Given below are Shortcut Formulae frequently used in solving Aptitude Question Papers

1. $1+2+3+4\ldots. +n = n(n+1) / 2$

2. $1^2+2^2+3^2\ldots. +n^2 = n(n+1)(2n+1) / 6$

3. $1^3+2^3\ldots+n^3 = [n^2(n+1)^2] / 4$

4. $1+3+5\ldots. 2n-1= n^2$

5. Every prime number greater than 3 can be written using the formula (6k+1) or (6k-1)

6. Number of factors present in a number is given as (p+1)(q+1)(r+1)…
   Where $N=(a^p)+(b^q)+(c^r)\ldots$
   Where a, b, c are prime numbers and p, q, r are positive numbers
   In the same way sum of all factors=$[(a^{(p+1)} / (a-1)][(b^{(q+1)} / (b-1)]\ldots$

7. If there is P volume of pure liquid initially in each operation and Q volume is taken out and replaced by Q volume of water then at the end of n such operations, the concentration k is given as $K = [(P-Q) / P]^n$

8. If successive increase in percentage is given p%, q%, r% then effective % increase is given as [(100+p)/100][(100+q)/100][(100+r)/100]-1}*100

9. If an article is sold such that a article has a profit of p% on one and loss of p% on other then we have the net result to be loss and the loss percent is $(p^2) / 100$

10. In a party each members shakes hand with other member. If total number of Hand shakes were N then Number of members in Party = Larger nearest whole squared number to N. E.g.: N=210, Larger nearest Square to 210 is 225. So Members = $(225)^{1/2} = 15$.

11. If a person goes at X km/hr in forward direction and returns back at Y km/hr then the average speed is 2XY / (X+Y)

12. If a person traveling between two points reaches p hours late traveling at u kmph and reaches early traveling at v kmph, the distance between two points is [vu(p-q)] / (v-u)

13. If we have a term of this sort “Apple” the number of possible arrangements possible are 5! /2!

14. Number of ways of selecting one or more items from n given items is $(2^n)-1$

15. If we are given problems based on number of squares possible all together then we have a generalized short cut method of doing it

Eg: given a chess board (8*8) how many squares can be formed the solution is $(8^2) + (7^2) + (6^2) + (1^2)$

19. If a problem is given with some sequence (2, 4, 6...)And (3, 6, 9..) along with just 2 operations possible the answer is the number of Square terms.

20. In calendars the first day of the year after the leap year will be in this manner. If Jan 1 of 2006 was on Sunday then Jan 1 of 2005 will be on Saturday and that of Jan 1 of 2004 will be on Thursday this is because 2004 is a leap year so there is an extra gap of one.

21. Given a circular track and both the riders ride in the same direction then the first time they meet is given as L / (a-b) for opposite direction it is L / (a+b)
Where L is the length of the track and a, b the speed of riders.

22. If A can complete a work in a days and B can complete it in b days then A and B working together can complete it in ab / (a+b)

23. If A can complete a work in a days and B can complete it in b days and C can complete it in c days then all working together can complete it in abc / (ab+bc+ca)

24. If two trains start at the same time from two points A and B towards each other and after crossing they take x and y hrs to reach B and A respectively then (A speed): (B speed)=$[(x)^{1/2}] : [(y)^{1/2}]$

25. If Length of a rectangle is increased by I1% and Breadth is increased by I2% then The Percentage increase in Area is $I_1+I_2+[(I_1*I_2) / 100]$

26. If Length of a rectangle is increased by I% and Breadth is decreased by D% then Percentage increase or decrease in Area is I-D-[(I*D) / 100]

27. If Length of a rectangle is decreased by D1% and Breadth is decreased by D2% then Percentage increase or decrease in Area is $D_1-D_2+[(D_1*D_2) / 100]$

28. If A is R% more than B, the Percentage B less than A is (100*R)/(100+R)

29. If A is R% less than B, the Percentage B more than A is (100*R)/(100-R)

34. How many numbers are divisible by n between A and B. Solution is (A / n) – (B / n)

30. Let the present population of a town be P with an annual increase of R% then:
Population after n years = $P (1+R/100)^n$
Population n years ago = $P / (1+R/100)^n$

