

QUANTITATIVE ABILITY

DIRECTIONS for Questions 1 to 4: Seven integers A, B, C, D, E, F and G are to be arranged in an increasing order such that-

- A. First four numbers are in arithmetic progression.
- B. Last four numbers are in geometric progression.
- C. There exists one number between E and G.
- D. There exist no numbers between A and B.
- E. D is the smallest number and E is the greatest.

$$\frac{A}{D} = \frac{G}{C} = \frac{F}{A} > 1$$

G. $E = 960$

1. The common difference in the A. P. is
 a. 20 b. 22 c. 25 d. 30 e. None of these
2. $D =$
 a. 30 b. 25 c. 22 d. 20 e. None of these
3. $\frac{E}{A} =$
 a. 2 b. 3 c. 4 d. 5 e. None of these
4. The position and value of A is
 a. 5th highest and 100 b. 4th highest and 100 c. 4th highest and 100
 d. 3rd highest and 180 e. None of these

DIRECTIONS for Questions 5 and 6: It is possible to arrange eight of the nine numbers 2, 3, 4, 5, 7, 10, 11, 12, 13 in the vacant squares of the 3 by 4 array shown below so that the arithmetic average of the numbers in each row and column is the same integer.

1			15
	9		
		14	

5. Which one of the nine numbers must be left out when completing the array?
 a. 4 b. 5 c. 7 d. 10 e. 11
6. The arithmetic average is -
 a. 6 b. 7 c. 8 d. 9 e. 12
7. For which value of non-negative 'a' will the system $x^2 - y^2 = 0$, $(x - a)^2 + y^2 = 1$ have exactly three real solutions?
 a. $-\sqrt{2}$ b. 1 c. $\sqrt{2}$ d. 2 e. No such 'a' exists.

8. Let $\{A_n\}$ be a unique sequence of positive integers satisfying the following properties: $A_1 = 1$, $A_2 = 2$, $A_4 = 12$.
and $A_{n+1} \cdot A_{n-1} = A_n^2 \pm 1$ for $n = 2, 3, 4 \dots$
Then, A_7 is
a. 60 b. 120 c. 149 d. 169 e. 187
9. If the polynomial $x^3 + px + q$ has three distinct roots, then which of the following is a possible value of p ?
a. -1 b. 0 c. 1 d. 2 e. 3
10. In a certain factory, each day the expected number of accidents is related to the number of overtime hours by a linear equation. Suppose that on one day there were 1000 overtime hours logged and 8 accidents reported, and on another day there were 400 overtime hours logged and 5 accidents. What are the expected numbers of accidents when no overtime hours are logged?
a. 2 b. 3 c. 4 d. 5 e. None of these

DIRECTIONS for Questions 11 to 13: Each questions is followed by two statements labeled as (1) and (2). You have to decide if these statements are sufficient to conclusively answer the questions. Choose

- a. If statements (1) alone is sufficient to answer the question.
b. If statement (2) alone is sufficient to answer the question.
c. If statement (1) and statement (2) together are sufficient but neither of the two alone is sufficient to answer the question.
d. If either statement (1) or statement (2) alone is sufficient to answer the question.
e. If both statement (1) and statement (2) together are insufficient to answer the question.
11. Five integers A, B, C, D, and E are arranged in such a way that there are two integers between B and C and B is not the greatest. There exists one integer between D and E and D is smaller than E. A is not the smallest integer. Which one is the smallest?
1. E is the greatest
2. There exists no integer between B and E.
12. ABC is a triangle with $\angle B = 90^\circ$. What is the length of the side AC?
1. D is the midpoint of BC and E is the midpoint of AB.
2. $AD = 7$ and $CE = 5$.
13. What is the maximum value of a/b ?
1. a , $a + b$ and $a + 2b$ are three sides of a triangle.
2. a and b both are positive.
14. Triangle ABC has vertices A (0, 0), B (0, 6) and C (9, 0). The points P and Q lie on side AC such that $AP = PQ = QC$. Similarly, the points R and S lie on side AB such that $AR = RS = SB$. If the line segments PB and RC intersect at X, then the slope of the line AX is
a. $\frac{2}{3}$ b. $-\frac{2}{3}$ c. $\frac{3}{2}$ d. $-\frac{3}{2}$ e. None of these

15. ABCD is a rectangle. The points P and Q lie on AD and AB respectively. If the triangles PAQ, QBC and PCD all have the same area and $BQ = 2$ then $AQ =$
- a. $1 + \sqrt{5}$ b. $1 - \sqrt{5}$ c. $\sqrt{7}$ d. $2\sqrt{7}$ e. Not uniquely determined

DIRECTIONS for Questions 16 to 18: Substitute different digits (0, 1, 2, ..., 9) for different letters in the problem below, so that the corresponding addition is correct and it results in the maximum possible value of MONEY.

		P	A	Y
			M	E
	R	E	A	L
M	O	N	E	Y

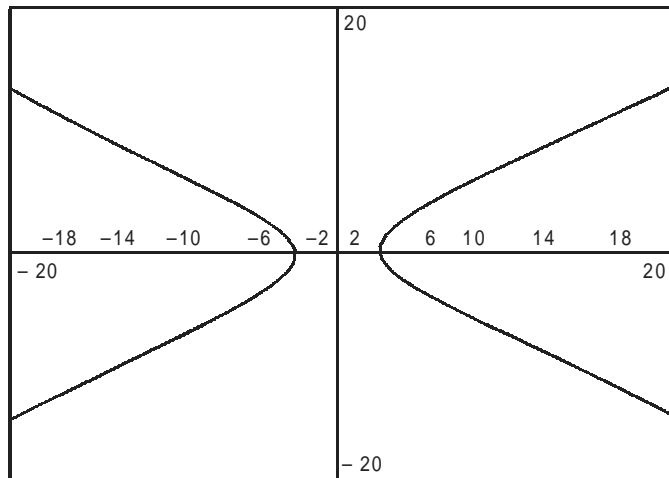
16. The letter 'Y' should be
- a. 0 b. 2 c. 3 d. 7 e. None of the above
17. The resulting value 'MONEY' is:
- a. 10364 b. 10563 c. 10978 d. 19627 e. None of the above
18. There are nine letters and ten digits. The digit that remains unutilized is:
- a. 4 b. 3 c. 2 d. 1 e. None of the above

DIRECTIONS for Questions 19 and 20: Let 'g' be a function defined on the set of integers. Assume that 'f' satisfies the following properties:

1. $f(0) \neq 0$;
2. $f(1) = 3$; and
3. $f(x)f(y) = f(x + y) + f(x - y)$ for all integers x and y.

19. $f(7)$
- a. 123 b. 322 c. 123 d. 1126 e. None of the above
20. $f(3)$
- a. 7 b. 18 c. 123 d. 322 e. None of the above
21. For how many integers n, $\frac{n}{20 - n}$ is the square of an integer?
- a. 0 b. 1 c. 2 d. 3 e. 4

22. Which equation can be graphically represented as follows?



a. $8x^2 - 15y^2 = 169$

b. $9x^2 - 16y^2 = 144$

c. $|(x - 8)(y - 15)| = 12$

d. $|(x - 9)(y - 16)| = 13$

e. None of the above

DIRECTIONS for Questions 23 and 24: A truck traveled from town A to town B over several days.

During

$\frac{1}{p}$ of the total distance, where p is a natural number. During the second day, it

traveled $\frac{1}{q}$ of the remaining distance, where q is a natural number. During the third day, it traveled $\frac{1}{p}$ of the

distance remaining after the second day, and during the fourth day, $\frac{1}{q}$ of the distance remaining after third

day. By the end of the fourth day the truck and traveled $\frac{3}{4}$ of the distance between A and B.

23. If the total distance is 100 kilometers, the minimum distance that can be covered on day 1 is _____ kilometers.

a. 25

b. 30

c. 33

d. 35

e. 40

24. The value of the sum of p and q is

a. 4

b. 5

c. 6

d. 7

e. 8

25. ABC is a triangle with $\angle CAB = 15^\circ$ $\angle ABC = 30^\circ$. If M is the midpoint of AB then $\angle ACM =$

a. 15°

b. 30°

c. 45°

d. 60°

e. None of the above

26. Let p be any positive integer and $2x + p = 2y$, $p + y = x$ and $x + y = z$.

For what value of p would $x + y + z$ attain its maximum value?

