YEAR 13 – MATHEMATICS (Week 27)

Subject	**Mathematics**
Class/ Section	**Year 13 – Batch A, B and C**
Week	**28th February to 04th March 2021**
Work send to students by	**Group email / Google classroom / Zoom**
Total number of lessons per week	**3**
Units	**Pure Mathematics – Year 2** **Chapter 10 - Numerical Methods**
Lesson 1 – Live Zoom lesson	**10.1 – Locating roots** **10.2 – Iteration** **Learning objective – To locate roots of f(x) = 0 by considering changes of sign. To Use iteration to find an approximation to the root of the equation f(x) = 0.** **Intended Learning Outcomes** -- Students will be understand that if the function f(x) is continuous on the interval [a, b] and f(a) and f(b) have opposite signs, then f(x) has a least one root, x which satisfies $a < x < b$. --Students will be able to solve an equation of the form f(x) = 0 by an iterative method, rearrange f(x) = 0 into the form x = g(x) and use the iterative formula $x_{n+1} = g(x_n)$. Some iteration will converge to a root. This can happen in two ways. One graphically creates a series of steps called staircase diagram and the other one converges in such a way that the successive iterations alternate being below the root and above the root resulting in a graph called cobweb diagram. Not all iterations converges to a root. When iteration moves away from a root, often increasingly quickly, you say that it diverges.
Tasks	To complete the questions assigned from the Textbook (pdf) in their notebook. Students will be put in break out rooms during Zoom lesson to encourage collaborative learning.
Resources	1 Power point presentation 2 Pure Mathematics Year 2 3 https://www.physicsandmathstutor.com/ 4 https://www.drfrostmaths.com/ 5 https://www.examsolutions.net/

Lessons 2 –Live Zoom lesson **Tasks** **Resources**	**10.3 – The Newton-Raphson Method** **<u>Learning objective</u> – To use Newton-Raphson procedure to find approximations to the solutions of equations of the form f(x) = 0.** **<u>Intended Learning Outcomes</u>** -- The Newton-Raphson method can be used to find numerical solutions to equations of the form f(x) = 0. You need to be able to differentiate f(x) to use this method. The Newton-Raphson formula is $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$. The method uses the tangent lines to find increasingly accurate approximations of a root. The value of x_{n+1}, is the point at which the tangent to the graph at (x_n, f(x_n)) intersects the x-axis. To complete the questions assigned from the Textbook (pdf) in their notebook. Students will be put in break out rooms during Zoom lesson to encourage collaborative learning. 1. Power point presentation 2. Pure Mathematics Year 2 3. https://www.physicsandmathstutor.com/ **4.** https://www.drfrostmaths.com/ **5.** https://www.examsolutions.net/
Lesson 3–Live Zoom lesson **Tasks** **Resources**	**10.4 – Applications to modelling** **<u>Learning objective</u> – To use numerical methods to solve problems in context.** **<u>Intended Learning Outcomes</u>** --Students will be able to know if the starting value is not chosen carefully, the Newton-Raphson method can converge on a root very slowly, or can fail completely. If the initial value, x_0, is near a turning point or the derivative at this point, f'(x_0), is close to zero, then the tangent at (x_0, f(x_0)) will intercept the x-axis a long way from x_0. If any value, x_i, in the Newton-Raphson method is at a turning point, the method will fail because f'(x_i) = 0 and the formula would result in division by zero, which is not valid. Graphically the tangent line will run parallel to the x-axis, therefore never intersecting. We can use these techniques to find the solutions to models of real life situations. To complete the questions assigned from the Textbook (pdf) in their notebook. Students will be put in break out rooms during Zoom lesson to encourage collaborative learning. 1. Power point presentation 2. Pure Mathematics Year 2 3. https://www.physicsandmathstutor.com/ 4. https://www.drfrostmaths.com/ 5. https://www.examsolutions.net/