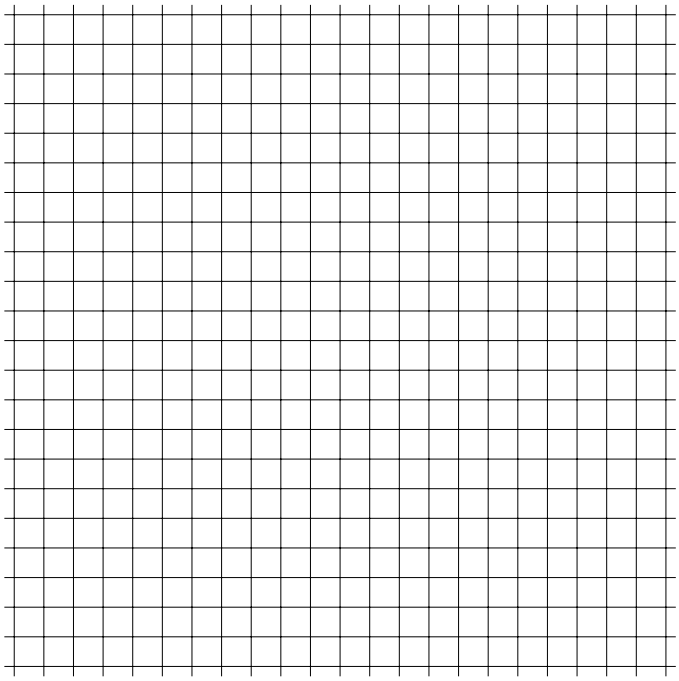
Name: _____ Student Number: _____ Marks: /50

[2] **1.** Find an equation for the line passing through $(4, 7)$ and perpendicular to $7 - x + 5y = 0$.

[1] **2.** Find an equation of the vertical line passing through $(-2, 1)$.

[4] **3.** For the function $f(x) = \begin{cases} 2 - 2x & \text{if } x < 2 \\ x - 4 & \text{if } x \geq 3 \end{cases}$

(a) Sketch a graph.
(b) State the domain.
(c) State the range.



[3] **4.** Simplify: $\left(\frac{2x^2}{y^{-1}}\right)^3 \left(\frac{2x^{-2}}{y^3}\right)^{-2}$. (Your answer should have only positive exponents.)

5. Factor each polynomial as much as possible.

[2] (a) $8x^2 - 18x - 35$

[2] (b) $27x^3 + 8$

[2] (c) $2x^3 - 9x^2 - 18x + 81$

6. Simplify the expression. (You may leave factored forms.)

[4] (a) $\dfrac{x^2+6x+9}{2x^2-3x-2} \div \dfrac{3x+9}{5x-10}$

[3] (b) $\dfrac{x+1}{x^2-5x} - \dfrac{30}{x^3-5x^2} + \dfrac{1}{x^2}$

[3] (c) $\dfrac{\frac{1}{x+3} - \frac{1}{x}}{3x}$

7. Solve each of the following for x:

[1] (a) $-3(1-x) < 4-(3x-2)$

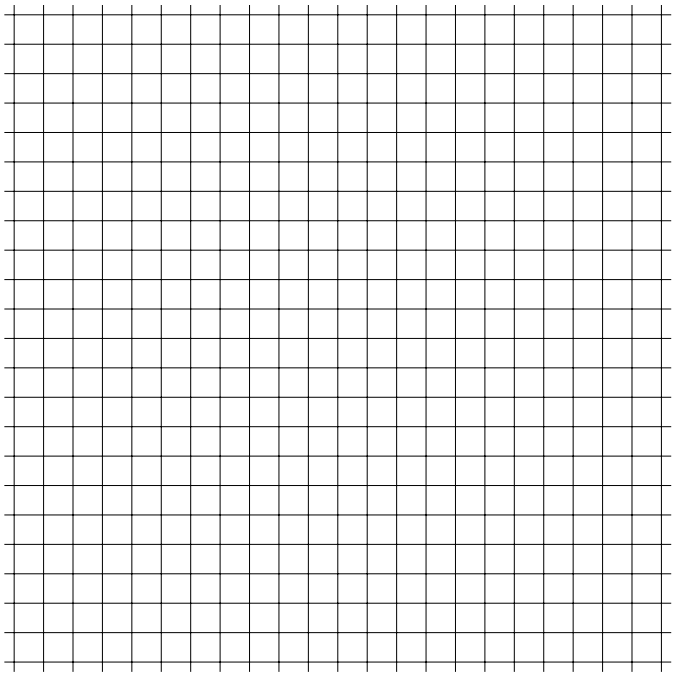
[2] (b) $10x^2 + 13x + 3 = 0$

[3] (c) $x^3 + 4x^2 - 2x = 0$

[4] (d) $\dfrac{4}{x-1} - \dfrac{x}{x+3} = \dfrac{11x+5}{x^2+2x-3}$

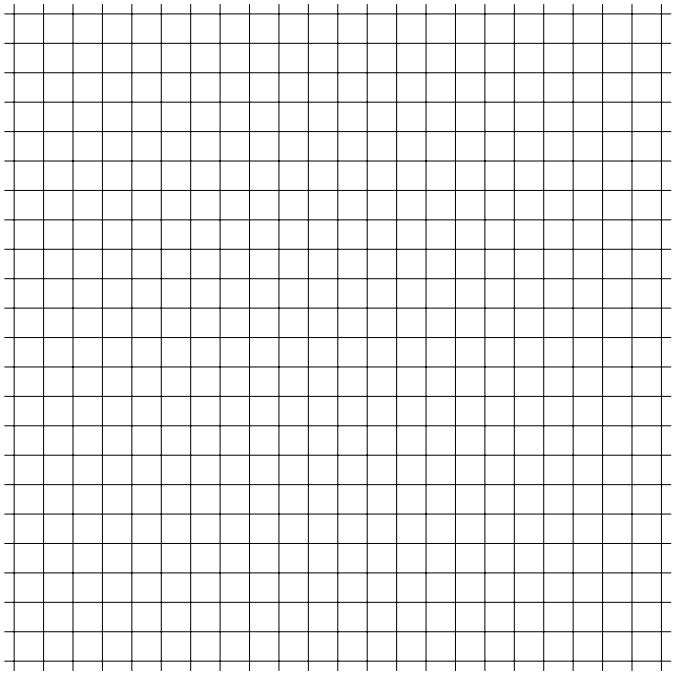
[3] **8.** Given the quadratic function $f(x) = 6x - x^2$.

(a) Find all intercepts.
(b) Find the vertex.
(c) Sketch a graph of the function.



[4] **9.** Given the rational function $f(x) = \dfrac{2x + 10}{x - 5}$.

(a) Find all intercepts.
(b) Find all asymptotes.
(c) Sketch a graph of the function.



10. Given $f(x) = \dfrac{2x+10}{x-5}$ and $g(x) = 7 - 2x$.

[2] (a) Simplify $(f \circ g)(x)$.

[2] (b) Find a formula for $f^{-1}(x)$.

[3] **11.** Perform the long division: $\dfrac{6x^4 - 2x^3 + 5x^2 + 3x - 11}{2x^2 - 3}$