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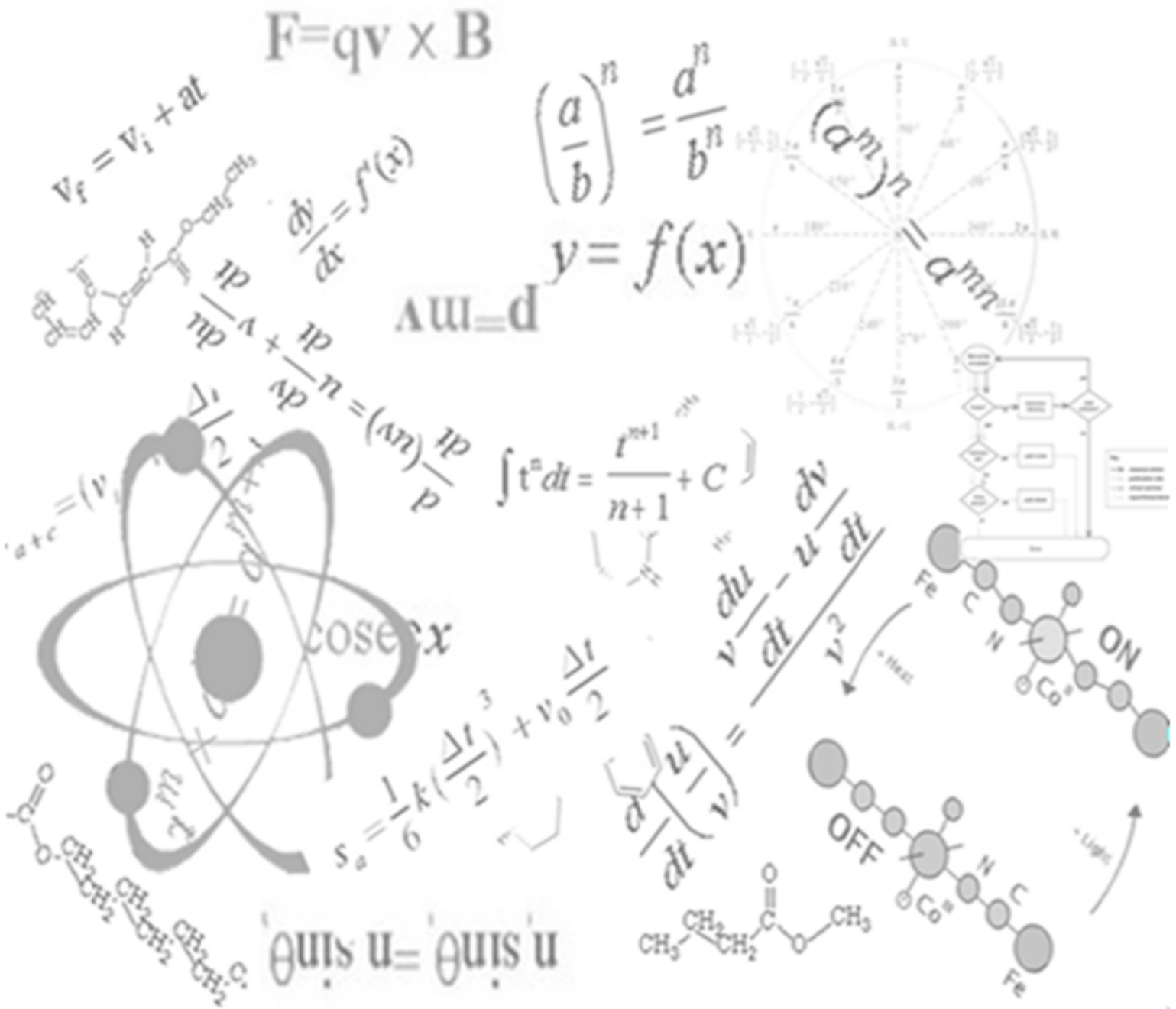
S4S coaching

Year 12- General Mathematics

Algebraic Modeling



Algebraic modelling

Practice Questions:

1) Substitution, Indices and algebraic processes:

