

13. [Number Patterns]

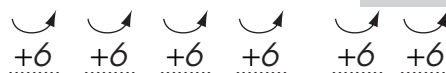
Skill 13.1 Completing number patterns by adding the same number.

MMS 1 2 3 3 4 4
MMG 1 2 3 3 4 4

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations.

Q. 1, 7, 13, 19, 25, _ , _ A. 1, 7, 13, 19, 25 31 , 37



Ask: 'Are the numbers increasing or decreasing?'

'How can you get from 1 to 7?'

Answer: To get from 1 to 7, add 6.

To get from 7 to 13, add 6.

To get from 13 to 19, add 6 and so on.

So the rule of the pattern is:

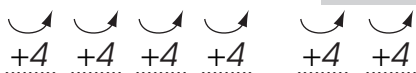
"Add 6 to the previous number."

Apply this rule to the last given number.

$$25 + 6 = 31$$

$$31 + 6 = 37$$

a) 5, 9, 13, 17, 21, 25 , 29



Rule: Add 4 to the previous number

b) 9, 14, 19, 24, 29, _ , _



Rule:

c) 8, 11, 14, 17, 20, _ , _



Rule:

d) 6, 16, 26, 36, 46, _ , _



Rule:

e) 3, 10, 17, 24, 31, _ , _



Rule:

f) 5, 14, 23, 32, 41, _ , _



Rule:

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations.

Q. 59, 50, 41, 32, 23, _ , _

A. 59, 50, 41, 32, 23 14 , 5

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ -9 & -9 & -9 & -9 \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ -9 & -9 \\ \hline \end{array}$

Ask: ‘Are the numbers increasing or decreasing?’
 ‘How can you get from 59 to 50?’

Answer: To get from 59 to 50, subtract 9.
 To get from 50 to 41, subtract 9.
 To get from 41 to 32, subtract 9 and so on.
 So the rule of the pattern is:
 “Subtract 9 from the previous number.”
 Apply this rule to the last given number.
 $23 - 9 = 14$
 $14 - 9 = 5$

a) 45, 38, 31, 24, 17, 10 , 3

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ -7 & -7 & -7 & -7 \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ -7 & -7 \\ \hline \end{array}$

Rule: Subtract 7 from the previous number

b) 16, 14, 12, 10, 8, _ , _

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ & & & \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ & \\ \hline \end{array}$

Rule:

c) 42, 36, 30, 24, 18, _ , _

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ & & & \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ & \\ \hline \end{array}$

Rule:

d) 33, 28, 23, 18, 13, _ , _

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ & & & \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ & \\ \hline \end{array}$

Rule:

e) 51, 43, 35, 27, 19, _ , _

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ & & & \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ & \\ \hline \end{array}$

Rule:

f) 51, 47, 43, 39, 35 _ , _

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ & & & \\ \hline \end{array}$

$\begin{array}{cc} \curvearrowright & \curvearrowright \\ & \\ \hline \end{array}$

Rule:

Skill 13.3

Completing number patterns by multiplying by the same number.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations.

Q. 1, 5, 25, 125, _ , _

A. 1, 5, 25, 125, 625 , 3125

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 5 \\ \hline \end{array}$

Ask: ‘Are the numbers increasing or decreasing?’

‘How can you get from 1 to 5?’

Answer: To get from 1 to 5, multiply by 5.
To get from 5 to 25, multiply by 5.
To get from 25 to 125, multiply by 5 etc.
So the rule of the pattern is:
“Multiply the previous number by 5.”
Apply this rule to the last given number.
 $125 \times 5 = 625$
 $625 \times 5 = 3125$

a) 2, 8, 32, 128, 512 , 2048

$\begin{array}{c} \curvearrowright \\ \times 4 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 4 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 4 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 4 \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \times 4 \\ \hline \end{array}$

b) 1, 2, 4, 8, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

Rule: Multiply the previous number by 4

Rule:

c) 1, 3, 9, 27, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

d) 9, 18, 36, 72, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

Rule:

Rule:

e) $\frac{1}{2}$, 2, 8, 32, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

f) 0.2, 1, 5, 25, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \\ \hline \end{array}$

Rule:

Rule:

Skill 13.4 Completing number patterns by dividing by the same number.

MM5 11 22 33 44
MM6 11 22 33 44

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations.

Q. 81, 27, 9, 3, _ , _

A. 81, 27, 9, 3, 1 , $\frac{1}{3}$

$\begin{array}{c} \curvearrowright \\ \div 3 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 3 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 3 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 3 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 3 \end{array}$

Ask: ‘Are the numbers increasing or decreasing?’

‘How can you get from 81 to 27?’

Answer: To get from 81 to 27, divide by 3.
To get from 27 to 9, divide by 3.
To get from 9 to 3, divide by 3 and so on.
So the rule of the pattern is:
“Divide the previous number by 3.”
Apply this rule to the last given number.
 $3 \div 3 = 1$
 $1 \div 3 = \frac{1}{3}$

a) 64, 32, 16, 8, 4 , 2

$\begin{array}{c} \curvearrowright \\ \div 2 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 2 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 2 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 2 \end{array}$

$\begin{array}{c} \curvearrowright \\ \div 2 \end{array}$

Rule: Divide the previous number by 2

b) 224, 112, 56, 28, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

Rule:

c) 4096, 1024, 256, 64, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

Rule:

d) 3750, 750, 150, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

Rule:

e) 972, 324, 108, 36, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

Rule:

f) 45, 15, 5, $\frac{5}{3}$, _ , _

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

$\begin{array}{c} \curvearrowright \\ \dots \end{array}$

Rule:

Skill 13.5 Completing number patterns by using changing values in the rule.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations. Counting numbers, even numbers and odd numbers have patterns themselves that will create changing numbers in the rule.

Q. 50, 49, 46, 41, 34, _ , _

A. 50, 49, 46, 41, 34, 25 , 14

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline -1 & -3 & -5 & -7 & -9 & -11 \end{array}$

Ask: ‘Are the numbers increasing or decreasing?’
‘How can you get from 50 to 49?’

Answer: To get from 50 to 49, subtract 1.
To get from 49 to 46, subtract 3.
To get from 46 to 41, subtract 5 and so on.
So the rule of the pattern is:
“Subtract consecutive odd numbers from the previous number.”
Apply this rule to the last given number.
 $34 - 9 = 25$
 $25 - 11 = 14$

a) 15, 15, 16, 18, 21, 25 , 30

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline +0 & +1 & +2 & +3 & +4 & +5 \end{array}$

b) 2, 4, 8, 14, 22, _ , _

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline & & & & & \end{array}$

Rule: Add consecutive counting numbers

Rule:

c) 42, 30, 20, 12, 6, _ , _

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline & & & & & \end{array}$

d) 2, 5, 11, 20, 32, _ , _

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline & & & & & \end{array}$

Rule:

Rule:

e) 21, 20, 18, 15, 11, _ , _

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline & & & & & \end{array}$

f) 2, 9, 15, 20, 24, _ , _

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ \hline & & & & & \end{array}$

Rule:

Rule: