

CAT2001 Original Paper with Solutions

SECTION – I (Quant)

NUMBER OF QUESTIONS – 50

Directions for questions 1 to 37: Answer the questions independent of each other.

1. A student took 5 papers in an examination, where the full marks were the same for each paper. His marks in these papers were in the proportion of 6 : 7 : 8 : 9 : 10. In all papers together, the candidate obtained 60% of the total marks. Then the number of papers in which he got more than 50% marks is:
 (1) 2 (2) 3 (3) 4 (4) 5

Solution:

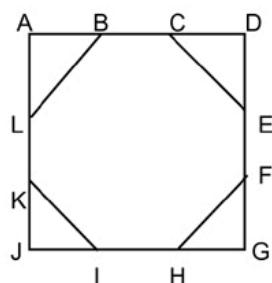
Assume that full marks are 100 in each paper. Then the total marks obtained in all of the papers together is = 300 (i.e., 60% of 5×100)

The given proportion of marks is 6 : 7 : 8 : 9 : 10
 Say, these are P1, P2, P3, P4 and P5 respectively.
 Marks in P1 are $300 \times 6/40 = 45$ i.e < 50%
 P2 = $300 \times 7/40 = 52.5$
 52.5 out of 100 $\Rightarrow 52.5\%$ i.e > 50%
 Hence, he has got more than 50% marks in four of the papers. Choice (3)

2. A square, whose side is 2 meters, has its corners cut away so as to form an octagon with all sides equal. Then the length of each side of the octagon in meters is

$$(1) \frac{\sqrt{2}}{\sqrt{2}+1} \quad (2) \frac{2}{\sqrt{2}+1} \quad (3) \frac{2}{\sqrt{2}-1} \quad (4) \frac{\sqrt{2}}{\sqrt{2}-1}$$

Solution:



In the given square ADGJ

$AD = 2$ metres

Say $AB = x$ metres

$\Rightarrow AL = x$ metres

In the right angled triangle ABL, length of BL is equal to $\sqrt{AB^2 + AL^2} = \sqrt{x^2 + x^2} = x\sqrt{2}$

$BL = BC = x\sqrt{2}$

$AB + BC + CD = 2$ metres

$$\Rightarrow x + x\sqrt{2} + x = 2$$

$$\Rightarrow x(2 + \sqrt{2}) = 2$$

$$\Rightarrow x = \frac{2}{2 + \sqrt{2}} \Rightarrow x\sqrt{2} = \frac{2\sqrt{2}}{2 + \sqrt{2}} = \frac{2}{1 + \sqrt{2}}$$

Choice (2)

3. Let x , y and z be distinct integers. x and y are odd and positive and z is even and positive. Which one of the following statements can not be true?
 (1) $(x-z)^2y$ is even (2) $(x-z)y^2$ is odd
 (3) $(x-z)y$ is odd (4) $(x-y)^2z$ is even

Solution:

x and y are odd

z is even.

Consider Choice (1)

$(x-z)$ is odd.

$\Rightarrow (x-z)^2$ is odd.

$\Rightarrow (x-z)^2y$ is odd.

" $(x-z)^2y$ is even" is false.

Choice (1)

4. If $x > 5$ and $y < -1$, then which of the following statements is true?
 (1) $(x+4y) > 1$ (2) $x > -4y$
 (3) $-4x < 5y$ (4) None of these

Solution:

The best approach in such problems is to try and contradict the relationships given in the choices

Choice (1) says $x + 4y > 1$

Make the LHS as small as possible.

i.e. $x = 6$ and $y = -3$ say, and $6 - 12 > 1$

Similarly for choice 2 take $x = 6$ and $y = -5$ say $6 > 20$

For choice (3) $x = 6$ and $y = -6$ gives $-24 < -30$

Choice (4)

5. A red light flashes 3 times per minute and a green light flashes 5 times in two minutes at a regular intervals. If both lights start flashing at the same time, how many times do they flash together in each hour?
 (1) 30 (2) 24 (3) 20 (4) 60

Solution:

Red light flashes every 20 seconds (3 times per minute)
 Green light flashes every 24 seconds (5 times in two minutes). If they start flashing simultaneously, they flash together again after 120 seconds (LCM of 20 & 24)
 i.e. after 2 minutes.

\Rightarrow They flash together every 2 minutes.

\Rightarrow They flash together 30 times in an hour .

Choice (1)

6. Of 128 boxes of oranges, each box contains at least 120 and at most 144 oranges. The number of boxes containing the same number of oranges is at least
 (1) 5 (2) 103
 (3) 6 (4) Cannot be determined

Solution:

A box may contain any number of oranges in the range of 120 to 144.

\Rightarrow There are 25 different possibilities if there are 26 boxes, at least 2 boxes contain the same number of oranges (That is even if each of the 25 boxes contains a different number of oranges, the

If $a = 2$, $b = 16$, which is not possible, Hence $a = 1$.
 $\Rightarrow b = 8$ and $d = 4$
 $\Rightarrow c = 5$ and the number is 1854. Choice (1)

11. Two men X and Y started working for a certain company on similar jobs on January 1, 1950. X asked for an initial salary of Rs.300 with an annual increment of Rs.30. Y asked for an initial salary of Rs.200 with a rise of Rs.15 every six months. Assume that the arrangements remained unaltered till December 31, 1959. Salary is paid on the last day of the month. What is the total amount paid to them as salary during the period?
(1) Rs.93,300 (2) Rs.93,200
(3) Rs.93,100 (4) None of these

Solution:

Initial salary will be paid by X and Y throughout the period [120 months]
 $\Rightarrow 120 [300 + 200] = 60,000/-$
X's increment is 30/- pm every year.
 \Rightarrow 2nd year he gets 360/- above the initial salary
3rd year – 720/-
4th year – 1080/- and so on \Rightarrow He gets
 $360 [1 + 2 + 3 + \dots + 9]$
above the initial salary in the whole period.
 $= 360 \times 45 = 16,200/-$
Y gets
 $90 [1 + 2 + \dots + 19] = 90 \times 190 = 17,100/-$
Total money paid to them is $60,000 + 16,200 + 17,100 = 93,300/-$ Choice (1)

12. Anita had to do a multiplication. Instead of taking 35 as one of the multipliers, she took 53. As a result, the product went up by 540. What is the new product?
(1) 1050 (2) 540 (3) 1440 (4) 1590

Solution:

If the second number is x , then difference between $53x$ and $35x$ is 540
 $\Rightarrow 53x - 35x = 540$
 $\Rightarrow x = 30$
 $=$ New product = $53x = 53 \times 30 = 1590$ Choice (4)

13. A college has raised 75% of the amount it needs for a new building by receiving an average donation of Rs.600 from the people already solicited. The people already solicited represent 60% of the people the college will ask for donations. If the college is to raise exactly the amount needed for the new building, what should be the average donation from the remaining people to be solicited?
(1) Rs.300 (2) Rs.250
(3) Rs.400 (4) Rs.500

Solution:

Let us assume that the college will ask 100 people for donations.
Then the people already solicited = 60% = 60
Average donation = 600
Total donation from these 60 people is $60 \times 600 = 36,000/-$
Rs.36,000/- is 75% of the total requirement

$$= \frac{36,000}{75\%} = 48,000$$

\Rightarrow 12,000 is to be raised from 40 people
average donation to be collected is Rs.300/- per person
Choice (1)

14. x and y are real numbers satisfying the conditions $2 < x < 3$ and $-8 < y < -7$. Which of the following expressions will have the least value?
(1) x^2y (2) xy^2
(3) $5xy$ (4) None of these

Solution:

From the choices, choice 2 is always positive. So we need to check between x^2y and $5xy$ since x and y are common the only checking that needs to be done is between x and 5. Since x lies between 2 and 3. 5 is larger and since $5xy$ is negative, this will be the least. Choice (3)

15. m is the smallest positive integer such that for any integer $n \geq m$, the quantity $n^3 - 7n^2 + 11n - 5$ is positive. What is the value of M ?
(1) 4 (2) 5
(3) 8 (4) None of these

Solution:

This question can be done by simple substitution.
If $m = 4$ then take $n \geq m = 4$ the expression
 $n^3 - 7n^2 + 11n - 5 = -9$ (Hence ≥ 0)
 $m = 5$ ($n = 5$) then $n^3 - 7n^2 + 11n - 5 = 0$ Hence ≥ 0
Since $m=8$ is given we need to check for $m = 6$ or $m = 6$
 $n^3 - 7n^2 + 11n - 5 = 19$ (+ve)
Hence the least value is 6. Choice (4)

16. A ladder leans against a vertical wall. The top of the ladder is 8 m above the ground. When the bottom of the ladder is moved 2 m further away from the wall, the top of the ladder rests against the foot of the wall. What is the length of the ladder?
(1) 10 m (2) 15 m (3) 20 m (4) 17 m

Solution:

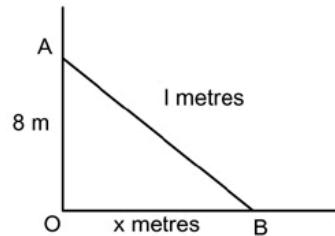


Figure 1

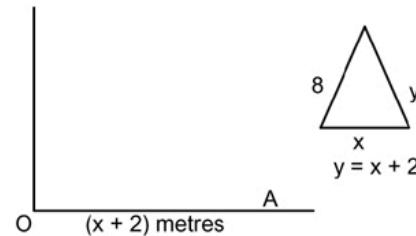


Figure 2

In figure 1, AB represents the ladder and the length of the ladder is l metres. The bottom of the ladder, 'B' is x metres away from the bottom of the wall.

$$l^2 + 8^2 + x^2 = 64 + x^2 \quad \dots \quad (1)$$

In figure 2, OA represents the length of the ladder which is equal to $(x + 2)$ metres, since the bottom of the ladder is moved 2 metres farther away from the wall.

$$l = (x + 2)$$

$$\Rightarrow l^2 = x^2 + 4x + 4 \quad \dots \quad (2)$$

From (1) and (2)

$$64 + x^2 = x^2 + 4x + 4$$

$$\Rightarrow 4x = 60$$

$$\Rightarrow x = 15 \text{ metres}$$

\Rightarrow length of the ladder

$$= l = (x + 2) = 15 + 2 = 17 \text{ metres} \quad \text{Choice (4)}$$

17. Three friends returning from a movie, stopped to eat at a restaurant. After dinner, they paid their bill and noticed a bowl of mints at the front counter. Sita took $\frac{1}{3}$ of the mints, but returned four because she had a momentary pang of guilt. Fatima then took $\frac{1}{4}$ th of what was left but returned three for similar reasons. Eswari then took half of the remainder but threw two back into the bowl. The bowl had only 17 mints left when the raid was over. How many mints were originally in the bowl?

(1) 38

(2) 31

(3) 41

(4) None of these

Solution:

$$\text{Number of mints at the end} = 17$$

$$\text{Number of mints before Eswari gave two back} = 15$$

$$\text{Number of mints before Eswari took mints} [15 \times 2] = 30$$

$$\text{Number of mints before Fatima returned three} = 27$$

$$\text{Number of mints before Fatima took } \frac{1}{4} [27 \times 4/3] = 36$$

$$\text{Number of mints before Sita returned four} = 32$$

$$\text{Number of mints before Sita took } \frac{1}{3} [32 \times 3/2] = 48$$

Therefore, there were 48 mints originally.

Choice (4)

18. If 09/12/2001 happens to be Sunday, then 09/12/1971 would have been a

(1) Wednesday (2) Tuesday

(3) Saturday (4) Thursday

Solution:

Each normal year has one odd day and each leap year has two odd days.

The total number of normal years in this period is 22.

The total number of leap years in this period is 8.

The total number of odd days in this period is

$$(22 \times 1 + 8 \times 2) = 38$$

\Rightarrow 3 odd days \Rightarrow 9/12/1971 is Thursday

[Sunday – 3] Choice (4)

19. In a number system the product of 44 and 11 is 1034. The number 3111 of this system, when converted to the decimal number system becomes

(1) 406 (2) 1086 (3) 213 (4) 691

Solution:

The multiplication of 44×11 in decimal system gives 484 as result.

$$484 [\text{Decimal}] = 1034 [\text{New system}]$$

"8" in tens place has become "3" in the relevant place in new system.

\Rightarrow "5" is carried forward to the next place

\Rightarrow The new system is of base "5".

3111 of base "5"

$$= 1 \times 5^0 + 1 \times 5^1 + 1 \times 5^2 + 3 \times 5^3 \text{ of base "10"}$$

$$= 1 + 5 + 25 + 375 = 406$$

Choice (1)

20. At his usual rowing rate, Rahul can travel 12 miles downstream in a certain river in 6 hrs less than it takes him to travel the same distance upstream. But if he could double his usual rowing rate for this 24 mile round trip, the downstream 12 miles would then take only 1 hr less than the upstream 12 miles. What is the speed of the current in miles per hour?

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

(2) $\frac{4}{3}$

(3) $\frac{5}{3}$

(4) $\frac{8}{3}$

Solution:

Say Rahul's usual rowing rate is u miles per hour and speed of the current is v miles per hour.

$$\frac{12}{u - v} - \frac{12}{u + v} = 6$$

$$\Rightarrow 24v = 6(u^2 - v^2)$$

$$\Rightarrow 4v = u^2 - v^2$$

$$\Rightarrow 16v = 4u^2 - 4v^2 \quad \dots \quad (1)$$

$$\frac{12}{2u - v} - \frac{12}{2u + v} = 1$$

[at double the usual speed]

$$\Rightarrow 24v = 4u^2 - v^2 \quad \dots \quad (2)$$

$$(2) - (1)$$

$$\Rightarrow 8v = 3v^2$$

$$\Rightarrow v = \frac{8}{3} \text{ miles per hour}$$

Choice (4)

21. Every ten years the Indian government counts all the people living in the country. Suppose that the director of the census has reported the following data on two neighbouring villages Chota hazri and Mota hazri.

Chota hazri has 4,522 fewer males than Mota hazri.

Mota hazri has 4,020 more females than males.

Chota hazri has twice as many females as males.