a. 0

b. 1

c. 2

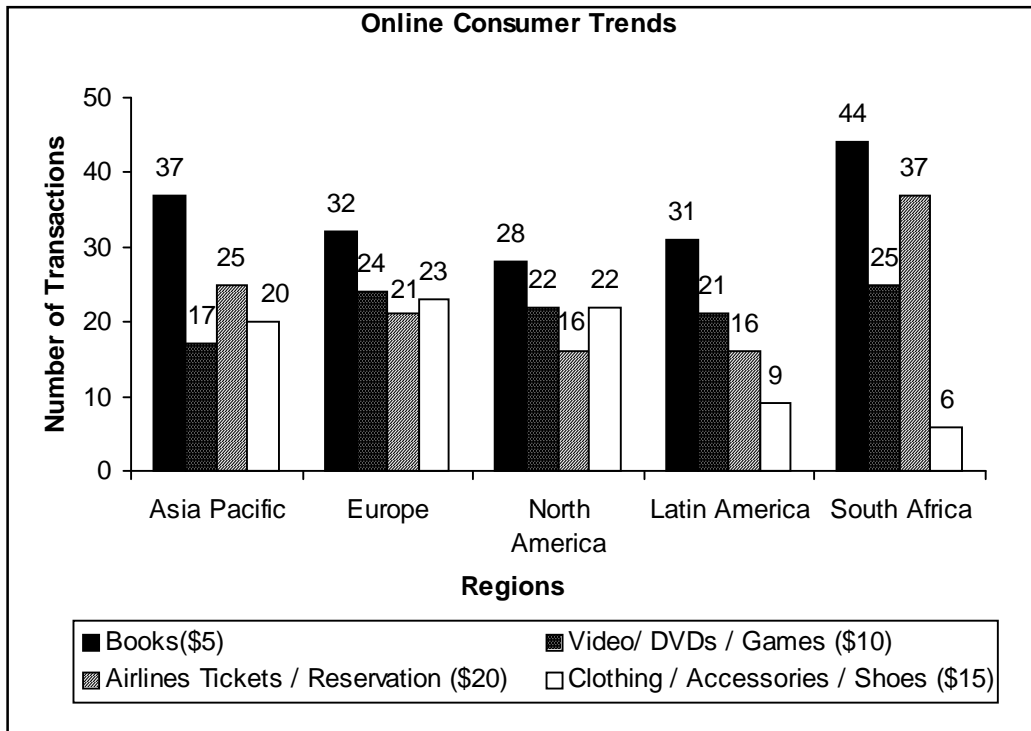
d. 3

e. None of the above

27. Consider the system of linear equations
 $2x + 3y + 4z = 16$
 $4x + 4y + 5z = 26$
 $ax + by + cz = r$
 For $r = 5$ and $a = 1$ then the system of linear equation will have infinite number of solutions if $c =$
- a. $\frac{3}{2}$ b. 1 c. $\frac{1}{2}$ d. 0 e. None of the above
28. ABC is a triangle with $\angle BAC = 60^\circ$. A point P lies on one-third of the way from B to C, and AP bisects $\angle BAC$, $\angle APC$ is
- a. 30° b. 45° c. 60° d. 90° e. 120°
29. A management institute has six senior professors and four junior professors. Three professors are selected at random for a Government project. The probability that at least one of the junior professors would get selected is:
- a. $\frac{5}{6}$ b. $\frac{2}{3}$ c. $\frac{1}{5}$ d. $\frac{1}{6}$ e. None of the above
30. We define a function f on the integers $f(x) = \frac{x}{10}$, if x is divisible by 10, and $f(x) = x + 1$ if x is not divisible by 10. If $A_0 = 1994$ and $A_{n+1} = f(A_n)$. What is the smallest n such that $A_n = 2$?
- a. 9 b. 18 c. 128 d. 1993 e. A_n never equals 2

DATA INTERPRETATION

DIRECTIONS for Questions 31 and 32: The graph given below contains data pertaining to number of electronic commerce transactions that have taken place in the last six months of the financial year 2005. This graph contains data related to private consumption and does not include corporate electronic commerce activities. Numbers mentioned above the bar graphs are in millions and average price per unit is mentioned in the brackets.



31. If the airline ticket purchase made through internet increase by 20% and the average price of the airline ticket 25% then the net increase in revenues from the ecommerce activities world wide will be _____ percent of the corresponding pre-price- increase revenues.
- a. 18 b. 19 c. 20 d. 21 e. 22
32. For which product category is the revenue contribution of Asia Pacific region the maximum?
- a. Books
 b. Video / DVDs / Games
 c. Airline Tickets / Reservation and Clothing / Accessories / Shoes
 d. Clothing / Accessories / shoes
 e. Airline Tickets / Reservation

DIRECTIONS for Questions 33 and 34: Study the aggregate financial ratios of all registered Indian manufacturing companies in the table below to answer the questions that follow:

All figures are as % of net sales unless otherwise mentioned						
	2000	2001	2002	2003	2004	2005
PBDIT	13.1	11.7	12.3	13.3	14.4	14.7
PBDT	8.1	7.1	8	9.9	11.8	12.7
PBIT	9.4	8.4	8.7	9.9	11	11.6
PAT	3.2	2.8	2.7	4.4	6	6.9
Raw Material expense	41	40.6	43.1	45.5	45.7	47.1
Salaries and wages	5.9	5.7	5.6	5.3	4.9	4.4
Interest payments	4.6	4.3	4	3.1	2.3	1.7
Operating profit	5.2	4.2	4.9	6.7	8	8.7
Net sales (% Growth Over Previous Year)	18.4	19.3	2.6	15.7	15.2	19.9

33. In which year the annual growth rate in the aggregate Salaries and Wages expense was maximum?
a. 2005 b. 2004 c. 2003 d. 2002 e. 2001
34. What is the annual growth rate in aggregate PAT of the Indian manufacturing companies in the financial year 2005 as compared to that in the financial year 2004?
a. 15.0 Percent b. 5.7 Percent c. 88.6 Percent d. 37.9 Percent e. None of these

DIRECTIONS for Questions 35 to 39: Study the tables of the Indian foreign trade given below to answer the questions.

Principal Commodities Export	Weight (%)		
	2003-04	2004-05	2005-06
COMMODITIES			
Plantations	0.92	0.78	0.71
Agri & allied prdts	8.39	7.61	7.21
marine Products	2.08	1.6	1.4
ores & minerals	3.69	5.29	6.02
leather & mfrs.	3.19	2.89	2.56
gems & jewellery	16.56	17.29	15.13
sports goods	0.15	0.12	0.13
Chemicals & related products	15.43	16	15.1
engineering goods	16.41	18.41	18.66
electronic goods	2.74	2.28	2.18
project goods	0.09	0.06	0.13
Textiles	18.86	15.16	14.8
Handicrafts	0.7	0.43	0.4
Carpets	0.9	0.75	0.81
Cotton raw incl. waste	0.28	0.1	0.61
petroleum products	5.54	8.57	11.21
unclassified exports	4.07	2.66	0.94
GRAND TOTAL	100.00	100.00	100.00
Total Exports in Rupees Crore	293,366.75	375,339.53	454,799.97
US Dollar Exchange Rate	45.9513	44.9315	44.2735

