



MATHEMATICAL METHODS 2020

Unit 3

Key Topic Test 7 – Transformations Technology Free

Recommended writing time*: 45 minutes

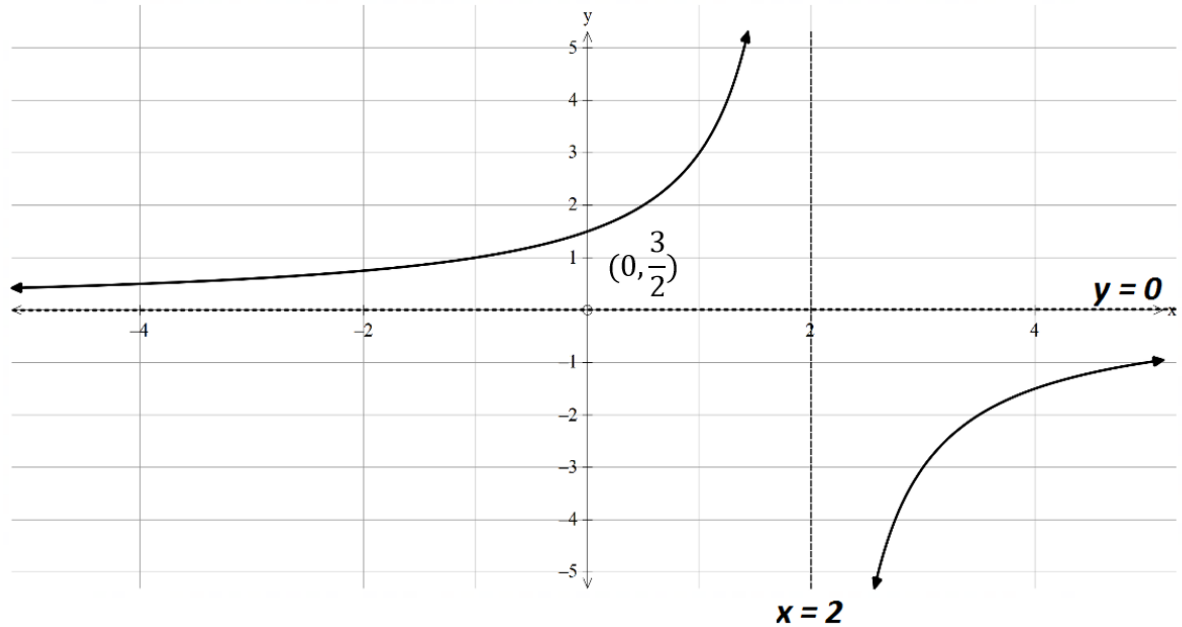
Total number of marks available: 30 marks

SOLUTIONS

Question 1

- a.** Dilation factor 3 from the x-axis
 Reflection in the y-axis (or x-axis)
 Translation 2 units to the right

