

Question: 3

Write the first four products of two numbers with difference 4 starting from in the following order:

1 , 2 , 3 , 4 , 5 , 6 ,

Identify the pattern in the products and write the next three products.

Solution:

$$1 \times 5 = 5 \quad (5 - 1 = 4)$$

$$2 \times 6 = 12 \quad (6 - 2 = 4)$$

$$3 \times 7 = 21 \quad (7 - 3 = 4)$$

$$4 \times 8 = 32 \quad (8 - 4 = 4)$$

Question: 4

Observe the pattern in the following and fill in the blanks:

Solution:

$$9 \times 9 + 7 = 88$$

$$98 \times 9 + 6 = 888$$

$$987 \times 9 + 5 = 8888$$

$$9876 \times 9 + 4 = 88888$$

$$98765 \times 9 + 3 = 888888$$

$$987654 \times 9 + 2 = 8888888$$

$$9876543 \times 9 + 1 = 88888888$$

Question: 5

Observe the following pattern and extend it to three more steps:

Solution:

$$6 \times 2 - 5 = 7$$

$$7 \times 3 - 12 = 9$$

$$8 \times 4 - 21 = 11$$

$$9 \times 5 - 32 = 13$$

$$10 \times 6 - 45 = 15$$

$$11 \times 7 - 60 = 17$$

$$12 \times 8 - 77 = 19$$

Question: 6

Study the following pattern:

$$1 + 3 = 2 \times 2$$

$$1 + 3 + 5 = 3 \times 3$$

$$1 + 3 + 5 + 7 = 4 \times 4$$

$$1 + 3 + 5 + 7 + 9 = 5 \times 5$$

By observing the above pattern, find:

Solution:

$$(i) 1 + 3 + 5 + 7 + 9 + 11$$

$$= 6 \times 6$$

$$= 36$$

$$(ii) 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$$

$$= 8 \times 8$$

$$= 64$$

$$(iii) 21 + 23 + 25 + \dots + 51$$

= (21 + 23 + 25 + ... + 51) can also be written as

$$(1 + 3 + 5 + 7 + \dots + 49 + 51) - (1 + 3 + 5 + \dots + 17 + 19)$$

$$(1 + 3 + 5 + 7 + \dots + 49 + 51) = 26 \times 26 = 676$$

$$\text{and, } (1 + 3 + 5 + \dots + 17 + 19) = 10 \times 10 = 100$$

Now,

$$(21 + 23 + 25 + \dots + 51) = 676 - 100 = 576$$

Question: 7

Study the following pattern:

$$1 \times 1 + 2 \times 2 = \frac{2 \times 3 \times 5}{6}$$

$$1 \times 1 + 2 \times 2 + 3 \times 3 = \frac{3 \times 4 \times 7}{6}$$

$$1 \times 1 + 2 \times 2 + 3 \times 3 + 4 \times 4 = \frac{4 \times 5 \times 9}{6}$$

By observing the above pattern, write next two steps.

Solution:

The next two steps are as follows:

$$1 \times 1 + 2 \times 2 + 3 \times 3 + 4 \times 4 + 5 \times 5$$

$$= 5 \times 6 \times 116$$

$$= 55$$

$$1 \times 1 + 2 \times 2 + 3 \times 3 + 4 \times 4 + 5 \times 5 + 6 \times 6$$

$$= 6 \times 7 \times 136$$

$$= 91$$

Question: 8

Study the following pattern:

$$1 = \frac{1 \times 2}{2}$$

$$1 + 2 = \frac{2 \times 3}{2}$$

$$1 + 2 + 3 = \frac{3 \times 4}{2}$$

$$1 + 2 + 3 + 4 = \frac{4 \times 5}{2} <$$

By observing the above pattern, find:

Solution:

$$(i) 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10$$

$$= 10 \times 112$$

$$= 55$$

$$(ii) 50 + 51 + 52 + \dots + 100$$

This can also be written as

$$(1 + 2 + 3 + \dots + 99 + 100) - (1 + 2 + 3 + 4 + \dots + 47 + 49)$$

Now,

$$(1 + 2 + 3 + \dots + 99 + 100) = 100 \times 1012$$

$$\text{and, } (1 + 2 + 3 + 4 + \dots + 47 + 49) = 49 \times 502$$

$$\text{So, } (50 + 51 + 52 + \dots + 100) = 100 \times 1012 - 49 \times 502$$

$$= 5050 - 1225$$

$$= 3825$$

$$(iii) 2 + 4 + 6 + 8 + 10 + \dots + 100$$

This can also be written as $2 \times (1 + 2 + 3 + 4 + \dots + 49 + 50)$

Now,

$$(1 + 2 + 3 + 4 + \dots + 49 + 50) = 50 \times 512$$

$$= 1275$$

$$\text{Therefore, } (2 + 4 + 6 + 8 + 10 + \dots + 100) = 2 \times 1275 = 2550$$