30. If the price of a commodity increases by R% then the reduction in consumption so as not to increase the expenditure is (100*R) / (100+R)

31. If the price of a commodity decreases by R% then the increase in consumption so as not to decrease the expenditure is (100*R) / (100+R)

32. Let the present value of a machine be P. Suppose depreciates at the rate of R% per annum. Then
    Value of Machine after n years = $P(1-R/100)^n$
    Value of Machine n years ago = $P / (1-R/100)^n$

35. In a examination A% registered Candidates are absent and B% failed out of those who are present. If successful Candidates are X then.
    Number of Registered Candidates = (100*100*X) / [(100-A)(100-B)]

36. If a number divisible by D_1 leaves a remainder R_1, Then the same number when divided by D_2 the remainder will be the remainder got in scomputing R_1 / D_2.

37. A reduction of A% in the price of a commodity enables the purchaser to obtain C kgs more for Rs. B. Then the price per kg of the commodity before reduction is (A*B) / [(100-A)*C]

38. When the price of a commodity decreased by A%, the sale increased by B%. The effect on Sale is A–B - (AB / 100)

39. A number should be subtracted from numbers a, b, c, d so that the remainders may be proportional. Then the number is (AD-BC) / [(A+D)-(B+C)]

40. If N men takes X days to complete a work if M men left the team they complete the work in Y days. Then the number of men Left the team is M = [N(Y-X)] / Y.

41. If the Average age of N members is A. If M members are added to the team the Average becomes less by a value B. Then the Average age of Newcomers is A – [(N/M + 1) * B]

42. If A number of men or B number of women can complete a work in X days. Then time taken to complete the same work by a number of men and b number of women is X / (a/A + b/B)

43. If P_1 number of pipes working H_1 number of hours can fill a tank in D_1 days. Then number of hours H_2 needed for P_2 number of pipes to fill same tank in D_2 number of days is $H_2 = (P_1 * H_1 * D_1) / (P_2 * D_2)$

44. A and B together can do a piece of work in X days. A can do it alone in Y days.Then number of days needed by B to finish the work alone is XY/(Y-X)

45. Two pipes can fill a tank in X hours and Y hours respectively. The third pipe can empty it in Z hours. Then the number of hours needed to fill the tank if all pipes are opened simultaneously is XYZ / (YZ + ZX –XY)

46. A train with a speed of X kmph starts from a place. Another train starts from the same place after t hours with a speed of Y kmph . Then
The time in which they meet is (X*t) / (Y-X)
The distance taken to meet is Y(X*t) / (Y-X)

47. If a train passes the station of length X metres in T_1 seconds but a person in T seconds. Then the length of the Train is $(X*T_1) / (T_1-T)$

48. If the Cost price of X articles is equal to the Selling price of Y articles. Then the Gain Percent is [100(X-Y)] / X

49. By selling B items one gains the selling price of A items. Then the Gain percent is (A*100) / (B-A)

50. Selling price of an item is X.The Profit percent is equal to the Cost Price. Then the Cost Price is $–50+[10*(25+X)^{1/2}]$

51. A certain sum of money at Simple interest amounts to Rs.A in a years and Rs.B in b years. Then Rate percent = [(B-A)*100] / [Ab-Ba].
Also Principal = (Ab-aB) / b-a

52. If a certain sum at simple interest is becoming m times in t years then it will become n times in [(n-1)*t] / [m-1] years

53. If a certain sum at C becomes n times with rate percent R% then the number of years required is [(n-1)*100] / R years

54. If a sum at simple interest becomes n times in T years then Rate percent is [(n-1)*100]/T

55. The difference between S.I and C.I on a sum of money at R% per annum for n years is Rs.X. Then the principal is $X[(100/R)^n]$

56. The Compound interest value on a certain sum is C.I for n years for R% then the simple interest will be for same R% and n years is S.I = n * C.I / (n+R/100)