

15. [Number Patterns]

Skill 15.1 Completing number patterns in table format by adding, subtracting or multiplying by the same number.

MM9 1 2 2 3 3 4 4
MM10 1 1 2 2 3 3 4 4

- Look at consecutive terms in the second row of the table.
- Find the number and operation used to get from one term to the next.
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next term of the pattern.

Q. What is the value of the missing term in the pattern?

| | | | | | | |
|----------|----|---|-----|----|------|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | -1 | 3 | -27 | 81 | -243 | ? |

A. $-1, 3, -27, 81, -243, ?$
 $\times (-3)$

Rule: Multiply each term by -3 .

$$-1 \times (-3) = 3$$

$$3 \times (-3) = -27$$

$$-27 \times (-3) = 81$$

$$81 \times (-3) = -243$$

$$-243 \times (-3) = 729$$

$$-1, 3, -27, 81, -243, 729$$

Note that the value of each term in the pattern is a multiple of 3 in increasing order. The signs are changing.

a) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|---|---|----|----|---|----------------------|
| position | 1 | 2 | 3 | 4 | 5 | |
| term | 3 | 7 | 11 | 15 | ? | <input type="text"/> |

$$3 + 4 = 7, 7 + 4 = 11, 11 + 4 = 15, 15 + 4 = 19$$

b) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|---|---|----|----|---|----------------------|
| position | 1 | 2 | 3 | 4 | 5 | |
| term | 1 | 6 | 11 | 16 | ? | <input type="text"/> |

c) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|----|----|---|---|----|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | 17 | 12 | 7 | 2 | -3 | ? |

d) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|----|----|---|---|----|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | 21 | 15 | 9 | 3 | -3 | ? |

e) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|---|----|----|------|-----|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | 1 | -5 | 25 | -125 | 625 | ? |

f) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|---|----|---|-----|----|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | 2 | -4 | 8 | -16 | 32 | ? |

g) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|-----|----|-----|----|------|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | -10 | 20 | -40 | 80 | -160 | ? |

h) What is the value of the missing term in the pattern?

| | | | | | | |
|----------|---|-----|----|------|------|---|
| position | 1 | 2 | 3 | 4 | 5 | 6 |
| term | 2 | -10 | 50 | -250 | 1250 | ? |

Skill 15.2 Completing number patterns by using changing values in the rule.

MM9 1 2 2 3 3 4 4
MM10 1 1 2 2 3 3 4 4

- Look at consecutive terms of the pattern.
- Find the operation used to get from one term to the next.
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

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

Counting numbers, even numbers and odd numbers have patterns themselves that can become part of the rule (see below).

Q. Complete the pattern:

3, 5, 9, 15, 23,

A. 3, 5, 9, 15, 23, ,

+2 +4 +6 +8

Rule: Add 2, then 4, then 6, then 8, etc.
The pattern is formed by adding consecutive even numbers.

$$23 + 10 = 33$$

$$33 + 12 = 45$$

3, 5, 9, 15, 23, 33, 45

a) Complete the pattern:

11, 13, 16, 20,

+2 +3 +4 +5 +6

$$20 + 5 = 25$$

$$25 + 6 = 31$$

b) Complete the pattern:

2, 3, 5, 8, 12,

c) Complete the pattern:

3, 5, 9, 15,

d) Complete the pattern:

1, 3, 7, 13,

e) Complete the pattern:

0, 3, 9, 18, 30,

f) Complete the pattern:

49, 48, 45, 40, 33,

g) Complete the pattern:

1, 4, 8, 13, 19,

h) Complete the pattern:

5, 6, 9, 14, 21,

i) Complete the pattern:

1, 4, 10, 19,

j) Complete the pattern:

30, 28, 24, 18, 10,

Skill 15.3 Completing number patterns by adding or subtracting the same positive number to integers.

MM9 11 2 2 3 3 4 4
MM10 11 2 2 3 3 4 4

- Look at consecutive terms of the pattern.
- Find the operation used to get from one term to the next.
Hint: Every number pattern is created by adding or subtracting the same positive integer.
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

Q. Complete the pattern:

$-25, -17, -9, -1, 7, \boxed{\quad, \quad}$

Note that the value of each term in the pattern is increasing. Then find by how much.

