

CLASS 8 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 8: HOTS: Algebra Play (Class 8)

Topic-wise short notes with solved examples

Higher order thinking questions on algebra for Class 8: explaining number tricks, consecutive numbers, calendar grids, largest products and age problems with equations, each with a full solution.

1 Solved HOTS questions

- Algebra explains why a trick always works: call the number you think of n , follow the steps, and the n cancels. For word problems, name the unknown, write an equation from the story, solve it, and check the answer in the story.

Example 1.1 Think of a number, add 5, double the result, subtract 4, halve it and subtract the number you started with. The answer is always 3. Explain why.

SOLUTION

Let the number be n . Adding 5: $n + 5$. Doubling: $2n + 10$. Subtracting 4: $2n + 6$.

Halving: $n + 3$. Subtracting the starting number: $n + 3 - n$.

3, for every starting number

Example 1.2 The sum of three consecutive numbers is 78. Find them.

SOLUTION

Let the numbers be n , $n + 1$ and $n + 2$. $3n + 3 = 78$, so $n = 25$.

25, 26 and 27

Example 1.3 In a calendar, a 3×3 square of dates has the middle date c . Show that the sum of the nine dates is $9c$.

SOLUTION

The dates around c are $c - 8$, $c - 7$, $c - 6$ (top row), $c - 1$, c , $c + 1$ (middle row) and $c + 6$, $c + 7$, $c + 8$ (bottom row).

Each pair that sits opposite the centre adds up to $2c$, so the sum is $c + 4 \times 2c = 9c$.

The sum is $9c$

Example 1.4 Two numbers add up to 20. What is the largest possible value of their product?

SOLUTION

Let the numbers be $10 - d$ and $10 + d$. The product is $100 - d^2$.

This is largest when $d = 0$.

100 (when both numbers are 10)

Example 1.5 A father is three times as old as his son. In 10 years he will be twice as old as his son. Find their ages now.

SOLUTION

Let the son be s and the father $3s$. Then $3s + 10 = 2(s + 10)$.

$3s + 10 = 2s + 20$, so $s = 10$.

The son is 10 and the father is 30