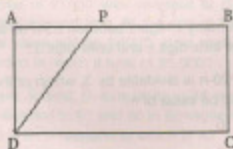


PROBLEM SOLVING'S 50 VERY IMPORTANT QUESTIONS

- Three positive integers: m , n , and q , their average is 10, median is $m+6$. What is the greatest possible value of Q ?
- Six alphabets, A,B,C,D,E, and F have to be arranged in six numbered positions(1-6). How many ways can you arrange them so that a is not in position numbered 1, b is not in position numbered 2 and c is a is not in position numbered 4.
- The number of the members of a club is more than 10 and less than 40. When 3 people sit at a table, other people exactly divided to 4-people groups (4people sit at a table) or 5-people groups (5 people sit at a table). If the members are divided to 6-people groups, how many people will be left?



- In the rectangle shown above, $AD=6$, $AB=8$. What is the probability that $PD < 45^{\circ}$?
- Each of 30 students studies at least one of the three languages, English, French, and Italian. there are 17 students who study English, 13 French, and 20 Italian. What is the possible least number of the students who study three of all the languages?
- $S(n)$ denotes to be the sum of the exponents of the prime factor, for example, $36=2^2 \cdot 3^2$, so, $S(36)=5$. If $S(a)=12$, $S(b)=4$, $S(a \cdot b)=$?
- A fair coin is tossed 5 times. What is the probability of getting at least three heads on **consecutive** tosses?
- There are 10 marble balls, including 5 green, 3 blue, and 2 red, in a container. One ball is picked out then put back, then another ball is selected. What is the p[probability that a green ball and a blue ball will be selected?

- There is one survey testing 60 people who taste the three different flavor ice-cream: V(allina), C(hocolate) and S(trawberry). All the people do the survey and rank them, there are no situation

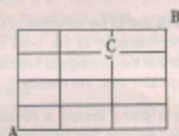
that two flavor rank equally, $\frac{3}{5}$ of people rank V

worst, $\frac{1}{10}$ of them (60 rank v ahead of C, $\frac{1}{3}$ of them rank v ahead of s, ? how many people rank v first?

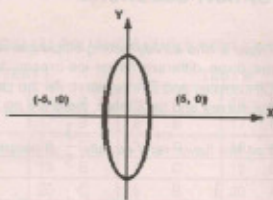
- If $f(x)=1, (x \geq 0)$; $f(x)=\frac{1}{x}, (x < 0)$, Asking the value of $f(2)+(-6)$?

- p and m are the positive integers, and p is a prime number, if $x^2 - mx + p = 0$ has a positive integer solution, asks what is the value of $(m-p)$?

- A person does a job and will gain \$336. Actually, he do 4 more hours than schedule time, therefore, his hour wage is \$2 less. What is the schedule work time?



- From A to C to B, how many (shortest) ways are possible? (The length of horizontal & vertical steps are same).
- When a number is divided by 13, quotient is K, remainder is 2; when divided by 17, remainder is 2. What is the remainder when K is divided by 17?