A. $-25, -17, -9, -1, 7, \boxed{\quad, \quad}$
 $\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ +8 & +8 & +8 & +8 \end{array}$

Rule: Add 8 to each term.

$$7 + 8 = 15$$

$$15 + 8 = 23$$

$-25, -17, -9, -1, 7, \underline{15}, \underline{23}$

a) Complete the pattern:

$35, 20, 5, -10, \boxed{\quad, \quad}$
 $\begin{array}{cccc} \curvearrowleft & \curvearrowleft & \curvearrowleft & \curvearrowleft \\ -15 & -15 & -15 & -15 \end{array}$
 $-10 - 15 = -25 \quad -25 - 15 = -40$

b) Complete the pattern:

$8, 5, 2, -1, -4, \boxed{\quad, \quad}$

c) Complete the pattern:

$-20, -14, -8, -2, 4, \boxed{\quad, \quad}$

d) Complete the pattern:

$-16, -11, -6, -1, 4, \boxed{\quad, \quad}$

e) Complete the pattern:

$9, 5, 1, -3, -7, \boxed{\quad, \quad}$

f) Complete the pattern:

$10, 7, 4, 1, -2, \boxed{\quad, \quad}$

g) Complete the pattern:

$-35, -28, -21, -14, -7, \boxed{\quad, \quad}$

h) Complete the pattern:

$-19, -15, -11, -7, -3, \boxed{\quad, \quad}$

i) Complete the pattern:

$16, 10, 4, -2, -8, \boxed{\quad, \quad}$

j) Complete the pattern:

$12, 7, 2, -3, -8, \boxed{\quad, \quad}$

k) Complete the pattern:

$46, 34, 22, 10, -2, \boxed{\quad, \quad}$

l) Complete the pattern:

$-20, -11, -2, 7, 16, \boxed{\quad, \quad}$

Skill 15.4 Completing number patterns by multiplying by the same integer.

MM9 11 2 33 44
MM10 11 2 33 44

- Look at consecutive terms of the pattern.
- Find the number and operation (in this case multiplication) used to get from one term to the next.
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

Q. Complete the pattern:

$$-5, 15, -45, 135, \boxed{\quad, \quad}$$

Note that the value of each term in the pattern is increasing, but the signs are changing.

A. $-5, 15, -45, 135, \quad, \quad$
 $\times (-3) \times (-3) \times (-3)$

Rule: Multiply each term

by -3 .

$$135 \times (-3) = -405$$

$$-405 \times (-3) = 1215$$

$$-5, 15, -45, 135, \underline{-405}, \underline{1215}$$

a) Complete the pattern:

$$1, 3, 9, 27, 81, \boxed{\quad, \quad}$$

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ \times 3 & \times 3 & \times 3 & \times 3 & \times 3 & \end{array}$

$$81 \times 3 = 243$$

$$243 \times 3 = 729$$

b) Complete the pattern:

$$3, 6, 12, 24, 48, \boxed{\quad, \quad}$$

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ \times 2 & \times 2 & \times 2 & \times 2 & \times 2 & \end{array}$

$$48 \times 2 =$$

c) Complete the pattern:

$$2, 6, 18, 54, 162, \boxed{\quad, \quad}$$

d) Complete the pattern:

$$1, 5, 25, 125, \boxed{\quad, \quad}$$

e) Complete the pattern:

$$\frac{1}{36}, \frac{1}{6}, 1, 6, \boxed{\quad, \quad}$$

$\begin{array}{cccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \\ \times 6 & \times 6 & \times 6 & \times 6 & \times 6 & \end{array}$

f) Complete the pattern:

$$\frac{1}{25}, \frac{1}{5}, 1, 5, \boxed{\quad, \quad}$$

g) Complete the pattern:

$$\frac{5}{2}, 5, 10, 20, 40, \boxed{\quad, \quad}$$

h) Complete the pattern:

$$\frac{1}{49}, \frac{1}{7}, 1, 7, 49, \boxed{\quad, \quad}$$

i) Complete the pattern:

$$2, -4, 8, -16, 32, \boxed{\quad, \quad}$$

j) Complete the pattern:

$$1, -4, 16, -64, \boxed{\quad, \quad}$$

k) Complete the pattern:

$$-3, 9, -27, 81, \boxed{\quad, \quad}$$

l) Complete the pattern:

$$4, -20, 100, -500, \boxed{\quad, \quad}$$

Skill 15.5 Completing number patterns by dividing by the same integer.

MM9 11 22 33 44
MM10 11 22 33 44

- Look at consecutive terms of the pattern.
- Find the number and operation (in this case division) used to get from one term to the next.
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

Q. Complete the pattern:

-1215 , 405 , -135 , 45 , ,

NB: The value of each term in the pattern is decreasing, but the signs are changing.

