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| pact jpg1 | **Year 11 Mathematics: Applications**  **Investigation 4, 2015**  **Topic – Piecewise Linear Graphs**  **Take home component** | | | |  |
| **Important Information:**  *Although the take-home component is not worth any marks, it is essential in preparation for the in-class component. Knowledge and skills gained will be extended in the in-class validation component. This in-class validation will be completed under test conditions on the day in which this take-home component is due. The take-home component may be used when completing the in-class component. Contact may be made to parent(s) if the take-home component is not available for submission (at the start of the lesson).* | | | | | |
| **Date out:** | | *Week \_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_* | **Date Due:** | *Week \_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_* | |
| **Take home component weighting:** | | *0% of the year* | **In-class component weighting:** | *10% of the semester* | |
| **AIM:** *In this assessment, you will be investigating how to sketch piece-wise linear graphs, using technology when appropriate and the applications of this process.* | | | | | |

**The following table is the taxation rates for 2015–16 that apply from 1 July 2015.**

|  |  |
| --- | --- |
| **Taxable income** | **Tax on this income** |
| 0 – $18,200 | Nil |
| $18,201 – $37,000 | 19c for each $1 over $18,200 |
| $37,001 – $80,000 | $3,572 plus 32.5c for each $1 over $37,000 |
| $80,001 – $180,000 | $17,547 plus 37c for each $1 over $80,000 |
| $180,001 and over | $54,547 plus 45c for each $1 over $180,000 |

The above rates **do not** include the: Medicare levy of 2%, Temporary Budget Repair Levy; this levy is payable at a rate of 2% for taxable incomes over $180,000.

**Task 1]** Use **only** the tax table above to complete the following tables of values.

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| --- | --- | --- | --- | --- | --- | --- |
| Income in $10000 increments | 1.8201 | 2.0 | 2.5 | 3.0 | 3.5 | 3.7 |
| Tax Payable in $ |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Income in 10000 increments | 3.7001 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 |
| Tax Payable in $ |  |  |  |  |  |  |  |  |  |  |

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| Income in 10000 increments | 8.0001 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 |
| Tax Payable in $ |  |  |  |  |  |  |  |  |  |  |  |

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| Income in 10000 increments | 18.001 | 19.0 | 20.0 |
| Tax Payable in $ |  |  |  |

**Task 2]** Construct a piecewise **line graph** to represent the information contained within the tables of values in task 1, using “Tax Payable” as the y axis and “Taxable Income” as the x axis. Ensure that you use a relevant scale for both axes and label accordingly. (**HINT**: The x axis should go from 0 at the origin to at least 22 with each square representing $5000 to allow for all of the coordinates and the y axis from 0 at the origin to 60 with each line representing $2000.)

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Use the graph above, to answer the following questions;

**(a)** What is the gradient of the line between x = 1.82001 and x = 3.700 given that the gradient of a line is given by m = rise / run.

**(b)** Using the gradient and one of the coordinates from the first table of values, construct an equation

(call it Eq 1.) for this line.

Recall that the equation of a line through two points is given by; y − y1 = m(x − x1)

**(c)** Repeat the process in (a) and (b) for the other 3 tables of values, to generate the equations Eq 2, Eq 3, for the other three line segments.

(d) You can combine the 5 line segments of this graph to produce a piecewise Linear Function F(x) using the three equations of each line segment. Fill in the missing information in the following to define F(x);

**F(x) = 0 if 0 < 1.821**

**Eq1. \_\_\_\_\_\_\_\_\_\_ if 1.821< x < 3.701**

**Eq2. \_\_\_\_\_\_\_\_\_\_ if \_\_\_\_\_< x < \_\_\_\_\_**

**Eq3. \_\_\_\_\_\_\_\_\_\_ if \_\_\_\_\_< x < \_\_\_\_\_**

**Eq4. \_\_\_\_\_\_\_\_\_\_\_\_\_ if \_\_\_\_\_< x < \_\_\_\_\_**

**Task 3]**

1. Using your graph and the function F(x), calculate how much tax is payable for someone earning $45 000 pa.
2. Given that the Medicare levy is 2% of your taxable income and that it is added on to your tax payable, what would be their total tax payable on the original $45 000 income?

**~** End of Investigation**~**