Chota hazri has 2,910 fewer females than Mota hazri.

What is the total number of males in Chota hazri?

(1) 11,264 (2) 14,174

(3) 5,632 (4) 10,154

Solution:

$$Mh (M) \Rightarrow Mota hazri - \text{males.}$$

$$Mh (F) \Rightarrow Mota hazri - \text{females.}$$

$$Ch (M) \Rightarrow Chota hazri - \text{males}$$

$$Ch (F) \Rightarrow Chota hazri - \text{females}$$

$$Ch (M) = Mh (M) - 4522 \quad \dots \quad (1)$$

$$Mh (f) = Mh (M) + 4020 \quad \dots \quad (2)$$

$$Ch (f) = Ch (M) \times 2 \quad \dots \quad (3)$$

$$Ch (f) = Mh (f) - 2910 \quad \dots \quad (4)$$

$$(2) \text{ and } (4)$$

$$\Rightarrow Ch (F) = Mh (M) + 4020 - 2910$$

$$\Rightarrow Ch (F) = Mh (M) + 1110 \quad \dots \quad (5)$$

$$(1), (3) \text{ and } (5)$$

$$\Rightarrow [Mh (M) - 4522] \times 2 = Mh (M) + 1110$$

$$\Rightarrow 2 \times Mh (M) - 9044 = Mh (M) + 1110$$

$$\Rightarrow Mh (M) = 10,154$$

$$\Rightarrow Ch (M) = 5,632 \text{ [From (1)]}$$

Choice (3)

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Solution:

Each normal year has one odd day and each leap year has two odd days.

The total number of normal years in this period is 22.

The total number of leap years in this period is 8.

The total number of odd days in this period is

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(1) 406 (2) 1086 (3) 213 (4) 691

Solution:

The multiplication of 44×11 in decimal system gives 484 as result.

$$484 [\text{Decimal}] = 1034 [\text{New system}]$$

"8" in tens place has become "3" in the relevant place in new system.

22. Three math classes X, Y and Z, take an algebra test.
 The average score in class X is 83.
 The average score in class Y is 76.
 The average score in class Z is 85.
 The average score of all students in classes X and Y together is 79.
 The average score of all students in classes Y and Z together is 81.
 What is the average for all the three classes?
 (1) 81 (2) 81.5 (3) 82 (4) 84.5

Solution:

The number of students in classes X and Y are in the ratio of 3 : 4, since the average X and is raised by 3 marks from that of Y and is decreased by four points from that of X.

Similarly the ratio of number of students in classes Y and Z is 4 : 5

$$X : Y : Z = 3 : 4 : 5$$

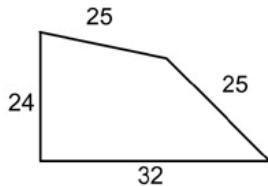
Average X, Y and Z is

$$\frac{3 \times 83 + 4 \times 76 + 5 \times 85}{12} =$$

$$\frac{249 + 304 + 425}{12} = \frac{978}{12} = 81.5$$

Choice (2)

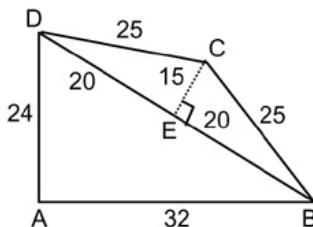
23. Two sides of a plot measure 32 meters and 24 meters and the angle between them is a perfect right angle. The other two sides measure 25 meters each and the other three angles are not right angles.



What is the area of the plot?

- (1) 768 (2) 534 (3) 696.5 (4) 684

Solution:



Since $\angle A = 90^\circ$ BD is hypotenuse = 40

$$\begin{aligned} \text{Area} &= \Delta ABD + \Delta BDC (= \Delta DCE + \Delta BCE) \\ &= 1/2 \times 24 \times 32 + 2 \times 1/2 \times 15 \times 20 \\ &= 384 + 300 = 684 \end{aligned}$$

Choice (4)

24. All the page numbers from a book are added, beginning at page 1. However, one page number was mistakenly added twice. The sum obtained was 1000. Which page number was added twice?
 (1) 44 (2) 45 (3) 10 (4) 12

Solution:

If the last page number is n

$$\text{Sum of all numbers is } \frac{n(n+1)}{2}$$

$$\frac{n(n+1)}{2} < 1000 \Rightarrow n^2 + n < 2000$$

$$\text{If } n = 43 \quad n^2 + n = 1892$$

$$\text{If } n = 43, \frac{n^2 + n}{2} = 946$$

This implies that 54 is added twice [946 + 540]. This is not possible, as there are only 43 pages

$$\Rightarrow n \neq 43$$

$$\text{If } n = 44 \quad n^2 + n = 1980$$

$$\text{If } n = 44, \frac{n(n+1)}{2} = 990$$

\Rightarrow Page number 10 is added twice Choice (3)

25. Shyama and Vyom walk up an escalator (moving stairway). The escalator moves at a constant speed. Shyama takes three steps for every two of Vyom's steps. Shyama gets to the top of the escalator after having taken 25 steps while Vyom (because his slower pace lets the escalator do a little more of the work) takes only 20 steps to reach the top. If the escalator were turned off, how many steps would they have to take to walk up?

- (1) 40 (2) 50 (3) 60 (4) 80

Solution:

Say in t seconds, Shyam takes 3 steps, Vyom takes 2 steps.

Shyam :

$$\text{Takes 25 steps in } \frac{25t}{3} \text{ sec}$$

Escalator moves $\frac{25a}{3}$ steps up [if it moves 'a' steps up in one second]

Total number of steps

$$= 25 + \frac{25}{3} a$$

Similarly

$$\frac{20}{2} f 20a + 20 \text{ is also the total number of steps}$$

[since Vyom has taken 20 steps]

$$\Rightarrow 10a + 20 = 25/3 a + 25$$

$$\Rightarrow 5a/3 = 5$$

$$\Rightarrow a = 3$$

\Rightarrow Escalator moves 3 steps up in 1 seconds.

Total number of steps is

$$25 + \frac{25}{3} \times 3 = 50$$

Choice (2)

Alternate in 12 m = s made up 2 m

$$\therefore 8 m - ? = 48m$$

26. At a certain fast food restaurant, Brain can buy 3 burgers, 7 shakes and one order of fries for Rs.120 exactly. At the same place it would cost Rs.164.5 for 4 burgers, 10 shakes and one order of fries. How much would it cost for an ordinary meal of one burger, one shake and one order of fries?

- (1) Rs.31 (2) Rs.41
 (3) Rs.21 (4) Cannot be determined

Solution:

Say price of a burger is "b", that of shakes is "s" and that of fries is "f".

$$\begin{aligned}3b + 7s + f &= 120 \quad (1) \\4b + 10s + f &= 164.5 \quad (2) \\(2) - (1) \Rightarrow b + 3s &= 44.5 \\&\Rightarrow 2b + 6s = 89 \quad (3) \\(1) - (3) \Rightarrow b + s + f &= 31\end{aligned}$$

Choice (1)

27. If a, b, c and d are four positive real numbers such that $abcd = 1$, what is the minimum value of $(1+a)(1+b)(1+c)(1+d)$?
 (1) 4 (2) 1 (3) 16 (4) 18

Solution:

If $ab = 1$
 Minimum value of $a + b = 2$
 a and b being 1.

Proof :

Say $a > 1$

$b = 1/a < 1$

$$(\sqrt{a} - \sqrt{b})^2 \geq 0$$

$$\Rightarrow a + b - 2\sqrt{ab} \geq 0 \Rightarrow a + b \geq 2\sqrt{a}/1/a$$

$$\Rightarrow a + b \geq 2$$

Therefore the least value of the expression, which has 16 elements in it must be greater than or equal to 16.
 Choice (3)

28. There's a lot of work in preparing a birthday dinner. Even after the turkey is in the oven, there's still the potatoes and gravy, yams, salad and cranberries not to mention setting the table.

Three friends Asit, Arnold and Afzal, work together to get all of these chores done. The time it takes them to do the work together is 6 hrs less than Asit would have taken alone, 1 hr less than Arnold would have taken working alone and half the time Afzal would have taken working alone.

How long did it take them to do these chores working together?

- (1) 20 minutes (2) 30 minutes
 (3) 40 minutes (4) 50 minutes

Solution:

Let 't' be the time taken for all three together

$$\text{Given } \frac{1}{t+6} + \frac{1}{t+1} + \frac{1}{2t} = \frac{1}{t}$$

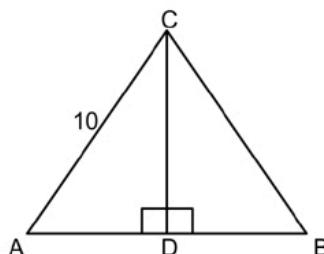
Solving the above we get $3t^2 + 7t - 6 = 0$

$$\Rightarrow t = 2/3 \text{ hours} = 40 \text{ minutes} \quad \text{Choice (3)}$$

29. Euclid has a triangle in mind, its longest side has length 20 and another of its sides has length 10. Its area is 80. What is the exact length of its third side?

- (1) $\sqrt{260}$ (2) $\sqrt{250}$ (3) $\sqrt{240}$ (4) $\sqrt{270}$

Solution:



$$\begin{aligned}AB &= 20 \\AC &= 10 \\Area &= 80 = \frac{1}{2} \times AB \times CD \\&= \frac{1}{2} \times 20 \times CD \\&\Rightarrow CD = 8 \\AD &= \sqrt{AC^2 - CD^2} = \sqrt{100 - 64} = 6 \\&\Rightarrow DB = 14 \\CB &= \sqrt{CD^2 + DB^2} = \sqrt{64 + 196} = \sqrt{260}\end{aligned}$$

Choice (1)

30. For a Fibonacci sequence from the third term onwards, each term in the sequence is the sum of the previous two terms in that sequence. If the difference in squares of seventh and sixth terms of this sequence is 517, what is the tenth term of this sequence?
 (1) 147 (2) 76
 (3) 123 (4) Cannot be determined

Solution:

$$7^{\text{th}} \text{ term } m^2 - n^2 = 517$$

$$18, 29$$

$$\therefore 10^{\text{th}} \text{ term } 29, 18 = 123$$

Choice (3)

31. Fresh grapes contain 90% water by weight while dried grapes contain 20% water by weight. What is the weight of dry grapes available from 20 kg of fresh grapes?

- (1) 2 kg (2) 2.4 kg
 (3) 2.5 kg (4) None of these

Solution:

20 kg – fresh grapes

$\Rightarrow 18 \text{ kg is water} \Rightarrow 2 \text{ kg is non water}$

2 kg is 80% of dried grape.

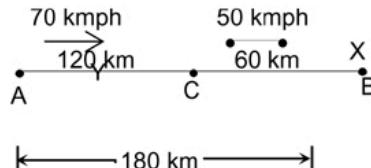
\Rightarrow weight of dried grape

$$= \frac{2 \text{ kg}}{80\%} = 2.5 \text{ kg} \quad \text{Choice (3)}$$

32. A train X departs from station A at 11.00 a.m. for station B, which is 180 km away. Another train Y departs from station B at 11.0 a.m. for station A. Train X travels at an average speed of 70 kms/hr and does not stop anywhere until it arrives at station B. Train Y travels at 50 kms/hr, but has to stop for 15 minutes at station C, which is 60 kms away from station B enroute to station A. Ignoring the lengths of the trains, what is the distance to the nearest km, from station A to the point where the trains cross each other?

- (1) 112 (2) 118
 (3) 120 (4) None of these

Solution:



Train Y reaches station C at 60/50 hours after 11 a.m.
 It stops for 15 minutes = 1/4 hour

\Rightarrow To gain 6 metres over C, B has to run for 36 metres.
 \Rightarrow length of the race = $36 + 12 = 48$ metres
 Choice (2)

37. Let x, y be two positive numbers such that $x + y = 1$.
 Then the minimum value of $\left[x + \frac{1}{x}\right]^2 + \left[y + \frac{1}{y}\right]^2$ is
 (1) 12 (2) 20 (3) 12.5 (4) 13.3

Solution:

This question can be done by assuming values for x and y since $x + y = 1$; the minimum value of $(x + 1/x)^2 + (y + 1/y)^2$ will be only when $x = y = 1/2$
 \therefore Minimum value = $(1/2 + 2)^2 + (1/2 + 2)^2 = 2(2.5)^2 = 12.5$
 Choice (3)

Directions for questions 38 and 39: The batting average (BA) of a test Batsman is computed from runs scored and innings played – completed innings and incomplete innings (not out) in the following manner:

r_1 = number of runs scored in completed innings

n_1 = number of completed innings

r_2 = number of runs scored in incomplete innings

n_2 = number of incomplete innings

$$BA = \frac{r_1 + r_2}{n_1}$$

To better assess a batsman's accomplishments, the ICC is considering two other measures MBA_1 and MBA_2 defined as follows:

$$MBA_1 = \frac{r_1}{n_1} + \frac{n_2}{n_1} \max \left[0, \left(\frac{r_2}{n_2} - \frac{r_1}{n_1} \right) \right]$$

$$MBA_2 = \frac{r_1 + r_2}{n_1 + n_2}$$

38. Based on the information provided which of the following is true?

- (1) $MBA_1 \leq BA \leq MBA_2$
- (2) $BA \leq MBA_2 \leq MBA_1$
- (3) $MBA_2 \leq BA \leq MBA_1$
- (4) None of these

Solution:

$$BA = \frac{r_1}{n_1} + \frac{n_2}{n_1} (0) = \frac{r_1}{n_1}$$

OR

$$\frac{r_1}{n_1} + \frac{n_2}{n_1} \left[\frac{r_2}{n_2} - \frac{r_1}{n_1} \right]$$

$$\frac{r_1}{n_1} + \frac{r_2}{n_1} - \frac{n_2 r_1}{n_1 \times n_2}$$

$$\frac{r_1 + r_2}{n_1} - \frac{n_2 r_1}{n_1^2} = BA - \frac{n_2 r_1}{n_1^2}$$

If $n_2 = 0$ $MBA_1 = BA$

$$\text{If } n_2 > 0 \text{ } MBA_1 = BA - \frac{n_2 r_1}{n_1^2}$$

$$\Rightarrow MBA_1 \leq BA \text{ ----- (1)}$$

Similarly if $n_2 = 0$

$$\begin{aligned} MBA_2 &= MBA_1 \\ \text{Otherwise } MBA_2 &< MBA_1 \\ \Rightarrow MBA_2 &\leq MBA_1 \text{ ----- (2)} \\ (1) \text{ and (2)} &\Rightarrow MBA_2 \leq MBA_1 \leq B. \end{aligned}$$

Choice (4)

39. An experienced cricketer with no incomplete innings has a BA of 50. The next time he bats, the innings is incomplete and he scores 45 runs. It can be inferred that
 (1) BA and MBA_1 will both increase
 (2) BA will increase and MBA_2 will decrease
 (3) BA will increase and not enough data is available to assess change in MBA_1 and MBA_2
 (4) None of these

Solution:

$$BA = 50 \text{ New BA} = 50 + \frac{45}{n_1}$$

$$\begin{aligned} MBA_1 &= 50 \text{ New } MBA_1 = 50 + \frac{n_1}{n_2} 0 \\ &= 50 \text{ [Since } 0 > (45 - 50)] \end{aligned}$$

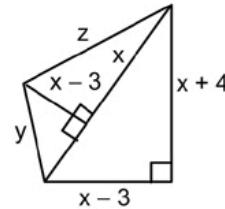
$$MBA_2 = \frac{5n + 45}{n_1 + 1} < 50$$

Therefore BA increases
 MBA_1 does not change
 MBA_2 decreases.

