

## Important Shortcuts & Formulas on Problem Based on Ages

To solve the **Problem Based on Ages in Quant Section**, students require the knowledge of linear equations. This method needs some basic concepts as well as some more time than it deserves. Sometimes it is easier to solve the problems by taking the given choices in account. But this hit-and-trial method proves costly sometimes, when we reach our solution much later. We have tried of questions. Although, we are not able to cover each type of questions in this section, our attempt is to minimize your difficulties.

### Have a look at the following questions:

**Ex. 1:** The age of the father 3 years ago was 7 times the age of his son. At present, the father's age is five times that of his son. What are the present ages of the father and the son?

**Ex. 2:** At present, the age of the father is five times the age of his son. Three years hence, the father's age would be four times that of his son. Find the present ages of the father and the son.

**Ex. 3:** Three years earlier, the father was 7 times as old as his son. Three years hence, the father's age would be four times of his son. What are the present ages of the father and the son?

**Ex. 4:** The sum of the ages of a mother and her daughter is 50 yrs. Also 5 years ago, the mother's age was 7 times the age of the daughter. What are the present ages of the mother and the daughter?

**Ex. 5:** The sum of the ages of a son and father is 56 yrs. After 4 years, the age of the father will be three times that of the son. What is the age of the son?

**Ex. 6:** The ratio of the ages of the father and the son at present is 6: 1. After 5 years, the ratio will become 7:2. What is the present age of the son?

### By the conventional method:

**Solution: 1.** Let the present age of son = x years

Then, the present age of father = 5x yr

3 years ago,

$$7(x - 3) = 5x - 3$$

$$\text{Or, } 7x - 21 = 5x - 3$$

$$\text{Or, } 2x = 18$$

$$x = 9 \text{ years}$$

Therefore, son's age = 9 years

Father's age = 45 years

**Solution: 2.** Let the present age of son = x years

Then, the present age of father = 5x years

3 years hence,

$$4(x + 3) = 5x + 3$$

$$\text{Or, } 4x + 12 = 5x + 3$$

$$x = 9 \text{ yrs.}$$

Therefore, son's age = 9 yrs and father's age = 45 years

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**Solution : 3.** Let the present age of son = x yrs and the present age of father = y yrs

3 yrs earlier,  $7(x - 3) = y - 3$  Or,  $7x - y - 18 \dots\dots\dots(i)$

3 yrs hence,  $4(x + 3) = y + 3$

Or,  $4x + 12 = y + 3$  Or,  $4x - y = 9 \dots\dots\dots(ii)$

Solving (1) & (2) we get,  $x = 9$  yrs &  $y = 45$  yrs

**Solution : 4.** Let the age of the daughter be x yrs.

Then, the age of the mother is  $(50x - x)$  yrs

5 yrs ago,  $7(x - 5) = 50 - x - 5$

Or,  $8x = 50 - 5 + 35 = 80$

$x = 10$

Therefore, daughter's age = 10 yrs and mother's age = 40 yrs

**Solution : 5.** Let the age of the son be x yrs.

Then, the age of the father is  $(56 - x)$  yrs.

After 4 yrs,  $3(x + 4) = 56 - x + 4$

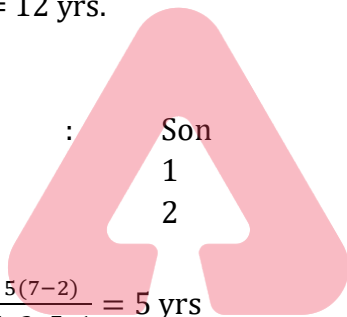
Or,  $4x = 56 + 4 - 12 = 48$

$x = 12$  yrs

Thus, son's age = 12 yrs.

**Solution : 6.**

Father	:	Son
Present age = 6		1
After 5 yrs = 7		2



Son's age =  $1 \times \frac{5(7-2)}{6 \times 2 - 7 \times 1} = 5$  yrs

Father's age =  $6 \times \frac{5(7-2)}{6 \times 2 - 7 \times 1} = 5$  yrs

**Other Method :-**

**Solution : 1.**

Son's age =  $\frac{3 \times (7-1)}{7-5} = 9$  yrs

and father's age =  $9 \times 5 = 45$  yrs.

Undoubtedly you get confused with the above method, but it is very easy to understand and remember. See the following form of question.

**Question :**  $t_1$  yrs earlier the father's age was x times that of his son. At present the father's age is y times that of his son. What are the present ages of the son and the father ?

**Formula**

$$\text{Son's age} = \frac{t_1(x - 1)}{x - y}$$

**Solution 2:** Son's age =  $\frac{3 \times (4-1)}{5-4}$

= 9 yrs and father's age =  $9 \times 5 = 45$  yrs

To make clearer, see the following form:

**Questions :** The present age of the father is y times the age of his son. t2 yrs hence, the father's age become z times the age of his son. What are the present ages of the father and his son ?

**Formula**

$$\text{Son's age} = \frac{(z - 1)t_2}{y - z}$$

**Solution . 3:** Son's age =  $\frac{3 \times (4-1) + 3(7-1)}{7-4} = \frac{9+18}{3} = 9$  yrs

To make the above formula clear, see the following form of question.

**Questions :** t1 yrs earlier, the age of the father was x times the age of his son. t2 yrs hence, the age of the father becomes z times the age of his son. What are the present ages of the son and the father ?

**Formula**

$$\text{Son's age} = \frac{t_2(z - 1) + t_2(x - 1)}{(x - z)}$$

**Solutions. 4:**

Daughter's age =  $\frac{\text{Total ages} + \text{No.of yrs ago (Times-1)}}{\text{Times+1}}$

$\frac{50+5(7-1)}{7+1} = 10$  yrs

Thus, daughter's age = 10 yrs and mother's age = 40 yrs

**Solutions. 5:**

Son's age =  $\frac{\text{Total ages}-\text{No.of yrs after (Time-1)}}{\text{Time+1}}$

$\frac{56-4(3-1)}{3+1} = \frac{48}{4} = 12$  yrs

**Note :** Do you get the similarities between the above two direct methods? They differ only in sign in the numerator. When the question deals with 'ago', a +ve sign exists and when it deals with 'after' a -ve sign exists in the numerator.

**Solutions. 6:** Then what formula comes?

Father	:	Son
Present age = x	:	y
After T yrs = a	:	b
Then, Son's age = $y \times \frac{T(a-b)}{\text{Difference of cross product}}$		
And, Father's age = $x \times \frac{T(a-b)}{\text{Difference of cross product}}$		

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**Note:**

1. While evaluating the difference of cross-product, always take +ve sign.
2. Both the above direct formulas look similar. The only difference you can find is in the denominators. But it has been simplified as "difference of cross-products to make it easier to remember. So, with the help of one formula only you can solve both the question.
3. We suggest you to go through both the methods and choose the better of the two.  
We hope that the post would have cleared all your doubts related to the topic.

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