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|  | Mathematics 3200Chapter 1 Test - Function Transformations | $$\frac{}{38}$$ |
|  | Version 2 |
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| NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
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| SECTION A: Selected Response: Place the LETTER of your response in the \_\_\_\_ at the right. [17 points] |
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| 1. | The function $y=f(x)$ is stretched vertically by a factor of 3 and is translated 4 units to the left. What is the equation of the transformed function? | 1.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$3y=f\left(x-4\right)$$ | B  | $$3y=f\left(x+4\right)$$ |
|  | C | $$\frac{1}{3}y=f\left(x-4\right)$$ | D | $$\frac{1}{3}y=f\left(x+4\right)$$ |
|  |  |  |  |  |
| 2. | The graph of $y=f(x)$ contains P(-2, 6). What are the coordinates of the image of this point on the function $y-1=-\frac{1}{3}f(2\left(x-1\right))$? | 2.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(-3, -1\right)$$ | B  | $$\left(0, -1\right)$$ |
|  | C | $$\left(-3, -17\right)$$ | D | $$(0, -17)$$ |
|  |  |  |  |  |
| 3. | The mapping rule $\left(x,y\right)\rightarrow (2x-1, y+3)$ is applied to the function $y=f(x)$. What is the equation of the resulting function? | 3.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$y=f\left(2\left(x+1\right)\right)-3$$ | B  | $$y=f\left(2\left(x-1\right)\right)+3$$ |
|  | C | $$y=f\left(\frac{1}{2}\left(x+1\right)\right)+3$$ | D | $$y=f\left(\frac{1}{2}\left(x-1\right)\right)-3$$ |
|  |  |  |  |  |
| 4. | The point $\left(a,b\right)$ is on the graph of the function $y=f(x)$. What are the coordinates of the image of this point on the graph of $y+b=f(x+1)$? | 4.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(a+1, 2b\right)$$ | B  | $$\left(a-1, 2b\right)$$ |
|  | C | $$\left(a+1, 0\right)$$ | D | $$(a-1, 0)$$ |
|  |  |  |  |  |
| 5. | The function $y=f(x)$ is transformed to produce $y=\frac{1}{3}f(-x)$. Which describes the transformations that are required? | 5.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | A reflection in the y-axis and a vertical stretch by a factor of 3. |
|  | B | A reflection in the x-axis and a vertical stretch by a factor of 3. |
|  | C | A reflection in the y-axis and a vertical stretch by a factor of $\frac{1}{3}$ |
|  | D | A reflection in the x-axis and a vertical stretch by a factor of $\frac{1}{3}$ |
|  |  |  |
| 6. | Which mapping rule would map the function $y=f(x)$ onto the function $y=f(-\frac{1}{3}x+3)$? | 6.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(x,y\right)\rightarrow \left(-3x+9, y\right)$$ | B  | $$\left(x,y\right)\rightarrow \left(-3x+1, y\right)$$ |
|  | C | $$\left(x,y\right)\rightarrow \left(-\frac{1}{3}x+9, y\right)$$ | D | $$\left(x,y\right)\rightarrow \left(-\frac{1}{3}x+1, y\right)$$ |
|  |  |  |  |  |
| 7. | Which would produce a graph with the same x-intercepts as the graph of $y=f(x)$? | 7.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\frac{1}{2}y=f\left(x\right)$$ | B  | $$y=f\left(x\right)+1$$ |
|  | C | $$y=f\left(-x\right)$$ | D | $$y=f\left(x+1\right)$$ |
|  |  |  |  |  |
| 8. | The domain of $y=f\left(x\right)$ is $\left\{x/-6\leq x\leq 12, x\in R\right\}$. What is the domain of$y=f(2\left(x+1\right))$? | 8.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left\{x/-11\leq x\leq 25, x\in R\right\}$$ | B  | $$\left\{x/-2\leq x\leq 7, x\in R\right\}$$ |
|  | C | $$\left\{x/-13\leq x\leq 23, x\in R\right\}$$ | D | $$\left\{x/-4\leq x\leq 5, x\in R\right\}$$ |
|  |  |  |  |  |
| 9. | The function $y=f\left(x\right) $is reflected in the x-axis and is translated 5 units down. What is the equation of the transformed function? | 9.\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$y=-f\left(x\right)-5$$ | B  | $$y=f\left(-x\right)-5$$ |
|  | C | $$y=-f\left(x\right)+5$$ | D | $$y=f\left(-x\right)+5$$ |
|  |  |  |  |  |
| 10. | If $f\left(x\right)=x²+4x-12 $, what are the zeroes of the function $y=-f\left(\frac{1}{2}x\right)$? | 10.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $3$ and $-1$ | B  | $-3$ and $1$ |
|  | C | $12$ and $-4$ | D | $-12$ and $4$ |
|  |  |  |  |  |
| 11. | The graph of $y=f\left(x\right) $is shown. Which is an invariant point under the transformation $-3y=f\left(x\right)$? | 11.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(-3, -2\right)$$ |  |
|  | B | $$\left(-1, 0\right)$$ |  |
|  | C | $$\left(0, 1\right)$$ |  |
|  | D | $$\left(1, 2\right)$$ |  |
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| 12. | The function $y=f\left(x\right)$ contains the point $P(4, 2)$. It is transformed by applying the following transformations in the order listed. What is the resulting image of point P?* Reflection in the x-axis
