < b < c < 8$. The values of a, b and c are 2, 3 and 5 respectively.

Hence, the value of $a^2 + b^2 + c^2$ equals to 38.

Hence, statement I alone is sufficient to answer the question.

Using statement II:

There are multiple sets of values of a, b and c that satisfies $a + b + c = 9$ and $0 < a < b < c$.

For example $(a = 1, b = 2, c = 6)$, $(a = 1, b = 3, c = 5)$ and $(a = 2, b = 3, c = 4)$.

Hence we cannot calculate a unique value of $a^2 + b^2 + c^2$.

Hence, statement II alone is not sufficient to answer the question.

Therefore, option (a) is the correct choice.

47. How many 5-digit numbers are there such that digits at hundred's place, unit's place and ten-thousand's place are the first three terms of a geometric progression in any order?

(a) 3300

(b) 2700

(c) 1300

(d) 1200

47. a Number is of the form $a_1 a_2 a_3 a_4 a_5$ where $a_1 \neq 0$

Possible geometric progressions are

$(1, 1, 1), (2, 2, 2), (3, 3, 3) \dots (9, 9, 9)$ and

$(1, 2, 4), (1, 3, 9), (2, 4, 8), (4, 6, 9)$

$\Rightarrow 9 \times (1 \times 10 \times 1 \times 10 \times 1) + 4 \times (3! \times 10 \times 10) = 3300$ numbers in all.

48. When 907 is divided by two 2-digit numbers N and $(N + 2)$, the remainder obtained in both the cases is 'x'. Then the value of 'x' for the maximum possible value of N is:

(a) 1

(b) 3

(c) 5

(d) 8

48. d Since, 907 when divided by N and $N + 2$ leaves a remainder of 'x' in each case it is of the following forms:

$907 = Nk_1 + x$ and $907 = (N + 2)k_2 + x$

where k_1 and k_2 are quotients.

$\Rightarrow 907 = N(N + 2)k_1 k_2 + x$

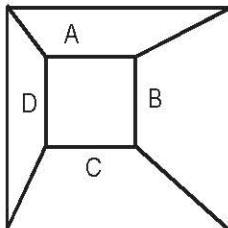
To maximize the value of N , $k_1 k_2$ should be 1.

$\Rightarrow N(N + 2) = 907 - x$

$\Rightarrow (N + 1)^2 = 908 - x = 900 + 8 - x$

\therefore Maximum possible value of N , which is 29, will occur at $x = 8$.

49. In the given figure, consider a square inside a bigger square and the four vertices of the smaller square are joined to the vertices of the bigger square. The area of the four regions thus obtained are represented by A, B, C and D. Which of the following statements is necessarily TRUE regarding areas A, B, C and D?



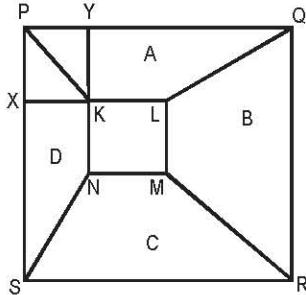
(a) $A + B > C + D$

(b) $A + B < C + D$

(c) $A + C = B + D$

(d) Data insufficient

49. c



Let any side of the bigger square be 'a' and that of smaller square be 'b'
Also let $KX = x$ and $KY = y$

$$\text{Area } A = \text{ar}(\text{Trapezium PQLK}) = \frac{a+b}{2} \times y$$

$$\text{Area } C = \text{ar}(\text{Trapezium SNMR}) = \frac{(a+b)}{2}[a - b - y]$$

$$\therefore A + C = \frac{a+b}{2}[y + a - y - b] = \frac{(a+b)}{2}(a - b)$$

$$\text{Similarly Area } B = \text{ar}(\text{Trapezium QLMR}) = \frac{(a+b)}{2}[a - x - b]$$

$$\text{and Area } D = \text{ar}(\text{Trapezium PKNS}) = \left(\frac{a+b}{2}\right)x$$

$$\Rightarrow B + D = \frac{1}{2}(a+b)[a - x - b + x] = \frac{(a+b)}{2}(a - b)$$

$$\therefore A + C = B + D$$

Alternate method:

All the four regions(A, B, C and D) are trapezium with parallel sides being identical.

Now, sum of heights of trapezium A and C

= sum of heights of trapezium B and D

= side of bigger square – side of smaller square

$\rightarrow A + C = B + D$.

50. How many 6-digit numbers can be formed by using first 6 natural numbers such that the digit at the unit's place is greater than the digit at the hundred's place; and the numbers thus formed are multiples of 4? (Assume that the repetition of digits is not allowed.)

(a) 96

(b) 108

(c) 114

(d) 78

50. c

H	T	U

(HTU) possible combinations

(1, 3, 2), (1, 5, 2), (1, 2, 4), (1, 6, 4), (1, 3, 6), (1, 5, 6)

(2, 6, 4), (2, 1, 6), (2, 3, 6), (2, 5, 6)

(3, 2, 4), (3, 6, 4), (3, 1, 6), (3, 5, 6)

(4, 1, 6), (4, 3, 6), (4, 5, 6)

(5, 1, 6), (5, 3, 6)

$\Rightarrow 19$ combination

The remaining 3 places in $3!$ ways i.e. 6 ways

So total number of ways = $6 \times 19 = 114$ ways.

Section II: VA & LR

51. Five sentences are given below, labeled A, B, C, D and E. They need to be arranged in a logical order to form a coherent paragraph/passage. From the given options, choose the most appropriate sequence.

- A. Engineers swarm over the structures, looking for imperfections that could weaken the wafer-thin yet granite-tough material.
- B. That future is plastic — and lots of it.
- C. At center stage in the tightly guarded building are three huge fuselage sections, dubbed barrels, made entirely of composites known as carbon fiber-reinforced plastic.
- D. Over in one corner, mechanics are sculpting the world's biggest composite aircraft wing.
- E. Inside Boeing Co.'s cavernous development center in Seattle, the future of its commercial jet business is taking shape.

(a) DACEB

(b) CAEDB

(c) DEABC

(d) EBCAD

51. d The best option for the first sentence is E which introduces the main idea of the paragraph – Boeing and innovation. E mentions “the future” and B describes that future explicitly. This makes EB a mandatory pair. C talks about the details of the goings-on and mentions three structures. A further talks about those structures and D finally provides information about another aspect. This makes option (d) the right answer.

52. A paragraph is given below from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.

The fundamental sea change in this decade is the opening of developed economies' markets to the commoditizing influence of developing economies like India and China. In response, companies jumped to innovation. But what you really have to do to fight commoditization is create sustainable differentiation, which means your competitors cannot or will not copy you. Innovation which creates sustainable differentiation is what you want. What most companies do, and why you have the feeling that they're just talking about it, is they innovate but they do not achieve sustainable differentiation. _____

- (a) Yes, they're spending a lot on research and development, but at the end of the day, they are not substantially differentiated from their competitors.**
- (b) The issue has to do with whether you are innovating for something that's core or ancillary to your business model.
- (c) Instead of concentrating on a few bold ideas that could revolutionize their companies, most firms put their resources in too many places, often creating product enhancements that don't actually enhance the bottom line.
- (d) They don't drive their customer service and engagement so far down the road that their competitors cannot or will not follow—and that is the gold standard.

