

TAFE ID	329428800	Result Slip No	S2519777
Student Name	Rachel Loveday	Date marked	19/10/2021

Student Feedback Mathematics Assignment 6492MD 3

Result	$\frac{12}{45} = 27\%$
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Max mark	mark	Teacher's Comments

Q1 to 3

1	1	0	B (<i>Note: option B appears twice.</i>)
2	1	1	B
3	1	0	D

<p>1 If $f(x) = (x - 1)^2$ and $g(x) = x$, then an expression for $\frac{f(x)}{g(x)}$ is</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">A $x - 2 - \frac{1}{x}$</td> <td style="text-align: center;">B $x - 2 + \frac{1}{x}$</td> </tr> <tr> <td style="text-align: center;">BC $x - 1 - \frac{1}{x}$</td> <td style="text-align: center;">D $x - 1 + \frac{1}{x}$</td> </tr> </table> <p></p> <p>1: If $f(x) = (x - 1)^2$ and $g(x) = x$,</p> $\frac{f(x)}{g(x)} = \frac{(x - 1)^2}{x} = \frac{x^2 - 2x + 1}{x} = x - 2 + \frac{1}{x}$ <p>3: Differentiate x twice in terms of time to find the acceleration: $x = 2t^2 - 3t + 1$ Differentiate x to find the velocity:</p>	A $x - 2 - \frac{1}{x}$	B $x - 2 + \frac{1}{x}$	BC $x - 1 - \frac{1}{x}$	D $x - 1 + \frac{1}{x}$
A $x - 2 - \frac{1}{x}$	B $x - 2 + \frac{1}{x}$			
BC $x - 1 - \frac{1}{x}$	D $x - 1 + \frac{1}{x}$			

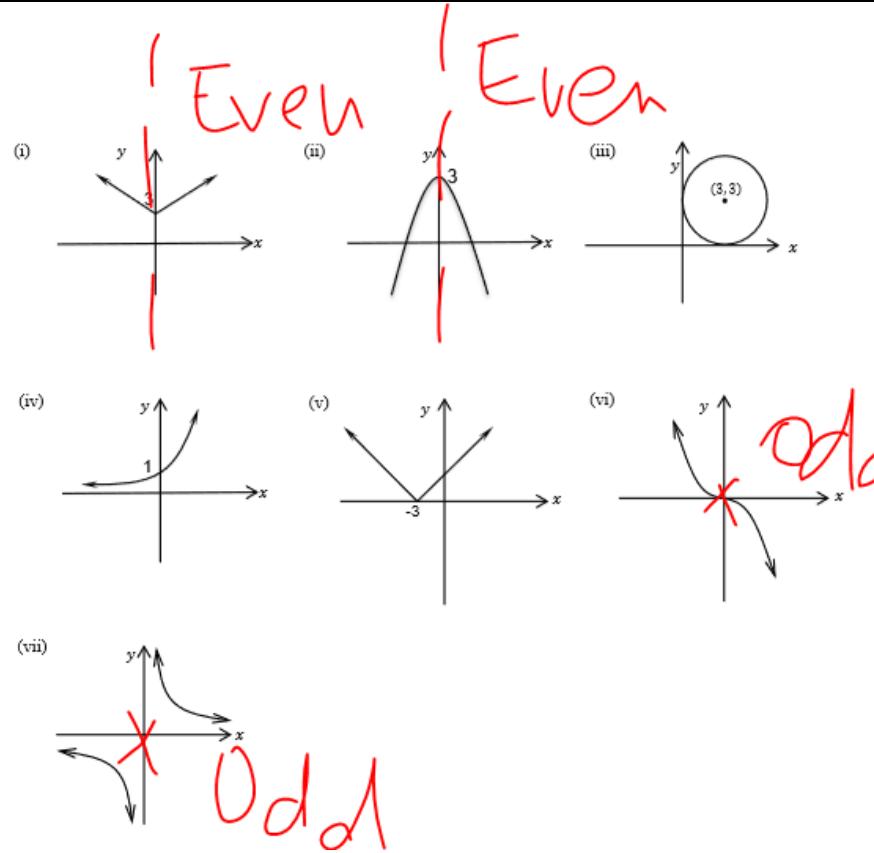
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		$\frac{dx}{dt} = v = 4t - 3$ <p>Differentiate again to find the acceleration:</p> $\frac{dv}{dt} = a = 4 \frac{m}{s^2}$
total	3	1