Choice (2)

Directions for questions 40 to 48: Answer the questions independent of each other.

40. Based on the figure, what is the value of x , if $y = 10$?



- (1) 10
- (2) 11
- (3) 12
- (4) None of these

Solution:

If $y = 10$

$$y^2 = 100$$

$x - 3$ = either 8 or 6 because $8^2 + 6^2 = 100$

If $x - 3 = 6$; then $x = 9 \Rightarrow x + 4 = 13$ and $x - 3 = 6$
 $13^2 + 6^2 = 169 + 36 = 205 \neq 172[(9 + 8)^2]$

Hence $x - 3 \neq 6$

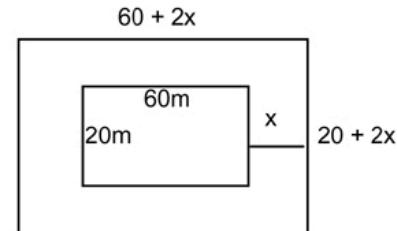
$$\Rightarrow x - 3 = 8 \Rightarrow x = 11.$$

Choice (2)

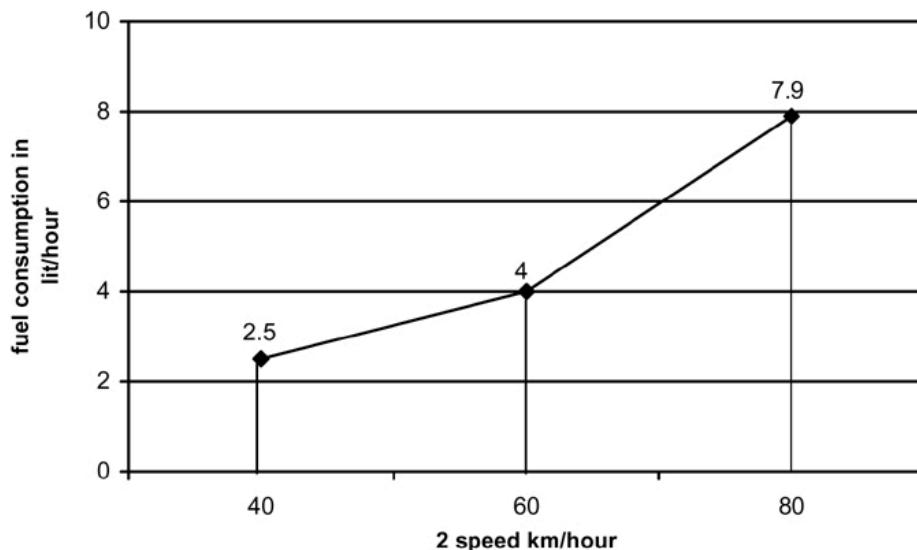
41. A rectangular pool 20 metres wide and 60 metres long is surrounded by a walkway of uniform width. If the total area of the walkway is 516 square metres, how wide, in metres, is the walkway?

- (1) 4.3
- (2) 4.3
- (3) 3
- (4) 3.5

Solution:



Directions for questions 49 and 50: The petrol consumption rate of a new model car 'Palto' depends on its speed and may be described by the graph below.



49. Manasa makes the 200 km trip from Mumbai to Pune at a steady speed of 60 km/hr. What is the amount of petrol consumed for the journey?

- (1) 12.5 litres (2) 13.33 litres
 (3) 16 litres (4) 19.75 litres

Solution:

$$4 \text{ Hrs per hour} \times \frac{200}{60} = \frac{800}{60} = \frac{80}{6} = \frac{40}{3} = 13.33 \text{ hrs.}$$

Choice (2)

50. Manasa would like to minimize the fuel consumption for the trip by driving at the appropriate speed. How should she change the speed?

- (1) Increase the speed

- (2) Decrease the speed
 (3) Maintain the speed at 60 km/hour
 (4) Cannot be determined

Solution:

$$2.5 \text{ ltrs} \times \frac{200}{40} = 12.5 \text{ ltrs.}$$

$$7.9 \text{ ltrs} \times \frac{200}{80} = 19.75 \text{ ltrs.}$$

If Manasa travels at 40 kmph. The total consumption would be 12.5 ltrs.

⇒ Manasa has to decrease the speed.

Choice (2)

SECTION – II (RC & Verbal)

NUMBER OF QUESTIONS – 50

Directions for questions 51 to 55: For the word given at the top of each table, match the dictionary definitions 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 boxes below the table, select the one that has all the definitions and their usages correctly matched.

51. EXCEED

A.	To extend outside of or enlarge beyond — used chiefly in strictly physical relations	E.	The mercy of God exceeds our finite comprehension.
B.	To be greater than or superior to	F.	Their accomplishments exceeded our expectation.
C.	Be beyond the comprehension of	G.	He exceeded his authority when he paid his brother's gambling debts with money from the trust.
D.	To go beyond a limit set by (as an authority or privilege)	H.	If this rain keeps up, the river will exceed its banks by morning.

(1)

A	H
B	F
C	E
D	G

(2)

A	H
B	E
C	F
D	G

(3)

A	G
B	F
C	E
D	H

(4)

A	F
B	G
C	H
D	E

Solution:

Let us first check for AH, AG and AF. Of these AH is correct hence choices 3 and 4 are ruled out. Let us now check for BF and BE. Of the two BF is correct hence 2 is also eliminated.
Choice (1)

52. INFER

A.	To derive by reasoning or implication	E.	We see smoke and infer fire.
B.	To surmise	F.	Given some utterance, a listener may infer from it all sorts of things which neither the utterance nor the utterer implied.
C.	To point out	G.	I waited all day to meet him. – from this you can infer my zeal to see him.
D.	To hint	H.	She did not take part in the debate except to ask a question inferring that she was not interested in the debate.

(1)

A	G
B	E
C	H
D	F

(2)

A	F
B	H
C	E
D	G

(3)

A	H
B	G
C	F
D	E

(4)

A	E
B	F
C	G
D	H

Solution:

Let us check for AG, AF, AH and AE. Of these AE is the right combination hence choices 1, 2 and 3 are ruled out.
Choice (4)

53. MELLOW

A.	Adequately and properly aged so as to be free of harshness	E.	He has mellowed with age.
B.	Freed from the rashness of youth	F.	The tones of the old violin were mellow.
C.	Of soft and loamy consistency	G.	Some wines are mellow.
D.	Rich and full but free from stridency	H.	Mellow soil is found in the Gangetic plains.

(1)

A	E
B	G
C	F
D	H

(2)

A	E
B	F
C	G
D	H

(3)

A	G
B	E
C	H
D	F

(4)

A	H
B	G
C	F
D	E

Solution:

Let us check for AE, AG and AH. Of these AG is the right combination hence choices 1, 2 and 4 are ruled out.
Choice (3)

54. RELIEF

A.	Removal or lightening of something distressing	E.	A ceremony follows the relief of a sentry after the morning shift.
B.	Aid in the form of necessities for the indigent	F.	It was a relief to take off the tight shoes.
C.	Diversion	G.	The only relief I have is playing cards.
D.	Release from the performance of duty	H.	Disaster relief was offered to the victims.

(1)

A	F
B	H
C	E
D	G

(2)

A	F
B	H
C	G
D	E

(3)

A	H
B	F
C	G
D	E

(4)

A	G
B	E
C	H
D	F

Solution:

Let us first check for AF, AH and AG. Of these AF is the right combination hence choices 3 and 4 are ruled out. Let us now check for CE and CG. Of these only CG is the right combination hence Choice 1 is also ruled out.

Choice (2)

55. PURGE

A.	Remove a stigma from the name of	E.	The opposition was purged after the coup.
B.	Make clean by removing whatever is superfluous, foreign	F.	The committee heard his attempt to purge himself of a charge of heresy.
C.	Get rid of	G.	Drugs that purge the bowels are often bad for the brain.
D.	To cause evacuation of	H.	It is recommended to purge water by distillation.

(1)

A	E
B	G
C	F
D	H

(2)

A	F
B	E
C	H
D	G

(3)

A	H
B	F
C	G
D	E

(4)

A	F
B	H
C	E
D	G

Solution:

Let us first check for AE, AF and AH. Of these the right combination is AF hence choices 1 and 3 are ruled out. Let us now check BE and BH. Of these the right combination is BH hence 2 is also ruled out. Choice (4)

Choice (4)

Directions for questions 56 to 60: The sentences given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.

Solution:

As per the choices E and A are our possible starting sentence. Of the two E is a very generalized statement and as such apt to begin a para. 'Regional' in A connects with 'India' in E hence A follows E. A talks of people who are not doing anything and the idea is continued by 'those who are employed' in D hence it follows A. 'office' in B connects with 'office' in D hence B follows D. EADBFC.

Choice (3)

Solution:

As per the choices either F or D begin the para. Of the two F is a general statement and hence it is a suitable first sentence. 'battle' in F connects with 'battle' in D which poses a question. E gives an answer to this question hence E follows D. E speaks of destroying productive capacities and also states that these productive capacity is different in different cases. A, B and C all speak of these different cases however in terms of chronology 'agrarian' in B should be followed by 'industrial' in A and 'information age' which is the latest comes next. FDEBAC.

Choice (1)

58. A. Michael Hofman, a poet and translator, accepts this sorry fact without approval or complaint.
B. But thanklessness and impossibility do not daunt him.

- C. He acknowledges too - in fact he returns to the point often - that best translators of poetry always fail at some level.
 - D. Hofman feels passionately about his work, and this is clear from his writings.
 - E. In terms of the gap between worth and rewards, translators come somewhere near nurses and street-cleaners.

(1) EACDB (2) ADEBC
(3) EACBD (4) DCEAB

Solution:

As per the choices E, A and D are possible first sentences. 'this sorry fact' in A rules it out. Between E and D, E is a more generalized statement and thus it is more suitable. E states a fact and A which has the word 'fact' in it follows next. 'He' in C refers to 'Michael Hofman' in A hence C follows A. 'impossibility' in B connects with 'fail' in C hence B follows C. EACBD.

Solution:

As per the choices the possible opening sentences are A, B, C or E. 'it' in C rules it out and 'this' in E also rules it out. Between A and B, A is a more general statement and hence it is the first sentence. ABCDE. Choice (4)

Solution:

D is a very general statement and is the first sentence. A continues the discussion about the nature of violence and how it is defined in theory. 'outsiders' in B connects with 'can anyone join in' in A hence it follows next. DABC. Choice (1)

Directions for questions 61 to 65: In each of the following sentences, parts of the sentence are left blank. Beneath each sentence, four different ways of completing the sentence are indicated. Choose the best alternative from among the four.

61. But _____ are now regularly written not just for tools, but well-established practices, organizations and institutions, not all of which seem to be _____ away.

 - (1) reports . . . withering
 - (2) stories . . . trading
 - (3) books . . . dying
 - (4) obituaries . . . fading

Solution:

Reports, stories and books are not written 'for' tools. Only 'obituaries' can be written for 'someone' or something. 'Fading' fits in with this. Choice (4)

62. The Darwin who _____ is most remarkable for the way in which he _____ the attributes of the world class thinker and head of the household.

 - (1) comes . . . figures
 - (2) arises . . . adds
 - (3) emerges . . . combines
 - (4) appeared . . . combines

Solution:

The keywords here are 'world class thinker' and 'head of the household'. The sentence tells us that Darwin had both the above mentioned attributes and the appropriate word for the second blank would be combines. The first blank as per the choices could be either emerges or appeared. However 'emerges' fits in appropriately. Choice (3)

63. Since her face was free of _____ there was no way to _____ if she appreciated what had happened.

 - (1) make-up . . . realise
 - (2) expression . . . ascertain
 - (3) emotion . . . diagnose
 - (4) scars . . . understand

Solution:

The keywords here are 'face' 'free of ', 'no way' and 'appreciated'. The sentence conveys the idea that the facial expression is the key to finding out reaction of people. The appropriate words here are 'expression' and 'ascertain'. Choice (2)

64. In this context, the _____ of the British labour movement is particularly _____.
(1) affair . . . weird
(2) activity . . . moving
(3) experience . . . significant
(4) atmosphere . . . gloomy

Solution:

The word 'affair' in choice 1 does not fit into the blank as it does not convey any sense. In the same way 'activity.....moving' in 2 also does not convey any sense and is rejected 'atmosphere' does not make sense when used along with 'British.....'

Hence choice 4 is also rejected. 'experience' fits in with 'labour movement' and 'significant' fits into the second blank to give a coherent sentence.

Choice (3)

65. Indian intellectuals may boast, if they are so inclined, of being _____ to the most elitist among the intellectual _____ of the world.