* Translated 2 units to the left and 3 units up
* Stretched vertically by a factor of 2
* Translated 1 unit right and 1 unit up
* Stretched horizontally by a factor of 3
 | 12.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(9, 3\right)$$ | B | $$\left(3, 15\right)$$ |
|  | C | $$\left(5, 6\right)$$ | D | $$\left(-15, 11\right)$$ |
|  |  |  |  |  |
| 13. | Which mapping rule would map $y=2f(x-1)$ onto $y=f(x+3)$? | 13.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$\left(x,y\right)\rightarrow \left(x-4,2y\right)$$ | B | $$\left(x,y\right)\rightarrow \left(x+4, 2y\right)$$ |
|  | C | $$\left(x,y\right)\rightarrow \left(x-4, \frac{1}{2}y\right)$$ | D | $$\left(x,y\right)\rightarrow \left(x+4, \frac{1}{2}y\right)$$ |
|  |  |  |  |  |
| 14. | The mapping rule $\left(x,y\right)\rightarrow \left(4x-3, -2y\right)$ is applied to $y=f\left(x\right)$ to produce a function of the form $y=af\left(b(x-h\right))+k$. Which values are correct for $a and b$? | 14.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$a=-\frac{1}{2}, b=4$$ | B | $$a=-2, b=\frac{1}{4}$$ |
|  | C | $$a=-2, b=4$$ | D | $$a=-\frac{1}{2}, b=\frac{1}{4}$$ |
|  |  |  |  |  |
| 15. | The graph of $y=f\left(x\right)$ is shown. Which represents the graph of $y=f^{-1}\left(x\right)$? | 15.\_\_\_\_\_\_\_\_ |
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|  | A |  | B  |  |
|  | C |  | D |  |
|  |  |  |  |  |
| 16. | Which mapping rule would map $y=f\left(x\right)$ onto $y=g\left(x\right)$? | 16.\_\_\_\_\_\_\_\_ |
|  |  |  |
|  | A | $$\left(x,y\right)\rightarrow \left(-x-1,\frac{1}{2}y\right)$$ | B | $$\left(x,y\right)\rightarrow \left(-x+1,\frac{1}{2}y\right)$$ |
|  | C | $$\left(x,y\right)\rightarrow \left(x-1,-\frac{1}{2}y\right)$$ | D | $$\left(x,y\right)\rightarrow \left(x+1,-\frac{1}{2}y\right)$$ |
| 17. | What is the inverse of g$\left(x\right)=-\frac{2}{3}x-4$? | 17.\_\_\_\_\_\_\_\_ |
|  |  |  |  |  |
|  | A | $$g^{-1}\left(x\right)=-\frac{3}{2}x+4$$ | B | $$g^{-1}\left(x\right)=\frac{2}{3}x+4$$ |
|  | C | $$g^{-1}\left(x\right)=-\frac{3}{2}x-6$$ | D | $$g^{-1}\left(x\right)=\frac{3}{2}x+6$$ |
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| SECTION B: Constructed Response: Answer ALL questions in the space provided. Full credit will only be awarded for correct **solutions.** |
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| 1. | The graph of $g\left(x\right)$ is a transformation of $f\left(x\right)$.  |
|  | (a) | List the transformations required to map $f\left(x\right) $onto g$\left(x\right).$ | [2 pts] | PC12 tech art BLM 1–3-2 |
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|  | (b) | Write the mapping rule. | [1 pt] |
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|  |  |  |
|  | (c) | Determine the equation of $g\left(x\right)$ in the form $y=af\left(b\left(x-h\right)\right)+ k$ | [1 pt] |
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| 2. | The graph of a function $y=f\left(x\right)$ is shown below.  |  |
|  | (a) | On the same grid, sketch the graph of the function that results when the mapping rule $\left(x,y\right)\rightarrow (-x+3, 2y-1)$ is applied to this function. | [2 pts] |  |
|  | (b) | Write the equation of the resulting function in the form $y=af\left(b\left(x-h\right)\right)+ k$. | [1 pt] |  |
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|  | 3. | The function $f\left(x\right)=x^{2}$ is transformed to produce $g\left(x\right)= -f\left(\frac{1}{2}x+1\right)+ 3$.  |
|  |  | 1. Write the mapping rule that maps $f\left(x\right)$ onto $g\left(x\right)$.
 | [2 pts] |  |
|  |  | 1. Sketch the graphs of both functions on the grid provided, clearly showing at least 5 points on each function.
 | [3 pts] |  |
|  |  | 1. Write the equation that represents $g\left(x\right)$.
 | [2 pts] |  |
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|  | 4. | (a) Algebraically determine the inverse of $f\left(x\right)=x²-6x+1$  | [3 pts] |
|  |  |  |  |  |
|  |  | (b) Restrict the domain of $f\left(x\right)$ so that its inverse is also a function. | [1 pt] |
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|  | 5. The function $y=f\left(x\right)$ is transformed to produce a function of the form$y=af\left(b\left(x-h\right)\right)+k$.The list of transformations is given below. * Reflected in the x-axis
* Stretched vertically by a factor of 4
* Stretched horizontally by a factor of $\frac{2}{3}$
* Translated 3 units right and 5 units down.
 |
|  |  | (a) | Write the mapping rule that represents this set of transformations. | [2 pts] |
|  |  |  |  |  |
|  |  | (b) | Write the function in the form $y=af\left(b\left(x-h\right)\right)+k$. | [1 pt] |
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