Principal Commodities' Import COMMODITIES	Weight (%)		
	2003-2004	2004-2005	2005-2006
bulk imports	37.87	39.09	42.56
pearls, precious & semiprecious stones	9.25	8.8	6.42
Machinery	10.63	10	10.94
Project goods	0.49	0.54	0.57
Others	41.76	41.57	39.51
TOTAL IMPORTS	100	100	100
Total Imports (in Crores fo Rupees)	359,107.66	501,064.54	630,526.77

35. Growth of trade imbalance (exports less imports) in dollar terms in the year 2005 - 06 as compared to the previous year was:
a. 39.77 b. 41.85 c. 91.24 d. 95.98 e. None of these
36. Given that the weight (%) of Petroleum crude & products in the total imports of India is 26.70, 27.87, and 30.87 in the years 2003 - 04, 2004-05, and 2005-06 respectively. What is the ratio of yearly difference in the export of Petroleum Products and Import of Petroleum crude & products in dollar terms, in the year 2005-06 versus 2004-05?
a. 1.36 b. 1.38 c. 1.46 d. 1.48 e. None of these
37. The three commodities which had highest export growth rate in the year 2004-05 as compared to the previous year, arranged in descending order of growth rates are:
a. Petroleum products, ores & minerals, engineering goods
b. Ores & minerals, gems& jewellery, chemicals & related products
c. Gems & jewellery, chemicals & related products, agri & allied products
d. Ores & minerals, chemical and related products, arri & allied products.
e. Ores & minerals, engineering goods, chemicals & related products.
38. In the year 2005-06 the commodity which witnessed maximum growth in exports (in Indian Rupees) as compared to the year 2004-05 is:
a. Petroleum products b. Project goods c. Ores & minerals
d. Sports goods e. None of these
39. In the two year period from 2004-2005 to 2005-2006, the average growth in import (in Indian Rupees) of which commodity to India was maximum?
a. bulk imports b. pearls, precious & semi precious stones
c. machinery d. project goods
e. others

DIRECTIONS for Questions 40 to 43: Read the data below and choose the correct option for the questions that follow.

Queen Airlines offers the following Privilege program. There are 5 membership rises, each with its own set of enhanced tier-specific benefits. New members join at the Blue tier level, then upgrade to the Blue plus, with the added benefit of Tele check-in. The program also has three elite tiers-Silver Gold, and Platinum. The 6 months fast - track upgrade and the 12 months standard upgrade system operate in parallel implying that whenever a particular passengers satisfies conditions, either in terms of number of flights in the stipulated period or in terms of accumulated Queen-Miles in either of the two systems, they are automatically upgrade systems considered the data in rolling 6 months period. The same holds for the 12 months period. If conditions for more than one upgrade are satisfied, the passenger is given the higher of the two.

Cummulative Queen Airways flights/Cummulative Status Queen-Miles		
Tier Upgrade	6-month Fast Track Upgrade System	12-month Standard Upgrade System
Blue to Blue Plus	3/3,000	Not applicable
Blue Plus to Silver	Not Applicable	5/12,500
Silver to Gold	5/12,500	10/20,000
Gold to Platinum	10/20,000	20/30,000

	Blue	Blue Plus	Silver	Gold	Platinum
Tele Check-in		√	√	√	√
Additional baggage allowance			10 kgs	20 kgs	35 kgs
Confirmed upgrade vouchers			1	3	5
Guaranteed reservations up to 24 hours prior to departure				√	√
Cancellation fees waived on published fares					√

Distance between cities in Queen-miles

Kolkata	1461						
Mumbai	1407	1987					
Hyderabad	1499	1516	711				
Bangalore	2061	1881	998	562			
Coimbatore	2401	2167	1265	902	340		
Guwahati	1959	1081	2746	2370	2932	3209	
Chennai	2095	1676	1329	688	331	491	2718
	Delhi	Kolkata	Mumbai	Hudrabad	Banglore	Chennai	Ghy

Mr. Kakkar, a newly recruited MBA from a business school, started his career with the start of the year 2007. His travel plans for the year of 2007 is given below in the table.

Date	From	To
2.1.2007	Mumbai	Hydrabad
8.1.2007	Hydrabad	Mumbai
3.2.2007	Mumbai	Delhi
8.3.2007	Delhi	Guwahati
20.3.2007	Guwahati	Kolkatta
11.4.2007	Kolkatta	Guwahati
30.4.2007	Guwahati	Chennai
4.7.2007	Chennai	Guwahati
20.7.2007	Guwahati	Kolkatta
2.9.2007	Kolkatta	Hydrabad
11.9.2007	Hydrabad	Guwahati
22.9.2007	Guwahati	Delhi
1.10.2007	Chennai	Banglore
11.10.2007	Guwahati	Chennai
4.11.2007	Chennai	Delhi
29.11.2007	Delhi	Hydarabad
1.12.2007	Hydrabad	Guwahati
31.12.2007	Guwahati	Mumbai

40. The difference in complete calendar months, discounting any partial months, between the first tier upgrade and the last tier upgrade for Mr. Kakkar is:
a. 7 b. 8 c. 9 d. 10 e. 11
41. In which month will Mr. Kakkar become eligible for guaranteed reservations up 24 hours prior to departure?
a. January b. February c. March d. April e. May
42. The number of complete calendar months, discounting any partial months, for which Mr. Kakkar avails the gold tier membership is:
a. 7 b. 8 c. 9 d. 10 e. 11
43. If 6 months upgrade had not been in operation, then Mr. Kakkar would have reached Gold tier in the months of
a. June b. July c. August d. September e. October

Answers and Explanations

1. d As per the condition given in the question, following combination are possible, i.e.