52. a The last sentence states that companies do not achieve differentiation despite innovating. Option (a) takes this idea further by emphasizing that though companies spend a lot on R&D, they do not achieve differentiation. Option (b) does not address the issue of sustainable differentiation at all. Option (c) talks about enhancing the bottom line rather than about sustainable differentiation. Option (d) similarly talks about customer service and not about sustainable differentiation.

53. A paragraph is given below from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.

Such nuggets abound. Americans have a wider anti-big-business streak. Britons are cooler on multiculturalism. Britons are more willing than Americans to curb civil liberties in pursuit of security. Americans are less keen not only on the United Nations but also on NATO - and more enthusiastic about the "special relationship" with Britain. If the British could choose their leader from a host of recent Anglo-American greats, they would pick Bill Clinton before Tony Blair. So would Americans, even if they may turn down his wife. _____

(a) Of the current presidential candidates, British Tories would vote for Barack Obama while Labour supporters would prefer Hillary Clinton by a narrow margin.

- (b) We will have to consciously assess where the differences between the people of the various countries of the world lead to.
(c) They feel much the same about the death penalty: they are broadly against it.
(d) People in both places are worried about their economic future but are still bullish on chances for bright kids from poor families.

53. a Option (a) is the correct answer since it continues with the comparison in the political arena. Options (c) and (d) talk about other areas. Option (b) goes beyond the scope of the given paragraph.

54. Five sentences are given below, labeled A, B, C, D and E. They need to be arranged in a logical order to form a coherent paragraph/passage. From the given options, choose the most appropriate sequence.

- A. Increasingly, many scholars in the field agree that there is a need to revert to foundational economic issues.
B. This has led to important advancements, for example, in asset pricing theory, and interest rate modelling.
C. This direction of study, however, can be regarded as somewhat secluded from real-world considerations.
D. In the last two decades, mathematical finance has developed discretely from economic theory and primarily as a branch of probability theory and stochastic exegesis.
E. Mainstream finance, on the other hand, has often entertained interesting economic problems, but finance chronicles normally pay less attention to high level mathematical approach.

(a) DBCAE

(b) ACDBE

(c) BADEC

(d) ADBEC

54. a D is the opening statement - it starts with the development of the subject. B follows D since it talks about the "advancements" that the development mentioned in D has led to. C gives further information about this direction of study. Therefore, DBC forms a mandatory pair. A follows C and talks about what scholars in the field believe. E concludes by contrasting mainstream finance with mathematical finance.

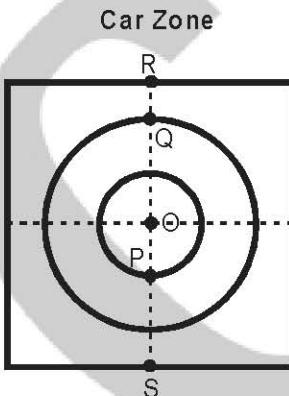
55. A paragraph is given below from which the last sentence has been deleted. From the given options, choose the one that completes the paragraph in the most appropriate way.

Critics often argue that the ability to effect structural change is limited in ethical consumerism. They cite the preponderance of niche markets as the actual effects of ethical consumerism. Critics also argue that ethical consumerism is fundamentally anti-democratic. In their view, the act of buying is considered as a vote, and the number of votes does not equal one per individual. Instead, the more money an individual (corporation, government, university etc.) has, the more votes they have in the market place. _____

- (a) Critics also argue that the continued reliance on inherently anti-democratic methods leads to societies that no longer understand or desire engaged citizenry.
- (b) This viewpoint suggests, though, that for a democratic system to be fair, vote distribution must be equal for all viewpoints.
- (c) The distribution of wealth, therefore, leads to an unfair distribution of votes.**
- (d) A small group having few votes is irrelevant, which means that it can have no influence.
55. c Option (c) continues with the idea presented in the given paragraph. ‘More money - means more votes’ is anti-democratic which leads to option (c) - ‘an unfair distribution’. Option (b) talks about a democratic system whereas the paragraph talks about an anti-democratic system. Option (d) contradicts the given paragraph while option (a) does not connect to the given paragraph. There is nothing in the given paragraph to support “reliance on inherently anti-democratic methods “or “societies that no longer understand or desire engaged citizenry”.

Directions for questions 56 to 59: Answer the questions on the basis of the information given below.

Four car drivers – A, B, C and D – were driving their cars on one of the tracks in a car zone, shown below. In the zone, there are two concentric circular tracks passing through either P or Q and one square track passing through R and S, as shown in the figure below where O is the center of the concentric circles.



Following information is given:

- The cars are such that their drivers cannot get to know whether they are moving or stationary. They cannot even judge the speed of their own cars.
- However, the drivers can measure the speed of the other cars only with respect to themselves, whenever two or more cars are moving parallel to each other.
- They move at a constant speed in either clockwise or anticlockwise direction.

When B passed from point P, he made the following observations at that instant:

- A. A's car passed through point Q at a speed of 50 mph.
 - B. C's car passed through point R and D's car passed through point S.
 - C. C and D were moving in same directions at that particular instant, and their speed was 40 mph & 60 mph respectively.
56. If A, B, C, D are all moving in a clockwise direction and B's speed is 20 mph, what was the ratio of speed of A, B, C and D?
- (a) 7 : 2 : 6 : 4 (b) 3 : 2 : 2 : 4 **(c) 3 : 2 : 2 : 8** (d) 7 : 2 : 6 : 8

56. c If B's speed is 20 mph.
 Then A's speed = 30 mph
 C's speed = 20 mph
 D's speed = 80 mph
 Ratio of their speeds = 3 : 2 : 2 : 8.

57. If both A and B are moving in the clockwise direction, what could be the possible value of the average of the speeds of these four cars?
 (a) 37.5 mph (b) 22.5 mph (c) 27.5 mph (d) 47.5 mph

57. a At that instant A, B, C and D passed through the points P, Q, R and S. As they passed these points, all of them were moving parallel to each other. Let their speeds be V_a , V_b , V_c and V_d respectively.

At that instant A & B were moving in the same directions (both clockwise), so we must have.

$$V_a + V_b = 50 \quad \dots(i)$$

Similarly C and D also moved in the same directions (either both in the clockwise direction or both in the anticlockwise direction) and their speeds with respect to B are 40 mph and 60 mph respectively.

Case I:

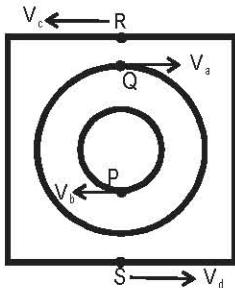


Fig. C & D, both anti-clockwise

If both C & D are moving in the anticlockwise direction, then

$$V_c - V_b = \pm 40 \quad \dots(ii)$$

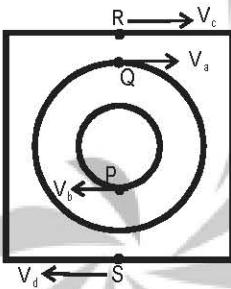
$$V_b + V_d = 60 \quad \dots(iii)$$

Adding (i), (ii) and (iii)

$$V_a + V_b + V_c + V_d = 150 \text{ or } 70$$

Therefore, the average of the speeds of these cars is: $\frac{150}{4}$ or $\frac{70}{4}$ i.e. 37.5 mph or 17.5 mph

Case II:



If both C & D are moving in the clockwise direction, then

$$V_d - V_b = \pm 60 \quad \dots(iv)$$

$$V_b + V_c = 40 \quad \dots(v)$$

Adding (i), (iv) and (v)

$$V_a + V_b + V_c + V_d = 150 \text{ or } 30$$

But 30 is not possible as in that case $V_c + V_d = -20$ (speed cannot be negative)

$$\Rightarrow \text{Average speed} = \frac{150}{4} = 37.5 \text{ mph.}$$

58. If A drove his car in the clockwise direction, and B in the anticlockwise direction and C observed that D's speed was 20mph with respect to him. What could be the speed of driver B?