 - (1) subordinate . . . traditions
 - (2) heirs . . . cliques
 - (3) ancestors . . . societies
 - (4) heir . . . traditions

Solution:

The keywords here are 'intellectuals' 'boast' and 'elitist'. The word 'intellectuals' denotes a group and as such gives us a clue that the first blank should contain a word that refers to this group. Choices 2 and 3 contain plural words heirs and ancestors hence they are ruled out. The word 'subordinate' does not qualify the word 'boast' hence 1 is also rejected. 'heir' in 4 refers to this group and traditions fits in with 'intellectual.....world' at the end of the sentence.

Choice (4)

Directions for questions 66 to 70: For each of the words below, a contextual usage is provided. Pick the word from the alternatives given that is most inappropriate in the given context.

Solution:

'Specious' means something that seems to be good or logical without really being so in other words, false. Credible which means reliable is the only word that is does not fit in. Choice (3)

Directions for questions 71 to 75: The passage given below is followed by a set of five questions. Choose the best answer to each question.

Number of words in this passage : 633

The union government's present position vis-à-vis the upcoming United Nations conference on racial and related discrimination world-wide seems to be the following: discuss race please, not caste; caste is our very own and not at all as bad as you think. The gross hypocrisy of that position has been lucidly underscored by *Kancha Ilaiah*. Explicitly, the world community is to be cheated out of considering the matter on the technicality that caste is not, as a concept, tantamount to a racial category. Internally, however, allowing the issue to be put on agenda at the said conference would, we are patriotically admonished, damage the country's image. Somehow, India's virtual beliefs elbow out concrete actualities. Inverted representations, as we know, have often been deployed in human histories as balm for the forsaken – religion being the most persistent of such inversions. Yet, we would humbly submit that if globalising our markets are thought good for the 'national' pocket, globalising our social inequities might not be so bad for the mass of our people. After all, racism was as uniquely institutionalised in South Africa as caste discrimination has been within our society; why then can't we permit the world community to express itself on the latter with a fraction of the zeal with which, through the years, we pronounced on the former?

As to the technicality about whether or not caste is admissible into an agenda about race (that the conference is also about 'related discriminations' tends to be forgotten), a reputed sociologist has recently argued that where race is a 'biological' category caste is a 'social' one. Having earlier fiercely opposed implementation of the Mandal Commission Report, the said sociologist is at least to be complimented now for admitting, however tangentially, that caste

Solution:

Obviate means to prevent, to do away with or to make unnecessary. Bolster which means to support, strengthen or reinforce is an inappropriate replacement for the word obviate. Choice (4)

- 68.** Disuse: Some words fall into disuse as technology makes objects obsolete.
(1) Prevalent (2) Discarded
(3) Obliterated (4) Unfashionable

Solution:

Disuse means to stop using or some practice which is not in vogue any more. Prevalent means widely existing, generally practiced and hence this is an inappropriate word to use. Choice (1)

Solution:

Parsimonious means miserliness, stinginess and extreme frugality. Altruistic means selflessness, or unselfish and this is the word that is most inappropriate in the given circumstances.

Choice (4)

- 70.** Facetious: When I suggested that war is a method of controlling population, my father remarked that I was being facetious.

844

Facetious means joking or trying to be humorous at an inappropriate time. Jovian means of the planet Jupiter or pertaining to it which is inappropriate.

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discrimination is a reality, although, in his view, incompatible with racial discrimination. One would like quickly to offer the hypothesis that biology, in important ways that affect the lives of many millions, is in itself perhaps a social construction. But let us look at the matter in another way.

If it is agreed – as per the position today at which anthropological and allied scientific determinations rest – that the entire race of *homo sapiens* derived from an originary black African female (called ‘Eve’) then one is hard put to understand how, on some subsequent ground, ontological distinctions are to be drawn either between races or castes. Let us also underline the distinction between the supposition that we are all god’s children and the rather more substantiated argument about our descent from ‘Eve’, lest both positions are thought to be equally diversionary. It then stands to reason that all subsequent distinctions are, in modern parlance, ‘constructed’ ones, and, like all ideological constructions, attributable to changing equations between knowledge and power among human communities through contested histories here, there, and elsewhere.

This line of thought receives, thankfully, extremely consequential buttress from the findings of the Human Genome project. Contrary to earlier (chiefly 19th century colonial) persuasions on the subject of race, as well as, one might add, the somewhat infamous Jensen offerings in the 20th century from America, those findings deny genetic difference between 'races'. If anything, they suggest that environmental factors impinge on gene-function, as a dialectic seems to unfold between nature and culture. It would thus seem that 'biology' as the constitution of pigmentation enters the picture first only as a part of that dialectic. Taken together, the originary mother stipulation and the Genome findings ought indeed to furnish ground for human equality across the board, as well as yield policy initiatives towards equitable material dispensations aimed at building a global order where, in Hegel's stirring formulation, only the rational constitutes the right. Such, sadly, is not the case as everyday fresh arbitrary grounds for discrimination are constructed in the interests of sectional dominance.

71. When the author writes "globalising our social inequities," the reference is to:

 - (1) going beyond an internal deliberation on social inequity.
 - (2) dealing with internal poverty through the economic benefits of globalisation.
 - (3) going beyond an internal delimitation of social inequity.
 - (4) achieving disadvantaged people's empowerment, globally.

Solution:

Refer to the last 4 lines of para 1. The words 'why then can't we permit the world community to express itself . .' suggests that choice 1 is the right answer.

Choice (1)

72. According to the author, 'inverted representations as balm for the forsaken':

 - (1) is good for the forsaken and often deployed in human histories.
 - (2) is good for the forsaken, but not often deployed historically for the oppressed.
 - (3) occurs often as a means of keeping people oppressed.
 - (4) occurs often to invert the *status quo*.

Solution:

Refer to para 1, lines 7 - 9. 'Inverted representation' clearly refers to distortion of reality and we use this as balm for the forsaken. The earlier lines also refer to 'gross hypocrisy'. Hence choice (3) is apt.

Choice (3)

Solution:

Refer to the first sentence of the passage which shows that A and C fall under the purview of the UN conference.

Choice (1)

74. According to the author, the sociologist who argued that race is a 'biological' category and caste is a 'social' one:

 - (1) generally shares the same orientation as the author's on many of the central issues discussed.
 - (2) tangentially admits to the existence of "caste" as a category.
 - (3) admits the incompatibility between the people of different race and caste.
 - (4) admits indirectly that both caste-based prejudice and racial discrimination exist.

Solution:

Refer to para 2, lines 4 - 6. By calling race biological and casts social, the sociologists admits to the existence of both. Choice (4)

Choice (4)

75. An important message in the passage, if one accepts a dialectic between nature and culture, is that:

 - (1) the results of the Human Genome Project reinforces racial differences.
 - (2) race is at least partially a social construct.
 - (3) discrimination is at least partially a social construct.
 - (4) caste is at least partially a social construct.

Solution:

Refer to para 4, lines 4 - 6.

Choice (2)

Directions for questions 76 to 80: The passage given below is followed by a set of five questions. Choose the best answer to each question.

Number of words in this passage : 652

Studies of the factors governing reading development in young children have achieved a remarkable degree of consensus over the past two decades. This consensus concerns the causal role of phonological skills in young children's reading progress. Children who have good phonological skills, or good "phonological awareness", become good readers and good spellers. Children with poor phonological skills progress more poorly. In particular, those who have a specific phonological deficit are likely to be classified as dyslexic by the time that they are 9 or 10 years old.

Phonological skills in young children can be measured at a number of different levels. The term *phonological awareness* is a global one, refers to a deficit in recognising smaller units of sound within spoken words. Developmental work has shown that this deficit can be at the level of syllables, of onsets and rimes, or of phonemes. For example, a 4-year old child might have difficulty in recognising that a word like *valentine* has three syllables, suggesting a lack of *syllabic* awareness. A 5-year old might have difficulty in recognising that the odd word out in the set of words *fan*, *cat*, *mat* is *fan*. This task requires an awareness of the sub-syllabic units of the *onset* and the *rime*. The onset corresponds to any initial consonants in a syllable, and the rime corresponds to the vowel and to any following consonants. Rimes correspond to rhyme in single-syllable words, and so the rime in *fan* differs from the rime in *cat*, *hat* and *mat*. In longer words, rime and rhyme may differ. The onsets in *val:en:tine* are /v/ and /t/, and the rimes correspond to the spelling patterns 'al', 'en', and 'ine'.

A 6-year-old might have difficulty in recognising that *plea* and *pray* begin with the same initial sound. This is a *phonemic* judgement. Although the initial phoneme /p/ is shared between the two words, in *plea* it is part of the onset 'pl', and in *pray* it is part of the onset 'pr'. Until children can segment the onset (or the rime), such phonemic judgements are difficult for them to make. In fact, a recent survey of different developmental studies has shown that the different levels of phonological awareness appear to emerge sequentially. The awareness of syllables, onsets, and rimes appears to emerge at round the ages of 3 and 4, long before most children go to school. The awareness of phonemes, on the other hand, usually emerges at around the age of 5 or 6, when children have been taught to read for about a year. An awareness of onsets and rimes thus appears to be a precursor of reading, whereas an awareness of phonemes at every serial position in a word only appears to develop as reading is taught. The onset-rime and phonemic levels of phonological structure, however, are not distinct. Many onsets in English are single phonemes, and so are some rimes (e.g., *sea*, *go*, *zoo*).

The early availability of onsets and rimes is supported by studies that have compared the development of phonological awareness of onsets, rimes and phonemes in the same subjects using the same phonological awareness tasks. For example, a study by Treiman and Zudowski used a same/different judgement task based on the beginning or the end sounds of words. In the beginning sound task, the words either began with the same onset, as in *plea* and *plank*, or shared only the initial phoneme, as in *plea* and *pray*. In the end-sound task, the words either shared the entire rime, as in *spit* and *wit*, or shared only the final phoneme, as in *rat* and *wit*. Treiman and Zudowski showed that 4- and 5-year-old children found the onset-rime version of the same/different task significantly easier than the version based on phonemes. Only the 6-year-olds, who had been learning to read for about a year, were able to perform both versions of the tasks with an equal level of success.

- 76.** From the following statements, pick out the true statement according to the passage:
- A mono-syllabic word can have only one onset.
 - A mono-syllabic word can have only one rhyme but more than one rime.
 - A mono-syllabic word can have only one phoneme.
 - All of the above.

Solution:

Statement 1 is true – a syllable is a unit of sound and onset is sub syllabic and refers to the initial consonant sound. Statement 2 is not true – para 2, line 3 from the end of the para negates it. Statement 3 is also not true – in monosyllabic words like 'plea' and 'pray', the initial phoneme is /p/.

Choice (1)

- 77.** Which of the following is likely to emerge last in the cognitive development of a child?
- Rhyme.
 - Rime.
 - Onset.
 - Phoneme.

Solution:

Refer to para 3, lines 6 - 9. Phonemes emerged the last.
Choice (4)

- 78.** A phonological deficit in which of the following is likely to be classified as dyslexia?
- Phonemic judgement.
 - Onset judgement.
 - Rime judgement.
 - Any one or more of the above.

Solution:

Refer to para 1, end. Children with poor phonological skill or deficit develop dyslexia and the deficit may be in one or more areas.

Choice (4)

- 79.** The Treiman and Zudowski experiment found evidence to support the following:
- at age 6, reading instruction helps children perform, both the same-different judgement task.

- (2) the development of onset-rime awareness precedes the development of an awareness of phonemes.
- (3) at age 4-5 children find the onset-rime version of the same/different task significantly easier.
- (4) the development of onset-rime awareness is a necessary and sufficient condition for the development of an awareness of phonemes.

Solution:

Refer to the last para, lines 7 - 9. Choice 2 is right. Choice 3 is not the answer since it is incomplete ('easier' than what?)

Choice (2)

- 80.** The single-syllabus words *Rhyme* and *Rime* are constituted by the exact same set of:

- | | |
|---------------|-----------------|
| A. rime(s). | B. onset(s). |
| C. rhymes(s). | D. phonemes(s). |
| (1) A, B | (2) A, C |
| (3) A, B, C | (4) B, C, D |

Solution:

In monosyllabic words rimes corresponds with rhymes (para 2, 3rd line from the end). Hence A and C. Onsets and phonemes are not identical.

Choice (2)

Directions for questions 81 to 84: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 669

Billie Holiday died a few weeks ago. I have been unable until now to write about her, but since she will survive many who receive longer obituaries, a short delay in one small appreciation will not harm her or us. When she died we – the musicians, critics, all who were ever transfixed by the most heart-rending voice of the past generation – grieved bitterly. There was no reason to. Few people pursued self-destruction more whole-heartedly than she, and when the pursuit was at an end, at the age of forty-four, she had turned herself into a physical and artistic wreck. Some of us tried gallantly to pretend otherwise, taking comfort in the occasional moments when she still sounded like a ravaged echo of her greatness. Others had not even the heart to see and listen any more. We preferred to stay home and, if old and lucky enough to own the incomparable records of her heyday from 1937 to 1946, many of which are not even available on British LP, to recreate those coarse-textured, sinuous, sensual and unbearable sad noises which gave her a sure corner of immortality. Her physical death called, if anything, for relief rather than sorrow. What sort of middle age would she have faced without the voice to earn money for her drinks and fixes, without the looks - and in her day she was hauntingly beautiful – to attract the men she needed, without business sense, without anything but the disinterested worship of ageing men who had heard and seen her in her glory?

And yet, irrational though it is, our grief expressed Billie Holiday's art, that of a woman for whom one must be sorry. The great blues singers, to whom she may be justly compared, played their game from strength. Lionesses, though often wounded or at bay (did not Bessie Smith call herself 'a tiger, ready to jump'?), their tragic equivalents were Cleopatra and Phaedra; Holiday's was an embittered Ophelia. She was the Puccini heroine among blues singers, or rather among jazz singers, for though she sang a cabaret version of the blues incomparably, her natural idiom was the pop song. Her unique achievement was to have twisted this into a genuine expression of the major passions by means of a total disregard of its sugary tunes, or indeed of any tune other her own few delicately crying elongated notes, phrased like Bessie Smith or Louis Armstrong in sackcloth, sung in a thin, gritty, haunting voice whose natural mood was an unresigned and voluptuous welcome for the pains of love. Nobody has sung, or will sing, Bess's songs from *Porgy* as she did. It was this combination of bitterness and physical submission, as of someone lying still while watching his legs being amputated, which gives such a blood-curdling quality to her *Strange Fruit*, the anti-lynching poem which she turned into an unforgettable art song. Suffering was her profession; but she did not accept it.