(i) DABCGFE

(ii) DBACGFE

(iii) DCBAGFE

(iv) DCABGFE

Since it is given that the greatest term is 960, that is 'E'

and $\frac{A}{D} = \frac{F}{C} = \frac{F}{A} > 1$, we can assume that the common

ratio is 2 and check the feasibility. Therefore

$E = 960, F = 480, G = 240$

Also, it can easily be observed that DCBAGFE is the only combination satisfying the condition. Now other values will be

$A = 120, B = 90, C = 60, D = 30$

Now since none of the above values are against the condition given, the sequence will be

30 60 90 120 240 480 960

(D) (C) (B) (A) (G) (F) (E)

Hence

Option 'd' is the correct answer.

2. a

3. e

4. e

For questions 5 and 6:

5. d There is no hard and fast rule for solving these kind of question. The only points to be considered are as follows

(i) Every row has summation being multiple of 4

(ii) Every column sums up to be multiple of 3

(iii) First row, already has the number 15, the largest number. Hence, the blank boxes should contain the minimum possible number.

Keeping in mind the above points, the complete arrangement is as follows.

1	13	3	15
11	9	7	5
12	2	14	4

Observe that rows sum up to '32' and column sum up to '24'.

5. d

6. c

7. b Given that
 $x^2 - y^2 = 0$... (i)
 $(x - a)^2 + y^2 = 1$

... (ii)

Solving (i) and (ii), we get-

$$\frac{a \pm \sqrt{2 - a^2}}{2}$$

Now for all the real values of x

$$2 - a^2 \geq 0 \quad \text{or} \quad -\sqrt{2} \leq a \leq \sqrt{2}$$

For non-negative values of 'a' we have $0 \leq a \leq \sqrt{2}$

Now, when we put $a = 1$, we get

$$x = 2, 0. \Rightarrow y = 2, -2, 0.$$

Hence we get- exactly three real solutions (2, 2),

(2, -2) and (0, 0) ($\because y = \pm x$).

8. d Putting $n = 2$ in the equation $A_{n+1} A_{n-1} = A_n^2 \pm 1$, we get.

$$A_3 A_1 = A_2^2 \pm 1$$

$$A_3 = \frac{2^2 \pm 1}{1} = 3, 5$$

Putting $n = 3$.

$$A_4 A_2 = A_3^2 \pm 1$$

$$\Rightarrow A_4 = \frac{3^2 \pm 1}{2} \text{ or } \frac{5^2 \pm 1}{2}$$

But, $A_4 = 12$, Therefore $A_3 = 5$

Now putting $n = 4, 5, 6$ similarly as in above equation

$$A_7 = \frac{A_6^2 \pm 1}{A_5} = \frac{4901}{29} = 169.$$

9. a Given polynomial is

$$x^3 + px + q = 0 \quad \dots(i)$$

Now let a, b, c be three distinct roots of above equation.

So we can write-

$$a + b + c = 0$$

$$ab + bc + ca = p$$

$$abc = -q$$

Also, we can write here,

Squaring on both sides, we get

$$(a^2 + b^2 + c^2) = (a + b + c)^2 - 2(ab + bc + ac)$$

$$\Rightarrow (a^2 + b^2 + c^2) = -2p$$

Here L. H. S cannot be negative as it is the sum of squares. So 'p' has to be negative which is option (a) only.

10. b Let the expected number of accidents be 'A' and number of overtime hours be 'T'
As expected number of accidents and number of overtime hours are related by a linear equation, we can write here
 $A = K + K_1(T)$
 Now,
 $8 = K + K_1(1000)$... (i)
 $5 = K + K_1(400)$... (ii)

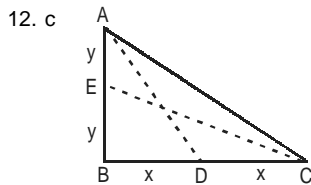
Solving (i) and (ii) we get $K = 3, K_1 = \frac{1}{200}$

Hence,

$$A = 3 + \frac{1}{200}(0)$$

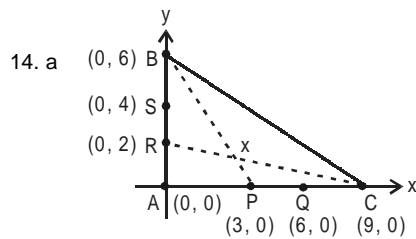
$$A = 3.$$

11. c From the given, three different arrangements are possible.
 case (i) DBEAC
 case (ii) BADCE
 case (iii) CADBE
 From statement (1), either case (ii) or case (iii) could be valid so we cannot answer which one is the smallest.
 From statement (2), either case (i) or case (ii) is possible.
 If we combine the two statements; only case (iii) is possible. Hence (c) is correct option.