- (a) 75 mph (b) 50 mph (c) 65 mph (d) 80 mph

58. b C observes that D is moving at a speed of 20 mph.

As C and D are moving in the same direction we must have:

$$V_c + V_d = 20$$

From this equation, the maximum values of either

V_c OR V_d can be 20 mph only irrespective of the direction of C & D

....(i)

Again, there are two cases:

Case I: Both C and D drive in the clockwise direction.

$$V_b - V_c = +40 \quad \dots \text{(ii)}$$

$$V_b + V_d = 60 \quad \dots \text{(iii)}$$

Case II: Both C and D drive in the anticlockwise direction.

$$V_b - V_d = 60 \quad \dots \text{(iv)}$$

$$V_b + V_c = 40 \quad \dots \text{(v)}$$

Case II is impossible.

As all the speeds are either positive or zero, equations (ii) and (iii) must be changed as following:

$$V_b - V_c = 40 \text{ or } V_b = V_c + 40 \quad \dots \text{(vi)}$$

{since $V_c \leq 20$ }

$$V_b + V_d = 60 \text{ or } V_b = 60 - V_d \quad \dots \text{(vii)}$$

{since $V_d \leq 20$ }

From both equations, we get

$$40 \leq V_b \leq 60.$$

Out of the given options, only option (ii) lies in the given range. Hence (b) is the correct choice.

59. One out of A and B drove his car in the clockwise direction and the other in the anticlockwise direction. At the same instant when B passed through point P, a person E, who was standing at point O, observed that while passing through points R and S, C and D had the same speed with respect to him. Which of the following could also be observed by E?
- (a) Three of these four cars had a speed of 10 mph.
 (b) Three of these four cars had a speed of 50 mph.
 (c) A's car was moving at exactly double the speed of either of C's or D's car.
(d) A's car was moving at more than double the speed of B's car.

59. d As E is stationary, the speeds observed by E, are the actual speeds of the cars. Let both the drivers C and D were driving with a speed of V mph. As C and D have the same speed, we need not find the solution under different cases as we did in the previous problems. We can write the following equations:

$$V_a - V_b = \pm 50 \quad \dots \text{(i)}$$

$$V_b + V = 60 \quad \dots \text{(ii)}$$

$$V - V_b = \pm 40 \quad \dots \text{(iii)}$$

Adding (ii) and (iii) we get:

$$V = V_c = V_d = 50 \text{ or } 10 \quad \dots \text{(iv)}$$

Subtracting (iii) from (ii) we get:

$$V_b = 10 \text{ or } 50 \quad \dots \text{(v)}$$

Putting both these values of V_b in (i), we get

$$V_a = 50 \pm 50 \text{ or } 10 \pm 50 \text{ i.e.}$$

$$V_a = 100, 0 \text{ or } 60, -40$$

As V_a represents speed, it cannot be negative, hence $V_a = -40$ is discarded.

$$V_a = 100, 0 \text{ or } 60 \quad \dots \text{(vi)}$$

From (iv), (v) and (vi) we observe that V_b and V_a do not have unique values rather they have more than one allowed value. As a result (V_a, V_b, V_c, V_d) can have any one of the following combinations of values:

Case I: (V_a, V_b, V_c, V_d) have values $(0, 50, 10, 10)$

OR

Case II: (V_a, V_b, V_c, V_d) have values $(100, 50, 10, 10)$

OR

Case III: (V_a, V_b, V_c, V_d) have values $(60, 10, 50, 50)$

Options (a), (b) and (c) are not correct. If we check the options, only option (d) is correct. As $V_b = 10$ and $V_a = 60$ (more than double) is a possible combination of speeds.

Directions for questions 60 to 63: The passage given below is followed by a set of four questions. Choose the most appropriate answer to each question.

Eight million Iraqi voters have finished risking their lives to endorse freedom and defy fascism. Three things happen in rapid succession. The right cheers. The left demurs. I walk away from a long-term intimate relationship. I'm separating not from a person but from a cause - the political philosophy that for more than three decades has shaped my character and consciousness, my sense of self and community, even my sense of the cosmos.

I choose this day for my departure because I can no longer abide the simpering voices of self-styled progressives — people who once championed solidarity with oppressed populations everywhere — reciting all the ways Iraq's democratic experiment might yet implode.

My estrangement hasn't happened overnight. Out of the corner of my eye I watched what was coming for more than three decades, yet refused to truly see. Now it's all too obvious. Leading voices in America's "peace" movement are actually cheering against self-determination for a long-suffering Third World country because they hate George W. Bush more than they love freedom.

Like many others who came of age politically in the 1960s, I became adept at not taking the measure of the left's mounting incoherence. To face it directly posed the danger that I would have to describe it accurately, first to myself and then to others. That could only give aid and comfort to Jerry Falwell, Pat Robertson, Rush Limbaugh, Ann Coulter and all the other Usual Suspects the left so regularly employs to keep from seeing its own reflection in the mirror. Now, I find myself in a swirling metamorphosis. Think Kafka, without the bug. Think Kuhnian paradigm shift, without the buzz. Every anomaly that didn't fit my perceptual set is suddenly back, all the more glaring for having been ignored so long. The insistent inner voice I learned to suppress now has my rapt attention. "Something strange — something approaching pathological — something entirely of its own making — has the left in its grip," the voice whispers. "How did this happen?" The Iraqi election is my tipping point. The time has come to walk in a different direction — just as I did many years before.

I grew up in a northwest Ohio town where conservative was a polite term for reactionary. When Martin Luther King Jr. spoke of Mississippi "sweltering in the heat of oppression," he could have been describing my community, where blacks knew to keep their heads down, and animosity towards Catholics and Jews was unapologetic. Liberal and conservative, like left and right, wouldn't be part of my lexicon for a while, but when King proclaimed, "I have a dream," I instinctively cast my lot with those I later found out were liberals (then synonymous with "the left" and "progressive thought").

The people on the other side were dedicated to preserving my hometown's backward-looking status quo. This was all that my 10-year-old psyche needed to know. The knowledge carried me for a long time. Mythologies are helpful that way.

66. A prominent business magazine recently noted the curious irony that Europe, which often takes a dim view of market forces, lets them rip in sports, while America, usually the world's most enthusiastic exponent of commerce and its consequences for society, has all sorts of arrangements in place to mitigate its effects on the nation's favourite pastimes.

In light of the information given in the preceding paragraph, which of the following proposals is most likely to be accepted by American sports regulators?

- (a) A proposal from a major American sports channel for allowing collective selling of television rights by basketball leagues to American sports channels in the face of growing foreign competition.
 - (b) A proposal to allow governing bodies to equalize the resources of all sports clubs in the interest of reducing the dominance of a few clubs and ensuring more competitive matches.**
 - (c) A proposal from the American Baseball league to legalize the institution of minimum quotas for Japanese players in American basketball clubs, in order to take advantage of the growing talent of Japanese players in baseball.
 - (d) A proposal which would allow preferential promotional rights to European sports goods manufacturers over American sports good manufacturers.