15. On the circle shown above, how many points have both integer x and y ?
16. If 6 different numbers are to be selected from integers 0 to 6, how many 6-digit even integers greater than 300,000 can be composed?
17. $X^3 - x = (x-a)(x-b)(x-c)$, and $a > b > c$, $b = ?$
18. The product of all prime numbers from 2 to 29 plus 1 equals K . Which of the following is true?
 I. K is divisible by prime number.
 II. K has a prime factor greater than 29.
 III. P is divisible by 30
19. Five cards are to be selected at random from 10 cards numbered 1 to 10. How many ways are possible that the average of five numbers selected will be greater than the median?
20. Linking a point inside a rectangle and four vertices, we can get four line segments, with length w, x, y , and z . In terms of x, y , and z , what is w^2 ?
21. $A_1 = 2, A_2 = 3, A_3 = A_1 A_2, A_4 = A_1 A_2 A_3, \dots$ If $A_n = t$ ($n > 3$), is $A_{n+2} = ?$
22. X is a multiple of 5, $X = p^2 \cdot q$, p and q are integers. Which of the following must be the multiple of 25?
 pq, pq^2, p^2q^2, p^3q
23. When which digit in $467^{**}15^{*}23$ (not sure about the numbers) is added 1, the product changes least value?
 1, 2, 6, 7, 5
24. There are 4 letters and 4 corresponding envelopes. If we put the 4 letters into the envelopes at random, what is the probability that only one letter was into the exact envelope?
25. A 4-digit telephone number consists of 3, 4, and 5. If 4, 5 can be used exactly one time, 3 can be used two times, how many such numbers are possible?
26. If n is positive integer, and x, y are positive, what is the value of $\left[x^{\frac{1}{n}} \left(-\frac{1}{n}\right) y^{\frac{1}{n}} \left(-\frac{1}{n}\right)\right]^n$?
27. If the four sides of a pentagon is 2, 3, 4, 5, respectively, which of the following could be the length of the fifth side?
 5, 10, 15
28. How many integers between 234700 and 458600 have tens digit 1 and units digit 3?
29. If 2^{20-n} is divisible by 3, which of the following could be value of n ?
 I. 0
 II. 1
 III. 4
30. If $x < 0$, in terms of x , $\left\{ \left[(x-3)^4 \right]^{\frac{1}{4}} + (-x)^{\text{absolute value}} \right\}$ of $x^{\frac{1}{2}} = ?$
31. The product of the integers from 1 to 8 can be expressed by $2^k \cdot 3^m \cdot 5^p \cdot 7^q$, $k+m+p+q = ?$
32. At its constant rate, sluice X drained off $\frac{1}{2}$ amount of water in four hours. Then, X and Y together, at their constant rates, drained off the remaining water in three hours. How many hours will it take for Y to drain off all the water, independently?
33. 98% of the people have a television; at least, 60% of the people both have TVs and to have the Cable TVs, 72% of people who have TVs also have VCRs. What is the maximum percent of the people who can have all three (TVs, Cable TVs and VCRs)?

34. A right triangle is drawn, the opposite side of right angle is 10, sum of the sides next to right angle is 12. Ask Area?

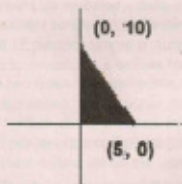
35. There are two points $p(a,b)$, and $q(c,d)$ in a xy -plane. If $a^2+b^2+c^2+d^2=87$, and $ac+bd=31$, what the length of the segment pq ?

36. A certain characteristic in a large population has a distribution that is symmetric about the mean m . If 68 percent of the distribution lies within one standard deviation d of the mean, what percent of the distribution is less than $m + d$?

- A. 16%
- B. 32%
- C. 48%
- D. 84%
- E. 92%

37. A total of \$1000 was invested at compounded annual interest rate. At the end of 12 years, the total value will be \$4000. How many years are needed to reach a total of \$8,000?

38. Scale A and B are linear. 24 and 30 in A correspond to 40 and 60 in B(maybe inaccurate). 100 in B correspond to which in A?



39. Point (x,y) is a point within the triangle. What is the probability that $y < x$?

40. $(\sqrt{15+4\sqrt{14}})+\sqrt{15-4\sqrt{14}})^2$

41. Someone invested x dollars at simple annual interest, and the investment, including interest will

be doubled in 8 and $\frac{1}{3}$ years. What will be the total amount of the investment after 25 years?

42. T is a set of 30 decimals, sum of which is S . All the decimals are classified to two groups: If the tenth's digit is even, the decimal rounds to the immediate greater integer (For example, $2.2 \Rightarrow 3$); if the tenth's digit is odd, the digits to the right of the decimal point are abandoned (For example, $2.1 \Rightarrow 2$). The

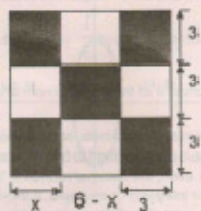
sum of these integers is E , if $\frac{1}{3}$ of the decimals have a even tenth's digit, which of the following could be the value of $E-S$?