Neither statement (i) nor (ii) alone is sufficient to determine the length of side AC.
 But when statement (i) and (ii) are combined, value of AC can be determined.
 As per the diagram above
 $x^2 + 4y^2 = 49$... (i)
 $4x^2 + y^2 = 25$... (ii)
 Solving (i) and (ii) we can determine the value of $4(x^2 + y^2) = AC^2$. Hence (c) is correct.

13. e Since 'b' is the common difference of three sides of a triangle, $\frac{a}{b}$ can take any values in the given range of real; numbers.
 Suppose $a = 1000$
 $b = 1$
 Then there sides will be 1000, 1001, 1002
 Here $\frac{a}{b} = \frac{1000}{1} = 1000$
 So the values of 'a' and 'b' can be varied to any values making the ratio $\frac{a}{b}$ a variable or undeterminable.



14. a From the above diagram
Equation of line PB:

$$y = -2x + 6 \quad \dots(i) \quad \left(\because y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1) \right)$$

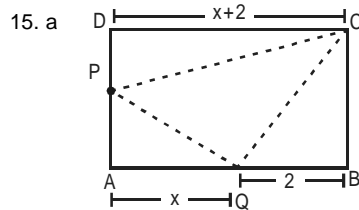
Equation of line CR:

$$y = -\frac{2}{9}x + 2 \quad \dots(ii)$$

Solving equation (i) and (ii) for the co-ordinates of

point 'X', we get $x = \left(\frac{9}{4}, \frac{3}{2}\right)$

Now slope of AX is $\frac{\frac{3}{2} - 0}{\frac{9}{4} - 0} = \frac{2}{3} \left(\because m = \frac{y_2 - y_1}{x_2 - x_1} \right)$



15. a

Let AQ be 'x' and area of triangles PAQ, QBC and PCD be 'A'
Now

$$\frac{1}{2} \times 2 \times BC = A \Rightarrow BC = A \quad \dots(i)$$

Similarly in ΔPDC

$$\frac{1}{2} \times PD \times (x+2) = A \Rightarrow PD = \frac{2A}{x+2} \quad \dots(ii)$$

Also in ΔPAQ

$$AP = \frac{2A}{x} \quad \dots(iii)$$

Now $AD = PD + PA$
or,

$$A = \frac{2A}{x+2} + \frac{2A}{x}$$

Solving above equations, we get $x = 1 \pm \sqrt{5}$

As x cannot be negative.

$$\therefore x = 1 + \sqrt{5}.$$

For questions 16 and 18:

This question is a 'hit and trial' based question with little application of logic. Observe that-
 (i) Summation of 'E' and 'L' must give zero in the end so that 'y' comes as it is in the fourth row. (E + L = 10)
 (ii) Rest all is 'hit and trial'
 The correct assignment of digits is

$$\begin{array}{r} 7\ 2\ 5 \\ 1\ 6 \\ \hline 9\ 6\ 2\ 4 \\ \hline 1\ 0\ 3\ 6\ 5 \end{array}$$

Hence, Option (e) is the correct answer.

16. e

17. e

18. e

19. c Given that

$$f(i) = 3$$

$$f(x) f(y) = f(x+y) + f(x-y) \text{ Putting}$$

$x = 0, y = 0$, we get

$$f(0)^2 = 2f(0) \Rightarrow f(0) = 2$$

Putting $x=1, y = 1$, we get

$$f^2(1) = f(2) + 2 \quad (\because f(0) = 2)$$

$$\Rightarrow f(2) = 7$$

Similarly $f(3) = 18$ and $f(4) = 47$

Now putting $x = 4, x = 3$

$$f(4) f(3) = f(7) + f(1)$$

$$\Rightarrow f(7) = 843$$

Therefore, option (c) is the correct answer.

20. b

21. e For $n = 0, 10, 16, 18$ the expression $\frac{n}{20-n}$ is the square for an integer. Therefore the correct option is (e).

22. b According to the graph at $y = 0$, x should be '4'. Option (b) satisfies this condition.

23. a According to the statement of the question

$$\frac{(p-1)}{p} \binom{q-1}{q} \binom{p-1}{p} \binom{q-1}{q} = \frac{1}{4}$$

$$\text{or } 2(p-1)(q-1) = pq$$

$$\text{or } (p-2)(q-2) = 2.$$

Hence, $p-2 = 2$ and $q-2 = 1$

$$\Rightarrow p = 4 \text{ \& } q = 3$$

$$\text{or } p-2 = 1 \text{ and } q-2 = 2$$

$$\Rightarrow p = 3 \text{ \& } q = 4$$

Which gives $p = 3, 4$ and $q = 3, 4$

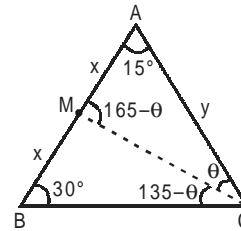
Minimum distance is covered when $p = 4$, i.e.

$$100 \times \frac{1}{4} = 25$$

Also in each of the above cases $p + q = 7$.