66. b If a proposal for equalizing the resources of all American sports clubs is brought into effect, this would mitigate the effects of market forces since large clubs with more resources would no longer be able to use their additional resources to dominate over other clubs. This is in line with the idea mentioned in the given paragraph. Hence, option (b) is the right answer. The other options do not relate to the ideas presented in the given paragraph.

67. Some movies that are recognized as masterpieces today were considered obscene when first created. It therefore follows that what is considered obscene or not obscene has changed over time.

Which of the following is an assumption on which the above argument depends?

- (a) Screening of movies that are considered obscene change the way in which obscenity is defined.
 - (b) A recognized masterpiece is not considered obscene.**
 - (c) The number of things that are considered obscene has decreased with the passage of time.
 - (d) All currently recognized masterpieces have at one time been considered obscene.

67. b Options (a), (c) and (d) are irrelevant. Option (b) is the assumption on which the argument is based. The given conclusion cannot be drawn without this assumption.

Directions for questions 68 to 71: Read the following information and answer the items that follow:

The number written on T-shirts of eight children are 1, 2, 3, 4, 5, 6, 7 and 8, with one number on a T-shirt. On a particular day, each of the eight children ate exactly one fruit out of three different types of fruits – apple, orange and mango. Each type of fruit is eaten by at least one child but not more than three children. The consecutive time slots of the day in which the eight children ate fruits were I, II, III, IV, V, VI, VII and VIII, in that order.

Additional Information Given:

- A. No two fruits of the same type were eaten in any two consecutive time slots.
B. No two children with two consecutive numbers on their T-shirts ate either a mango or an apple.
C. Three children with three consecutive numbers on their T-shirts ate an orange each.
D. The children with T-shirts numbered 1 and 7 ate an apple and a mango respectively.

68. Which of the following fruits did child with T-shirt numbered 4 eat?
(a) Apple **(b) Orange** (c) Mango (d) Either (a) or (b) or (c)

69. If the time slots in which children with T-shirts numbered 3, 1 and 7 ate fruits were IV, V and III respectively, then which of the following MUST be false?
- The time slot in which child with T-shirt numbered 2 ate fruit was II.
 - The time slot in which children with T-shirts numbered 4 and 5 ate fruits was VI and VII respectively.
 - The time slot in which children with T-shirts numbered 2 and 5 ate fruits was VI and VIII respectively.
 - (d) The time slot in which children with T-shirts numbered 6 and 8 ate fruits was VI and VII respectively.**
70. If the time slots in which children with T-shirts numbered 5 and 3 ate fruits were I and II respectively, then each of the following statements could be true, EXCEPT:
- The time slot in which child with T-shirt numbered 4 ate fruit was III.
 - The time slots in which children with T-shirts numbered 6 and 8 ate fruits were III and IV respectively.
 - (c) The time slots in which children with T-shirts numbered 1 and 8 ate fruits were V and VI respectively.**
 - Both (b) and (c)
71. Which of the following sequences of fruits eaten by children with T-shirts numbered 2, 3, 5 and 8, in that order, is not possible?
- Orange, Orange, Mango and Apple
 - Mango, Orange, Mango and Apple
 - Orange, Orange, Apple and Apple
 - (d) Both (b) and (c)**

For questions 68 to 71:

Let an apple, an orange and a mango be denoted by A, O and M respectively.

From the additional information (2), (3) and (4), the following the following table lists down the three cases that are possible.

	Child Numbered							
	1	2	3	4	5	6	7	8
Case 1	A	O	O	O	M	A	M	A
Case 2	A	M	O	O	O	A	M	A
Case 3	A	M	A	O	O	O	M	A

68. b In all the three cases, child numbered 4 will always eat an Orange.
69. d Given that the time slots in which child numbered 3, 1 and 7 ate the fruit is IV, V and III respectively. So, Case 3 is not possible as in case 3 children numbered 3 and 1 eat an apple and this violates the additional information (1). Option (a): It is possible in the following manner

Child Numbered	1	2	3	4	5	6	7	8
Time slot	V	II	IV	VI	VII	VIII	III	I
Fruit	A	O	O	O	M	A	M	A

Option (b): It is possible as shown in the table given above.

Option (c): It is possible in the following manner

Child Numbered	1	2	3	4	5	6	7	8
Time slot	V	VI	IV	II	VIII	VII	III	I
Fruit	A	O	O	O	M	A	M	A

Option (d): It is not possible because in Case 1 as well as Case 2; child numbered 6 and 8 ate an apple each and this violates the additional information (1) given.

Hence, option (d) is the correct choice.

70. c Given that the time slots in which child numbered 5 and 3 ate the fruits is I and II respectively. This means that Case 2 is not possible.

Option (a): It is possible in the following manner

Child Numbered	1	2	3	4	5	6	7	8
Time slot	V	IV	II	III	I	VIII	VI	VII
Fruit	A	M	A	O	O	O	M	A

Option (b): It is possible in the following manner

Child Numbered	1	2	3	4	5	6	7	8
Time slot	VIII	V	II	VI	I	III	VII	IV
Fruit	A	M	A	O	O	O	M	A

Option (c): Is not possible because in Case 1 as well as Case 3, children numbered 1 and 8 ate an apple each and henceforth the mentioned two children cannot eat the fruit in time slots V and VI respectively as it violates the additional information (1).

Hence, option (c) is the correct choice.

71. d Referring the first table that lists down all the three possible cases

Option (a): It is possible in Case 1

Option (b): It is not possible

Option (c): It is not possible

Hence, option (d) is the correct choice.

Directions for questions 72 to 74: The passage given below is followed by a set of three questions. Choose the most appropriate answer to each question.

With the 2005 publication of Steven Levitt's *Freakonomics*, the world has come to see that economists can be spectacularly clever. In the search for "clean identification" — a situation in which it is easy to discern the causal forces in play — Levitt has turned to such offbeat contexts as Japanese sumo-wrestling and the seedy world of Chicago real estate. He has studied racial discrimination on a game show, and reflected on white-collar bagel filching. This has inspired a flurry of imitators, including papers on point shaving in college basketball, under-used gym memberships and the parking tickets of UN diplomats. Within the tedious body of economics scholarship, these papers stand out as fantastically entertaining. Judging from the dizzying sales of *Freakonomics* and the thousands of lecture halls across the U.S. now bursting with econ majors, they've also been wildly successful at ginning up interest in the discipline. But what if all the cleverness has crowded out some of the truly deep questions we rely on economists to answer?

For more than a generation after the Second World War, the economists who dealt with real world data were mostly earnest, stubborn men. They tackled the era's thorniest questions. Zvi Griliches of Harvard devoted decades to the problem of productivity growth, the chief determinant of rising living standards. His colleague Simon Kuznets spent half his career devising the measure of economic growth we still use today.

