6. Which of the following is the value of \( x_1 = 11 \)  
   \[ x_n = 3x_{n-1} - 4 \] 
   \[ x_2 = \ ? \] 

(1) \( x_2 = 7 \)  
(2) \( x_2 = 1 \)  
(3) \( x_2 = 3 \)  
(4) \( x_2 = 13 \)

5. If the first three terms of a geometric sequence are \( a, b, c \)  
   then what is the value of \( x = \frac{a + b + c}{3} \)? 
   \[ x = \ ? \] 

(1) \( x = 3 \)  
(2) \( x = 8 \)  
(3) \( x = 27 \)  
(4) \( x = 121 \)

4. A triangle has dimensions 3, 4, and 6. If the triangle is rotated 180 degrees, how many times will the rotated triangle fit into the same area as the original triangle? 
   \[ \text{Area of triangle} = \frac{1}{2} \times 3 \times 4 = 6 \] 
   \[ \text{Area of rotated triangle} = \ ? \] 

(1) \( 6 \)  
(2) \( 12 \)  
(3) \( 24 \)  
(4) \( 48 \)

3. A sequence is defined by \( a_1 = 15 \) and \( a_2 = 16 \). Then when \( a_n = a_1 + (n-1)d \)  
   \[ a_n = \ ? \] 

(1) \( a_n = 15 \)  
(2) \( a_n = 16 \)  
(3) \( a_n = 31 \)  
(4) \( a_n = 30 \)

2. Which of the following formulas properly describes the sequence 3, 5, 9, 17, 33, ...? 
   \[ a_n = \ ? \] 

(1) \( a_n = 2^n + 1 \)  
(2) \( a_n = 2n^2 - 1 \)  
(3) \( a_n = 2^n + 2 \)  
(4) \( a_n = 2^n - 1 \)

1. For a sequence defined by \( a_1 = 1 \) and \( a_n = 2a_{n-1} + (n-1) \)  
   \[ \text{Find the next term} = \ ? \] 

(1) \( 1 \)  
(2) \( 3 \)  
(3) \( 5 \)  
(4) \( 7 \)
11. If the following sum represents a geometric series, then which of the following is its value? 

\[ \sum_{x=1}^{\infty} \frac{1}{2^x} \]

12. A sequence is given by the recursive definition: 

\[ a_1 = 1, \quad a_{n+1} = a_n - 4 \] 

What are the first five terms of the sequence? 

13. Write the following in simplest form in terms of \( x \) and \( a \): 

\[ \frac{3x^2 - 4x + 1}{x^2 - 2x + 1} \]
18. Simplify the expression $\frac{3}{5} \times 15$. Show your working.

19. Solve the following quadratic equation: $\sqrt{7}x^2 - 11x + 6 = 0$.

16. If a sequence is defined by the recursive formula $a_n = \frac{a_{n-1}}{2}$, when is the value of $a_n$ always negative? Use the formula provided to determine the second term of the sequence. Show your working.

15. In a geometric sequence, the first term is $8$ and the eighth term is $11.496$. Find the sum of the first 30 terms of this sequence. Show your working.

14. For some value of $x$, the sequence $2x + 1, x^2 + 5$ forms the first three terms of an arithmetic sequence. Find the value of $x$.
(26) The polynomial $2x^2 - 4ax + 3b - 6c$ can be written as

$$\frac{2}{a} \times \left( x + \frac{2}{a} \right) \left( x + \frac{3}{a} \right) \left( x + \frac{5}{a} \right).$$

(27) The cubic polynomial $2x^3 + 3x + 20$ can be factored as

$$(2x + \frac{2}{a})(x^2 + \frac{3}{a}x + \frac{5}{a}) = (x - \frac{1}{a})(x - \frac{1}{a}x - \frac{1}{a}x).$$

(28) The height of an object can be modeled by the function

$$y = ax^2 + bx + c.$$

(29) If $x > 0$, then $y > 0$.

(30) If $x < 0$, then $y < 0$.

(31) If $x = 0$, then $y = c$.

(32) For $x > 1$, $y$ is increasing.

(33) For $x < 1$, $y$ is decreasing.

(34) For $x = 1$, $y$ is stationary.

(35) The function $y = ax^2 + bx + c$ is strictly decreasing over

$$x < 0.$$

(36) The interval $x > 0$ is increasing.

(37) The interval $x < 0$ is decreasing.

(38) The interval $x = 0$ is stationary.

(39) The function $y = ax^2 + bx + c$ is increasing over

$$x > 0.$$

(40) The function $y = ax^2 + bx + c$ is decreasing over

$$x < 0.$$

(41) The function $y = ax^2 + bx + c$ is stationary over

$$x = 0.$$
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1. \( y = x \) \( z = x \)

2. \( \frac{1}{10} \cdot \frac{3}{4} + \frac{5}{6} = \frac{11}{10} \)

3. \( Q = \frac{-4 - (1 - x)}{x + 10} \)

4. \( Q = \frac{3}{5} - \frac{x}{x + 10} \)

5. \( 0 = \frac{-4 - (1 - x)}{x + 10} \)

6. 
   \( x = 10 \)

7. 
   \( x = \frac{11}{10} \)

8. \( x = 13 \pm \sqrt{13} \)