1. (**3 marks**)
Solve the equation:
$\frac{3x-1}{5x+2} = \frac{3x-2}{5x+1}$

2. (**1 marks**)
Solve: $x^3 = 5x^2$

3. (**2 marks**)
Simplify: $\frac{x^2+y^2+2xy}{x^2-y^2}$

4. (**3 marks**)
Simplify: $\frac{3}{x^2-9} - \frac{1}{x^2-6x+9}$

5. (**3 marks**)
Simplify: $\frac{a^2-25}{a^2-7a+10} \div \frac{a^2+6a+5}{3a^2-6a}$

6. (**4 marks**)
If f=$\frac{(M-m)g}{(M+m)}$, find m, if M=32,g=10,f=5.5

7. (**3 marks**)
Find T to the nearest whole integer if L=8/4($\frac{T}{\pi}$)^2, when L=3.5,g=9.8

8. (**2 marks**)
Simplify: ($\frac{x^6}{x^3}$)^2

9. (**2 marks**)
Simplify: (4ah2 b$^2c^2$)^2

10. (**2 marks**)
Simplify: (x+2)/3 – (2-3x)/2

11. (**2 marks**)
Simplify: (x2+y2+2xy)/(x2-y2)

12. (**2 marks**)
Expand: 5a(a2-2a) -3a2 (2a-3)

2) **Graphing linear functions and generating tables of value**:

1. Find the gradient of the lines joining:
a) $(1,3)$ and $(2,1)$ b) $(-1,4)$ and $(-5,4)$ c) $(-3,-6)$ and $(2,-4)$

2. Write down the gradient and y-intercept for the following lines:
a) $y = 4x + 3$ b) $5x + y + 2 = 0$ c) $6x - 1 = 11 + 3y$ d) $\frac{3x+5}{y-2} = -1$

3. Write down the gradient and y-intercept for the following lines:
a) $3ky - 7kx - 2y - x = -22$ b) $2k(x - y) + y(k + 1) - 1 = 0$

4. Given the gradient and the y-intercept, find the equation of the line. Give it in the general form:
a) $m = -2$ y-intercept $= -\frac{1}{2}$ b) $m = 15$ y-intercept $= -11$ c) $m = -\frac{23}{14}$ y-intercept $= -\frac{89}{13}$
$\left[y = mx + b, m = \text{gradient and } b = y\text{-intercept}\right]$

5. Sketch $y = 4x + 5$

6. Sketch $y = 9x + 3$

7. Sketch $2y + 3x = -2$

3) **Point of intersection of two linear functions**:

1. Find the point of intersection of $5x - y + 12 = 0$ and $18x - 7y - 18 = 0$:
2. Find the point of intersection of $13x - 4y - 11 = 0$ and $19x - 2y - 18 = 0$:
3. Show that the point of intersection of the lines $12x - 11y + 7 = 0$ and $9x + 13y - 18 = 0$ is not $(-5, 7)$:
4. Show that the point of intersection of the lines $13x - 15y + 33 = 0$ and $7x + 5y - 114 = 0$ is not $(-11, 9)$:

4) **Graphing quadratic functions and finding min/max values**:

1. Sketch $y = x^2 - 1$
2. Find the the min. value of y=$x^2 - 1$
3. Sketch $y = -x^2 + 4$
4. Find the max point of $y = -x^2 + 4$

5) **Sketching other graphs**:

1. Sketch $y = 2/x$
2. Sketch $y = 4x^3$
3. Sketch $y = e^{-x}$
4. Sketch $y = -e^{x}$
5. Sketch $y = -e^{-x}$

6) **Direct/inverse variations**:

1. y varies directly with x. If $y = 15$ when $x = 3$, find y when x is 1.
2. y varies inversely with x. If $y = 15$ when $x = 3$, find y when x is 1.
3. b varies directly as the square root of c. If $b = 1$ when $c = 16$, find b when c is 9.
4. b varies inversely as the square root of c. If $b = 1$ when $c = 16$, find b when c is 9.
5. z varies directly as the cube of d. If $z = 175$ when $d = 5$, find z when d is 2.
6. z varies inversely as the cube of d. If $z = 175$ when $d = 5$, find z when d is 2.
7. g is directly proportional to the square of a. If $a = -3$ when $g = -9$, find a when g is -25.
8. g is inversely proportional to the square of a. If $a = -3$ when $g = -9$, find a when g is -25.