Q4

a	2	1	-0.5/error
			<p>(Q4)</p> <p>a)</p> <p>i) Neither <input checked="" type="checkbox"/></p> <p>ii) Even <input checked="" type="checkbox"/></p> <p>iii) Neither <input checked="" type="checkbox"/></p> <p>iv) Odd <input checked="" type="checkbox"/></p> <p>v) Neither <input checked="" type="checkbox"/></p> <p>vi) Odd <input checked="" type="checkbox"/></p> <p>vii) Odd <input checked="" type="checkbox"/></p> <p><i>Note that question a should say relations, not functions as the circle is not a function.</i></p> <p>EVEN relations are symmetrical about the y-axis or $f(-x) = f(x)$ for the whole domain.</p> <p>ODD relations are symmetrical about the origin or $f(-x) = -f(x)$.</p>

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		 <p>Even relations are i ii. Odd relations are vi vii. Neither are iii iv v.</p>	
b	3	0	-0.5/error
		<p>b)</p> <p>i) $y = [x+3]$ \times</p> <p>ii) $y = 3^x$ \times</p> <p>iii) $(x-3)^2 + (y-3)^2 = 9$ \checkmark</p> <p>iv) $y = [x+3]$ \times</p> <p>v) $y = 3x^3$ \times</p> <p>vi) $y = \frac{3}{x}$ \times</p> <p>vii) $y = 3 - x^2$ \times</p>	

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		i $y = x + 3$	ii $y = 3 - x^2$	
		iii $(x - 3)^2 + (y - 3)^2 = 9$	iv $y = 3^x$	
		v $y = x + 3 $	vi $y = -3x^3$	
		vii $y = \frac{3}{x}$		
Q4 total	5	1		
Q5				
	2	0	-0.5/error	
		<p>Q5) (i)</p> <p>↓</p> <p>Domain = $(-\infty, 3)$ X</p> <p>Range = $[0, 3)$ X</p>	<p>iv)</p> <p>↓</p> <p>Domain = $[1, \infty)$ X</p> <p>Range = $[1, 0)$ X</p>	
		<p>i $y = x + 3$</p> <p>domain: $x \in \mathbb{R}$ or $(-\infty, \infty)$ range: $y \in \mathbb{R}$: $y \geq 3$ or $[3, \infty)$</p> <p>ii $y = 3^x$</p> <p>domain: $x \in \mathbb{R}$ or $(-\infty, \infty)$ range: $y \in \mathbb{R}$: $y > 0$ or $(0, \infty)$</p>		
Q5 total	2	0		
Q6				
a	3	2	1 each	

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		<p>Q6) (2)</p> <p>i) $f(x) = -x + 2$ $f(-x) = -(-x) + 2$ $y = x + 2$ ✓</p> <p>ii) $f(x) = -x + 2$ $-f(x)$ $= -(-x + 2)$ $y = x - 2$ ✓</p> <p>iii) $-f(-x)$ $f(x) = -x + 2$ $-f(-x) = -f(x) = -(-x + 2)$ $= x + 2$ $y = 2x$ ✗</p> <p>iv) $-f(-x) = -(-(-x) + 2) = -x - 2$</p> <p>Q6 (b) (i), (ii), (iii), (iv)</p> <p>Graph showing four lines on a Cartesian coordinate system. The x-axis ranges from -4 to 13 and the y-axis from -5 to 6. The lines are: <ul style="list-style-type: none"> $y = f(-x)$: A line passing through (-2, 0), (-1, 1), (0, 2), (1, 3), (2, 4), (3, 5). $y = -f(x)$: A line passing through (-2, 4), (-1, 3), (0, 2), (1, 1), (2, 0), (3, -1). $y = -f(-x)$: A line passing through (-2, 4), (-1, 3), (0, 2), (1, 1), (2, 0), (3, -1). $y = f(x)$: A line passing through (-2, 0), (-1, -1), (0, -2), (1, -3), (2, -4), (3, -5). The lines $y = f(-x)$ and $y = -f(-x)$ are identical, and the lines $y = -f(x)$ and $y = f(x)$ are identical. Red checkmarks are placed next to the equations for parts i, ii, and iv.</p>

b 4 3 1 each

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		<p> <input checked="" type="radio"/> $f(x) = -x + 2$ <input type="radio"/> $g(x) = f(-x)$ $\rightarrow -(-x) + 2$ <input type="radio"/> $h(x) = -f(x)$ $\rightarrow -(-x + 2)$ <input type="radio"/> $p(x) = -f(-x)$ $\rightarrow -(-(-x) + 2)$ </p>
Q6 total	7	5
Q7		
a	1	1
		Correct answer Substitute 5 in t: $\frac{5}{5-1} = \frac{5}{4} = 1\frac{1}{4}$
b	1	1
		Correct answer Substitute $x + 1$ into t: $\frac{x+1}{(x+1)-1} = \frac{x+1}{x}$ is correct or you may simplify and get $\frac{x+1}{x} = \frac{x}{x} + \frac{1}{x} = 1 + \frac{1}{x}$
c	1	0
		Correct answer