In the '80s, however, the data-crunchers had a crisis of confidence. In one famous episode, the eminent economist Gregg Lewis reviewed several studies on unions. Some papers reported that unions strongly increased wages; others reported exactly the opposite. The old approach had been sweeping in its ambition. But what good were ambitious goals if the best you could do was "on the one hand/on the other hand"-style equivocation or plain gibberish? Many economists concluded that the path to knowledge lay in solid answers to modest questions. Henceforth, the emphasis would be on "clean identification." "I've always been someone who's thought it's better to answer a small question well than to fail to answer a big question," Levitt says. While still a student, he wondered whether money drives election results or if the better candidate raises more money. He ingeniously demonstrated the latter. Another early paper found that a slight increase in the chance of arrest dramatically deterred auto theft. Levitt discerned this by studying cities that had approved the use of Lojack, a transmitter that leads police to stolen cars. In 2001, Levitt published his most controversial finding: a paper highlighting the connection between the legalization of abortion in the '70s and the falling

crime rates of the '90s. Levitt argued that unwanted children are most at risk of becoming criminals. Abortion, he concluded, lowered crime rates by reducing unwanted pregnancies.

Some of these papers made important contributions. The Lojack paper helped demonstrate that theft is a rational phenomenon and can therefore be discouraged.

A few years later, Levitt debuted a new kind of paper: an investigation into offbeat phenomena from daily life. One pondered the strategies soccer players' employ when taking penalty kicks. Another paper studied corruption in sumo-wrestling tournaments as a window onto the power of incentives. Not long after, Levitt conducted an exhaustive inquiry into Weakest Link, a game show in which contestants voted to remove a player after each round of trivia questions. Tallying the voting data revealed that contestants were discriminating against Latinos and the elderly, but not blacks and women.

But while the game show provided a pure setting for observing discrimination, there was no reason to think we could extrapolate from Weakest Link contestants to hiring and promotion decisions, where discrimination often intersects with economics. Most such decisions don't take place in a Hollywood studio before a national TV audience.

Levitt's voice is high, except when it's trailing off at the end of a sentence. He leans heavily on the word "OK." He is lanky and concave-chested and makes little eye contact. But Levitt has a droll magnetism, an anti-charisma, which, combined with his eclectic interests, made a talk he gave at Harvard in 2002 a hit. "He talked about his kick-ass creative papers," recalls one attendee. "Here are the lessons you can draw to improve your own research, how you can do clever, appealing papers yourself." As he was wrapping up, Levitt reflected on the choices facing grad students: If you think you can do as well in traditional topics as someone like Marty Feldstein — a giant of the profession — you should pursue that, he said. Knowing laughter broke out. But, he continued, if you don't feel like you're up to that, you might want to think about alternative topics. The message resonated. One student watched classmates spend the next several weeks on high alert for some curiosity of daily life around which they could build a paper.

Levitt has become famous for saying that "economics is a science with excellent tools for gaining answers but a serious shortage of interesting questions." What is one to make of a discipline that heaps scorn on its own *raison d'être*?

When I raise this with Levitt, he is almost apologetic: "There needs to be a core for work on the periphery to make any sense. I don't think we would want to have a whole profession with dilettantes like me out doing what I do." But he quickly adds: "The simple fact is that it's hard to do good research. To the extent that you can do interesting research that teaches us something about the world, and entertains along the way, that's not so bad."

72. According to the passage, the 1980's saw the data-crunchers:
- Facing sweeping ambition, which had been clearly identified.
 - Combating a predicament that was leading to uncertainty.**
 - Identifying the prevalence of racial discrimination.
 - Celebrating the success of economics as a discipline.
72. b The third paragraph of the passage clearly talks about this. Option (b) is the right answer.
73. On the basis of the information given in the passage, it cannot be concluded that many old day economists who dealt with real world data ended up:
- Tackling the era's thorniest questions.
 - Dealing with the problem of productivity growth.
 - Readyng measures for economic growth.
 - Tackling modest questions.**

73. d As per the passage, "tackling modest questions" was a decision which economists in the 80's finally arrived at. So, this cannot be attributed to old day economists. Hence, option (d) is the correct answer.

74. Which one of the following is eminent on Levitt's wish list for economists?

 - (a) Understanding the links that always exist between any two given situations.
 - (b) Understanding the deep link between game show contestants and Latinos.
 - (c) Discerning corruption in Sumo-wrestling tournaments.
 - (d) Seeking valuable answers to unassuming questions.**

74. d "I've always been someone who's thought it's better to answer a small question well than to fail to answer a big question," Levitt says. This leads to option (d).

75. For the word given at the top of the following table, match the dictionary definition on the left (A, B, C, D) with their corresponding usage on the right (E, F, G, H). Out of the four possibilities given in the options below the table, select the one that has all the definitions and their usages closely matched.

Bellowing

	Dictionary definition		Usage
A.	to emit a hollow, loud, animal cry, as a bull or cow	E.	The bellowing noises from the forests kept us awake all night.
B.	to roar; bawl	F.	The steward kept bellowing his commands across the kitchen.
C.	to utter in a loud deep voice	G.	The principal was bellowing with rage.
D.	an act or sound of bellowing	H.	The bull kept bellowing in pain after the truck hit him.

(a) AH, BG, CF, DE (b) AE, BG, CF, DH (c) AG, BE, CH, DF (d) AF, BE, CH, DG

75. a 'Animal cry' in A matches with 'bellowing in pain'. Hence, AH is the correct match. In B, 'roar' matches clearly with 'bellowing with rage'. Hence, BG is the correct match. CF and DE are correctly matched. So, option (a) is the right answer.

76. There are two gaps in the sentence/paragraph given below. From the pairs of words given, choose the one that fills the gaps most appropriately.

This _____ of Che Guevara's image has been accompanied by a parallel _____ of the real man, swallowed by the myth.

(a) abasement, appeasement
(c) vilification, indictment

(b) degradation, show
(d) apotheosis, disappearance

76. d Apotheosis means the elevation of someone to divine status and this fits well with the real man getting lost in the myth. Thus, option (d) is the right answer. The other options do not fit the given context.

77. There are two gaps in the sentence/paragraph given below. From the pairs of words given, choose the one that fills the gaps most appropriately.

The rich and powerful people of ancient Rome were the _____, who governed the city from the Senate, and the equites, or men of _____.

(a) plebeians, power (b) patricians, property (c) pushovers, talent (d) politicians, greed

77. b A patrician is an aristocrat or nobleman. This makes option (b) correct. A plebeian is a commoner. Plebeians, pushovers or men of greed are not likely to be rich and powerful.
78. There are two gaps in the sentence/paragraph given below. From the pairs of words given, choose the one that fills the gaps most appropriately.

Ampère, a teacher at Paris, has a _____ place in the history of science because it was his name that was given to the _____ by which we measure electrical current.

- (a) physical, yard (b) casual, rule **(c) permanent, unit** (d) eternal, intensity

78. c The use of 'unit' gives away the correct answer - ampere is a unit of measurement of electricity.
79. There are two gaps in the sentence/paragraph given below. From the pairs of words given, choose the one that fills the gaps most appropriately.
- Iran's nuclear programme is a _____ challenge made even more complex by the conservatives' _____ of power.
- (a) strict, avowal (b) serpentine, shirking
(c) daunting, consolidation (d) meaningful, disgust
79. c Options (a), (b) and (d) are inappropriate because "strict", "serpentine" and "meaningful" do not fit in with "challenge". Option (c) correctly fits the given context.

Directions for questions 80 to 83: The passage given below is followed by a set of four questions. Choose the most appropriate answer to each question.