24. d

25. b



Applying sine rule to ΔABC

$$\frac{y}{\sin 30^\circ} = \frac{2x}{\sin 135^\circ} \quad \dots(i)$$

Also

$$\frac{y}{\sin(165^\circ - \theta)} = \frac{x}{\sin \theta} \quad \dots(ii)$$

$$\text{or } \sin(165^\circ - \theta) = \sqrt{2} \sin \theta$$

$$\Rightarrow \theta = 30^\circ$$

Hence option (b) is the correct answer.

26. a

27. c Given equation are

$$2x + 3y + 4z = 16 \quad \dots(i)$$

$$4x + 4y + 5z = 26 \quad \dots(ii)$$

$$ax + by + cz = r \quad \dots(iii)$$

Also given that $a = 1$ and $r = 5$. Subtracting (i) from (ii), we get $2x + y + z = 10$ $\dots(iv)$

$$x + by + cz = 5. \quad \dots(v)$$

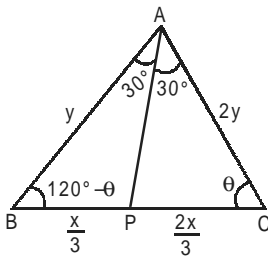
Now for above two lines to have infinite solution

$$\frac{2}{1} = \frac{1}{b} = \frac{1}{c} = \frac{10}{5}$$

$$\Rightarrow b = c = \frac{1}{2}$$

Hence option (c) is correct

28. e



From angle bisector theorem

$$\frac{BP}{PC} = \frac{AB}{AC} = \frac{1}{2}$$

$$\frac{x}{\sin 60^\circ} = \frac{y}{\sin \theta} \Rightarrow \sin \theta = \frac{\sqrt{3}y}{2x}$$

$$\text{Now } = \frac{y\sqrt{3}}{2x} \left(\text{Area or } \Delta = \frac{1}{2} ab \sin \theta \right)$$

Also applying cosine rule to the ΔABC

$$\cos 60^\circ = \frac{y^2 + (2y)^2 - x^2}{4y^2} \Rightarrow \sqrt{3}y = x \quad \dots(ii)$$

Putting his value of y in (i) we get

$$\theta = 30^\circ$$

Therefore $\angle APC = 120^\circ$.

29. a Total number of cases ${}^{10}C_3$

$$\text{Favorable (required) case} = {}^{10}C_3 - {}^6C_3$$

$$\text{The required probability} = \frac{{}^{10}C_3 - {}^6C_3}{{}^{10}C_3}$$

$$= \frac{5}{6}$$

Hence option 'a' is the correct answer.

30. a It is clear with the definition of given function that if

given 'x' is divisible by 10, Then $f(x) = \frac{x}{10}$ Also

increment of '1' will be given to x, i.e. $f(x) = x + 1$ Now,

$$f(1994) = 1995 \quad (\because 1994 \text{ is not divisible by } 10)$$

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$$f(2000) = 200$$

$$f(200) = 20$$

$$f(20) = 2$$

So in all '9' steps required to get $A_n = 2$.

$$\therefore n = 9$$

For questions 31 and 32:

31. d The revenues from the e-commerce activities, world wide
 $= 5 \times (37 + 32 + 28 + 31 + 44) + 10 \times (17 + 24 + 22 + 21 + 25) + 20 \times (25 + 21 + 16 + 16 + 37) + 15 \times (20 + 23 + 22 + 9 + 6)$
 $= (860 + 1090 + 2300 + 1200)$
 $= 5450$ million dollars.

The total number of e-commerce transactions made for airline ticket purchase

$$= (25 + 21 + 16 + 16 + 37) = 115 \text{ million}$$

$$\text{after } 20\% \text{ increase: } = 115 \times 1.20 = 138 \text{ million dollars}$$

$$\text{The new average price} = 20 \times 1.25 = 25 \$$$

\Rightarrow net increase in the worldwide e-commerce revenues

$$= (138 \times 25 - 115 \times 20) \text{ million dollar}$$

$$= 1150 \text{ million dollars}$$

$$\Rightarrow \text{The required percentage} = \frac{1150}{5450} \times 100 = 21.1\%$$

$$\approx 21\%$$

\Rightarrow Option (d) is correct.

32. e The revenue contribution of the Asia Pacific region, for the four product categories is:-

$$\text{Books} = 37 \times 5 = 185 \text{ Mn \$}$$

$$\text{Videos/DVDs/Games} = 17 \times 10 = 170 \text{ Mn \$}$$

$$\text{Airline Tickets/Reservation} = 25 \times 20 = 500 \text{ Mn \$}$$

$$\text{Clothings/Accessories/shoes} = 20 \times 15 = 300 \text{ Mn \$}$$

Definitely (e) is the correct option.

For questions 33 and 34: Let the net sales, in the year 2000 be 100. Hence, the net sales values in the after years are:

YEAR	NET SALES
2000	100
2001	119.3
2002	122.4
2003	141.6
2004	163.1
2005	195.6

33. e The absolute values of the aggregate salaries and wages expenses are, year wise given as :-

YEAR	SALERIS & WAGES
2000	5.9
2001	6.8
2002	6.85
2003	7.5
2004	7.99
2005	8.6

The maximum growth rate has been in the year 2001 when it increased to 6.80; from a previous value of 5.90.

