



Practice Worksheet on Calculus and Algebra

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Subject: Mathematics

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Long Answer Questions

1. Solve the quadratic equation $3x^2 - 7x + 2 = 0$ using the quadratic formula. Explain what the solutions represent graphically.
2. Solve for θ in the equation $2\sin^2\theta - 1 = 0$, where $0^\circ \leq \theta \leq 360^\circ$.
3. Find the derivative of $f(x) = 4x^3 - 6x^2 + 2x - 5$ using the power rule. Show each step of your work.
4. Find the indefinite integral of $g(x) = 6x^2 + 4x - 3$ with respect to x . Show your work.
5. Vector A has components $(3, 4)$ and vector B has components $(-1, 2)$. Find the magnitude of the resultant vector $A + B$.
6. Find the area of the triangle with vertices $A(1, 2)$, $B(4, 1)$, and $C(2, 5)$. Explain the geometrical meaning of this calculated area.

7. Solve for x in the equation: $\log_{10}(x) + \log_{10}(x-2) = 3$.

8. Explain the concept of function composition and provide two examples showing $f(g(x))$ and $g(f(x))$.

Multiple Choice Questions

1. What are the solutions to the quadratic equation $3x^2 - 7x + 2 = 0$?

- a) $x = 1$ and $x = -2$
- b) $x = 2$ and $x = 1/3$
- c) $x = -2$ and $x = -1/3$
- d) $x = 2$ and $x = -1$

2. Solve for θ in $2\sin^2\theta - 1 = 0$, where $0^\circ \leq \theta \leq 360^\circ$

- a) 30° and 150°
- b) $30^\circ, 150^\circ, 210^\circ, 330^\circ$
- c) 60° and 120°
- d) $60^\circ, 120^\circ, 240^\circ, 300^\circ$

3. What is the derivative of $f(x) = 4x^3 - 6x^2 + 2x - 5$?

- a) $12x^2 - 6x + 2$
- b) $12x^2 - 12x + 2$
- c) $12x^3 - 12x^2 + 2x$
- d) $12x^2 - 6x$
- e) $12x^2$
- f) $12x - 6$

4. What is the indefinite integral of $g(x) = 6x^2 + 4x - 3$?

- a) $2x^3 + 2x^2 - 3x + C$

- b) $2x^3 + 2x^2 - 3x + C$
- c) $6x + 4 + C$
- d) $18x^2 + 4x + C$

5. What is the magnitude of vector $A + B$, given $A = (3, 4)$ and $B = (-1, 2)$?

- a) $\sqrt{10}$
- b) $\sqrt{20}$
- c) 5
- d) $\sqrt{5}$

6. What is the area of the triangle with vertices $A(1, 2)$, $B(4, 1)$, and $C(2, 5)$?

- a) 4
- b) 6
- c) 7.5
- d) 15

7. What is the solution for x in $\log_{10}(x) + \log_{10}(x - 2) = 3$?

- a) $x = 4$
- b) $x = 4$
- c) $x = 2$
- d) $x = 3$

8. What is function composition?

- a) The product of two functions
- b) Applying one function to the result of another
- c) The sum of two functions
- d) The difference of two functions

Answer Key

Long Answer Questions - Expected Responses

1. Solve the quadratic equation $3x^2 - 7x + 2 = 0$ using the quadratic formula. Explain what the solutions represent graphically.

Expected Answer: Apply the quadratic formula to find the roots of the equation. The roots represent the x-intercepts.

2. Solve for θ in the equation $2\sin^2\theta - 1 = 0$, where $0^\circ \leq \theta \leq 360^\circ$.

Expected Answer: Use the trigonometric identities to simplify and solve for the unknown angle.

3. Find the derivative of $f(x) = 4x^3 - 6x^2 + 2x - 5$ using the power rule. Show each step of your work.

Expected Answer: The answer should include a detailed explanation on how to obtain the derivative of the function, showing all steps.

4. Find the indefinite integral of $g(x) = 6x^2 + 4x - 3$ with respect to x . Show your work.

Expected Answer: Integrate the function using standard integration techniques. Remember to include the constant of integration.

5. Vector A has components $(3, 4)$ and vector B has components $(-1, 2)$. Find the magnitude of the resultant vector $A + B$.

Expected Answer: Use vector addition to find the resultant vector, and use the Pythagorean theorem to find the magnitude.

6. Find the area of the triangle with vertices $A(1, 2)$, $B(4, 1)$, and $C(2, 5)$. Explain the geometrical meaning of this calculated area.

Expected Answer: Use the formula to calculate the area and explain the

geometrical meaning of the area.

7. Solve for x in the equation: $\log_2(x) + \log_2(x-2) = 3$.

Expected Answer: Use the rules of logarithms to simplify and solve for the variable. Show steps.

8. Explain the concept of function composition and provide two examples showing $f(g(x))$ and $g(f(x))$.

Expected Answer: Explain the concept and give at least two examples to show your understanding.

Multiple Choice Questions - Correct Answers

1. What are the solutions to the quadratic equation $3x^2 - 7x + 2 = 0$?

Correct Answer: $x = 2$ and $x = 1/3$

2. Solve for θ in $2\sin^2\theta - 1 = 0$, where $0^\circ \leq \theta \leq 360^\circ$

Correct Answer: $30^\circ, 150^\circ, 210^\circ, 330^\circ$

3. What is the derivative of $f(x) = 4x^3 - 6x^2 + 2x - 5$?

Correct Answer: $12x^2 - 12x + 2$

4. What is the indefinite integral of $g(x) = 6x^2 + 4x - 3$?

Correct Answer: $2x^3 + 2x^2 - 3x + C$

5. What is the magnitude of vector $A + B$, given $A = (3, 4)$ and $B = (-1, 2)$?

Correct Answer: $\sqrt{20}$

6. What is the area of the triangle with vertices $A(1, 2)$, $B(4, 1)$, and $C(2, 5)$?

Correct Answer: 7.5

7. What is the solution for x in $\log_{10}(x) + \log_{10}(x - 2) = 3$?

Correct Answer: $x = 4$

8. What is function composition?

Correct Answer: Applying one function to the result of another