Entering the teaching profession is most challenging in the early moments when one is unacquainted with what lies ahead. To have mastered the role of student in a school does not lead naturally to an easy execution of the role of teacher. Indeed, new teachers often find their students to be unpredictable; many wonder if they will ever be able to gain a feeling of control over "the classroom". Soon, however, after a few years of stumbling, they gain a mastery of the textbooks and their associated pedagogical devices. They begin to see a repetitive pattern in the way that students tend to respond to certain problems and issues and, most importantly, they begin to remember which of their responses were effective in which contexts. The key to their success is confinement. They must learn within the already determined environment of the textbook to focus student attention on the key issues which in linked sequence provide the essence of a stage of mastery of a discipline. This isolation and clear pedagogical linking of the important stuff also provides the instructor with a defensible matrix of expectations against which fair evaluation can take place. Essential to the teacher, and somewhat available in the intellectual structure of the textbook, is a refined developmental sense of what is appropriate at which age level. Given the body of material a teacher must cover, time demands that repetition be eliminated and that only those things, which are age appropriate, no more and no less, be the stuff of each year's work. The teacher's willingness to commit himself to being part of a team by working within the specific segment of the curricular pie for which he is responsible is a significant sign of professional maturity. To know the sequences of instruction and to know his place in them increases the degree of predictability of each day and hence, adds significantly to the ease and comfort of professional life.

Virgil's greatness as a guide and teacher for Dante rested in his understanding that his student must experience, either directly or vicariously, all the possibilities of the human soul before discussion would be

of value. Accordingly, Virgil seldom offered tuition but most often responded to questions, which emerged from the intense experiences of traveling the underworld. The postmodern school with its emphasis on student inquiry will introduce the element of unpredictability into daily discourse and disturb any possibility of the routinization of educational discourse. Responding constantly to questions emerging from students' experience, teachers will re-assume the Socratic mantle and reverse the progressive de-skilling the profession has undergone since the Industrial Revolution.

Ethical "conversation" in schools focuses often on socializing the young to behaviors adults have deemed necessary for a successfully functioning society. If one adds to this the additional voices which urge self-understanding, free inquiry, and often a humanist ethic staunchly opposed to the competitive forces which shape the society, then one hardly wonders at the confusion of the young who learn only the lesson that the adult world thrives on contradiction and a self-serving hypocrisy. Consider the possibility of whether the dismantling of the competitive apparatus of the school and the establishment of faculty in the position of respondents would not also eliminate much of the contradiction in the public conversation and in turn reduce the number of voices needed to be reconciled by the students.

The exigency of the modern school, that tuition requires simultaneity of time and place, will not be a restraining structure of the postmodern school. Through the use of advanced systems of electronic mail, students can log queries addressed to their teachers or classmates and, then, check for their answers when they can. This exchange is, of course, not constrained by geography. Questions can be logged from either within the school through a network or from without via modem. The same technology facilitates scheduling live exchanges. Without the tyranny of the single focus of the textbook as the information core of the process, one could imagine in a networked computer environment attentional foci changing as the teacher and students shift from attending to a large screen suitable for a hundred to working in small groups around workstations to individuals pursuing research on notebook computers linked to a server by radio coupling. This requires flexibility in the learning environment - walls which are soundproof and move, computer stations which are comfortable for four but recede when a group of the whole is formed, work surfaces which are suitable for notebooks but disappear when necessary.

The information logistics of the curriculum, the quantity and quality available without travail, decrease or increase the capacity of the curriculum to act as a competitive game-board. In the modern school each student focuses as much on others as on the work at hand in order to catch a glimpse of where his colleagues are in the race to master the same information. In the postmodern school, the information resources will be expanded and the points of departure multiplied to a degree that each student will travel a path distinctly her own, albeit within the orbit of a single question/area of investigation. The learning environment will be composed of students seeking to pursue individual questions and then coming together to coordinate their results. Cooperation will follow the natural need to understand. When students travel individual paths within a single complex and multidimensional subject area, they will, out of their own deep sense of insufficiency, seek to complement their own work with that of others.

80. According to the passage, the behavior of the teacher gradually undergoes a change, because
- The unpredictable nature of students helps their progress.
 - They were good students; so, they are natural teachers.
 - They begin to mature with age.
- (d) They consider feedback with implication to different situations.**
80. d Option (d) is the correct answer. The lines "... most importantly, they begin to remember which of their responses were effective in which contexts," supports this answer.

81. The author cites 'confinement' as key to the teacher's success because according to the passage
(a) Constraint within the textbook leads to adeptness.
(b) The intellectual structure of the text offers a feeling of development.
(c) The textbooks need to be mastered.
(d) It's important to work out a matrix.
81. a In the passage, the author states, "They must learn within the already determined environment of the textbook to focus student attention on the key issues which in linked sequence provide the essence of a stage of mastery of a discipline", making option (a) correct.
82. According to the author, as a teacher, what is the intrinsic reason for Virgil's greatness?
(a) Virgil seldom offered tutelage to his students.
(b) Virgil inferred that experience must precede deliberation.
(c) He displayed perspicacity in all his dealings with students.
(d) Virgil understood student experience and exposure.
82. b The line, "Virgil's greatness as a guide and teacher for Dante rested in his understanding that his student must experience, either directly or vicariously, all the possibilities of the human soul before discussion would be of value", brings out the reason for Virgil's greatness. Thus, option (b) is the correct answer.
83. Which of the following cannot advance the reversal of the progressive de-skilling the profession has undergone?
(a) The process of preparing for intense travel experiences.
(b) The process of responding to student queries.
(c) The introduction of inquiry into the discourses.
(d) Responding to students' experiences.
83. a Option (a) is correct. The line, "Responding constantly to questions emerging from students' experience, teachers will re-assume the Socratic mantle and reverse the progressive de-skilling the profession", provides the right answer. Nowhere does the author state that preparing for travel will advance the reversal.
84. The word given below has been used in the given sentences in four different ways. Choose the option corresponding to the sentence in which the usage of the word is *incorrect* or *inappropriate*.

ENSHRINED

- (a) The right to vote is enshrined in our constitution.
(b) 'Service to all' is deeply enshrined in the policy of the mission.
(c) The diamond was enshrined in the bank vault.
(d) Respect for elders has been enshrined in our religious books since time immemorial.
84. c 'Enshrined' means to preserve or cherish as sacred. Option (c) therefore, uses the word enshrined incorrectly.

Directions for questions 85 to 88: Read the following information and answer the items that follow:

Seven friends – Ankit, Bhola, Chintu, Dolo, Ekta, Farhan and Govind – are standing in a row facing north. The ages of no two friends, out of the seven, are the same. It is also known that:
(i) The oldest friend has as many persons to his left as to his right.
(ii) The youngest and the second youngest friends are standing at the left and the right ends of the row respectively.

- (iii) Farhan is younger than Chintu, who is standing to the immediate left of Ekta.
(iv) Exactly two persons are standing between Dolo and Govind, and Ekta is not one of them.
(v) Ankit is younger than Govind, who is not the oldest.
(vi) Ekta is not the second youngest.
(vii) Farhan is older than Ekta, but younger than Bhola.

