



Squares and Square Roots Ex 3.2 Q9

Answer :

Observing the three numbers for right hand side of the equalities:

The first equality, whose biggest number on the LHS is 1, has 1, 1 and 1 as the three numbers.

The second equality, whose biggest number on the LHS is 2, has 2, 2 and 1 as the three numbers.

The third equality, whose biggest number on the LHS is 3, has 3, 3 and 1 as the three numbers.

The fourth equality, whose biggest number on the LHS is 4, has 4, 4 and 1 as the three numbers.

Hence, if the biggest number on the LHS is n , the three numbers on the RHS will be n , n and 1.

Using this property, we can calculate the sums for (i) and (ii) as follows:

$$(i) \quad 1 + 2 + 3 + \dots + 50 = \frac{1}{2} \times 50 \times (50 + 1) = 1275$$

(ii) The sum can be expressed as the difference of the two sums as follows:

$$31 + 32 + \dots + 50 = (1 + 2 + 3 + \dots + 50) - (1 + 2 + 3 + \dots + 30)$$

The result of the first bracket is exactly the same as in part (i).

$$1 + 2 + \dots + 50 = 1275$$

Then, the second bracket:

$$1 + 2 + \dots + 30 = \frac{1}{2} (30 \times (30 + 1)) = 465$$

Finally, we have:

$$31 + 32 + \dots + 50 = 1275 - 465 = 810$$

Squares and Square Roots Ex 3.2 Q10

Answer :

Observing the six numbers on the RHS of the equalities:

The first equality, whose biggest number on the LHS is 1, has 1, 1, 1, 2, 1 and 1 as the six numbers.

The second equality, whose biggest number on the LHS is 2, has 2, 2, 1, 2, 2 and 1 as the six numbers.

The third equality, whose biggest number on the LHS is 3, has 3, 3, 1, 2, 3 and 1 as the six numbers.

The fourth equality, whose biggest number on the LHS is 4, has numbers 4, 4, 1, 2, 4 and 1 as the six numbers.

Note that the fourth number on the RHS is always 2 and the sixth number is always 1. The remaining numbers are equal to the biggest number on the LHS.

Hence, if the biggest number on the LHS is n , the six numbers on the RHS would be n , n , 1, 2, n and 1.

Using this property, we can calculate the sums for (i) and (ii) as follows:

$$(i) \quad 1^2 + 2^2 + \dots + 10^2 = \frac{1}{6} \times [10 \times (10 + 1) \times (2 \times 10 + 1)]$$

$$= \frac{1}{6} \times [10 \times 11 \times 12] = 385$$

(ii) The sum can be expressed as the difference of the two sums as follows:

$$5^2 + 6^2 + \dots + 12^2 = (1^2 + 2^2 + \dots + 12^2) - (1^2 + 2^2 + \dots + 4^2)$$

The sum of the first bracket on the RHS:

$$\begin{aligned} 1^2 + 2^2 + \dots + 12^2 &= \frac{1}{6} [12 \times (12 + 1) \times (2 \times 12 + 1)] \\ &= 650 \end{aligned}$$

The second bracket is:

$$\begin{aligned} 1^2 + 2^2 + \dots + 4^2 \\ &= \frac{1}{6} \times [4 \times (4 + 1) \times (2 \times 4 + 1)] \\ &= \frac{1}{6} \times 4 \times 5 \times 9 = 30 \end{aligned}$$

Finally, the wanted sum is:

$$\begin{aligned} 5^2 + 6^2 + \dots + 12^2 \\ &= (1^2 + 2^2 + \dots + 12^2) - (1^2 + 2^2 + \dots + 4^2) \\ &= 650 - 30 = 620 \end{aligned}$$

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