



CAMI Mathematics: Grade 11

GRADE 11 Number patterns

11.2 Number patterns

1. Linear patterns

- (a) Consider the pattern: 44 ; 60 ; 76 ;
- Write down the next two terms of the pattern.
 - Determine the formula for T_n .
 - Determine T_{20} .
- (b) Consider the pattern: 12 ; 21 ; 30 ;
- Write down the next two terms of the pattern.
 - Determine the formula for T_n .
 - Determine T_{33} .
- (c) Consider the pattern: 21 ; 6 ; -9 ;
- Write down the next two terms of the pattern.
 - Determine the formula for T_n .
 - Determine T_{50} .
- (d) Consider the pattern: 34 ; 22 ; 10 ;
- Write down the next two terms of the pattern.
 - Determine the formula for T_n .
 - Determine T_{29} .

2. Exponential patterns

- (a) Write number sentences using symbols.

v	2	3	4	5
y	-8	-27	-64	-125

- (b) Write number sentences using symbols.

h	4	5	6	7
i	192	375	648	1029



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(c) Write number sentences using symbols.

j	3	4	5	6
k	7	14	23	34

(d) Write number sentences using symbols.

u	4	5	6	7
v	32	50	72	98

(e) Write number sentences using symbols.

r	2	3	4	5
s	-4	-9	-16	-25

3. Quadratic patterns

(a) Consider the pattern: $-42 ; 6 ; 60 ; 120 ; \dots$

- Write down the next two terms of the pattern.
- Determine the formula for T_n .
- Determine T_{86} .

(b) Consider the pattern: $4 ; 20 ; 56 ; 112 ; \dots$

- Write down the next two terms of the pattern.
- Determine the formula for T_n .
- Determine T_{20} .

(c) Consider the pattern: $-39 ; -4 ; 27 ; 54 ; \dots$

- Write down the next two terms of the pattern.
- Determine the formula for T_n .
- Determine T_{75} .



Memo

1. Linear patterns [4.1.5.1]

(a) 44 ; 60 ; 76 ;

(i) 92 ; 108

(ii) $a = 16$

$$T_n = an + b$$

$$T_n = 16n + b$$

$$44 = 16(1) + b$$

$$b = 28$$

$$\therefore T_n = 16n + 28$$

(iii) $T_{20} = 16(20) + 28$

$$T_{20} = 348$$

(b) 12 ; 21 ; 30 ;

(i) 39 ; 48

(ii) $a = 9$

$$T_n = an + b$$

$$T_n = 9n + b$$

$$12 = 9(1) + b$$

$$b = 3$$

$$\therefore T_n = 9n + 3$$

(iii) $T_{33} = 9(33) + 3$

$$T_{33} = 300$$

(c) 21 ; 6 ; -9 ;

(i) -24 ; -39

(ii) $a = -15$

$$T_n = an + b$$

$$T_n = -15n + b$$

$$21 = -15(1) + b$$

$$b = 36$$

$$\therefore T_n = -15n + 36$$

(iii) $T_{50} = -15(50) + 36$

$$T_{50} = -714$$



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(d) 34 ; 22 ; 10 ;

(i) -2 ; -14

(ii) $a = -12$

$$T_n = an + b$$

$$T_n = -12n + b$$

$$34 = -12(1) + b$$

$$b = 46$$

$$T_n = -12n + 46$$

(iii) $T_{29} = -12(29) + 46$

$$T_{29} = -302$$

2. Exponential patterns [4.1.3.4]

(a)

v	2	3	4	5
y	-8	-27	-64	-125

$$\therefore y = -v^3$$

(b)

h	4	5	6	7
i	192	375	648	1029

$$i = 3h^3$$

(c)

j	3	4	5	6
k	7	14	23	34

$$\therefore k = j^2 - 2$$

(d)

u	4	5	6	7
v	32	50	72	98

$$\therefore v = 2u^2$$



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(e)

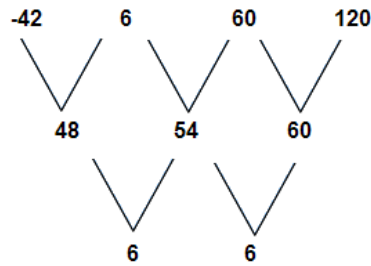
r	2	3	4	5
s	-4	-9	-16	-25

$$\therefore s = -r^2$$

3. Quadratic patterns [4.1.5.4]

(a) -42 ; 6 ; 60 ; 120 ;

(i)



186 ; 258

(ii) $T_n = an^2 + bn + c$

$$2a = 6$$

$$a = 3$$

$$3a + b = 48$$

$$3(3) + b = 48$$

$$b = 39$$

$$a + b + c = -42$$

$$3 + 39 + c = -42$$

$$c = -84$$

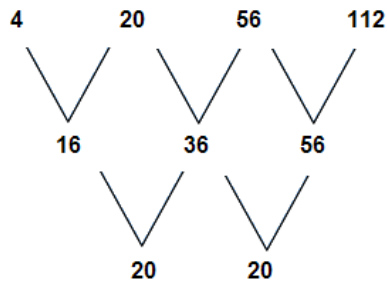
$$T_n = 3n^2 + 39n - 84$$

(iii) $T_{86} = 3(86)^2 + 39(86) - 84$

$$T_{86} = 25\,458$$

(b) 4 ; 20 ; 56 ; 112 ;

(i)



188 ; 284



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(ii) $T_n = an^2 + bn + c$

$$2a = 20$$

$$a = 10$$

$$3a + b = 16$$

$$3(10) + b = 16$$

$$b = -14$$

$$a + b + c = 4$$

$$10 - 14 + c = 4$$

$$c = 8$$

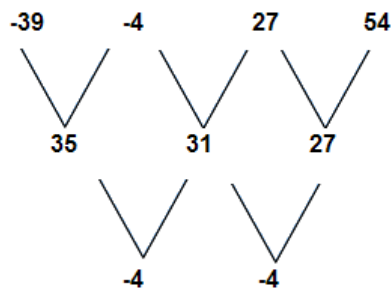
$$T_n = 10n^2 - 14n + 8$$

(iii) $T_{20} = 10(20)^2 - 14(20) + 8$

$$T_{20} = 3728$$

(c) -39 ; -4 ; 27 ; 54 ;

(i)



77 ; 96

(ii) $T_n = an^2 + bn + c$

$$2a = -4$$

$$a = -2$$

$$3a + b = 35$$

$$3(-2) + b = 35$$

$$b = 41$$

$$a + b + c = -39$$

$$-2 + 41 + c = -39$$

$$c = -78$$

$$T_n = -2n^2 + 41n - 78$$

(iii) $T_{75} = -2(75)^2 + 41(75) - 78$

$$T_{75} = -8253$$