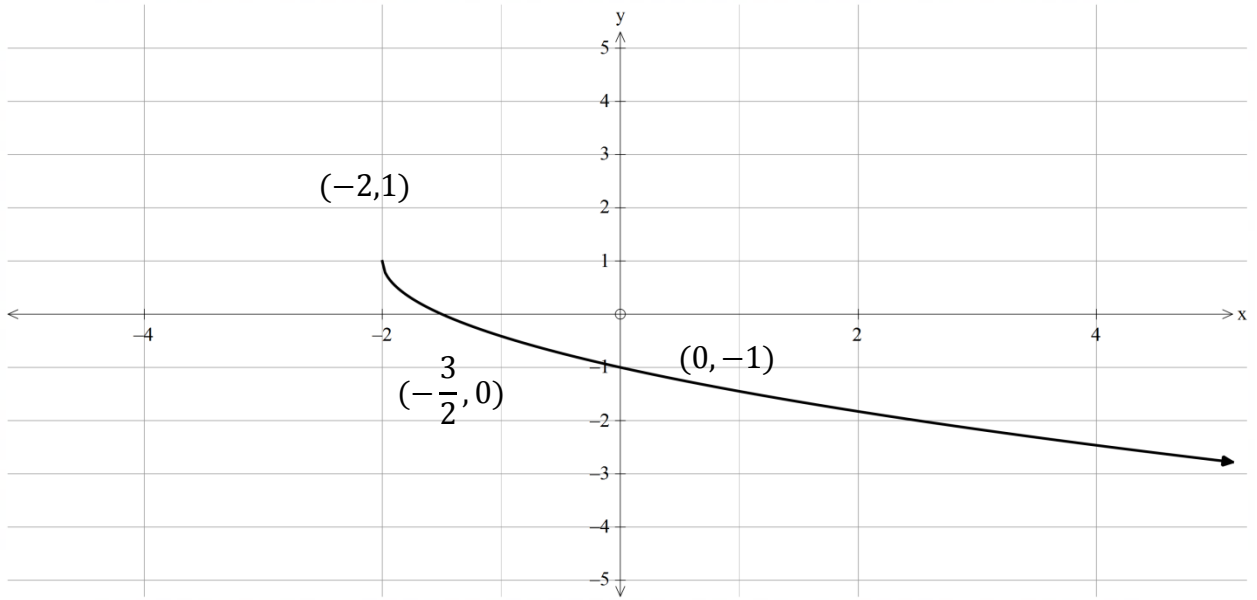
2 marks



1 mark asymptotes
 1 mark y-int & shape

- b.** Reflection in the x-axis
 Dilation factor $\frac{1}{2}$ from the y-axis
 Translation 2 units to the left
 Translation 1 unit up

2 marks



1 mark end point and shape
1 mark intercepts

Question 2

- a. Dilation factor $\frac{1}{2}$ from the y-axis $y = \sqrt{x+1} - 5$ 1 mark
 Translation 1 unit to the right $y = \sqrt{x} - 5$ 1 mark
 Translation 5 units up $y = \sqrt{x}$ 1 mark

- b. A has the dilation only
 $A = \begin{bmatrix} \frac{1}{2} & 0 \\ 0 & 1 \end{bmatrix}$ 1 mark

- c. B has the translations
 $B = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$ 1 mark

Question 3

- a. $(-2, 0) \rightarrow (2, 0) \rightarrow (2, 2) \rightarrow (2, 4) \rightarrow (-2, 4)$ 2 marks
- b. $(0, 12) \rightarrow (0, 12) \rightarrow (0, 6) \rightarrow (0, 4) \rightarrow (-4, 4)$ 2 marks

c. $y = (x + 2)^2$

Translation $y = (x - 2)^2$
 Translation $y = (x - 2)^2 + 2$
 Dilation $y = 2(x - 2)^2 + 4$
 Reflection $y = 2(-x - 2)^2 + 4$
 $y = 2(x + 2)^2 + 4$

2 marks

Question 4

$x' = -x + 3,$ $x = -(x' - 3)$

1 mark

$y' = \frac{y}{2} - 2,$ $y = 2(y' + 2)$

1 mark

$y = \frac{1}{x} \rightarrow 2(y + 2) = \frac{1}{-(x-3)}$

$y = \frac{1}{-2(x-3)} - 2$

1 mark

Question 5

a. Let $x = 2y - 4$

$y = \frac{x}{2} + 2 = f^{-1}(x)$

1 mark

b. Dilation factor 4 from the y-axis

1 mark

Translation 6 units up

1 mark

OR

Dilation factor $\frac{1}{4}$ from x-axis

Translation of 3 units up

$a = 4, b = 1, c = 0, d = 6$

OR

$a = 1, b = \frac{1}{4}, c = 0, d = 3$

1 mark

Question 6

a. $f(g(x)) = e^{2\left(\frac{x}{2}-1\right)+2}$
 $= e^x$

1 mark

1 mark

- b. Dilation factor 2 from the y-axis
Translation 2 units to the right
OR
Translation of 1 unit to the right
Dilation factor 2 from the y-axis.

1 mark

1 mark