Little need be said about her horrifying life, which she described with emotional, though hardly with factual, truth in her autobiography *Lady Sings the Blues*. After an adolescence in which self-respect as measured by a girl's insistence on picking up the coins thrown to her by clients with her hands, she was plainly beyond help. She did not lack it, for she had the flair and scrupulous honesty for John Hammond to launch her, the best musicians of the 1930s to accompany her – notably Teddy Wilson, Frankie Newton and Lester Young – the boundless devotion of all serious connoisseurs, and much public success. It was too late to arrest a career of systematic embittered self-immolation. To be born with both beauty and self-respect in the Negro ghetto of Baltimore in 1915 was too much of a handicap, even without rape at the age of ten and drug-addiction in her teens. But, while she destroyed herself, she sang, unmelodious, profound and heartbreaking. It is impossible not to weep for her, or not to hate the world which made her what she was.

- 81.** Why will Billie Holiday survive many who receive longer obituaries?

- (1) Because of her blues creations.
- (2) Because she was not as self-destructive as some other blues exponents.
- (3) Because of her smooth and mellow voice.
- (4) Because of the expression of anger in her songs.

Solution:

Refer to para 1, line 1 which says 'gave her a sure corner of immortality'. What gave her immortality

was her songs and para 2, line 2 says she was a 'great blues singer'.

Choice (1)

- 82.** According to the author, if Billie Holiday had not died in her middle age

- (1) she would have gone on to make a further mark.
- (2) she would have become even richer than what she was when she died.
- (3) she would have led a rather ravaged existence.
- (4) she would have led a rather comfortable existence.

Solution:

Refer to the last four lines of para 1.

Choice (3)

83. Which of the following statements is not representative of the author's opinion?
- (1) Billie Holiday had her unique brand of melody.
 - (2) Billie Holiday's voice can be compared to other singers in certain ways.
 - (3) Billie Holiday's voice had a ring of profound sorrow.
 - (4) Billie Holiday welcomed suffering in her profession and in her life.

Solution:

Choices 1 and 3 are supported by para 1, lines 10 - 11 choice 2 by para 2. Choice 4 is not the author's opinion.

Choice (4)

84. According to the passage, Billie Holiday was fortunate in all but one of the following ways:

- (1) She was fortunate to have been picked up young by an honest producer.
- (2) She was fortunate to have the likes of Louis Armstrong and Bessie Smith accompany her.
- (3) She was fortunate to possess the looks.
- (4) She enjoyed success among the public and connoisseurs.

Solution:

Choice 2 is not true, refer to para 2, lines 3 - 4.

Choice (2)

Directions for questions 85 to 90: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Number of words in this passage : 894

The narrative of Dersu Uzala is divided into two major sections, set in 1902 and 1907, the deal with separate expeditions which Arseniev conducts into the Ussuri region. In addition, a third time frame forms a prologue to the film. Each of the temporal frames has a different focus, and by shifting them Kurosawa is able to describe the encroachment of settlements upon the wilderness and the consequent erosion of Dersu's way of life. As the film opens, that erosion has already begun. The first image is a long shot of a huge forest, the trees piled upon one another by the effects of the telephoto lens so that the landscape becomes an abstraction and appears like a huge curtain of green. A title informs us that the year is 1910. This is as late into the century as Kurosawa will go. After his prologue, the events of the film will transpire even farther back in time and will be presented as Arseniev's recollections. The character of Dersu Uzala is the heart of the film, his life the example that Kurosawa wishes to affirm. Yet the formal organisation of the film works to contain, to close, to circumscribe that life by erecting a series of obstacles around it. The film itself is circular, opening and closing by Dersu's grave, thus sealing off the character from the modern world to which Kurosawa once so desperately wanted to speak. The multiple time frames also work to maintain a separation between Dersu and the contemporary world. We must go back farther even than 1910 to discover who he was. But this narrative structure has yet another implication. It safeguards Dersu's example, inoculates it from contamination with history, and protects it from contact with the industrialised, urban world. Time is organised by the narrative into a series of barriers, which enclose Dersu in a kind of vacuum chamber, protecting him from the social and historical dialectics that destroyed the other Kurosawa heroes. Within the film, Dersu does die, but the narrative structure attempts to immortalise him and his example, as Dersu passes from history into myth.

We see all this at work in the enormously evocative prologue. The camera tilts down to reveal felled trees littering the landscape and an abundance of construction. Roads and houses outline the settlement that is being built. Kurosawa cuts to a medium shot of Arseniev standing in the midst of the clearing, looking uncomfortable and disoriented. A man passing in a wagon asks him what he is doing, and the explorer says he is looking for a grave. The driver replies that no one has died here, the settlement is too recent. These words enunciate the temporal rapture that the film studies. It is the beginning of things (industrial society) and the end of things (the forest), the commencement of one world so young that no one has had time yet to die and the ellipse of another, in which Dersu has died. It is his grave for which the explorer searches. His passing symbolises the new order, the development that now surrounds Arseniev. The explorer says he buried his friend three years ago, next to huge cedar and fir trees, but now they all are gone. The man on the wagon replies they were probably chopped down when the settlement was built, and he drives off. Arseniev walks to a barren, treeless spot next to a pile of bricks. As he moves, the camera tracks and pans to follow, revealing a line of freshly built houses and a woman hanging her laundry to dry. A distant train whistle is heard, and the sounds of construction in the clearing vie with the cries of birds and the rustle of wind in the trees. Arseniev pauses, looks around for the grave that once was, and murmurs desolately, "Dersu." The image now cuts farther into the past, to 1902, and the first section of the film commences, which describes Arseniev's meeting with Dersu and their friendship.

Kurosawa defines the world of the film initially upon a valid, a missing presence. The grave is gone, brushed aside by a world rushing into modernism, and now the hunter exists only in Arseniev's memories. The hallucinatory dreams and visions of Dodeskaden are succeeded by nostalgic, melancholy ruminations. Yet by exploring these ruminations, the film celebrates the timelessness of Dersu's wisdom. The first section of the film has two purposes: to describe the magnificence and inhuman vastness of nature and to delineate the code of ethics by which Dersu lives and which permits him to survive in these conditions. When Dersu first appears, the other soldiers treat him with condescension and laughter, but Arseniev watches him closely and does not share their derisive response. Unlike them, he is capable of immediately grasping Dersu's extraordinary qualities. In camp, Kurosawa frames Arseniev by himself, sitting on the

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2001/18

other side of the fire from his soldiers. While they sleep or joke among themselves, he writes in his diary and Kurosawa cuts in several point-of-view shots from his perspective of trees that appear animated and sinister as the fire light dances across their gnarled, leafless outlines. This reflective dimension, this sensitivity to the spirituality of nature, distinguishes him from the others and forms the basis of his receptivity of Dersu and their friendship. It makes him a fit pupil for the hunter.

85. How is Kurosawa able to show the erosion of Dersu's way of life?
- By documenting the ebb and flow of modernisation.
 - By going back farther and farther in time.
 - By using three different time frames and shifting them.
 - Through his death in a distant time.

Solution:

Refer to para 1, lines 3 - 5. Choice (3)

86. Arseniev's search for Dersu's grave
- is part of the beginning of the film.
 - symbolises the end of the industrial society.
 - is misguided since the settlement is too new.
 - symbolises the rediscovery of modernity.

Solution:

Refer to para 2, first 5 lines. The search is part of the prologue, hence beginning. Choice (1)

87. The film celebrates Dersu's wisdom:
- by exhibiting the moral vacuum of the pre-modern world.
 - by turning him into a mythical figure.
 - through hallucinatory dreams and visions.
 - through Arseniev's nostalgic, melancholy ruminations.

Solution:

Refer to para 3, lines 1 - 4. Choice (4)

88. According to the author the section of the film following the prologue:
- serves to highlight the difficulties that Dersu faces that eventually kills him.

Directions for questions 91 to 96: The passage given below is followed by a set of six questions. Choose the best answer to each question.

Number of words in this passage : 933

Democracy rests on a tension between two different principles. There is, on the one hand, the principle of equality before the law, or, more generally, of equality, and, on the other, what may be described as the leadership principle. The first gives priority to rules and the second to persons. No matter how skilfully we contrive our schemes, there is a point beyond which the one principle cannot be prompted without some sacrifice of the other.

Alexis de Tocqueville, the great nineteenth century writer on democracy, maintained that the age of democracy, whose birth he was witnessing, would also be the age of mediocrity: in saying this he was thinking primarily of a regime of equality governed by impersonal rules. Despite his strong attachment to democracy, he took great pains to point out what he believed to be its negative side: a dead level plane of achievement in practically every sphere of life. The age of democracy would, in his view, be an unheroic age; there would not be room in it for either heroes or hero-worshippers.

But modern democracies have not been able to do without heroes: this too was foreseen, with much misgiving, by Tocqueville. Tocqueville viewed this with misgiving because he believed, rightly or wrongly, that unlike in aristocratic societies there was no proper place in a democracy for heroes and, hence, when they arose they would sooner or later turn into despots. Whether they require heroes or not, democracies certainly require leaders, and, in the contemporary age, breed them in great profusion; the problem is to know what to do with them.

In a world preoccupied with scientific rationality the advantages of a system based on an impersonal rule of law should be a recommendation with everybody. There is something orderly and predictable about such a system. When life is lived mainly in small, self-contained communities, men are able to take finer personal distinctions into account in dealing with their fellow men. They are unable to do this in a large and amorphous society, and organised living would be impossible here without a system of impersonal rules. Above all, such a system guarantees a kind of equality to the extent that everybody, no matter in what station of life, is bound by the same explicit, often written, rules, and nobody is above them.

But a system governed solely by impersonal rules can at best ensure order and stability; it cannot create any shinning vision of a future in which mere formal equality will be replaced by real equality and fellowship. A world governed by impersonal rules cannot easily change itself, or when it does, the change is so gradual as to make the basic and fundamental feature of society appear unchanged. For any kind of basic or fundamental change, a push is needed from within, a kind of individual initiative which will create new rules, new terms and conditions of life.

The issue of leadership thus acquires crucial significance in the context of change. If the modern age is preoccupied with scientific rationality, it is no less preoccupied with change. To accept what exists on its own terms is traditional, not modern, and it may be all very well to appreciate tradition in music, dance and drama, but for society as a whole the choice has already been made in favour of modernisation and development. Moreover, in some countries the gap between ideal and reality has become so great that the argument for development and change is now irresistible.

In these countries no argument for development has greater appeal or urgency than the one which shows development to be the condition for the mitigation, if not the elimination, of inequality. There is something contradictory about the very presence of large inequalities in a society which professes to be democratic. It does not take people too long to realise that democracy by itself can guarantee only formal equality; beyond this, it can only whet people's appetite for real or substantive equality. From this arises their continued preoccupation with plans and schemes that will help to bridge the gap between the ideal of equality and the reality which is so contrary to it.

When pre-existing rules give no clear directions of change, leadership comes into its own. Every democracy invests its leadership with a measure of charisma, and expects from it a corresponding measure of energy and vitality. Now, the greater the urge for change in a society the stronger the appeal of a dynamic leadership in it. A dynamic leadership seeks to free itself from the constraints of existing rules; in a sense that is the test of its dynamism. In this process it may take a turn at which it ceases to regard itself as being bound by these rules, placing itself above them. There is always a tension between 'charisma' and 'discipline' in the case of a democratic leadership, and when this leadership puts forward revolutionary claims, the tension tends to be resolved at the expense of discipline.

Characteristically, the legitimacy of such a leadership rests on its claim to be able to abolish or at least substantially reduce the existing inequalities in society. From the argument that formal equality or equality before the law is but a limited good, it is often one short step to the argument that it is a hindrance or an obstacle to the establishment of real or substantive equality. The conflict between a 'progressive' executive and a 'conservative' judiciary is but one aspect of this larger problem. This conflict naturally acquires added piquancy when the executive is elected and the judiciary appointed.

91. Dynamic leaders are needed in democracies because:

- (1) they have adopted the principles of 'formal' equality rather than 'substantive' equality.
- (2) 'formal' equality whets people's appetite for 'substantive' equality.
- (3) systems that rely on the impersonal rules of 'formal' equality loose their ability to make large changes.
- (4) of the conflict between a 'progressive' executive and a 'conservative' judiciary.

Solution:

Refer to the last 4 sentences of para 5 and the first sentence of para 6.
Choice (3)

92. What possible factor would a dynamic leader consider a 'hindrance' in achieving the development goals of a nation?

- (1) Principle of equality before the law
- (2) Judicial activism
- (3) A conservative judiciary
- (4) Need for discipline

Solution:

Refer to the last para.
Choice (3)

93. Which of the following four statements can be inferred from the above passage?

- A. Scientific rationality is an essential feature of modernity.
 - B. Scientific rationality in the development of impersonal rules.
 - C. Modernisation and development have been chosen over traditional music, dance and drama.
 - D. Democracies aspire to achieve substantive equality.
- (1) A, B, D but not C (2) A, B but not C, D
(3) A, D but not B, C (4) A, B, C and not D

Solution:

Statement C is a distortion of what is stated in para 6. The first two lines of para 4 substantiate statements A and B. Statement D is supported by para 2, lines 3.
Choice (1)

94. Tocqueville believed that the age of democracy would be an un-heroic age because:

- (1) democratic principles do not encourage heroes.
- (2) there is no urgency for development in democratic countries.

- (3) heroes that emerged in democracies would become despots.
 - (4) aristocratic society had a greater ability to produce heroes.

Solution:

Refer to para 2, last sentence.