Hence (e) is correct.

34. d The absolute value of the aggregate PAT are

$$\text{In 2005 : } \frac{195.6 \times 6.9}{100} = 13.49$$

$$\& \text{ In 2004 } \frac{163.1 \times 6}{100} = 9.78$$

⇒ The annual growth rate

$$= \frac{13.49 - 9.78}{9.78} \times 100 = 37.9\%$$

⇒ Option (d) is correct.

For questions 35 to 39:

35. a Trade imbalance in 2005 - 06 is given by $(630526.77) - 454799.97 = 175726.80$ crore rupees & trade imbalance in the years 2004 - 05 is given by $(501064.54 - 375339.53) = 125725.01$ crore rupees the growth in the trade imbalance is:-

$$\frac{(175726.80 - 125725.01)}{125725.01} \times 100 = 39.77$$

Hence answer is (a).

36. e In the year 2005 - 06
export of petroleum products = $0.1121 \times 454799.97 = 50983.08$ crore rupees.
& import of petroleum crude and products = $0.3087 \times 63.526.77 = 194643.61$ crore rupees.

⇒ yearly difference = $(50983.08 - 194643.61) = 143660.53$ crore rupees.

In the year 2004 - 05
export of petroleum products = $0.0857 \times 375339.53 = 32166.59$ crore rupees

& import of petroleum crude and products = $0.2787 \times 501064.54 = 139646.68$ crore rupees

⇒ yearly difference = $(32166.59 - 139646.68) = 107480.09$ crore rupees.

⇒ the ratio = $\frac{\text{yearly difference in 2005 - 06}}{\text{yearly difference in 2004 - 05}}$

$$= \frac{143660.53}{107480.09} = 1.336$$

⇒ (e) is the correct answer.

37. a The options discuss, 6 different commodities. Their export values in year 2003 - 04 and 2004 - 05 are given below. The last column shows the growth rate over the previous year.

Commodities	Export values		Growth Rate
	2003 - 04	2004 - 05	
Petroleum products	16252.517	32166.59	1.97
Ores and Minerals	10825.233	19855.46	1.83
Engineering Goods	48141.48	69100	1.43
Gems and Jewellery	48581.53	64896.2	1.33
Chemicals and related products	45266.48	60054.32	1.32
Agri and Allied Products	24613.47	28563.33	1.16

Clearly, option (a) has the correct descending order.

38. Growth exports = $[(\text{Weight percentage of 2005 - 06}) \times (\text{Total Exports value of 2005 - 06})] - [(\text{Weight percentage of 2004 - 05}) \times (\text{Total Exports value of 2004 - 05})]$

The growth for "Petroleum products]" has been the maximum and is given below.

$$\left(\frac{11.21}{100} \times 454799.97 \right) - \left(\frac{8.57}{100} \times 375339.53 \right) = 18816 \text{ crores rupees.}$$

39. Average growth of import

$$\frac{[(\text{Export value in 2005-06}) - (\text{Export value in 2004 - 05})] + [(\text{Export value in 2005 - 05}) - (\text{Export value in 2003-04})]}{2}$$

$$= \frac{(\text{Export value in 2005 - 06}) - (\text{Export value in 2003 - 04})}{2}$$

bulk export has the maximum value of this as

$$\frac{0.4256 \times 630526.77 - 0.3787 \times 359107.66}{2}$$

= 66179.06 crore rupees.

For questions 40 and 43:

40. d The first tier upgrade corresponds to Blue to Blue Plus and the last tier upgrade is Gold to Platinum. A passenger gets the first tier upgrade when he fulfills either of the following two conditions:

(i) He completes 3000 Queen Miles within the first 6 months of the first flight.

(ii) He makes 3 journeys, within the first 6 months of the first flight.

A passenger gets the last tier upgrade when he fulfills any of the following conditions:

(i) He completes 3000 Queen Miles within the first 6 months of the first flight.

(ii) He makes 10 journeys, within the first 6 months of the first flight.

(iii) He completes 20 journeys, within the first 6 months of the first flight.

(iv) He completes 30000 Queen Miles within the first 12 months of the first flight

Hence, Mr. Kakkar gets his first tier upgrade on

3.02.2007 and his last tier upgrade on 31.12.2007.

The difference is 10 Months and 29 days. Discounting the partial month (the extra 29 days) the difference is of 10 months. Hence (d) is the correct answer.

41. c To avail this benefit, the passenger should at least be a Gold member. On 30.3.2007 he makes Silver upgrade under the 12- month system. On the other hand, under the 6 month fast track system, he becomes eligible for Silver to Gold Upgrade, which is higher. Hence on 20.3.2007 his membership is upgraded to Gold and he becomes eligible for guaranteed reservations up to 24 hours prior to departure. Hence the correct answer is (c).

42. c Mr. Kakkar becomes a Gold member on 20.3.2007 and he becomes a Platinum member on 31.12.2007. Hence he enjoys the Gold membership for 9 months, discounting an partial months.

43. d Had there been no 6 – month system, then Mr. Kakkar membership, after completing 20,000 Queen Miles which happens in the month of September.