A. -1215 , 405 , -135 , 45 , ,
 $\div (-3) \quad \div (-3) \quad \div (-3)$

Rule: Divide each term by -3.

$$45 \div (-3) = -15$$

$$-15 \div (-3) = 5$$

-1215 , 405 , -135 , 45 , -15 , 5

a) Complete the pattern:

288 , -144 , 72 , -36 , 18 , ,

$$\div (-2) \quad \div (-2) \quad \div (-2) \quad \div (-2) \quad \div (-2) \quad \div (-2)$$

$$18 \div (-2) = -9 \quad -9 \div (-2) = 4.5$$

b) Complete the pattern:

1458 , 486 , 162 , 54 , 18 , ,

c) Complete the pattern:

3125 , 625 , 125 , 25 , ,

d) Complete the pattern:

1600 , 800 , 400 , 200 , 100 , ,

e) Complete the pattern:

-200 000 , 20 000 , -2000 , 200 , ,

f) Complete the pattern:

310 000 , -31 000 , 3100 , -310 , ,

g) Complete the pattern:

-6250 , 1250 , -250 , 50 , ,

h) Complete the pattern:

-64 , 32 , -16 , 8 , ,

i) Complete the pattern:

112 , 56 , 28 , 14 , 7 , ,

j) Complete the pattern:

54 , 18 , 6 , 2 , ,

k) Complete the pattern:

375 , 75 , 15 , 3 , ,

l) Complete the pattern:

7203 , 1029 , 147 , 21 , 3 , ,

Skill 15.6 Finding a random term in a number pattern.

MM9 11 22 3 44
MM10 11 22 3 44

- Draw a table and list the given terms and the position each term occupies in the pattern.
- Look for a relationship between consecutive terms and/or between the term and its position in the pattern.
- Based on this relationship, find the requested term in the pattern.

Q. Find the 15th term in the pattern

5, 7, 9, 11, 13,

A.

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 15 th |
|--------------|------------------|------------------|------------------|------------------|------------------|-------|-------------------|
| term | 5 | 7 | 9 | 11 | 13 | | ? |
| relationship | $1 \times 2 + 3$ | $2 \times 2 + 3$ | $3 \times 2 + 3$ | $4 \times 2 + 3$ | $5 \times 2 + 3$ | | $15 \times 2 + 3$ |

Relationship:

each term = twice its position plus 3

The 15th term of the pattern is:

$$15 \times 2 + 3 = \mathbf{33}$$

a) Find the 30th term in the pattern

2, 4, 6, 8, 10,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 30 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|------------------|
| term | 2 | 4 | 6 | 8 | 10 | | ? |
| relationship | 1×2 | 2×2 | 3×2 | 4×2 | 5×2 | | 30×2 |

Relationship: term =

30th term = =

b) Find the 18th term in the pattern

5, 10, 15, 20, 25,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 18 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|------------------|
| term | 5 | 10 | | | | | ? |
| relationship | | | | | | | |

Relationship: term =

18th term = =

c) Find the 20th term in the pattern

8, 13, 18, 23, 28,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 20 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|------------------|
| term | | | | | | | ? |
| relationship | | | | | | | |

Relationship: term =

20th term = =

d) Find the 25th term in the pattern

4, 6, 8, 10, 12,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 25 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|------------------|
| term | | | | | | | ? |
| relationship | | | | | | | |

Relationship: term =

25th term = =

e) Find the 20th term in the pattern

1, 4, 7, 10, 13,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 20 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|------------------|
| term | | | | | | | ? |
| relationship | | | | | | | |

Relationship: term =

20th term = =

f) Find the 8th term in the pattern

1, 2, 4, 8, 16,

| position | 1 st | 2 nd | 3 rd | 4 th | 5 th | | 8 th |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------|-----------------|
| term | | | | | | | ? |
| relationship | | | | | | | |

Relationship: term =

8th term = =

Skill 15.7 Finding a particular term of a sequence given its general rule.

- Substitute the value of n in the formula for the general rule of the sequence.
- Calculate the value of the required term.

Q. If the general rule of a sequence is $\frac{n}{4} - 9$
find the 60th term ($n = 60$).

A. *the n th term of the sequence =*
 $= \frac{n}{4} - 9$ *substitute $n = 60$*

the 60th term of the sequence =
 $= \frac{60}{4} - 9$
 $= 15 - 9$
 $= 6$

a) If the general rule of a sequence is $5n - 4$
find the 30th term ($n = 30$).

30th term = $5 \times 30 - 4$
 $= 150 - 4$ $=$

b) If the general rule of a sequence is $4n - 7$
find the 15th term ($n = 15$).