Choice (1)

95. A key argument the author is making is that:

 - (1) in the context of extreme inequality, the issue of leadership has limited significance.
 - (2) democracy is incapable of eradicating inequality.
 - (3) formal equality facilitates development and change.
 - (4) impersonal rules are good for avoiding instability but fall short of achieving real equality.

Solution:

Refer to para 5, lines 1 - 2. Choice (4)

Choice (2)

96. Which of the following four statements can be inferred from the above passage?

 - A. There is conflict between the pursuit of equality and individuality.
 - B. The disadvantages of impersonal rules can be overcome in small communities.
 - C. Despite limitations, impersonal rules are essential in large systems.
 - D. Inspired leadership rather than plans and schemes, is more effective in bridging inequality.

(1) B, D (2) A, C (3) A, B, C (4) B

Solution:

Statement A can be inferred from para 1. Statement B is supported by para 4, lines 3 - 4. Statement C is clearly stated in para 4 and so is not an inference. Statement D cannot be inferred. Refer to the last two paras. Line 1 of the last para as well as the last sentence of the penultimate para only refer to the 'claims' made by leaders not facts.

Directions for questions 97 to 100: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 620

In the modern scientific story, light was created not once but twice. The first time was in the Big Bang, when the universe began its existence as a glowing, expanding, fireball, which cooled off into darkness after a few million years. The second time was hundreds of millions of years later, when the cold material condensed into dense nuggets under the influence of gravity, and ignited to become the first stars.

Sir Martin Rees, Britain's astronomer royal, named the long interval between these two enlightenments the cosmic "Dark Age." The name describes not only the poorly lit conditions, but also the ignorance of astronomers about that period. Nobody knows exactly when the first stars formed, or how they organised themselves into galaxies – or even whether stars were the first luminous objects. They may have been preceded by quasars, which are mysterious, bright spots found at the centres of some galaxies.

Now, two independent groups of astronomers, one led by Robert Becker of the University of California, Davis, and the other by George Djorgovski of the Caltech, claim to have peered far enough into space with their telescopes (and therefore backwards enough in time) to observe the closing days of the Dark Age.

The main problem that plagued previous efforts to study the Dark Age was not the lack of suitable telescopes, but rather the lack of suitable things at which to point them. Because these events took place over 13 billion years ago, if astronomers are to have any hope of unravelling them they must study objects that are at least 13 billion light years away. The best prospects are quasars, because they are so bright and compact that they can be seen across vast stretches of space. The energy source that powers a quasar is unknown, although it is suspected to be the intense gravity of a giant black hole. However, at the distances required for the study of Dark Age, even quasars are extremely rare and faint.

Recently some members of Dr. Becker's team announced their discovery of the four most distant quasars known. All the new quasars are terribly faint, a challenge that both teams overcame by peering at them through one of the twin Keck telescopes in Hawaii. These are the world's largest, and can therefore collect the most light. The new work by Dr. Becker's team analysed the light from all four quasars. Three of them appeared to be similar to ordinary, less distant quasars. However, the fourth and most distant, unlike any other quasar ever seen, showed unmistakable signs of being shrouded in a fog of hydrogen gas. This gas is the leftover material of the Big Bang that did not condense into stars or quasars. It acts like fog because new-born stars and quasars emit mainly ultraviolet light, and hydrogen gas is opaque to ultraviolet. Seeing this fog had been the goal of would-be Dark Age astronomers since 1965, when James Gunn and Bruce Peterson spelled out the technique for using quasars as backlighting beacons to observe the fog's ultraviolet shadow.

The fog prolonged the period of darkness until the heat from the first stars and quasars had the chance to ionise the hydrogen (breaking it into its constituent parts, protons and electrons). Ionised hydrogen is transparent to ultraviolet radiation, so at that moment the fog lifted the universe became the well-lit place it is today. For this reason, the end of the Dark Age is called the "Epoch of Re-ionisation." Because the ultraviolet shadow is visible only in the most distant of the four quasars, Dr. Becker's team concluded that the fog had dissipated completely by the time the universe was about 900 million years old, and one-seventh of its current size.

- 97.** In the passage, the Dark Age refers to:
 (1) the period when the universe became cold after the Big Bang.
 (2) a period about which astronomers know very little.
 (3) the medieval period when cultural activity seemed to have come to an end.
 (4) the time that the universe took to heat up after the Big Bang.

Solution:

Refer to the first 3 lines of para 2. Choice (2)

- 98.** Astronomers find it difficult to study the Dark Age because:
 (1) suitable telescopes are few.
 (2) the associated events took place aeons ago.
 (3) the energy source that powers a quasar is unknown.
 (4) their best chance is to study quasars, which are faint objects to begin with.

Solution:

Refer to the first 3 lines of para 4. Choice (2)

- 99.** The four most distant quasars discovered recently:
 (1) could only be seen with the help of large telescopes.
 (2) appear to be similar to other ordinary quasars.
 (3) appear to be shrouded in a fog of hydrogen gas.
 (4) have been sought to be discovered by Dark Age astronomers since 1965.

Solution:

Refer to the first 4 lines of para 5. Choice (1)

- 100.** The fog of hydrogen gas seen through the telescopes:
 (1) is transparent to hydrogen radiation from stars and quasars in all states.
 (2) was lifted after heat from stars and quasars ionised it.
 (3) is material which eventually became stars and quasars.
 (4) is broken into constituent elements when stars and quasars are formed.

Solution:

Refer to the first two lines of the last para.

Choice (2)

SECTION – III (DI)

NUMBER OF QUESTIONS – 50

Directions for questions 101 to 104: Answer the questions based on the table given below.

The following is a table describing garments manufactured based upon the colour and size for each lay. There are four sizes: M-Medium, L-Large, XL-Extra Large and XXL-Extra-Extra Large. There are three colours : Yellow, Red and White.

Lay	Number of Garments											
	Yellow				Red				White			
Lay No.	M	L	XL	XXL	M	L	XL	XXL	M	L	XL	XXL
1	14	14	7	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	42	42	21	0
3	20	20	10	0	18	18	9	0	0	0	0	0
4	20	20	10	0	0	0	0	0	30	30	15	0
5	0	0	0	0	24	24	12	0	30	30	15	0
6	22	22	11	0	24	24	12	0	32	32	16	0
7	0	24	24	12	0	0	0	0	0	0	0	0
8	0	20	20	10	0	2	2	1	0	0	0	0
9	0	20	20	10	0	0	0	0	0	22	22	11
10	0	0	0	0	26	26	13	0	20	20	10	0
11	0	22	22	11	0	26	26	13	0	22	22	11
12	0	0	2	2	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	20	20
14	0	0	0	0	0	0	0	0	0	0	22	22
15	0	0	10	10	0	0	2	2	0	0	22	22
16	0	0	0	0	1	0	0	0	1	0	0	0
17	0	0	0	0	0	5	0	0	0	0	0	0
18	0	0	0	0	0	32	0	0	0	0	0	0
19	0	0	0	0	0	32	0	0	0	0	0	0
20	0	0	0	0	0	5	0	0	0	0	0	0
21	0	0	0	18	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	26	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	22
24	0	0	0	8	0	0	0	1	0	0	0	0
25	0	0	0	8	0	0	0	0	0	0	0	12
26	0	0	0	0	0	0	0	1	0	0	0	14
27	0	0	0	8	0	0	0	2	0	0	0	12
Production	76	162	136	97	67	194	89	59	135	198	195	156
Order	75	162	135	97	67	194	89	59	135	197	195	155
Surplus	1	0	1	0	0	0	0	0	0	1	0	1

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2001/22

Directions for questions 109 to 114: Answer these questions based on the two graphs shown below.

Figure 1 shows the amount of work distribution, in man-hours, for a software company between offshore and onsite activities. Figure 2 shows the estimated and actual work involved in the different offshore activities in the same company during the same period. [Note: onsite refers to work performed at the customer's premises and offshore refers to work performed at the developer's premises]

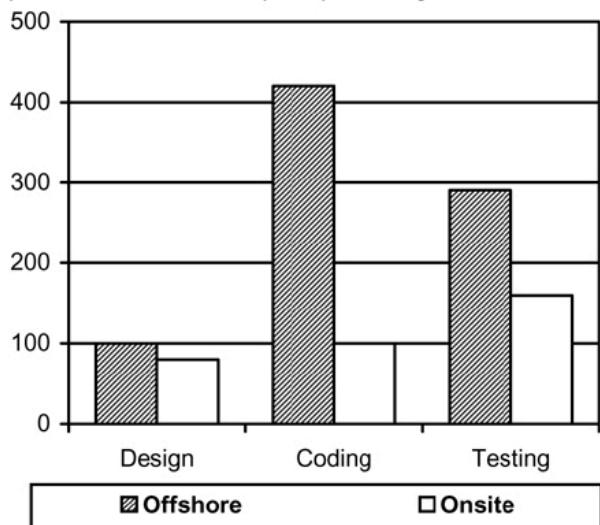


Figure 1

109. Which of the work requires as many man-hours as that spent in coding?
- Offshore, design and coding
 - Offshore coding
 - Testing
 - Offshore, testing and coding

Solution:

From the above table of approximate values, it can be observed that, coding took $420 + 100 = 520$ hours.
 Choice (1) --- 520 hours
 Choice (2) --- 420 hours
 Choice (3) --- 450 hours
 Choice (4) --- 710 hours

Choice (1)

110. Roughly what percentage of the total work is carried out onsite?
- 40 percent
 - 20 percent
 - 30 percent
 - 50 percent

Solution:

$$\frac{80 + 100 + 160}{(100 + 80) + (420 + 100) + (290 + 160)} = \frac{340}{1150} \approx 30\%$$

111. The total effort in man-hours spent onsite is nearest to which of the following?
- The sum of the estimated and actual effort for offshore design.
 - The estimated man-hours of offshore coding.
 - The actual man-hours of offshore testing.
 - Half of the man-hours of estimated offshore coding.

Solution:

Total hours spent onsite = $80 + 100 + 160 = 340$ hours
 (1) $\rightarrow 90 + 100 = 190$
 (2) $\rightarrow 410$
 (3) $\rightarrow 290$
 (4) $\rightarrow 410/2 = 205$
 $\therefore 290$ is nearest to 340

Choice (3)

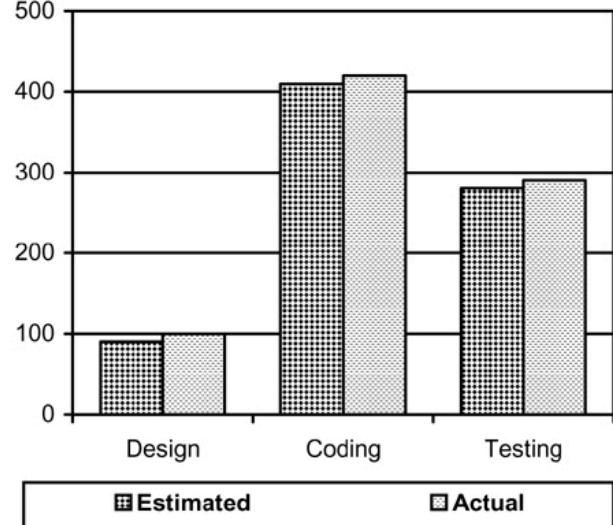


Figure 2

112. If the total working hours were 100, which of the following tasks will account for approximately 50 hours?
- Coding
 - Design
 - Offshore testing
 - Offshore testing plus design

Solution:

Total hours spent = 1150 hours
 Coding hours = $420 + 100 = 520$ hours
 Approximately 50% Choice (1)

113. If 50 percent of the offshore work were to be carried out onsite, with the distribution of effort between the tasks remaining the same, the proportion of testing carried out offshore would be
- 40 percent
 - 30 percent
 - 50 percent
 - 70 percent

Solution:

If 50% of offshore work is shifted to onsite with the distribution among the tasks remaining the same then

	Design	Coding	Testing
Offshore	$100/2 = 50$	$420/2 = 210$	$290/2 = 145$
Onsite	$80 + 50 = 130$	$100 + 210 = 310$	$160 + 145 = 305$

$$\therefore \frac{\text{Offshore testing}}{\text{Total testing}} = \frac{145}{450} \approx 30\% \text{ Choice (2)}$$

114. If 50 percent of the offshore work were to be carried out onsite, with the distribution of effort between the tasks remaining the same, which of the following is true of all work carried out onsite?
- The amount of coding done is greater than that of testing.
 - The amount of coding done onsite is less than that of design done onsite.

- (3) The amount of design carried out onsite is greater than that of offshore testing.
 (4) The amount of testing carried out offshore is greater than that of total design.

Solution:

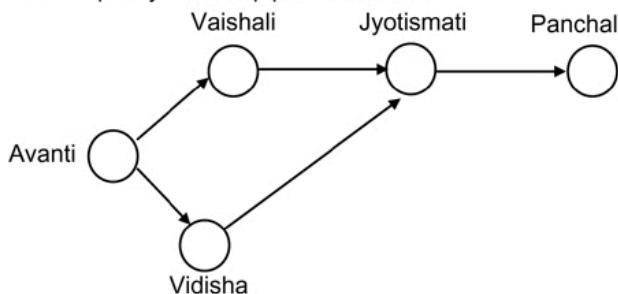
From the table in solution 113.

Choice (1) $\rightarrow 310 > 305$ which is true.

Choice (1)

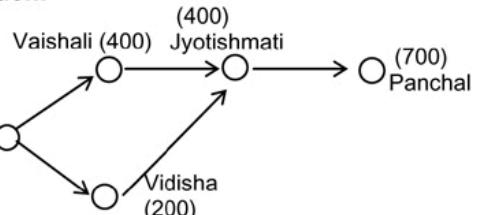
Directions for questions 115 to 117: Answer the questions based on the pipeline diagram below.

The following sketch shows the pipelines carrying material from one location to another. Each location has a demand for material. The demand at Vaishali is 400, at Jyotishmati is 400, at Panchal is 700, and at Vidisha is 200. Each arrow indicates the direction of material flow through the pipeline. The flow from Vaishali to Jyotishmati is 300. The quantity of material flow is such that the demands at all these locations are exactly met. The capacity of each pipeline is 1000.