- I. -16
- II. 6
- III. 10

43. When x is divided by y , the remainder is 9, and $x/y=96.12$, $y=?$

44. The function f is defined for each positive three digit integer n by $f(n)=2^x \cdot 3^y \cdot 5^z$, where x,y and z are the hundreds, tens, and unit digit of n , respectively. If m and v are three-digit positive integer such that $f(m)=9f(v)$, then $m-v=?$

45. A decimal is 0.123456789101112131415161718192021...What is the 100th digit to the right of the point place of the decimal?



46. The figure above represents a square garden that is divided into 9 rectangular regions with indicated dimensions in meters. The shaded regions are planted with peas, and the unshaded regions are planted with tomatoes. If the sum of the areas of the regions planted with peas is equal to the sum of the areas of the regions planted with tomatoes, what is the value of x ?

- A. 0.5
- B. 1
- C. 1.5
- D. 2
- E. 2.5

47. I, J, K, Z are positive integers, $1 < I < J < K < Z$, $I^2 \cdot J^3 \cdot K^4 \cdot Z = 462$. $Z=?$

48. X is the product of the integers 1 to 8, inclusive. If 2^m is a factor of x , what the greatest possible value of m ?

49. In which range does the deviation of 11, 10, 10, 10, 12, and 12 fall?

50. Each of the students in a class either has 3 pencils and 1 pen, or has 1 pencil and 2 pens; the average of pencils in total class is 1.6, what's the average of pen?

PROBLEM SOLVING'S 50 V.IMP QUESTION

1	22	26	xy
2	714	27	5 & 10
3	5	28	2239
4	$< 3/8$	29	II & III
5	0	30	$3 - 2x$
6	16	31	11
7	$1/4$	32	4.8
8	$3/10$	33	60%
9	2	34	11
10	$5/6$	35	5
11	1	36	D
12	24	37	18
13	20	38	42
14	Zero	39	$1/3$
15	12	40	32
16	1680	41	$4x$
17	0	42	I & II
18	I & II	43	75
19	111	44	20
20	$x^2 + z^2 - y^2$	45	5
21	T^4	46	C
22	p^2q^2	47	11
23	7	48	7
24	$1/3$	49	B/w 0 - 3
25	12	50	$17/10$

DATA SUFFICIENCY'S 50 VERY IMPORTANT QUESTIONS

1. Class A and B took a same test. For class A, median score is 80, average score is 82; for class B, median score is 78, average score is 74. Combining A and B, is the average greater than the median?
 - 1). A has 37 students and B has 40 students.
 - 2). A and B have 77 students.
2. X is an integer from 1 to 10, $x=?$
 - 1). The tenth digit of $\frac{1}{X}$ is x
 - 2). The hundredth digit of $\frac{1}{X}$ is x
3. Working together, A, B, and C can complete a work in 24 minutes. Working alone, A need how many minutes to complete the work?
 - 1). Working together, A and B need 48 minutes
 - 2). Working together, C and B need 36 minutes
4. $(X-Y)^4=?$
 - 1). the product of X and Y is 7
 - 2). X and Y are integer
5. Last year Luis invested x dollars for one year, half at 8 percent simple annual interest and the other half at 12 percent simple annual interest. Now he wants to invest the x dollars for one year in the same two types of investments, but the lower rate has decreased. If the higher rate is unchanged, what fraction of the x dollars must be reinvest at the 12 percent rate so that the total interest earned from the x dollars will be the same for both years?
 - 1). The lower rate is now 6 percent.
 - 2). The total amount of interest earned from the two investments last year was \$3,000
6. What is the remainder when x is divided by 3?
 - 1). The sum of the digits of X is 5
 - 2). When X is divided by 9, the remainder is 2
7. If two numbers are selected from 1, 3, 5, 7, 9, 11, 13, 15, 17, and 19 randomly, what is the standard deviation of the new list?
 - 1). The mean remains unchanged.
 - 2). The median of the new list is 10.
8. x, y and c are positive integers, if $\frac{x+c}{y+c} + c > \frac{x}{y}$?
 - 1). $y > x$
 - 2). $6 > y$
9. $0 < n < 9$, what is the value of n
 - 1). if tenth unit of $\frac{1}{n}$ is zero
 - 2). if unit digit of $\frac{1}{n} > n$
10. One person come from A (approximately New York) to B (Chicago) and back from a different way. (Below is a little unclear, but reflected the mentality should be right) The average speed from A to B is 30 kilometers/ hour. What is the average speed of total route?
 - (1) When he comes back, the average speed is $\frac{2}{3}$ of the speed he comes forth.
 - (2) The route he comes forth is $\frac{1}{5}$ longer than that of he comes back of the total route.
11. asked whether 30 is a factor of n ?
 - (1) 30 is a factor of the square of n
 - (2) 30 is a factor of $2n$
12. Two straight lines, ab, cd , intersects A, B on ab, C, D, E on cd, AC, AD, BD, BE connects, obtains is for the similar capital letter M graph. Asks ab, cd whether parallel
 1. Triangle ACD, BDE is equilaterals
 2. Triangle ABD is equilateral
13. X and Y are positive numbers, whether X is smaller than Y ?
 - (1) Square Root of $X <$ Square Root of Y
 - (2) $(X-3)^2 < (Y-3)^2$
14. The remainder of 26 divided by k is $k-2$, what value is K ?
 - (1) $K > 5$
 - (2) $K < 10$
15. N is an integer, r is the remainder when $(N-1)(N+1)$ is divided by 24, $r=?$
 - 1). N is not a multiple of 2
 - 2). N is not a multiple of 3