15th term =
 $=$

c) If the general rule of a sequence is $8 - 5n$
find the 10th term ($n = 10$).

10th term =
 $=$

d) If the general rule of a sequence is $25 - n$
find the 40th term ($n = 40$).

40th term =
 $=$

e) If the general rule of a sequence is $15n$
find the 30th term ($n = 30$).

30th term =
 $=$

f) If the general rule of a sequence is $-40n$
find the 25th term ($n = 25$).

25th term =
 $=$

g) If the general rule of a sequence is $-\frac{2n}{7}$
find the 35th term.

35th term =
 $=$

h) If the general rule of a sequence is $\frac{n}{3} + 1$
find the 21st term.

21st term =
 $=$

i) If the general rule of a sequence is $-6(n - 3)$
find the 23rd term.

23rd term =
 $=$

j) If the general rule of a sequence is $3(n - 6)$
find the 24th term.

24th term =
 $=$

Skill 15.8 Finding the general rule of a pattern given a table of values for the pattern (1).

MM9 11 22 33 44
MM10 11 22 33 44

To decide which general formula is true for the values shown in the table:

- Substitute the values for n (first row in the table) in the general formula.
- Check if the results match the term values given in the second row of the table.

To express a general term of a sequence:

EITHER

- Look for a relationship between consecutive terms and/or between the term and its position in the sequence.

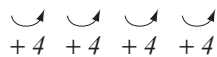
Hints: This relationship is an expression of n involving one or more operations, i.e. $n - 6, 2n, 4n + 2$

OR

- Find the difference between consecutive terms of the sequence (common difference).
- Write the term “common difference $\times n$ ” in the expression.
- Check the result by substituting a random value for n into the formula.
- Adjust the expression by adding, subtracting, multiplying or dividing by a constant.
- Check the result by substituting all values for $n = 1, 2, 3, 4, 5$ into the final formula.

Q. Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|---|---|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 1 | 5 | 9 | 13 | 17 | ... | |



A. common difference = 4

\Rightarrow term in position n contains $4n$

If term in position $n = 4n$ and $n = 1$

\Rightarrow term $1 = 4 \times 1 = 4 \neq 1$ Adjust by subtracting 3

If term in position $n = 4n - 3$

$n = 1 \Rightarrow$ term $1 = 4 \times 1 - 3 = 1$ (true)

$n = 2 \Rightarrow$ term $2 = 4 \times 2 - 3 = 5$ (true)

$n = 3 \Rightarrow$ term $3 = 4 \times 3 - 3 = 9$ (true)

$n = 4 \Rightarrow$ term $4 = 4 \times 4 - 3 = 13$ (true)

$n = 5 \Rightarrow$ term $5 = 4 \times 5 - 3 = 17$ (true)

The term in position n is $4n - 3$

a)

| | | | | | | | |
|----------|---|---|----|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 7 | 9 | 11 | 13 | 15 | ... | ? |

The rule for the term in position n is:

- A) $5n + 2$ B) $2n - 5$
C) $5n + 5$ D) $2n + 5$

A $n = 1 \Rightarrow$ term $1 = 5 \times 1 + 2 = 7 \Rightarrow$ true

$n = 2 \Rightarrow$ term $2 = 5 \times 2 + 2 = 12 \Rightarrow$ false

B $n = 1 \Rightarrow$ term $1 = 2 \times 1 - 5 = -3 \Rightarrow$ false

C $n = 1 \Rightarrow$ term $1 = 5 \times 1 + 5 = 10 \Rightarrow$ false

D $n = 1 \Rightarrow$ term $1 = 2 \times 1 + 5 = 7 \Rightarrow$ true

$n = 2 \Rightarrow$ term $2 = 2 \times 2 + 5 = 9 \Rightarrow$ true

$n = 3 \Rightarrow$ term $3 = 2 \times 3 + 5 = 11 \Rightarrow$ true

$n = 4 \Rightarrow$ term $4 = 2 \times 4 + 5 = 13 \Rightarrow$ true

$n = 5 \Rightarrow$ term $5 = 2 \times 5 + 5 = 15$ D

b)

| | | | | | | | |
|----------|---|----|----|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 7 | 10 | 13 | 16 | 19 | ... | ? |

The rule for the term in position n is:

- A) $3n - 4$ B) $3n + 4$
C) $4n + 3$ D) $4n - 3$

A
.....
.....

