

Name: \_\_\_\_\_

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Date: \_\_\_\_\_


**Baldivis**  
 Secondary College

# Year 11 Mathematics: Applications

## Investigation 4, 2017

### Topic – Piecewise Linear Graphs

### Inclass component

|            |
|------------|
| _____ / 55 |
| _____ %    |

#### 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.

## Tax Rates 2010/2011 Financial Year

| Taxable income       | Tax on this income                            |
|----------------------|---|
| 0 – \$6,000          | Nil   |
| \$6,001 – \$37,000   | 15c for each \$1 over \$6,000                 |
| \$37,001 – \$80,000  | \$4,650 plus 30c for each \$1 over \$37,000   |
| \$80,001 – \$180,000 | \$17,550 plus 37c for each \$1 over \$80,000  |
| \$180,001 and over   | \$54,550 plus 45c for each \$1 over \$180,000 |

Medicare Levy = 1.5%

Medicare Levy Surcharge = 1%

(29 marks: 1 mark each entry)

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

✓ - each box

| Income            | 6001 | 12000 | 18000 | 24000 | 36000 | 37000 |
|-------------------|------|-------|-------|-------|-------|-------|
| Tax Payable in \$ | 0.65 | 900   | 1800  | 2700  | 4500  | 4650  |

| Income            | 37 001  | 40 000 | 45 000 | 50 000 | 55 000 | 60 000 | 65 000 | 70 000 | 75 000           | 80 000 |
|-------------------|---------|--------|--------|--------|--------|--------|--------|--------|------------------|--------|
| Tax Payable in \$ | 4650.30 | 5550   | 7050   | 8550   | 10050  | 11550  | 13050  | 14550  | <del>16050</del> | 17550  |

16050

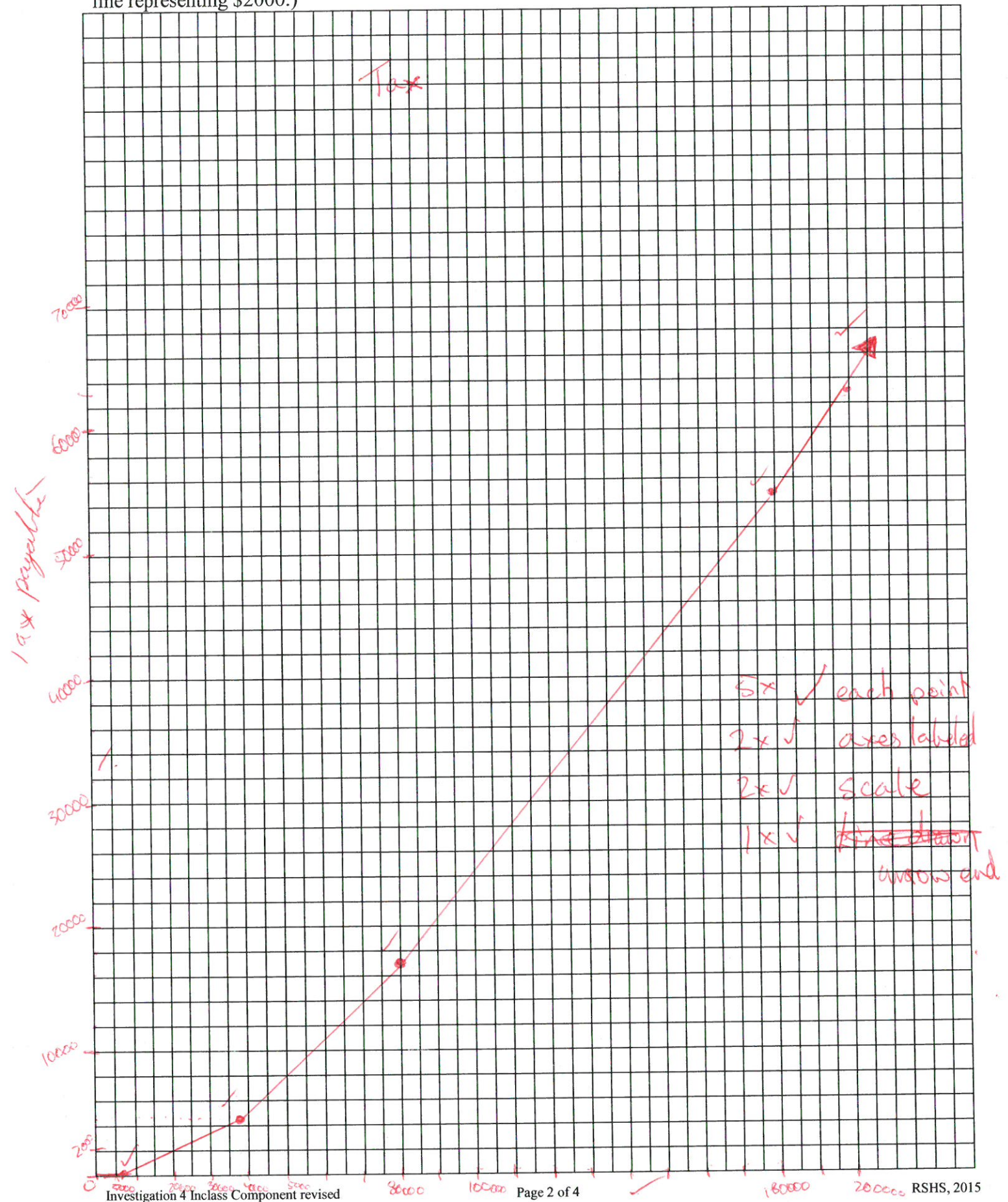
| Income            | 80 001   | 90 000 | 100 000 | 120 000 | 130 000 | 140 000 | 150 000 | 160 000 | 170 000 | 180 000 |
|-------------------|----------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| Tax Payable in \$ | 17550.30 | 21250  | 24950   | 32350   | 36050   | 39750   | 43450   | 47150   | 50850   | 54550   |

