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VCE Mathematical Methods ½
Transformations [2.4]

Test Solutions

15 Marks. 19 Minutes Writing.

Results:

Test	_____ / 15
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Section A: Test Questions (15 Marks)

Question 1 (3 marks)

Tick whether the following statements are **true** or **false**.

	True	False
a. The image of a transformation is the point before the transformation is applied.		<input checked="" type="checkbox"/>
b. Reflection in the x -axis makes the y value negative of what it was.	<input checked="" type="checkbox"/>	
c. When a point undergoes a dilation by a factor 3 from the y -axis, we can describe it as $x' = 3x$.	<input checked="" type="checkbox"/>	
d. The transformation $x' = 2(x - 2)$, indicates a translation of 2 units left, and a dilation by a factor 2 from the x -axis.		<input checked="" type="checkbox"/>
e. $y' = 2y + 1$ and $y' = 2\left(y + \frac{1}{2}\right)$ result in the same transformed function.	<input checked="" type="checkbox"/>	
f. A transformation that maps $y = x^2$ to $y = 9x^2$ could be a dilation by factor 3 from the y -axis.		<input checked="" type="checkbox"/>

Space for Personal Notes

Question 2 (2 marks)

The series of transformations given by “a dilation by a factor of 3 from the x -axis, followed by a translation of 8 units up”, yields the exact same result as the series of transformations given by “a translation by a units up, followed by a dilation by a factor of b from the x -axis”.

Find the values of a and b .

$$a = \frac{8}{3} \text{ and } b = 3$$

Space for Personal Notes

Question 3 (3 marks)

Consider the following function: $f(x) = (x + 1)^2$

Apply the following transformations below to the function above.

Dilation by a factor of $\frac{1}{4}$ from the y -axis

Dilation by a factor of 2 from the x -axis

Translation by 2 units in the negative direction of the x -axis

Translation by 9 units in the positive direction of the y -axis

Reflection in the y -axis

$$y = 2(9 - 4x)^2 + 9 = 2(4x - 9)^2 + 9$$

```
In[82]:= f[x_] := (x + 1) ^ 2
```

```
In[86]:= 2 f[4 (-x + 2)] + 9 // Expand
```

```
Out[86]= 171 - 144 x + 32 x^2
```

```
In[89]:= 171 - 144 x + 32 x^2 == 2 (4 x - 9) ^ 2 + 9 // FullSimplify
```

```
Out[89]= True
```

Space for Personal Notes

Question 4 (3 marks)

Consider the following functions:

$$f(x) = \sqrt{x + 2}$$

$$g(x) = -2\sqrt{7 - 2x} + 3$$

Find the set of transformations that maps $f(x)$ to $g(x)$.

Dilation by a factor of 2 from the x -axis
 Reflection in the x -axis
 Translate 3 units up

Dilation by a factor of $1/2$ from the y -axis
 Reflection in the y -axis
 Translation of $\frac{5}{2}$ units right

Space for Personal Notes

Question 5 (2 marks)

Consider the following functions:

$$f_1(x) = x^3$$

$$f_2(x) = -2(3x + 1)^3 - 1$$

Find the set of transformations that maps the function f_1 into f_2 .

Dilation by a factor of 2 from the x -axis
 Reflection in the x -axis
 Translate 1 unit down

Dilation by a factor of $1/3$ from the y -axis
 Translation of $1/3$ units left

Space for Personal Notes

Question 6 (3 marks)

For the function $f(x) = \sqrt{x+2}$, the function f is dilated by a factor of $\frac{5}{4}$ from the x -axis, translated 2 units in the negative x -direction and then is reflected in the y -axis to produce the function g .

Find the rule for $g(x)$.

$$g(x) = \frac{5\sqrt{4-x}}{4}$$

Space for Personal Notes

VCE Mathematical Methods ½

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