Skill 15.8 Finding the general rule of a pattern given a table of values for the pattern (2).

c) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|----|----|----|----|-----|----------|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 8 | 10 | 12 | 14 | 16 | ... | $2n + 6$ |

\curvearrowright \curvearrowright \curvearrowright \curvearrowright
 $+2$ $+2$ $+2$ $+2$

common difference = 2

term $n = 2n \Rightarrow$ term 1 = $2 \times 1 = 2$ (false)

adjust term $n = 2n + 6 \Rightarrow$ term 1 = 8 (true)

e) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|---|---|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 2 | 5 | 8 | 11 | 14 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

g) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|----|----|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 5 | 10 | 15 | 20 | 25 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

i) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|---|---|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 2 | 1 | 0 | -1 | -2 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

d) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|---|---|---|---|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 5 | 4 | 3 | 2 | 1 | ... | |

\curvearrowright \curvearrowright \curvearrowright \curvearrowright
 -1 -1 -1 -1

common difference = -1

term $n = -n \Rightarrow$ term 1 = -1 (false)

adjust term $n = 6 - n \Rightarrow$ term 1 = 5 (true)

f) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|---|----|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 5 | 9 | 13 | 17 | 21 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

h) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|---|----|----|----|----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | 7 | 10 | 13 | 16 | 19 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

j) Write an expression for the term in position n given the table of values for the sequence.

| | | | | | | | |
|----------|----|----|----|-----|-----|-----|-----|
| position | 1 | 2 | 3 | 4 | 5 | ... | n |
| term | -3 | -6 | -9 | -12 | -15 | ... | |

\curvearrowright \curvearrowright \curvearrowright

common difference =

term n

adjust term n

Skill 15.9 Completing number patterns involving decimals and fractions.

MM9 11 22 33 44
MM10 11 22 33 44

- Look at consecutive terms of the pattern.
- Find the operation used to get from one term to the next.
Hint: Every number pattern is created by adding, subtracting, multiplying or dividing by rational numbers (whole numbers, fractions or decimals).
- Define the rule (operation) of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

Q. Complete the pattern:
 $\frac{5}{18}, \frac{1}{2}, \frac{13}{18}, \frac{17}{18}, 1\frac{1}{6}, \boxed{\quad, \quad}$

A. $\frac{5}{18}, \frac{1}{2}, \frac{13}{18}, \frac{17}{18}, 1\frac{1}{6},$
 Look at the 3rd and 4th terms: their difference is $\frac{4}{18}$
Rule: Add $\frac{4}{18}$ to each term.
 $1\frac{1}{6} + \frac{4}{18} = \frac{7}{6} + \frac{4}{18} = \frac{21}{18} + \frac{4}{18} = \frac{25}{18} = 1\frac{7}{18}$
 $\frac{25}{18} + \frac{4}{18} = \frac{29}{18} = 1\frac{11}{18}$
 $\frac{5}{18}, \frac{1}{2}, \frac{13}{18}, \frac{17}{18}, 1\frac{1}{6}, \underline{1\frac{7}{18}}, \underline{1\frac{11}{18}}$

a) Complete the pattern:
 $1, 2, 3.5, 5.5, 8, \boxed{\quad, \quad}$
 $\begin{matrix} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ +1 & +1.5 & +2 & +2.5 & +3 & +3.5 \end{matrix}$
 $8 + 3 = 11 \qquad 11 + 3.5 = 14.5$

b) Complete the pattern:
 $0.8, 2, 3.4, 5, 6.8, \boxed{\quad, \quad}$
 $\begin{matrix} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ +1.2 & & & \end{matrix}$

c) Complete the pattern:
 $1.5, 3.5, 6, 9, 12.5, \boxed{\quad, \quad}$

d) Complete the pattern:
 $4, 5.5, 7.5, 10, 13, \boxed{\quad, \quad}$

e) Complete the pattern:
 $1.75, 3.5, 7, 14, \boxed{\quad, \quad}$

f) Complete the pattern:
 $1\frac{1}{4}, 2\frac{1}{2}, 5, 10, \boxed{\quad, \quad}$

g) Complete the pattern:
 $36, 18, 9, \frac{9}{2}, \frac{9}{4}, \boxed{\quad, \quad}$

h) Complete the pattern:
 $32, 8, 2, \frac{1}{2}, \frac{1}{8}, \boxed{\quad, \quad}$

i) Complete the pattern:
 $3\frac{1}{4}, 4, 4\frac{3}{4}, 5\frac{1}{2}, 6\frac{1}{4}, \boxed{\quad, \quad}$

j) Complete the pattern:
 $\frac{8}{15}, \frac{4}{5}, 1\frac{1}{15}, 1\frac{1}{3}, 1\frac{3}{5}, \boxed{\quad, \quad}$