e is NOTA

1. If *s* varies inversely as $\sqrt{d}$, find the percentage change in the value of *s* when the value of *d* is reduced by 75%.

a) $133\frac{1}{3}\%$ b) 100%   c) 75%   d) 50%   e) NOTA

2. Mr. Jones was offered a radio by one firm at $80. less discounts of 20% and 10%; another firm offered him the same radio at $80. less 30%. Which is the better offer and by how much?

a) same price   b) 1st, $1.60.   c) 1st, $.80   d) 2nd, $1.60   e) NOTA

3. Adam bought a number of ping-pong balls in a store in Tennessee, where a 5% sales tax (we wish) is added to every purchase. If he did not have to pay tax, he could have bought 3 more balls for the same amount of money. How many balls did he buy?

a) 30   b) 45   c) 57   d) 60   e) NOTA

4. The ratio of the number of boys to the number of girls in a room is 5:7. When 24 more boys enter, the ratio
.   is reversed. How many girls are in the room?

a) 29   b) 32   c) 35   d) 36   e) NOTA

5. A car radiator contains 5 liters of a 25% antifreeze solution. How many liters must be removed and replaced by a 75% antifreeze solution to leave the radiator filled with a 55% antifreeze solution?

a) 2.5   b) 3   c) 3.5   d) 3.7   e) NOTA

6. A and B, traveling at respective rates of a and b kilometers per hour, head directly towards each other across a distance of 120 kilometers. If both start at 10:30 a.m., they will meet at noon. If A starts at 10:00 a.m. and B starts at 11:00 a.m., they will also meet at noon. Find the ordered pair (a,b).

a) (30,30)   b) (30,40)   c) (40,40)   d) (40,30)   e) NOTA

7. Two freight trains, 120 miles apart, start toward each other. Each train is traveling at a rate of 40 miles per hour. A carrier pigeon on the first train flies to the second train, then flies back to the first train, and continues to fly back and forth in this way from one train to the other at a constant rate of 60 mph until the trains meet. How many miles does the pigeon fly?

a) 120   b) 110   c) 100   d) 90   e) NOTA

8. Given:

$A = 94_{10}$

$B = 134_8$ Arrange in order from smallest to largest.

$C = 10120_3$

$D = 401_5$

a) BDCA   b) CBAD   c) BACD   d) ABDC   e) NOTA

9. If Madeline scores 97% on her next math test, her average will be 90%. If she scores 73%, her average will be 87%. How many tests has Madeline already taken?

a) 6   b) 7   c) 8   d) 9   e) NOTA

10. Let $x =$ the units digit of the following sum:

$1! + 2! + 3! + 4! + 5! + \dots + 2009!$

Evaluate: $2^x + \begin{vmatrix} 4 & x \\ 2 & 5 \end{vmatrix} + {_5}C_x.$

a) 25   b) 30   c) 32   d) 38   e) NOTA

11. In the country of Mu, two towns, Alpha and Theta are in the same time zone. They are connected by a highway 200 miles long. A bus leaves Alpha at 3:00 p.m. and travels at a uniform rate of 50 mph toward Theta. Twelve minutes later, a second bus leaves Alpha and travels toward Theta at a uniform rate of 55 mph. At what time (p.m.) will the second bus catch up to the first bus?

a) 4:48 p.m.   b) 5:00 p.m.   c) 5:12 p.m.   d) 5:24 p.m.   e) NOTA

12. X is an integer greater than one such that when it is divided by 3, 5, 7, or 13, the remainder is one. What is the smallest possible value of X?

a) 1363   b) 1364   c) 1365   d) 1366   e) NOTA

13. The sum of three numbers is 88. The first number decreased by 5, the second number increased by 5, and the third number multiplied by 5 are all equal. Find the positive difference between the smallest and the largest of the three numbers.

a) 8   b) 35   c) 37   d) 45   e) NOTA

14. The remainder when $f(x) = x^5 - 2x^4 + ax^3 - x^2 + bx - 2$ is divided by $x + 1$ is -7. When $f(x)$ is divided by $x - 2$., the remainder is 32. Determine the remainder when $f(x)$ is divided by $x - 1$.

a -7   b) 7   c) -3   d) 3   e) NOTA

15. Let AΘB be defined as the sum of all integers between A and B. For example, $2 \Theta 8 = 3 + 4 + 5 + 6 + 7 = 25$. Find the value of $(798 \Theta 1211) - (799 \Theta 1210)$.

a) 2420   b) 2421   c) 2424   d) 2426   e) NOTA

16. Find the exact area of the region bounded by the graph of $x^2 + y^2 - 6x + 8y + 13 + 0$
a) 9π b) 10π c) 11π d) 12π e) NOTA

17. Find the sum of all the integers divisible by 7 between 32 and 5000.
a) 1,514,285   b) 1,515,285   c) 1,615,185   d) 1,786,715   e) NOTA