115. The quantity moved from Avanti to Vidisha is
 (1) 200 (2) 800 (3) 700 (4) 1000

Solution:



Vaishali to Jyotishmati = 300

\Rightarrow Jyotishmati needs 800 more (100 for its own requirement and 700 to pass on to Panchal) which has come from Vidisha.

Avanti \rightarrow Vidisha = 1000

(and Vidisha \rightarrow Jyotishmati = 800)

Choice (4)

116. The free capacity available at the Avanti-Vaishali pipeline is
 (1) 0 (2) 100 (3) 200 (4) 300

Solution:

$1000 - 700 = 300$ Choice (4)

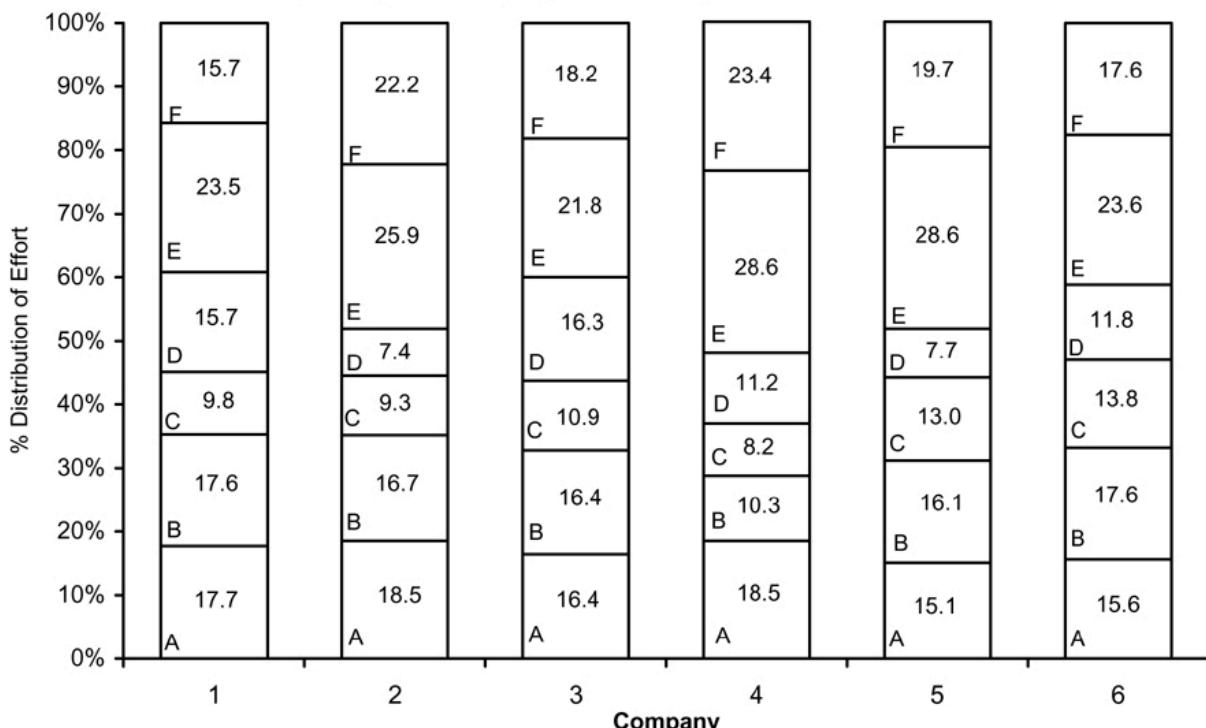
117. What is the free capacity available in the Avanti-Vidisha pipeline?
 (1) 300 (2) 200 (3) 100 (4) 0

Solution:

Zero. Choice (4)

Directions for questions 118 to 120: Answer these questions based on the data given below.

There are six companies, 1 through 6. All of these companies use six operations, A through F. The following graph shows the distribution of efforts put in by each company in these six operations.



118. Suppose effort allocation is interchanged between operations B and C, then C and D, and then D and E. If companies are then ranked in ascending order of effort in E, what will be the rank of company 3?
 (1) 2 (2) 3 (3) 4 (4) 5

Solution:

In essence, the question is about the ranking of company 3 in terms of effort in "B" from bottom. There are two companies which put less percent of effort in B than company 3.

\Rightarrow company 3 is 3rd

Choice (2)

- 119.** A new technology is introduced in company 4 such that the total effort for operations B through F get evenly distributed among these. What is the change in the percentage of effort in operation E?
- (1) Reduction of 12.3
 (2) Increase of 12.3
 (3) Reduction of 5.6
 (4) Increase of 5.6

Solution:

Existing % = 28.6

$$\text{New \%} = \frac{100 - 18.5}{5} = 16.3$$

\Rightarrow Reduction of 12.3

Choice (1)

- 120.** Suppose the companies find that they can remove operations B, C and D and re-distribute the effort released equally among the remaining operations. Then, which operation will show the maximum across all companies and all operations?
- (1) Operation E in company 1
 (2) Operation E in company 4
 (3) Operation F in company 5
 (4) Operation E in company 5

Solution:

$$\text{Choice (1)} = 23.5 + \frac{15.7 + 9.8 + 17.6}{3}$$

$$23.5 + 14.36 = 37.87$$

Similarly

$$\text{Choice (2)} = 38.5\%$$

$$\text{Choice (3)} = 31.97\%$$

$$\text{Choice (4)} = 40.87\%$$

40.87% is the highest

Choice (4)

Directions for questions 121 to 127: Each item is followed by two statements, A and B. Answer each question using the following instructions:

- Choose 1 if the question can be answered by one of the statements alone and not by the other.
- Choose 2 if the question can be answered by using either statement alone.
- Choose 3 if the question can be answered by using both the statements together, but cannot be answered by using either statement alone.
- Choose 4 if the question cannot be answered even by using both the statements together.

- 121.** What are the value of m and n?

- A. n is an even integer, m is an odd and m is greater than n.
 B. Product of m and n is 30.

Solution:

From A alone we cannot answer as infinite possibilities are there.

From B mn = 30

So the possible values are (1, 30), (2, 15) (3, 10) (5, 6). Even this alone cannot give the values of m and n. Now combining both. If n is even, m is odd and m > n. the only possibility is when m = 15; n = 2

Choice (3)

- 122.** Is Country X's GDP higher than country Y's GDP?

- A. GDP's of the countries X and Y have grown over the past 5 years at compounded annual rate of 5% and 6% respectively.
 B. 5 years ago, GDP of country X was higher than that of country Y.

Solution:

From A we only know the growth rates and not the base value.

From B also only information is that X has a higher GDP than Y. But the amounts or the order are not given.

Choice (4)

- 123.** What is the value of X?

- A. X and Y are unequal even integers less than 10 and X/Y is an odd integer.
 B. X and Y are even integers each less than 10 and product of X and Y is 12.

Solution:

From A, we can say that X and Y can take 2, 4, 6 and 8 as the values.

Since X/Y is odd X > Y and the only combination which satisfies is 6/2 \Rightarrow X = 6

Statement A is sufficient to answer.

From B, X and Y could be (6, 2) or (2, 6) since the product is 12.

However we cannot determine the value of X.

Choice (1)

- 124.** On a given day a boat ferried 1500 passengers across the river in 12 hrs. How many round trips did it make?

- A. The boat can carry 200 passengers at any time.
 B. It takes 40 minutes each way and 20 minutes for waiting time at each terminal.

Solution:

From A, we can only say that atleast 8 trips are required but whether in each trip the boat carried 200 passengers is not given and hence (A) is not sufficient.

From B, it is clear that one round trip will take 2 hours (40 + 20 for each side). Since there are 12 hours the boat makes 6 round trips.

Choice (1)

- 125.** What will be the time for downloading software?

- A. Transfer rate is 6 kilobytes per second.
 B. The size of the software is 4.5 megabytes.

Solution:

From A alone, we cannot determine as we don't know the size.

From B alone we cannot determine as we don't know the downloading speed.

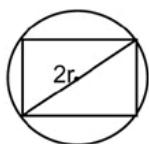
But from both we can determine the time for downloading.

Choice (3)

126. A square is inscribed in a circle. What is the difference between the area of the circle and that of the square?

- A. The diameter of the circle is $25\sqrt{2}$ cm.
- B. The side of the square is 25 cm.

Solution:



From A we can get the side of the square and hence the difference of the areas from B also we

can calculate the radius of the circle and hence answer can be found.
Choice (2)

127. Two friends, Ram and Gopal, bought apples from a wholesale dealer. How many apples did they buy?

- A. Ram bought one-half the number of apples that Gopal bought.
- B. The wholesale dealer had a stock of 500 apples.

Solution:

Since no numbers are given in 'A' we cannot determine even 'B' gives only the stock and not the sale.
Choice (4)

Directions for questions 128 to 130: These questions are based on the pie charts given below.

Chart 1 shows the distribution of twelve million tonnes of crude oil transported through different modes over a specific period of time. Chart 2 shows the distribution of the cost of transporting this crude oil. The total cost was Rs.30 million.

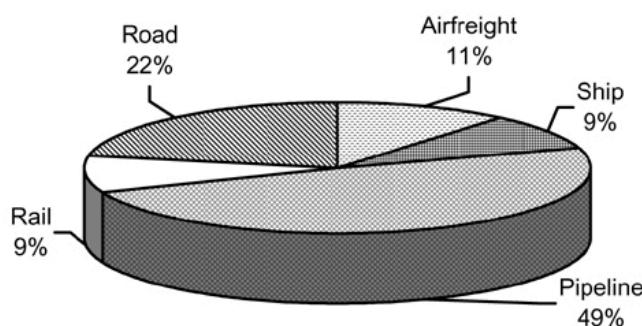


Chart 1 : Volume Transported

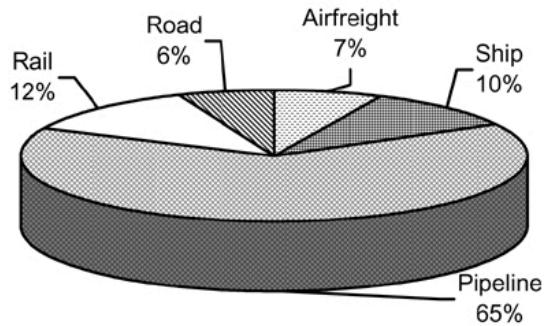


Chart 2 : Cost of Transportation

128. The cost in rupees per tonne of oil moved by rail and road happens to be roughly
(1) 3 (2) 1.5 (3) 4.5 (4) 8

Solution:

Tonnes transported through rail and road

$$= 12 \text{ million} \times \frac{22 + 9}{100} = 3.72 \text{ million tonnes.}$$

$$\text{Cost} = \frac{12 + 6}{100} \times 30 \text{ million} = \text{Rs. } 5.4 \text{ million}$$

$$\text{Cost per tonnes} = \frac{5.4}{3.72} = \text{Rs. } 1.452/-$$

Choice (2)

129. From the charts given, it appears that the cheapest mode of transport is
(1) Road (2) Rail (3) Pipeline (4) Ship

Solution:

$$\text{Choice (1) Road } \frac{30 \times 6\%}{12 \times 22\%} = \text{Rs. } 0.68/-$$

Choice (2) Rail.

$$\frac{30 \times 12\%}{12 \times 9\%} = \text{Rs } 3.33/- \text{ Choice (3) Pipe line}$$

$$\frac{30 \times 65\%}{12 \times 49\%} = \text{Rs } 3.32/- \text{ Choice (4) Ship}$$

$$\frac{30 \times 10\%}{12 \times 9\%} = \text{Rs } 2.78/- \text{ Cheapest of all these is Road transport.}$$

Alternately : As $30/12$ is common for all the modes of transportation, it is sufficient if we compare the percentages to get the least value of the ratio of (By observing) the percentage shares of cost and volume. we get road is the cheapest (only for road, numerator (6) is less than the denominator (22). For other modes of transportation, numerator is greater than the denominator)
Choice (1)

130. If the costs per tonne of transport by ship, air and road are represented by P, Q and R respectively, which of the following is true?

- (1) $R > Q > P$ (2) $P > R > Q$
- (3) $P > Q > R$ (4) $R > P > Q$

Solution:

$$\text{Air transport cost per tonne} = \frac{30 \times 7\%}{12 \times 11\%}$$

$$= \text{Rs } 1.6/-$$

$$P = \text{Rs } 2.78/-$$

$$Q = \text{Rs. } 1.60/-$$

$$R = \text{Rs. } 0.68/- \Rightarrow R < Q < P \text{ or } P > Q > R.$$

Alternately : It is sufficient to compare ship (P) - $10/9$

Air (Q) - $11/7$ and road (R) - $6/22$

R is the least (numerator < denominator). From choices only choice (3) is possible. Choice (3)

Directions for questions 131 to 134: Answer the questions independent of each other.

131. At a village mela, the following six *nautankis* (plays) are scheduled as shown in the table below.

No.	Nautanki	Duration	Show Times
1	Sati-Savitri	1 hour	9:00 a.m. and 2:00 p.m.
2	Joru ka Ghulam	1 hour	10:30 a.m. and 11:30 a.m.
3	Sundar Kand	30 minutes	10:00 a.m. and 11:00 a.m.
4	Veer Abhimanyu	1 hour	10:00 a.m. and 11:00 a.m.
5	Reshma aur Shera	1 hour	9:30 a.m., 12:00 noon and 2:00 p.m.
6.	Jhansi ki Rani	30 minutes	11:00 a.m. and 1:30 p.m.

You wish to see all the six nautankis. Further, you wish to ensure that you get a lunch break from 12:30 p.m. to 1:30 p.m. Which of the following ways can you do this?

- (1) *Sati-Savitri* is viewed first; *Sundar Kand* is viewed third and *Jhansi ki Rani* is viewed last.
- (2) *Sati-Savitri* is viewed last; *Veer Abhimanyu* is viewed third and *Reshma aur Shera* is viewed first.
- (3) *Sati-Savitri* is viewed first; *Sundar Kand* is viewed third and *Joru ka Ghulam* is viewed fourth.
- (4) *Veer Abhimanyu* is viewed third; *Reshma aur Shera* is viewed fourth and *Jhansi ki Rani* is viewed fifth.

