Applications of quadratic equations:

i.   Read the statement of the problem carefully and determine what quantity (or quantities) must be found.

ii.   Represent the unknown quantity (or quantities) by a variable (or variables).

iii.   Identify the relationships existing in the problem and determine which expressions are equal and write an equation (or equations).

Note: Check the answers obtained by determining whether they fulfil the conditions of the original problem. It may happen that out of the two roots of the quadratic equations, only one satisfies the conditions of the problem, reject the other root.

1.   A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72km at an average speed of 6km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is its original speed?

2.   Find the two consecutive odd integers, the sum of whose squares is 202.

3.   A natural number, when increased by 12, becomes equal to 160 times of its reciprocal. Find the number.

4.   A motor boat whose speed is 18km/hr in still water takes 1 hour more to go 24 km upstream than to return to the same spot. Find the speed of the stream.

5.   Find the roots of the quadratic equation:

$1/3x^2 - \sqrt{11}x + 1 = 0$

6.   Solve for x:

$$\frac{x+1}{x-1} + \frac{x-2}{x+1} = 3$$

7.   A shopkeeper buys a number of packets of biscuits for ` $80.x$ If he had bought 4 more packets for the same amount, each packet would have cost ` 1 less. How many packets did he buy?If

8.   Solve the following equations using quadratic formula:

(i) $4x^2 - 4a^2x + (a^4 - b^4) = 0$

(ii) $12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$II

9.   Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the square of the other two by 60, find the numbers.

10.   If the equation $(1+m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1+m^2)$.

11.   A trader bought a number of articles for ` 900, ffive were damaged and he sold each of the rest at `2 more than what he paid for it, thus getting a profit of ` 80 on the whole transaction. Find the number of articles he bought.