18. The intensity of light, I, is inversely proportional to the squaare of the distance, d, from the light source. If the intensity is 12 lumens when the distance is 4 feet, find the intensity when the distance is 8 feet.

a) 6   b) 5   c) 4   d) 3   e) NOTA

19. Given: $a*b = \sqrt[a]{b} + \dfrac{b}{a}$, and $a\Psi b = (a+b)^{\frac{b}{a}}$,   Find the numerical value of $(2*36)\Psi(3*27)$.

a) 6   b) 7   c) 8   d) 9   e) NOTA

20. A librarian saved one third of his salary for each of two years and then took a year off at half pay. At the end of the third year he had spent all his money, including the interest for one year at 5% on the savings of the first year, and he had a debt of $450. In this third year he spent twice as much as in each of the two preceding years. What was his salary?

a) $2700   b) $3000   c) $3300   d) $3600   e) NOTA

21. A party of students rented a motor boat, B, and shared the cost equally. If the number of students had been 5 less, the could have used a smaller boat costing only half as much as B and the expense to each would have been 50 cents less. If there had been 10 more students in the party, they would have required a larger boat costing 20% more than B, but the expense to each would have been 30 cents less. How many students were in the party?

a) 10   b) 15   c) 20   d)25   e) NOTA

22. The sum of three numbers is 32. The quotient of the second divided by the first is 4 and the third number is $\dfrac{3}{5}$ of the sum of the other two. Find the third number.

a) 5   b) 12   c) 15   d) 20   e) NOTA

23. How many combinations of 6 cent and 8 cent stamps can be purchased for exactly $5.00?

a) 83   b) 41   c) 21   d) 20   e) NOTA

24. Each valve A, B, and C when open, releases water into a tank at its own constant rate. With all three valves open, the tank fills in 1 hour, with only valves A and C open it takes 1.5 hours, and with only valves B and C open it takes 2 hours. The number of hours required with only valves A and B open is what?

a) $\dfrac{5}{6}$ hrs   b) 1 hrs   c) $\dfrac{6}{5}$ hrs   d) $\dfrac{5}{3}$ hrs   e) NOTA

25. At an expensive restaurant, George's meal cost $1 more than Barbara's, before the tip or the 6% sales tax were added. George left the same amount of tip that Barbara did. His tip was 15% of his meal's cost (including sales tax in computing the tip) and Barbara's tip was 16% before taxes. What was the cost of Barbara's meal, excluding the tax and the tip? Assume that no "rounding to the nearest cent" was required in computing all taxes and tips.

a) $98   b) $157   c) $159   d) $163   e) NOTA

26. Change 3.251351351351... to a fraction at lowest terms.

a) $\dfrac{3576}{110}$ b) $\dfrac{3601}{110}$ c) $\dfrac{3601}{1110}$ d) $\dfrac{3609}{1110}$ e) NOTA

27. A car travels at $\dfrac{1}{2}$ miles per hour for 8 minutes, then 1 mph for 4 minutes, then 2 mph for 2 minutes, then

4 miles per hour for 1 minute, and so forth: stopping after traveling 128 miles per hour for $\dfrac{1}{32}$ minutes.

How many miles does the car travel?

a) .56   b) .58   c) .6   d) .62   e) NOTA

28. Recall the formula $C = \dfrac{5}{9}(F - 32)$ for converting between Celsius and Fahrenheit temperatures.

An object's temperature rose by 20° F and its number of Fahrenheit degrees before the increase
turned out to match its number of Celsius degrees after in increase. What was its original temperature
in degrees Fahrenheit?

a) -15 b) -13 c) 10   d) 32   e) NOTA

29. To make plum wine, sugar is added to plum juice until the volume increases by 10%. The plum juice
is in a cylindrical container with a base of radius 12 cm and the height of 16.5 cm. What height, in
centimeters, of plum juice is needed so that when the sugar is added the container is just filled?

a) 12   b) 13   c) 14   d) 15   e) NOTA

30. A father in his will left all his money to his children in the following manner: $1000 to the first born and $\dfrac{1}{10}$

of what then remains, then $2000 to the second born and $\dfrac{1}{10}$ of what then remains, then $3000 to the third

born and $\dfrac{1}{10}$ of what then remains, and so on. When this was done each child had the same amount.
How many children were there?

a) 6   b) 7   c) 8   d) 9   e) NOTA

Tiebreaker 1. A motor car manufacturer makes m cars per week. The production is increased by n%.
The number of cars made per week is now what number?

Tiebreaker 2. A palindromic number is a whole number that reads the same both ways (for example
23432). How many palindromic numbers are there between 10 and 1000?

Tiebreaker 3. In 1970 I began collecting calendars and I have done so every year since. I ceased collecting
when every subsequent year can be served by one, at least, of the calendars I have already
collected. The last year in which I collected a calendar was what year?