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		$\begin{aligned} \frac{t}{t-1} &= 2 \\ t &= 2(t-1) \\ t &= 2t-2 \\ t &= 2 \end{aligned}$
d	1	0 Correct domain $t \neq 1$ (The denominator cannot equal to zero since dividing by zero is not defined.)
e	1	0 Correct range $g \neq 1$ The range is all real g values except for 1.
f	1	0 Correct asymptotes (-0.5/error) The asymptotes are: $t = 1$ and $g = 1$
		<p>Q7) (4)</p> <p>a) $g(t) = \frac{t}{t-1}$ d) $(-\infty, 1)$ $g(s) = \frac{5}{s-1}$ e) $[5, \infty)$ $g(s) = \frac{5}{4}$ f) $x=2$ $y=1$</p> <p>b) $g(t) = \frac{t}{t-1}$</p> $g(x+1) = \frac{x+1}{(x+1)-1} \checkmark = \frac{x+1}{x}$ <p>c) $g(t) = \frac{t}{t-1}$</p> $g(2) = \frac{2}{2-1}$ $g(2) = \frac{2}{1}$ $= 1$ <p><i>ANS</i></p>
Q7 total	6	2

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Q8

a	2	0	1 for correct completing of squares, 1 for rearranging
b	2	1	Correct coordinates for centre and correct radius (1 each)
			$ \begin{aligned} \text{Q8} \\ \text{a) } x^2 + y^2 + 2x - 4y - 44 = 0 \\ x^2 + y^2 + 2x - 4y = 44 \\ x^2 + y^2 + 2x - 4y = 44 + 1 \quad \left(\frac{2}{2}\right)^2 = 1^2 = 1 \\ x^2 + y^2 + 2x - 4y = 45 + 4 \quad \left(\frac{4}{2}\right)^2 = 2^2 = 4 \\ \cancel{x^2 + y^2} + \cancel{2x - 4y} = 49 \\ (x^2 + y^2) + (x - y)^2 = 49 \\ (x - x_0)^2 + (y - y_0)^2 = 49 \quad (r^2) \\ r^2 = 49 \quad \checkmark \end{aligned} $ $ \begin{aligned} \text{b) Radius} \\ \downarrow \\ r^2 = 49 \\ r = \sqrt{49} \\ r = 7 \text{ units} \quad \checkmark \end{aligned} $ Centre = 3.5 units \times $ \begin{aligned} (x + 1)^2 - 1 + (y - 2)^2 - 4 = 44 \\ (x + 1)^2 + (y - 2)^2 = 49 \end{aligned} $ <p>Centre is $(-1, 2)$ and radius $r = 7$</p>
Q8 total	4	1	

Q9

a	2	0	Correct coordinates for P and Q ($-0.5/\text{error}$)
b	2	0	Correct gradient of PQ
c	1	0	Correct limit of gradient

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		<p>(Q9)</p> <p>a) $y = 2x^2 - 5$ $y = 2 \times 2^2 - 5$ $y = (2 \times 4) - 5$ $y = 8 - 5$ $y = 3$ $P = \underline{\underline{3}} (2, 3)$</p> <p>$y = 2x^2 - 5$ $y = 2 \times 3^2 - 5$ $y = (2 \times 9) - 5$ $y = 18 - 5$ $y = 13$ $Q = \underline{\underline{13}} (3, 13)$</p> <p>b) $m = \frac{y^2 - y^1}{x^2 - x^1}$ $m = \frac{13 - 3}{3 - 2}$ $m = \frac{10}{1}$ $m = 10$</p> <p>c) $Q = x + h$ $Q = 3 + 13 = 16$ $h \rightarrow 0$ $\frac{dy}{dx} = \frac{13}{3}$ $= 4.33$</p> <p style="text-align: right;">(6) $\times \times$</p>
Q9 total	5	0

