YEAR 8 MATHEMATICS – TERM 3

Linear sequences have a constant difference. Non-linear sequences do not.

Sequences

Position: the place in the sequence

Term: the number or variable (the number of circles in each image).
In a table:

Position	1	2	3
Term	2	4	8

What comes next?
1. 2, 5, 8...
2. M, T, W, T...
3. 1, 2, 4, 7...
4. 2, 4, 8, 16...

Bar models can help us to see the relationship between terms and numbers

14	
x	10

30		
x	x	x

18		
x	x	8

Substitution:
If a = 3 and b = 4
Calculate:
3a
2b + a
3b + 2

Algebraic Manipulation

Commutative:
Means the operation can be done in any order.
+ and x are commutative

Further algebra

Like terms:
Are terms whose variables are the same.

3a and 4a are like terms.
3b and c are not like terms.

Equality:

2 + 4 = 3 + 3 = 6 = 12 – 6
All of the calculations above are equal to 6 but shown in a different way. Can you find other expressions equal to 6?

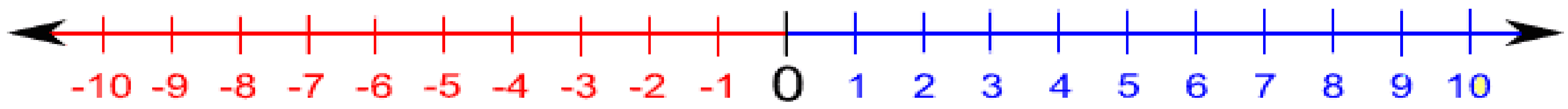
Top tip: a^2 and a are not like terms

Function machines

→ Calculation Instruction →

To find the input from the output you use the inverse

Keywords
Sequence
Term
Position
Rule
Linear
Non-linear
Arithmetic
Geometric
Function
Input
Output
Operation
Inverse
Commutative
Substitute
Expression
Evaluate
Equality
Equation
Equals
Solution
Solve
Term
Like
Coefficient



Question 1: Expand the following brackets

(a) $5(y + 3)$ (b) $4(a + 2)$ (c) $8(w + 10)$ (d) $3(x - 7)$

(e) $9(s - 1)$ (f) $2(8 - t)$ (g) $7(4 + h)$ (h) $10(a + 2b + 3c)$

(i) $4(3y + 2)$ (j) $5(2p - 1)$ (k) $3(7a + 2)$ (l) $9(2x - 5)$

(m) $5(4 + 3t)$ (n) $7(9 - 2c)$ (o) $8(3w + 1)$ (p) $9(1 - 4p)$

(q) $11(2k - 5)$ (r) $20(6a + 5c)$ (s) $3(15w - 7)$ (t) $3(9 - 2a)$

Question 2: Expand the following brackets

(a) $-2(w + 5)$ (b) $-3(c + 7)$ (c) $-8(c + 7)$ (d) $-10(y - 2)$

(e) $-7(g - 3)$ (f) $-4(2w + 3)$ (g) $-9(3w - 5)$ (h) $-9(5x - 1)$

(i) $-5(6 - c)$ (j) $-6(4 + 3m)$ (k) $-2(1 + 9c)$ (l) $-5(8a - 7w)$

Question 3: Expand the following brackets

(a) $a(c + 2)$ (b) $c(d - 3)$ (c) $a(b + c)$ (d) $w(8 - y)$

(e) $c(5 + a)$ (f) $w(a - 9)$ (g) $y(s + t)$ (h) $2a(c - 3)$

(i) $5x(y + 8)$ (j) $3a(2c + 9)$ (k) $6g(2c - 1)$ (l) $9k(2 + d)$

(m) $5(2f + 9w)$ (n) $3y(5p + 2)$ (o) $2s(t + 1)$ (p) $-4a(8x - 3)$

Question 1: Factorise the following expressions

(a) $4x + 6$ (b) $15x + 20$ (c) $9y - 12$ (d) $5x + 15$

(e) $6x - 3$ (f) $4x + 8$ (g) $5y - 25$ (h) $8w + 24$

(i) $10y + 15$ (j) $14w + 21$ (k) $20y - 30$ (l) $27x + 18$

(m) $6 - 4x$ (n) $9 + 12y$ (o) $45 + 60x$ (p) $16y - 32$

(q) $22a + 55$ (r) $100 - 40y$ (s) $6x + 9y$ (t) $4w - 2a$

(u) $25y - 35z$ (v) $8x^2 + 20$ (w) $30y^3 - 15$ (x) $42y + 28x - 56c$

Question 2: Factorise the following expressions

(a) $x^2 + 7x$ (b) $x^2 - 3x$ (c) $y^2 + y$ (d) $w^2 + 9w$

(e) $x^2 - 7x$ (f) $4w^2 + 10w$ (g) $6x^2 - 8x$ (h) $9y^2 - 6y$

(i) $10c + c^2$ (j) $5g - g^2$ (k) $14x^2 + 35x$ (l) $40x^2 - 50x$

(m) $12x^2 + 18x$ (n) $24x^2 - 18x$ (o) $45y^2 + 60y$ (p) $7w^2 + 2w$

Question 1: Describe the rule for each sequence below and find the next three terms

(a) 3, 5, 7, 9, . . . (b) 5, 10, 15, 20, . . . (c) 1, 4, 7, 10, . . .

(d) 20, 19, 18, 17, . . . (e) 5, 10, 20, 40, . . . (f) 10, 14, 18, 22, . . .

(g) 1, 6, 11, 16, . . . (h) 2, 4, 8, 16, . . . (i) 100, 80, 60, 40, . . .

(j) 5, 12, 19, 26, . . . (k) 1, 10, 100, 1000, . . . (l) 64, 32, 16, 8, . . .

(m) 55, 66, 77, 88, . . . (n) 32, 41, 50, 59, . . . (o) 15, 9, 3, − 3, . . .

(p) 2, 2.5, 3, 3.5, . . . (q) 8, 22, 36, 50, . . . (r) 1, 3, 9, 27, . . .

x	1	3	10	12	4
2					
5					
3					
6					
7					

x					

x					

Try filling out the multiplication grid, then make some of your own using the numbers 1 to 12

x					

x					

x					