1) Solve this equation. What is the solution set?

\[
\frac{a + 3}{6} + \frac{a + 1}{2} = a
\]

A \{−2\}  
B \{1\}  
C \{\frac{1}{3}\}  
D \{\frac{−20}{7}\}  
E \{3\}

2) When Liam got his car repaired after an accident, he was charged $569 for parts and the remaining part of the bill was mechanic’s labor. If the total bill was $1025 and labor was $48 per hour, how many hours did the mechanic work on his car?

A 8.5 hr.  
B 9.75 hr.  
C 8.75 hr.  
D 10.25 hr.  
E None of the above.

3) A chemist needs 2 liters of a solution that is 35% hydrochloric acid. She has 20% and 60% hydrochloric acid solutions available. If \(x\) represents the amount of 20% solution she uses, which equation could be used to solve for \(x\)?

A \(0.2x + 0.6(2 - x) = 0.35(2)\)  
B \(0.2x + 0.6x = 0.35(2)\)  
C \(0.2x + 0.6(2 - x) = 2\)  
D \(0.2x + 0.6(x - 2) = 0.35(2)\)  
E \(0.2x + 0.6(2) = 0.35x\)
4) Subtract: \( -2 + \sqrt{-25} - (-6 - \sqrt{-49}) \)

\[
 A \quad 4 + 12i \\
 B \quad -8 + 12i \\
 C \quad 4 - 12i \\
 D \quad -8 - 2i \\
 E \quad 4 + 2i
\]

5) Multiply: \( (12 - 10i)(-4 + \frac{1}{2}i) \)

\[
 A \quad -43 - 46i \\
 B \quad -48 - 51i \\
 C \quad -53 + 46i \\
 D \quad -43 + 46i \\
 E \quad \text{None of the above.}
\]

6) **One** of the solutions of the equation below can be described by which of the following?

\[
\frac{1}{x} + \frac{1}{3x - 2} = 2
\]

\[
 A \quad \text{It is greater than } \frac{1}{2}, \text{ but less than 1.} \\
 B \quad \text{It is at least 1, but less than } \frac{3}{2}. \\
 C \quad \text{It is at least } \frac{3}{2}, \text{ but less than 2.} \\
 D \quad \text{It is at least 2, but less than } \frac{5}{2}. \\
 E \quad \text{It is } \frac{5}{2} \text{ or greater.}
\]
7) A rectangular garden measures 15 feet by 11 feet and is surrounded by a walkway of uniform width as shown. If the area of the garden plus the walkway is 285 square feet and \( x \) represents the width of the walkway, which simplified equation could be used to find the width of the walkway?

\[
A \quad x^2 + 13x - 30 = 0 \\
B \quad x^2 + 26x - 120 = 0 \\
C \quad x^2 - 13x - 30 = 0 \\
D \quad x^2 + 13x + 30 = 0 \\
E \quad x^2 - 26x + 120 = 0
\]

8) Two hoses working together can fill a tank in 2 hours. The smaller hose, working alone, can fill the tank in 3 hours more time than the larger hose alone. How long would it take the larger hose alone to fill the tank?

\[
A \quad 2 \text{ hours} \\
B \quad 2 \frac{1}{2} \text{ hours} \\
C \quad 3 \frac{1}{2} \text{ hours} \\
D \quad 4 \text{ hours} \\
E \quad 3 \text{ hours}
\]

9) Solve the equation. Select the correct statement. \( \sqrt{42 - 2x} = x + 3 \)

\[
A \quad \text{There are two solutions, both positive.} \\
B \quad \text{There are two solutions, one positive and the other negative.} \\
C \quad \text{There are two solutions, both negative.} \\
D \quad \text{There is one positive solution.} \\
E \quad \text{There is one negative solution.}
\]
10) Which number line correctly illustrates the solution of \( \left| \frac{x+2}{3} \right| \leq 1 \)?

A

B

C

D

E

None of the above.

11) Which point \((x, y)\) would be a distance of 5 units from the point \((-2,5)\)?

A \((-1,1)\)

B \((-1,-1)\)

C \((1,-1)\)

D \((2,2)\)

E \((-2,2)\)

12) If \( f(x) = \frac{2(x+1)}{x-1} \), find and simplify \( f(x-1) \)

A \( f(x-1) = \frac{2x}{x-1} \)

B \( f(x-1) = \frac{2x+1}{x-2} \)

C \( f(x-1) = \frac{2x+2}{x-2} \)

D \( f(x-1) = \frac{2x}{x-2} \)

E \( f(x-1) = 2x + 2 \)
13) Given the piece-wise function \( f(x) = \begin{cases} 3x - 1 & \text{if } x < 1 \\ \frac{x + 2}{3} & \text{if } x \geq 1 \end{cases} \), evaluate \( f(1) \) and \( f(4) \).

\( A \) \( f(1) = 2, \quad f(4) = 2 \)

\( B \) \( f(1) = 2, \quad f(4) = \frac{10}{3} \)

\( C \) \( f(1) = 1, \quad f(4) = \frac{10}{3} \)

\( D \) \( f(1) = 1, \quad f(4) = 2 \)

\( E \) \( f(1) = \frac{7}{3}, \quad f(4) = 2 \)

14) Solve the equation. \( a^2 + 4a + 8 = 0 \)

\( A \) \( a = -2 + 4\sqrt{3}, -2 - 4\sqrt{3} \)

\( B \) \( a = -4 + 2i, -4 - 2i \)

\( C \) \( a = -2 + 2i, -2 - 2i \)

\( D \) \( a = -2 + 2\sqrt{3}, -2 - 2\sqrt{3} \)

\( E \) \( a = -4 + i, -4 - i \)

15) Solve: \( (x - 8)^{\frac{3}{2}} = 64 \)

\( A \) \( x = 24 \)

\( B \) \( x = 4 \)

\( C \) \( x = 512 \)

\( D \) \( x = 16 \)

\( E \) \( x = 64 \)