9. 
   \( x = 13 \pm \sqrt{13} \)

10. 
    \( x = 3, 5, 13 \pm \sqrt{13} \)

11. 
    \( x = 13 \pm \sqrt{13} \)

12. 
    \( x = 3, 5, 13 \pm \sqrt{13} \)

13. 
    \( x = 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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    \( x = 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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    \( x = 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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    \( x = 3, 5, 13 \pm \sqrt{13} \)

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60. 
    \( x = 3, 5, 13 \pm \sqrt{13} \)
1. The per unit cost in dollars of producing $n$ items is given by:

$$c(n) = 0.125n + 77.325$$

2. The per unit cost of producing 100 items is$

3. Find the TP.

4. Plot the solution on the number line provided.

5. Algebrally determine the solution to the inequality below:

$$x^2 + 2x - 35 > 0$$

6. Solve the following equation for all values of $x$ algebraically:

$$1 - x = \frac{x}{x - 5}$$

7. Given that the graph of the function $f(x)$ is shown, find the values of $x$ for which $f(x) > 0$.
44. Given that \( q \) is a translation of the graph of the function, which of the following equations would describe the graph shown below?

\[ f(x) = a(x-h)^2 + k \]

45. A parabola has a focus at \((6,8)\) and a directrix of \(x = -2\). Find the equation of the parabola using the focus-directrix definition.

\[ y = a(x-h)^2 + k \]

46. Given that both \( a \) and \( q \) are positive numbers, which of the following equations describe the graph of the function?

\[ f(x) = a(x-h)^2 + k \]
36. Which of the following is the simplified version of \( \frac{x^2}{\sqrt{x}} \)?

\[
\frac{x^2}{\sqrt{x}} = \frac{x^2}{x^{1/2}} = x^{2-1/2} = x^{3/2}
\]

37. The expression \( \frac{x^2}{\sqrt{x}} \) can be written equivalent as \( \frac{x^2}{x} \). Which of the following represents the value of the expression?

\[
\sqrt{x} \cdot \frac{x}{x} = x^{1/2} \cdot 1 = x^{1/2}
\]

38. The expression \( \frac{x^2}{\sqrt{x}} \) means the same as \( \frac{x^2}{x} \). Which of the following can be written as \( \frac{x^2}{x} \)?

\[
\frac{x^2}{x} = x^{2-1} = x
\]

39. The expression \( \frac{x^2}{\sqrt{x}} \) is the same as \( \frac{x^2}{x} \). Which of the following can be simplified to \( \sqrt{x} \)?

\[
\sqrt{x} \cdot \frac{x}{x} = x^{1/2} \cdot 1 = x^{1/2}
\]

40. Which of the following is the solution set for \( x = -\sqrt{2x+1} \)?

\[
x = -\sqrt{2x+1}
\]
Given the function $f(x) = -\frac{1}{2}x^2 + 3$, answer the following:

61.) Which of the following represents the solution set?

62.) Which of the following represents the solution set to:  

63.) Which of the following represents the solution set?

64.) Which of the following represents the solution set?

65.) Which of the following represents the solution set?

66.) Which of the following represents the solution set?

67.) Which of the following represents the solution set?

68.) Which of the following represents the solution set?

69.) Which of the following represents the solution set?

70.) Which of the following represents the solution set?

71.) Which of the following represents the solution set?

72.) Which of the following represents the solution set?

73.) Which of the following represents the solution set?
64. Solve the following system of equations algebraically.

\[
\begin{align*}
8 & = 3+x \quad (1) \\
-33 & = h - \frac{1}{2}(9) (6) \\
-1 & = x + 10 + x \quad (2)
\end{align*}
\]

65. Which of the following is the solution to \(2(x-3)^2 = -32\)?

62. Write \(\sqrt{80} \times 9\) in simplest radical form. Show how you arrived
The real number $a + bi$ and $c + di$ each giving $58$. Explain why the product of $10 - 4i$ and $3 + 2i$ produces a purely imaginary number.

70. The product of 6 and which of the following will result in a purely imaginary number?

71. The product of $a - 2bi$ and $2a + 5bi$ is found, where $a$ and $b$ are real numbers. Then the real component of the result is given as $10b - 2a$. Find the product.

67. Which of the following expressions is equivalent to $\sqrt{-98}$?

68. Which of the following is the sum of $5 - 3i$ and $-7 + 8i$?

69. If $x = 3 + 7i$ and $y = -6 - 2i$, then which of the following is the expression $2x - 4y$?

72. For which of the following values of $b$ will the equation $4x^2 + 6x + 7 = 0$ have real solutions?
Always resulting in a perfect square, the solutions of a quadratic equation have real roots. Explain why:

\[ \text{If } \quad \Delta = b^2 - 4ac = 0, \quad \text{then there is a double root.} \]

Explain why there is no real number value of \( a \) that can cause a quadratic expression to be an identity:

\[ a^2 + b^2 - c^2 = 0 \]

Steps and express your final answer in simplest form:

Evaluating the following complex arithmetic problem, show all work:

\[ \frac{\sqrt{17} + 5i\pi}{(3+2i)(2-3i)} \]

Given the quadratic equation \( ax^2 + 10x + 2 = 0 \), determine all values of \( a \) that will result in this equation having real solutions. Show the work that leads to your answer.