16. Is the perimeter of a triangle greater than 1?

- 1). Two of the heights are less than $\frac{1}{3}$
- 2). One of the heights is greater than $\frac{1}{2}$

17. p , q , and r are non-zero number, is line $p^2x + q^2y = r$ same as $3^2x + 5^2y = 2$?

- 1). We can get $q = \left(\frac{5}{3}\right)p$
- 2). We can get $r = \left(\frac{2}{3}\right)xp$

18. $X = ?$

- 1). The absolute value of $x+2$ is twice the absolute value of $x-2$?
- 2). $X > 2$

19. $\{X\}$ denotes the greatest integer less than or equal to X , is $\{X\} = 1$?

- 1). $X > 1$
- 2). $X < 2$

20. $\{x\}$ denotes to be the least integer no less than x , is $\{2d\} = 0$?

- 1). $\{d\} = 0$
- 2). $\{3d\} = 0$

21. Juan bought some paperback books that cost \$8 each and some hardcover books that cost \$25 each. If Juan bought more than 10 paperback books, how many hardcover books did he buy?

- 1). The total cost of the hardcover books that Juan bought was at least \$150.
- 2). The total cost of all the books that Juan bought was less than \$260.

22. If $f(x) = x - x^2$ is $f(a) < f(b)$?

- 1). $a < b$
- 2). $a^2 < b^2$

23. a and b are positive integer, is $a = b$?

- 1). $|a-s| = |b-s|$
- 2). $s < 0$

24. A line passes through point $(1, P)$. Is its slope greater than 0?

- 1). The line passes through $(P-1, 13)$
- 2). The line passes through $(0, 1)$

25. $a+b=5$, a^2b is not 0, is $ax^4+bx^3=a+b$?

- 1). $ax^4=a$
- 2). $bx^3=b$

26. If 500 is the multiple of 100 that is closest to X and 400 is the multiple of 100 that is closest to Y , which multiple of 100 is closest to $X+Y$?

- 1). X is less than 500
- 2). Y is less than 400

27. Someone come from New York to Chicago and back from a different way. The average speed from A to B is 30 km / hour. What is the average speed of total route?

- 1). When he comes back, the average speed is $\frac{2}{3}$ of the speed he goes forth.
- 2). The route he goes forth is $\frac{1}{5}$ longer than that of he comes back of the total route.

28. Gave some numbers about money cost, is the range of these numbers greater than \$500?

- 1). The median is \$1,000
- 2). Standard deviation is \$500

29. If g is the greatest common divisor of $k+7$ and n , where n and k are integers, $g = ?$

- 1). $n=20891$
- 2). $n=k+6$

30. A school administrator will assign each student in a group of n students to one of m classrooms. If $3 < m < 13 < n$, is it possible to assign each of the n students to one of the m classrooms so that each classroom has the same number of students assigned to it?

