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VCE Specialist Mathematics ½
Transformations II [4.3]
Test

21 Marks. 1 Minute Reading. 20 Minutes Writing.

Results:

Test Questions	_____ / 21

Section A: Test Questions (21 Marks)

Question 1 (3 marks)

State whether the statement is **true** or **false**.

Statement	True	False
a. To transform a function, we simply substitute in the x and y in terms of x' and y'.		
b. Rotations and reflections preserve the length of shapes, but dilations and shears do not.		
c. The rotation of θ clockwise around the origin is given by the following matrix: $\begin{bmatrix}\cos(\theta) & -\sin(\theta)\\ \sin(\theta) & \cos(\theta)\end{bmatrix}$		
d. A rotation by $60°$ anti-clockwise about the point $(1, 2)$ is the same as translating one unit down, two units to the left, rotating $60°$ about the origin, and then translating one unit upward, and finally translating two units to the right.		
e. To reflect around a point (a, b), we first translate a units right and b units up.		
f. To reflect a point about the line $y = -2x + 1$, first you need to translate the point one unit down, and then reflect it about the line $y = -2x$.		

Space for Personal Notes

Question 2 (3 marks)

Find the equation of the line $y = \frac{1}{2}x - 1$ after it undergoes a shear of factor -2 parallel to the y-axis.

Space for Personal Notes

Question 3 (4 marks)

Find the matrix corresponding to each of the following linear transformations, and hence find the image of the point $(1,2)$ after undergoing each of the transformations.

a. Rotation by $60°$ anticlockwise. (2 marks)

b. Reflection in the line $y = \frac{1}{\sqrt{3}}x$. (2 marks)

Space for Personal Notes

Question 4 (5 marks)

a. Find the matrix that will reflect the point (x, y) in the line through the origin at an angle of 30° to the positive direction of the x-axis. (2 marks)

b. Find the matrix that will reflect the point (x, y) in the line $y = 2x$. (3 marks)

Space for Personal Notes

Question 5 (6 marks)

Find the equation of the graph of $y = 3x + 1$ under a reflection in the line $y = \frac{1}{\sqrt{3}}x$.

Space for Personal Notes

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VCE Specialist Mathematics ½

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