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Q10 deleted question		
	2	Factorises the expression $\frac{3x-3}{x^2-1}$ and obtains correct limit
	2	Divides both numerator and denominator with x^2 , and obtains correct limit
		$ \begin{aligned} LHS &= \lim_{x \rightarrow 1} \frac{3(x-1)}{(x-1)(x+1)} \\ &= \lim_{x \rightarrow 1} \left(\frac{3}{x+1} \right) \\ &= \frac{3}{2} \\ &= 1\frac{1}{2} \end{aligned} $
Q10 total	4	deleted
Q11		
	2	Correct differentiation of P with respect to r
	0	<p>Q10) This question has been unanswered as requested in OLS. (7)</p> <p>Q11) $P = 20t + 45t^2$ find $\frac{dP}{dt}$</p> <p>$20 + 45 = 65$ X</p> <p>$= \frac{65t}{20}$ X</p>

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		<p>436 MATHS IN FOCUS 11. Mathematics Extension 1 ISBN 9780170413299</p> <p>EXAMPLE 10</p> <p>h Differentiate $S = 6r^2 - 12r$ with respect to r.</p> <p>h Differentiating with respect to r rather than x:</p> $S = 6r^2 - 12r$ $\frac{dS}{dr} = 12r - 12$ <p>As in the textbook example above, differentiate P with respect to t:</p> $\frac{dP}{dt} = 20 + 90t$
Q11 total	2	0
Q12		
	1	0
	1	Rewrites y in index form
	2	0
	2	Correct differentiation

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		<p>(Q12) $1.5\sqrt{x^3} - \frac{4}{x}$</p> $ \begin{aligned} f(x) &= 1.5\sqrt{x^3} = 1.5x^{\frac{3}{2}} \\ &= 1.5 \times \frac{1}{3}x^{\frac{1}{2}} \\ &= \frac{1.5}{3}x - \frac{11}{3} \\ &= \frac{1.5}{3}x - \frac{1}{x^{\frac{11}{2}}} \\ &= \frac{1.5}{3}x \times \frac{1}{\sqrt[11]{x^3}} \\ &= \frac{1.5}{11^{\frac{3}{2}}\sqrt{x^3}} \end{aligned} $ <p style="text-align: right;">X X</p> <p>First, write both terms in the expression in index form, then apply the index rule of differentiation.</p> <p>In the textbook, these two topics cover what you need to know. Short methods of differentiation and Derivatives and indices.</p> $ \begin{aligned} \frac{d}{dx} \left(1.5\sqrt{x^3} - \frac{4}{x} \right) &= \frac{d}{dx} \left(1.5x^{\frac{3}{2}} - 4x^{-1} \right) \\ &= 2.25x^{\frac{1}{2}} + 4x^{-2} \\ &= 2.25\sqrt{x} + \frac{4}{x^2} \end{aligned} $
Q12 total	3	0
Q13		
	2	0 Correct u' and v'

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2	0	Correct product rule
		<p>Q13) $x \sqrt{x+1}$</p> <p>$y = x \sqrt{x+1}$</p> <p>$y' = \frac{d}{dx} x \sqrt{x+1}$</p> <p>$y' = x^2 + x$ X</p> <p>⑧</p> <p>Rachel, you needed to apply the product rule $(u \times v)' = u'v + uv'$, where:</p> $x = u \quad \text{and} \quad v = \sqrt{x+1}$ $x' = 1 \quad \quad \quad v' = \frac{1}{2\sqrt{x+1}}$ $\begin{aligned} \frac{d}{dx} x\sqrt{x+1} &= \frac{d}{dx} x(x+1)^{\frac{1}{2}} \\ &= x \cdot \frac{1}{2}(x+1)^{-\frac{1}{2}} + (x+1)^{\frac{1}{2}} \cdot 1 \\ &= \frac{x}{2\sqrt{x+1}} + \frac{\sqrt{x+1}}{1} \\ &= \frac{x+2(x+1)}{2\sqrt{x+1}} \\ &= \frac{3x+2}{2\sqrt{x+1}} \end{aligned}$
Q13 total	4	0
Q14		
	1	0
	3	2
		Correct u' and v'
		Correct quotient rule

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		<p>(Q14) $\frac{x^2 + 3}{2x + 7}$</p> <p>$y = \frac{u}{v}$ where $u = x^2 + 3$ ✓ $v = 2x + 7$ ✓ $u' = 3$ ✗ $2x$ $v' = 7$ ✗ 2</p> $= \frac{3(x^2 + 3) - 7(2x + 7)}{(2x + 7)^2}$ $= \frac{3x^2 + 9 - 14x - 49}{(2x + 7)^2}$ $= \frac{3x^2 - 14x - 40}{(2x + 7)^2}$
Q14 total	4	2

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Teacher's Comment

Rachel,

The assignment was based on Further Functions and Introduction to Calculus Chapters. Calculus is a foundation for the all the calculus-based topics.

Regards,

Anna Fazekas
Maths Teacher