- 1). It is possible to assign each of $3n$ students to one of m classrooms so that each classroom has the same number of students assigned to it.
- 2). It is possible to assign each of $13n$ students to one of m classrooms so that each classroom has the same number of students assigned to it.

31. What is the remainder when the positive integer x is divided by 8?
- When x is divided by 12, the remainder is 5.
 - When x is divided by 18, the remainder is 7.
32. The circle has center Q and radius 50, and point P has coordinates $(50, 0)$. If point Q (not shown) is on the circle, what is the length of line segment PQ ?
- The x -coordinate of point Q is -30.
 - The y -coordinate of point Q is -40.
33. $p(x)$, $q(x)$ are the quadratic functions. What is the set of the real numbers for which $\frac{p(x)}{q(x)}$ is an integer?
- $p(2) = 0$, $p(3) = 0$
 - $q(0) = 0$, $q(1) = 0$
34. Does $Y = mX^2 + n$ have intersect with axis x ?
- $m < 0$
 - $n > 0$
35. Line K passes through point $(n, -1)$. Is slope of K positive?
- K passes through the origin point.
 - K passes through $(1, n+2)$
36. Is $x^2 / |x| > 1$?
- $x < 1$
 - $x > -1$
37. In xy -plane, line K passes through point $(1, a)$, L passes $(1, b)$, and both two line pass through original point. Whether K 's slope greater than that of L ?
- $ab > 0$
 - $|a| > |b|$
38. If n is an integer, is $3^n + 1$ divisible by 10?
- $n = 4k + 2$
 - $n > 4$
39. Line K 's slope is positive and L 's is negative. Is K 's intersection point with axis- y above that of L ?
- K 's intersection point with axis- x is to the left of the origin.
 - K 's intersection point with axis- y is above the origin.
40. Which of X , X^2 , and $1/X$ has the least value?
- $X > 0$
 - $X < 1$
41. If x , y , and a are integers, is $x > y$?
- $x + a > x - a$
 - $ax > ay$
42. $S_n = S(n-2) + 11$, is 633 a term of the sequence?
- $S_1 = 39$
 - $S_2 = 43$
43. $Y = a(x-b)^2 + P$. Can you tell if y has intersects with x axis?
- $a < 0$
 - $P > 0$
44. Each of people voted once in an election, X got 483 from male voters, Y got 433 from female voters. How many votes did X get?
- X got votes from 50% of male voters
 - Y got votes from 60% of female voters
45. Is deviation of set A greater than that of B ?
- A 's median is greater than that of B
 - A 's mean is greater than that of B
46. If $xyz > 0$, is $xy^2z^3 > 0$?
- $Y > 0$
 - $X > 0$
47. Both a , b , and c are 3-digits integers, where $a = b + c$. Is the hundreds' digit of number a equal to sum of that of b and c ?
- Tens' digit of $a =$ tens' digit of $b +$ tens' digit of c
 - Units' digit of $a =$ units' digit of $b +$ units' digit of c
48. Is r/s a terminated decimal?
- r is a factor of 100
 - s is a factor of 100
49. Is the range of per capita within 5 and 500?
- Nearest 1,000,000, the volume is 43,000,000,000
 - Nearest 1,000,000, the population is 86,000,000
50. x , y , z are numbers on the number line. Is $x < y < z$?
- $|y-x| + |y-z| = |z-x|$
 - $x < z$

DATA SUFFICIENCY'S 50 V.IMP QUESTIONS

1	A	14	C	27	C	40	C
2	A	15	C	28	B	41	C
3	B	16	B	29	B	42	A
4	C	17	C	30	B	43	C
5	A	18	C	31	E	44	B
6	D	19	C	32	E	45	E
7	E	20	B	33	E	46	A
8	A	21	C	34	C	47	E
9	E	22	E	35	C	48	C
10	C	23	C	36	C	49	E
11	C	24	E	37	E	50	E
12	C	25	B	38	A		
13	A	26	E	39	E		