Multiple Choice Questions

Directions: In each of the following exercises, select the “best” answer and darken the corresponding oval on your scantron sheet.

1. Given the equation \( f(x) = x^2 \), simplify \( \frac{f(x) - f(a)}{x - a} \).
   (a) \( x - a \)  
   (b) \( \frac{1}{x - a} \)  
   (c) \( x + a \)  
   (d) \( \frac{1}{x + a} \)  
   (e) None of these

2. Consider the piecewise definition
   \[
   f(x) = \begin{cases} 
   -2 & \text{if } x < -1, \\ 
   3 - 2x & \text{if } -1 \leq x < 3, \\ 
   4 & \text{if } x \geq 3 
   \end{cases}
   \]
   What is \( f(4) \)?
   (a) \(-2\)  
   (b) \(-5\)  
   (c) \(5\)  
   (d) \(4\)  
   (e) None of these

Use the following graph to answer questions 3–5.

3. What is \( f(-2) \)?
   (a) \(-2\)  
   (b) \(0\)  
   (c) \(-3\)  
   (d) \(1\)  
   (e) None of these

4. What is the domain of \( f \)?
   (a) \((-\infty, 0]\)  
   (b) \([0, -\infty)\)  
   (c) \((+\infty, 0]\)  
   (d) \([-3, +\infty)\)  
   (e) None of these

5. What is the range of \( f \)?
   (a) \((-\infty, 0]\)  
   (b) \([0, -\infty)\)  
   (c) \((+\infty, 0]\)  
   (d) \([-3, +\infty)\)  
   (e) None of these

6. What is the distance between points A(2, 3) and B(3, -4)?
   (a) \(2\sqrt{5}\)  
   (b) \(5\sqrt{2}\)  
   (c) \(3\sqrt{2}\)  
   (d) \(4\sqrt{5}\)  
   (e) \(2\sqrt{3}\)

7. What is the midpoint of the segment joining points A(2, -3) and B(4, -1)?
   (a) \((3, -2)\)  
   (b) \((-2, 3)\)  
   (c) \((-1, -1)\)  
   (d) \((1, 1)\)  
   (e) None of these

8. What is the equation of the circle with center at C(1, -2) that passes through the point (4, 4)?
   (a) \((x - 1)^2 + (y + 2)^2 = 29\)  
   (b) \((x + 1)^2 + (y - 2)^2 = 45\)  
   (c) \((x - 4)^2 + (y - 4)^2 = \sqrt{45}\)  
   (d) \((x - 1)^2 + (y + 2)^2 = 45\)  
   (e) \((x - 1)^2 + (y - 2)^2 = 5\)
Use the following figure to answer questions 9–10.

\[ \begin{array}{c}
\begin{array}{c}
\text{y} \\
\text{x}
\end{array}
\end{array} \]

9. What is the slope of the line in the figure?
   (a) 1/2      (b) 2      (c) 3/2      (d) -1/2      (e) -2

10. What is the equation of the line that passes through the point (-1, 1) that is perpendicular to the line given in the figure?
   (a) \( y - 1 = (-1/2)(x + 1) \)  
   (b) \( y - 1 = 2(x + 1) \) 
   (c) \( y - 1 = -2(x + 1) \) 
   (d) \( y + 1 = -2(x - 1) \) 
   (e) None of these

11. The graph of the relation defined by \( x^3 + y^4 = 36 \) is
   (a) Symmetric with respect to the y-axis only.
   (b) Symmetric with respect to the x-axis only.
   (c) Symmetric with respect to the origin only.
   (d) Symmetric with respect to the origin and the y-axis.
   (e) Symmetric with respect to the origin, the x-axis, and the y-axis.

12. Given \( f(x) = \sqrt{x} \) and \( g(x) = 2x - 3 \), then \( (g \circ f)(x) \) equals
   (a) \( \sqrt{2x - 3} \)  
   (b) \( x\sqrt{2x - 3} \) 
   (c) \( 2\sqrt{x} - 3 \) 
   (d) \( 2\sqrt{x - 3} \) 
   (e) None of these
Essay Questions

Directions: Place the solution to each of the following exercises on your own paper. You must follow directions explicitly and show all work to receive full credit.

EXERCISE 1. Consider the function defined by \( f(x) = |x + 1| + |x - 3| \).

a) Create a piecewise definition for \( f \).

b) Use the piecewise definition found in part (a) to help sketch the graph of \( f \). Place your plot on graph paper. Label and scale each axis. \textit{Note: This graph should be drawn without the aid of a calculator. No credit will be given for graphs that are simply copied from a calculator screen. However, it is all right to check your solution with your calculator.}

EXERCISE 2. Amy and Jim perform a physics experiment by releasing an object from rest. Each data point in the following table measures the speed \( s \) of the object (m/s) \( t \) seconds after it was released.

\[
\begin{array}{cccccc}
  t & 0 & 1 & 2 & 3 & 4 \\
  s & 0 & 11.0 & 19.4 & 29.2 & 39.4 \\
\end{array}
\]

a) Set up a coordinate system on a sheet of graph paper. Label and scale each coordinate axis. Plot the data from the table on your coordinate system.

b) Draw a line that “fits” the data on the plot developed in part (a). Select two points \textit{on the line} and use them to compute the slope of the line. What is the equation of your “line of best fit?” Record this answer on the plot developed in part (a) and clearly indicate that it is your hand-calculated solution.

c) Enter the data in your calculator. Use your calculator to find the line of best fit. Record this answer on the plot developed in part (a) and clearly indicate that this is your calculator solution.

EXERCISE 3. The graph of \( y = f(x) \) is drawn in the following figure.

Sketch the graph of \( y = -f(x + 3) + 2 \) on a sheet of graph paper. Be sure to correctly plot all key points.
Solutions to Quizzes

Solution to Question 1: Answer here.
Solution to Question 2: Answer here.
Solution to Question 3: Answer here.
Solution to Question 4: Answer here.
Solution to Question 5: Answer here.
Solution to Question 6: Answer here.
Solution to Question 7: Answer here.
Solution to Question 8: Answer here.
Solution to Question 9: Answer here.
Solution to Question 10: Answer here.
Solution to Question 11: Answer here.
Solution to Question 12: Answer here.
Solutions to Exercises

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