85. Who is the oldest friend in the group?
(a) Dolo (b) Govind (c) Chintu (d) Ekta

86. How many persons are standing between Ekta and Govind?
(a) 1 (b) 2 **(c) 3** (d) 4

87. Who among the following is definitely one of the persons standing adjacent to Dolo?
(a) Farhan (b) Govind (c) Chintu **(d) Ekta**

88. Who is standing at the right end of the row?
(a) Farhan **(b) Govind** (c) Chintu (d) Ekta

For questions 85 to 88:

From statement (i) and (ii), the primary arrangement is as follows:

Youngest			Oldest		Second Youngest

From statement (iv) and (v), there are two persons between Dolo and Govind, and Govind is not the oldest. The various possibilities are

i.	Govind			Dolo			
ii.		Govind			Dolo		
iii.			Govind			Dolo	
iv.		Dolo			Govind		
v.			Dolo			Govind	
vi.				Dolo			Govind

From statement (iii) and (vii), it is clear that Chintu is neither the youngest nor the second youngest, hence will not stand at either of the ends.

Also, he is to the immediate left of Ekta, so he will not stand between Dolo and Govind.

From this information, we can rule out possibilities (ii), (iii), (iv) and (v).

Also, Govind is not the youngest, so we can rule out possibility (i). The new arrangement will be

	Chintu	Ekta	Dolo			Govind
Youngest			Oldest			Second Youngest

Now, among the remaining three persons, neither Bhola nor Farhan is the youngest. Hence, Ankit is the youngest.

The given information can be tabulated as shown below.

Order of the position of friends from left to right

Ankit	Chintu	Ekta	Dolo	Farhan/ Bhola	Bhola/ Farhan	Govind
Youngest			Oldest			Second Youngest

85. a Dolo is the oldest in the group.
86. c Three people are standing between Ekta and Govind.
87. d Ekta is certainly standing adjacent to Dolo.
88. b Govind is standing at the right end of the row.
89. The following text is followed by four alternative summaries. Choose the option that best captures the essence of the text.

"The only certain things in life are death and taxes." That saying is something that we grow up with from an early age. You cannot predict the twists and turns of life except that you will pay taxes during your life and you will die. In many societies, including the United States, you may very well pay taxes when you die. Death is a fact of life and if you live long enough, you will experience the death of a friend, family member or acquaintance. We cannot escape it although we seem to be bent on trying. Early in our history, explorers in North America were searching for the "fountain of youth." Today, we have discovered that fountain. The fountain of youth is available in virtually the entire civilized world; it is contained in cologne, perfume, automobiles, clothing, soap, lotions, body sprays and exercise equipment. The world of advertising promises us that we can erase our worry lines, tone our bodies and forestall the effects of aging (and therefore, death) if we will just use their products. However, as we all know, this is not the case.

- (a) Death, like taxes is inescapable and inevitable, but modern civilization is close to finding a cure.
- (b) It is necessary to embrace death as an inevitable reality given that there can be no escape irrespective of the amount of effort we may exert to try to find the fountain of youth.
- (c) It is vital to relent to death, which is our final destination, and all attempts to live forever by beautification are futile.
- (d) Advertisements offer an illusionary escape from death and old age, but eventually there exists no fountain of youth since death is a hard reality.**
89. d Option (a) is incorrect since the passage does not talk of finding a cure. Options (b) and (c) both talk about embracing or giving in to death which cannot be summarized from the passage. Option (d) summarizes the passage by mentioning how there is no escape from death even though man does try and search for a way to live as long as possible. The passage ends with the note that this is not possible.

Directions for questions 90 to 94: The passage given below is followed by a set of five questions. Choose the most appropriate answer to each question.

"It is true that complex things in nature look as if they have been designed. Darwin knew this. But the sublime truth about his theory is that it explains how complex things can come about without design." That was James Randerson arguing that Darwin refuted intelligent design, which, he says, has no place in school science.

Darwin made a massive contribution to science, and his ideas still suggest hypotheses today. These have provided the starting point for my own research, published in journals of evolution. But despite the brilliance of Darwin's work, it is overoptimistic to claim that his theory explains the origin of all living things.

If Darwin had known what we now know about molecular biology - gigabytes of coded information in DNA, cells rife with tiny machines, the highly specific structures of certain proteins - would he have found his own theory convincing? Randerson thinks that natural selection works fine to explain the origin of molecular

machines. But the fact is that we are still unable even to guess Darwinian pathways for the origin of most complex biological structures.

Science has turned lots of corners since Darwin, and many of them have thrown up data quite unpredicted by his theory. Who, on Darwinian premises, would have expected that the patterns of distribution and abundance of species in tropical rainforests could be modelled without taking local adaptation into account? Or that whenever we sequence a new genome we find unique genes, unlike any found in other species? Or that bacteria gain pathogenicity (the ability to cause disease) by losing genes?

But, whatever the limitations of Darwinism, isn't the intelligent design (ID) alternative an "intellectual dead end"? No. If true, ID is a profound insight into the natural world and a motivator to scientific inquiry. The pioneers of modern science, who were convinced that nature is designed, consequently held that it could be understood by human intellects. This confidence helped to drive the scientific revolution. More recently, proponents of ID predicted that some "junk" DNA must have a function well before this view became mainstream among Darwinists.

But, according to Randerson, ID is not a science because "there is no evidence that could in principle disprove ID". Remind me, what is claimed of Darwinism? If, as an explanation for organised complexity, Darwinism had a more convincing evidential basis, then many of us would give up on ID.

Finally, Randerson claims that ID is "pure religion". In fact, ID is a logical inference, based on data gathered from the natural world, and hence it is firmly in the realm of science. It does not rely upon the Bible, the Qur'an, or any religious authority or tradition - only on scientific evidence. When a religious person advocates teaching ID in science without identification of the designer, there is no dishonesty or "Trojan horse", just realism about the limitations of the scientific method. If certain Darwinists also had the intellectual honesty to distinguish between science and their religious beliefs, the public understanding of science would be much enhanced.

90. Which of the following can be a valid inference from the passage?
 - (a) Intelligent design has no place in school science.
 - (b) Darwin's theory does not explain the origin of all living things.**
 - (c) The most complex biological structures can be easily explained by Darwin.
 - (d) Darwin refuted intelligent design.

90. b Refer to the 2nd paragraph which states that it would be overoptimistic to conclude that Darwin's theory explains the origin of all living things. Options (a) and (d) are Randerson's view. Option (c) contradicts the information given in the passage. Hence, option (b) is the correct answer.

91. Which of the following statements about Darwinian premises or principles cannot be inferred from the passage?
 - (a) Darwin's principles do not explain patterns of distribution and abundance of species in tropical rainforests.
 - (b) Darwinists would not have been able to imagine that sequencing a new genome would lead to unique genes.
 - (c) Bacteria losing pathogenicity by gaining genes is a phenomenon quite paradoxical to Darwinian principles.**
 - (d) Darwinian principles can give some idea about natural selection and evolution.