| Income            | 180 001  | 190 000 | 200 000 |
|-------------------|----------|---------|---------|
| Tax Payable in \$ | 54550.45 | 59050   | 63550   |



(10 marks)

**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 \$2000 increments and "Taxable Income" in \$10 000 increments as the x axis. (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.)



Use the previous graph to answer the following questions;

(10 marks)

Task 3]

Produce a piecewise Linear Function  $F(x)$  using the first tax bracket then the four tables of values and define  $F(x)$  by filling in the missing information in the following;

$$F(x) = \begin{cases} 0 & \text{if } 0 < x < 0.6001 \\ 0.15(x - 6000) & \text{if } 0.6001 < x < 3.7001 \\ 0.3(x - 37000) + 4650 & \text{if } 3.7001 < x < 8.0001 \\ 0.37(x - 80000) + 17550 & \text{if } 8.0001 < x < 18.0001 \\ 0.45(x - 180000) + 54550 & \text{if } 18.0001 < x < \infty \end{cases}$$

(6 marks)

Task 4]

Daniel's taxable income in 2010 was \$48 000. Using your function  $F(x)$  calculate how much tax does Daniel need to pay?

$$\text{\$ } 7950 \quad \checkmark$$

Given that the Medicare levy is 1.5% and Medicare levy surcharge is 1% of your taxable income and that it is added to your tax payable, what would be the total payable tax for Daniel on his income of \$48 000?

$$1.5 + 1 = 2.5 \quad \checkmark$$

$$0.025 \times 48000 = 1200$$

$$\begin{aligned} \text{total} &= 7950 + 1200 \\ &= \text{\$ } 9150 \quad \checkmark \end{aligned}$$

If Daniel's taxable income in 2010 was \$48 000 given he has not had a pay rise since then, what is the difference in total tax payable then to what it was in 2015?

2010                      2015  
\$9150                      \$8107 ✓  
difference = \$1043 Less in 2015 ✓

Compare the piecewise function  $F(x)$  in the take home investigation to the piecewise function  $F(x)$  above. Which function produces greater tax and why?

✓ - year  
✓ - reason

You pay more tax in 2010, because ✓  
you start paying tax at \$6000 rather than \$18,200 ✓

~~The lines get closer~~

~~In the~~ It evens out, but in the final tax bracket  
it is \$3 more in 2010

~ End of Investigation ~