Solution:

The period of time that we have is 6 hours [9.00 am to 3.00 pm] out of which, we have to spend one hour for lunch. That is, we have 5 hours to see all the Nautankis. Sum of durations of all Nautankis is 5 hours.

- 1) There should not be any time slack between two consecutive shows (except the lunch break)

Choice (1)

- (1) Sati Savitri 9.00 am to 10.00 am
- (2)
- (3) Sunder Kand 11.00 am to 11.30 am
- (4)
- (5)
- (6) Jhansi Ki Rani 1.30 pm to 2.00 pm

This is not possible and the total duration is reduced to 4 hours [except lunch break]

Choice (2)

If Reshma aur Shera is viewed first, we have to start viewing at 9.30 am which reduces the total time available by $\frac{1}{2}$ hours. Hence this is not possible.

Choice (3)

Order	Nautanki	Timings	Duration
1	Sati Savitri	9:00 to 10:00 am	1 hr
2	Veer Abhimanyu	10:00 am to 11:00 am	1 hr
3	Sunder Kand	11:00 am to 11:30 am	$\frac{1}{2}$ hr
4	Joru Ka Gulam	11:30 am to 12:30 am	1 hr
5	Jhansi Ki Rani	1:30 pm to 2:00 pm	$1\frac{1}{2}$ hr
6	Reshma Aur Shera	2:00 pm to 3:00 pm	1 hr

Choice (4)

If Reshma aur Shera is viewed fourth, it should be viewed at 12.00 noon in which case lunch break cannot be taken.

Therefore choice (3) is the only way among the given ones, in which I can do this. Choice (3)

132. Mrs. Ranga has three children and has difficulty remembering their ages and the months of their birth. The clues below may help her remember.

- The boy, who was born in June, is 7 years old.
- One of the children is 4 years old, but it is not Anshuman.
- Vaibhav is older than Suprita.
- One of the children was born in September, but it was not Vaibhav.
- Suprita's birthday is in April.
- The youngest child is only 2 years old.

Based on the above clues, which one of the following statements is true?

- (1) Vaibhav is the oldest, followed by Anshuman who was born in September, and the youngest is Suprita who was born in April.
- (2) Anshuman is the oldest being born in June, followed by Suprita who is 4 years old, and the youngest is Vaibhav who is 2 years old.
- (3) Vaibhav is the oldest being 7 years old, followed by Suprita who was born in April, and the youngest is Anshuman who was born in September.
- (4) Suprita is the oldest who was born in April, followed by Vaibhav who was born in June, and Anshuman who was born in September.

Solution:

From the given data, it is known that the ages of three children are 7 years, 4 years and 2 years.

Suprita's Birthday is in April.

The 7 year old was born in June

⇒ Suprita is not the 7 year old.

Vaibhav was not born in September.

⇒ Vaibhav was born in June

[since Vaibhav was not born in April too]

⇒ Vaibhav is the 7 year old

Anshuman is not the 4 year old

⇒ Supriya is the 4 year old and born in September

oldest – Vaibhav – 7 years – June

second – Supriya – 4 years – April

younger – Anshuman – 2 years – September

Statement given in choice (3) alone is right

Choice (3)

133. The Bannerjees, the Sharmas, and the Pattabhiramans each have a tradition of eating Sunday lunch as a family. Each family serves a special meal at a certain time of day. Each family has a particular set of chinaware used only for this meal. Use the clues below to answer the following question.

- The Sharma family eats at noon.
- The family that serves fried Brinjal uses blue chinaware.
- The Bannerjee family eats at 2 O'clock.
- The family that serves sambar does not use red chinaware.
- The family that eats at 1 O'clock serves fried brinjal.
- The Pattabhiraman family does not use white chinaware.
- The family that eats last likes makkai-ki-roti.

Which one of the following statements is true?

- (1) The Bannerjees eat makkai-ki-roti at 2 O'clock, the Sharmas eat fried Brinjal at 12 O'clock and the Pattabhiramans eat sambar from red chinaware.
- (2) The Sharmas eat sambar served in white chinaware, the Pattabhiramans eat fried brinjal at 1 O'clock, and the Bannerjees eat makkai-ki-roti served in blue chinaware.

- (3) The Sharmas eat sambar at noon, the Pattabhiramans eat fried brinjal served in blue chinaware, and the Bannerjees eat makkai-ki-roti served in red chinaware.
- (4) The Bannerjees eat makkai-ki-roti served in white chinaware, the Sharmas eat fried brinjal at 12 O'clock and the Pattabhiramans eat sambar from red chinaware.

Solution:

The Bannerjee family eats at 2'o' clock. The Sharma family eats at noon.
 ⇒ The Pattabhiraman family eats at 1 o'clock.
 ⇒ The Pattabhiraman family eats fried Brinjal
 ⇒ The Pattabhiraman family uses blue Chinaware
 The Bannerjee family likes makhai=ki-roti [since it eats last at 2'o clock]
 ⇒ The Sharma family eats Sambar
 ⇒ The Sharma family does not use red Chinaware
 ⇒ The Sharma family uses white Chinaware

Name of the family	Time of Lunch	Colour of Chinaware	Dish
Sharma	Noon	White	Sambar
Pattabhiraman	1'o clock	Blue	Fried Brinjal
Benarjee	2 'o clock	Red	Makkai-Ki-Roti

Now, by considering the given choices it can be observed that only choice (3) is true.

Choice (3)

134. While Balbir had his back turned, a dog ran into his butcher shop, snatched a piece of meat off the counter and ran out. Balbir was mad when he realised what had happened. He asked three other shopkeepers, who had seen the dog, to describe it. The shopkeepers really didn't want to help Balbir. So each of them made a statement which contained one truth and one lie.
- Shopkeeper number 1 said: "The dog had black hair and a long tail."
 - Shopkeeper number 2 said: "The dog had a short tail and wore a collar."
 - Shopkeeper number 3 said: "The dog had white hair and no collar."
- Based on the above statements, which of the following could be a correct description?
- (1) The dog had white hair, short tail and no collar.
 - (2) The dog had white hair, long tail and a collar.
 - (3) The dog had black hair, long tail and a collar.
 - (4) The dog had black hair, long tail and no collar.

Solution:

Let us assume that the dog has black hair
 S1 = Shopkeeper Number 1
 SII = Shopkeeper Number 2
 SIII = Shopkeeper Number 3
 S1's information about black hair is true.
 ⇒ The dog did not have long tail.
 SII's information about the dog's hair [white] is false
 ⇒ The dog had no collar.
 ⇒ SII's information about collar is false
 ⇒ SII's information about tail is true.
 ⇒ The dog had black hair, short tail and no collar.
 Similarly, if we assume that the colour of hair is white, the following deduction can be made.

The dog has white hair, a collar and a long tail.
 Either one of the above two deductions must be true.
 Choice (2) alone is one of the possibilities and the others are not.
 Choice (2)

Directions for questions 135 and 136: Answer the following questions based on the information given below.

Elle is three times older than Yogesh. Zaheer is half the age of Wahida. Yogesh is older than Zaheer.

135. Which of the following can be inferred?

- (1) Yogesh is older than Wahida.
- (2) Elle is older than Wahida.
- (3) Elle may be younger than Wahida.
- (4) None of the above.

Solution:

Let us represent the ages of the persons with the first letters of their names [ex : E = Elle's age] and form the following equations

$$E = 3Y \Rightarrow E > Y \quad \dots \quad (1)$$

Now since Z definitely less than Y

Hence $2Z$ is always less than $3Y$

$$\Rightarrow W < E$$

Choice (2)

136. Which of the following information will be sufficient to estimate Elle's age?

- (1) Zaheer is 10 years old.
- (2) Both Yogesh and Wahida are older than Zaheer by the same number of years.
- (3) Both (1) and (2) above.
- (4) None of the above.

Solution:

If we know that $Z = 10$ and $Y - Z = W - Z$, we can conclude that $Y = Z = 20 \Rightarrow E = 60$ Choice (3)

Directions for question 137 to 139: Answer the following questions based on the passage below.

A group of three or four has to be selected from seven persons. Among the seven are two women: Fiza and Kavita, and five men: Ram, Shyam, David, Peter and Rahim. Ram would not like to be in the group if Shyam is also selected. Shyam and Rahim want to be selected together in the group. Kavita would like to be in the group only if David is also there. David, if selected, would not like Peter in the group. Ram would like to be in the group only if Peter is also there. David insists that Fiza be selected in case he is there in the group.

137. Which of the following is a feasible group of three?

- (1) David, Ram, Rahim
- (2) Peter, Shyam, Rahim
- (3) Kavita, David, Shyam
- (4) Fiza, David, Ram

Solution:

Let us use the following letters for the names of persons in our discussion

Fiza = F

Kavita = K

Ram = R

Shyam = S

David = D

Peter = P

Rahim = Q

Women : F and K

Men : R, S, D, P and Q

Shubhra, and Shahira belong to the same weight-group. Sonali and Rupa are in one weight-group, Rupali and Renuka are also in one weight-group. Rupa, Radha, Renuka, Ruchika, and Ritu belong to different weight-groups. Somya cannot be with Ritu, and Tara cannot be with Radha. Komal cannot be with Radha, Somya, or Ritu. Shahira is in W1 and Somya is in W4 with Ruchika. Sweta and Jyotika cannot be with Rupali, but are in a weight-group with total membership of four. No weight-group can have more than five or less than one member. Amita, Babita, Chandrika, Deepika and Elina are instructors of weight-groups with membership sizes 5, 4, 3, 2 and 1, respectively. Who is the instructor of Radha?

Solution:

After considering the information given in the problem the following table can be made

Number of members	Name of members
5	Sonali, Shalini, Shubhra, Shahira and Rupa
4	Sweta, Jyotika
3	Renuka, Rupali and Konal
2	
1	

Apart from this, we can also observe that, Ruchika and Somya are together and hence cannot be in one-member group.

⇒ Either they are in four member group or two member group. In either case Radha must be alone in one member team, because she cannot be with either Rita or Tara. Hence Radha is in one member group and her instructor is Elina.

Choice (2)

- 146.** A king has unflinching loyalty from eight of his ministers M1 to m8, but he has to select only four to make a cabinet committee. He decides to choose these four such that each selected person shares a liking with at least one of the other three selected. The selected persons must also hate at least one of the likings of any of the other three persons selected.

M1 likes fishing and smoking, but hates gambling,
M2 likes smoking and drinking, but hates fishing,
M3 likes gambling, but hates smoking,
M4 likes mountaineering, but hates drinking,
M5 likes drinking, but hates smoking and
mountaineering,
M6 likes fishing, but hates smoking and
mountaineering,
M7 likes gambling and mountaineering, but hates
fishing, and
M8 likes smoking and gambling, but hates

Who are the four people selected by the King?

- Who are the four people selected by the king?
 (1) M1, M2, M5, M6 (2) M3, M4, M5, M6
 (3) M4, M5, M6, M8 (4) M1, M2, M4, M7

Solutions

Solution:

Minister	Likes	Hates
M1	Fishing, Smoking	Gambling
M2	Smoking, Drinking	Fishing
M5	Drinking	Smoking and Mountaineering
M6	Fishing	Smoking and Mountaineering

M1 and M6 like Fishing ; M2 and M5 like Drinking

M1 hates only gambling which is not liked by any other Minister. Hence this cannot be the right selection. By considering each of the choices given, we can observe that the selection given in choice (4) is possible and hence this choice is the answer. Choice (4)

Directions for questions 147 to 150: A and B are two sets (e.g. A = mothers, B = women). The elements that could belong to both the sets (e.g., women who are mothers) is given by the set C = A.B. The elements which could belong to either A or B, or both, is indicated by the set D = A \cup B. A set that does not contain any elements is known as a null set, represented by \varnothing (for example, if none of the women in the set B is a mother, then C = A.B is a null set, or C = \varnothing). Let 'V' signify the set of all vertebrates; 'M' the set of all mammals; 'D' dogs; 'F' fish; 'A' Alsatian and 'P', a dog named Pluto.

- 147.** Given that $X = M.D$ is such that $X = D$, which of the following is true?

 - (1) All dogs are mammals.
 - (2) Some dogs are mammals.
 - (3) $X = \emptyset$.
 - (4) All mammals are dogs.

148. If $Y = F.(D.V)$, is not a null set, it implies that

 - (1) All fish are vertebrates
 - (2) All dogs are vertebrates.
 - (3) Some fish are dogs.
 - (4) None of the above.

149. If $Z = (P.D) \cup M$, then

 - (1) The elements of Z consist of Pluto the dog or any other mammal.
 - (2) Z implies any dog or mammal.
 - (3) Z implies Pluto or any dog that is a mammal.
 - (4) Z is a null set.

150. If $P.A = \emptyset$ and $P \cup A = D$, then which of the following is true?

 - (1) Pluto and alsatians are dogs.
 - (2) Pluto is an alsatian.
 - (3) Pluto is not an alsatian.
 - (4) D is a null set.

Solutions for questions 147 to 150:

Let us change the symbols given in the problem to the conventional symbols and solve the problems.

$A \bullet B$ means $A \cap B$; $A \cup B$ means $A \cup B$; \emptyset means \emptyset

- 147.** $X = M \cap D = D$; M is a superset of D
All D 's are M 's Choice (1)

148. $Y = F \cap (D \cap V) \neq \emptyset \Rightarrow D \cap V \neq \emptyset$
 \Rightarrow There are some dogs which are vertebrates
 $F \cap (D \cap V) \neq \emptyset \Rightarrow$ There are some fish which are dogs
and vertebrates. Choice (3) is implied Choice (3)

149. $Z = (P \cap D) \cup M$; Z equals P into which is a dog
and/or mammals. Choice (1)

150. $P \cap A = \emptyset$; $P \cup A = D$; Pluto \cup Alsation = Dogs
 $\text{Pluto} \cap \text{Alsation} = \emptyset \Rightarrow$ Pluto is different from
Alsation OR. There is no Pluto which is Alsation.
But there are only Pluto and Alsation in the set of Dogs.
Choice (3)