91. c The passage says that "who, on Darwinian premises, would have expected ... that bacteria gain pathogenicity ...". This implies that Darwinian premises do not lead to the inference that bacteria would gain pathogenicity by losing genes. But it does not imply that this finding contradicts/is paradoxical to Darwinian premises. Hence, option (c) cannot be inferred from the passage.
92. As per the passage, James Randerson believes all of the following EXCEPT that
(a) Intelligent design is not a science because there is no evidence that could in principle disprove ID.
(b) Intelligent design is pure religion.
(c) Darwin's theory explains how complex things can come about without design.
(d) ID was refuted by Darwin partly in order to propagate his own theory which was more scientific.
92. d Options (a), (b) and (c) are stated in the passage and it can be inferred that Randerson believes in those ideas. Option (d) is not supported by the passage. As per the passage, Randerson claims that Darwin refuted ID but he does not say why Darwin refuted it. Hence, option (d) is the correct answer.
93. Which of the following would most conform to the author's view on intelligent design?
(a) ID is a profound insight into the natural world but it lacks substance and utility.
(b) ID is something which many of us would give up on if Darwin is proved right.
(c) The veracity of ID is unclear but it may be a motivator to scientific enquiry.
(d) ID and science are not really related
93. c The fourth paragraph of the passage states that "If true, ID is a profound insight into the natural world and a motivator to scientific inquiry." Thus, option (c) is the correct answer.
94. Which of the following statements would the author of the passage be most likely to agree to?
(a) Darwinists are dishonest about their religious beliefs, which prevents a clear understanding of science by the public.
(b) Promotion of ID as science by religious people is a blunder because there are limitations to the scientific method.
(c) The public understanding of science depends more on Darwinists than on religious people.
(d) Darwinism has certain limitations while ID, which too is scientific, may give better insights than Darwinian principles in some cases.
94. d Only option (d) is supported by the passage. The other options are irrelevant. The second, third and fourth paragraphs of the passage clearly mention the limitations of Darwinian beliefs. The last paragraph of the passage asserts that ID is firmly in the realm of science.
95. Four sentences are given below, labeled (a), (b), (c) and (d). Of these, three sentences need to be arranged in a logical order to form a coherent paragraph/passage. From the given options, choose the one that does not fit the sequence.
(a) Implicitly or explicitly, these variations of dimensions are all present in Alice.
(b) This divergence clearly points to a danger: that of neglecting one dimension.
(c) Yet, Elizabeth Sewell's analysis deals almost exclusively with the formal structure of order.
(d) Emile Cammaerts, on the other hand, defines nonsense poetry as "poetry run wild."
95. a The odd-one out here is option (a). Options (c), (d) and (b) form a sequence since option (c) presents Elizabeth Sewell's analysis and option (d) follows by offering a contrasting viewpoint. Then, option (b) talks about this 'disagreement' between various perspectives. Option (a) talks about the variations of dimensions, which none of the other options have talked about.

96. Four sentences are given below, labeled (a), (b), (c) and (d). Of these, three sentences need to be arranged in a logical order to form a coherent paragraph/passage. From the given options, choose the one that does not fit the sequence.
- (a) By one estimate, 80 percent of Florida's citrus trees are infected and dying.
(b) The trees are the work of Erik Mirkov, a plant pathologist at Texas A&M University who has spent his career applying the tools of biotechnology to citrus.
(c) The disease has spread beyond Florida to nearly every orange-growing region in the United States.
(d) Despite many generations of breeding by humanity, no citrus plant resists greening; it afflicts lemons, grapefruits, and other citrus species as well.
96. b Options (a) (d) and (c) are in a sequence. These statements talk about a disease called 'greening', which has affected citrus trees in Florida and other regions. Option (b) talks about only those trees which are the work of Erik Mirkov. The other options talk of citrus trees in general. This makes option (b) the odd-one out.
97. Given below are five sentences. Each sentence has a pair of words that are italicized. From the italicized words, select the most appropriate words (A or B) to form correct sentences. The sentences are followed by options that indicate the words, which may be selected to correctly complete the set of sentences. From the options given, choose the most appropriate option.
- I. She was their diary, their *calender*(A) /*calendar*(B) and their conscience, and they loved her like a sister.
II. Bordeaux's eyes twinkled and a *rye*(A) / *wry*(B) smile tugged at the corner of his mouth.
III. The coin and *bullion*(A) / *bouillon*(B) held by the banks varies between 20 and 24 millions sterling and the note circulation is almost stationary at about 34 millions.
IV. The *faun*(A) / *fawn*(B), a friend of the demigod, was one of the central characters in this movie based on Greek mythology.
V. The *invidious*(A) / *insidious*(B) pleasures of Temptation Island soon showed their true colors as Pinocchio and his companions started turning into donkeys, complete with ears and a tail.
- (a) ABABB **(b) BBAAB** (c) BAAAB (d) ABABA
97. b Diary is the keyword in statement I. It hints that she kept time for them and so the word needed is calendar. Calender refers to a machine in which cloth or paper is pressed by rollers to glaze or smooth it. Sentence II talks of a smile and so we get to know that wry is the word needed. Wry means an expression of dry humor. Rye is a plant used to make cereal. Bouillon is a thin broth made by simmering beef or chicken in water, while bullion, the word needed in statement III, means reserves of gold kept by banks in the form of bars, ingots or plates. In statement IV, a faun is a mythical creature with the body of a man and the horns, ears, tail and legs of a goat. Fawn refers to a young deer. Invidious means something unpleasant or offensive. Insidious means something which proceeds in a gradual, subtle way but with very harmful effects. It goes with the word pleasures in statement V. Thus, the correct answer is option (b), BBAAB.
98. In the following question, a main statement is given, followed by four statements A, B, C and D. Choose the ordered pair of statements where the first statement implies the second, and the two statements are logically consistent with the main statement.
- Whenever the moon wanes, the car must be waxed.
- A. The moon waned.
B. The moon did not wane.
C. The car was not waxed.
D. The car was waxed.
- (a) AB (b) AD (c) CB **(d) Both (b) and (c)**

98. d Option (a) offers contradictory statements and thus, can be eliminated. Option (b) gives us a pair which is logically consistent with the main statement since whenever the moon wanes, the car must be waxed. Similarly, option (c) is again a pair that is logically consistent with the main statement since we can be sure that if the effect (car is waxed) did not happen, the cause (moon waned) also must not have happened. Thus, the correct answer is option (d) – both (b) and (c).

99. In the following question, four sets of three sentences are given. You have to identify whether the three sentences in each of these sets are logically related. Choose the option which mentions all those sets where the third statement can be concluded from the first two statements.

- A. At least one ballerina danced. One ballerina danced. There was only one ballerina in the play.
- B. Athletes wear gear. Gear comes in either Nike or Adidas. Athletes wear either Nike or Adidas.
- C. Kosher cooks Jewish food. Jewish food contains nutrients. Kosher cooks nutrients.
- D. Bungee jumping is risky. Five young people were killed while participating in adventure sports yesterday. Bungee jumping should be banned.

(a) A, B and C

(b) B and C only

(c) C only

(d) C and D

99. b The conclusion in statement A does not follow since there might have been other ballerinas in the play who did not dance. In statement D, 'bungee jumping' and 'risky' may have no relation to the information given in the second sentence. Thus, the conclusion doesn't follow. In both statements B and C, the conclusion logically follows from the preceding two sentences.

100. In the following question a set of six statements is given, followed by four answer choices. Each of the answer choices has a combination of three statements from the given set of six statements. Identify the answer choice in which the statements are logically related.

- A. Some viruses are SARS
- B. No virus is Ebola
- C. Some viruses are SARS and Ebola
- D. Some viruses are Ebola
- E. All viruses are SARS
- F. All viruses are Ebola

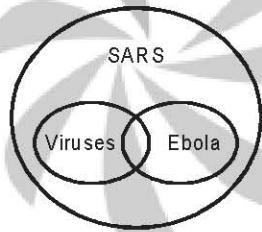
(a) EDC

(b) ABE

(c) ADC

(d) DCB

100. a



As can be seen from this diagram, option (a) has statements that are logically related.