

Test 5

1. $4 = \sqrt{8x}$

$4^2 = (\sqrt{8x})^2$ square both sides

$\frac{16}{8} = \frac{8x}{8}$ Divide both sides by 8.

$2 = x$ (B)

2. $9 = \sqrt{1-8n}$

$9^2 = 1-8n$ square both sides

$81 = 1-8n$

$81-1 = -8n$ subtract 1 from both sides

$-8n = 80$

$n = -10$ (D)

3. $\sqrt{\frac{b}{3}} = \sqrt{24-b}$ square both sides

$\frac{b}{3} = 24-b$ multiply 3 to both sides

$b = 72-3b$ collect like terms together

$4b = 72$ Divide both sides by 4.

$b = 18$ (C)

$$4. (\sqrt{11p-1})^2 = (\sqrt{2p+8})^2 \quad \text{square both sides}$$

$$11p-1 = 2p+8$$

$$11p-2p = 8+1 \quad \text{collect like terms}$$

$$9p = 9$$

$$p = 1 \quad (C)$$

$$5. \sqrt{6-b} = b \quad \text{square both sides}$$

$$6-b = b^2$$

$$b^2 + b - 6 = 0 \quad \text{quadratic equation}$$

$$b^2 - 2b + 3b - 6 = 0$$

$$b(b-2) + 3(b-2) = 0$$

$$(b+3)(b-2) = 0$$

$$b = -3, b = 2 \quad \langle \text{None of these} \rangle \quad (E)$$

$$6. m = \sqrt{42-m} \quad \text{square both sides}$$

$$m^2 = 42-m$$

$$m^2 + m - 42 = 0$$

$$m^2 - 6m + 7m - 42 = 0$$

$$m(m-6) + 7(m-6) = 0$$

$$(m+7)(m-6) = 0$$

$$m = -7, m = 6 \quad \langle E \rangle$$

$$7. -n + \sqrt{28-3n} = -6 \quad (n-6)(n-6)$$

$$\sqrt{28-3n} = n-6 \quad n^2 - 6n - 6n + 36$$

$$28-3n = (n-6)^2 \quad n^2 - 12n + 36$$

$$28-3n = n^2 - 12n + 36$$

$$0 = n^2 - 12n + 3n + 36 - 28$$

$$0 = n^2 - 9n + 8$$

$$0 = n^2 - n - 8n + 8$$

$$0 = n(n-1) - 8(n-1)$$

$$0 = (n-8)(n-1)$$

$$n = 8 \text{ or } n = 1 \quad \notin \text{None}$$

$$8. (-6-4i) - (-6-6i)$$

$$-6-4i + 6 + 6i$$

$$-6+6 + 6i-4i$$

$$= 2i$$

$$9. 5i(8-2i) = 40i - 10i^2 \quad i^2 = -1$$

$$40i + 10 \quad (A)$$

$$\begin{aligned}
 10. \quad (-1 + 2i)^2 &= (-1 + 2i)(-1 + 2i) \\
 &= -1(-1 + 2i) + 2i(-1 + 2i) \\
 &= 1 - 2i - 2i + 4i^2 \\
 &= 1 - 4i + 4i^2 \quad i^2 = -1 \\
 &= 1 - 4i - 4 \\
 &= \boxed{-3 - 4i} \quad \langle C \rangle
 \end{aligned}$$

$$\begin{aligned}
 11. \quad \frac{8}{-8i} &= \frac{8 \times (-8i)}{(-8i) \times (-8i)} = \frac{-64i}{64i^2} \\
 &= \frac{-64i}{-64} \\
 &= \boxed{i} \quad \langle E \rangle
 \end{aligned}$$

$$\begin{aligned}
 12. \quad \frac{2 - 8i}{-8 - 5i} &= \frac{(2 - 8i)(-8 + 5i)}{(-8 - 5i)(-8 + 5i)} \quad \begin{array}{l} \text{multiply with} \\ \text{conjugate} \end{array} \\
 &= \frac{-16 + 10i + 64i + 40}{64 - 40i + 40i + 25} \\
 &= \frac{-16 + 74i + 40}{89} \\
 &= \boxed{\frac{24 + 74i}{89}} \quad \langle D \rangle
 \end{aligned}$$

13. $y^2 - 40y + \underline{\hspace{2cm}}$

$c = \left(\frac{b}{a}\right)^2$ to complete

$a = 1, b = -40$

$c = \left(\frac{-40}{1}\right)^2 = 400$

$y^2 - 40y + 400$

$(y - 20)^2$

$400 (y - 20)^2 \quad \langle E \rangle$

14 $x^2 - 6x + 64 = 0$

$x^2 - 6x + \quad = -64$

$\frac{b}{2} = \left(\frac{-6}{2}\right) = 9$

$x^2 - 6x + 9 = -64 + 9$

$(x - 3)^2 = -55$

$x - 3 = \sqrt{-55}$

$x = 3 \pm i\sqrt{55} \quad \langle B \rangle$

$$15. \quad v^2 = -96 - 14v$$

$$v^2 + 14v + 96 = 0$$

$$v^2 + 14v + 49 = -96 + 49$$

$$(v+7)^2 = -47$$

$$v+7 = \sqrt{-47} = i\sqrt{47}$$

$$v = -7 + i\sqrt{47} \text{ or } -7 - i\sqrt{47} \quad \langle C \rangle$$

$$16. \quad 3x^2 - 8x - 16 = 0$$

$$x^2 - \frac{8}{3}x - \frac{16}{3} = 0$$

$$x^2 - \frac{8}{3}x + \left(\frac{8}{3}\right)^2 = \frac{16}{3} + \left(\frac{8}{3}\right)^2$$

$$\left(x - \frac{8}{3}\right)^2 = \frac{16}{3} + \left(\frac{8}{3}\right)^2 = \frac{16}{3} + \frac{64}{9}$$

$$x - \frac{8}{3} = \sqrt{\frac{48 + 64}{9}} = \sqrt{\frac{112}{9}}$$

$\langle E \rangle$

$$7. v^2 + 5v - 17 = 0 \quad a = 1, b = 5, c = -17$$

$$v = \frac{-5 \pm \sqrt{5^2 - 4 \cdot 1 \cdot -17}}{2}$$

$$= \frac{-5 \pm \sqrt{25 + 68}}{2} = \boxed{\frac{-5 \pm \sqrt{93}}{2}} \quad (E)$$

$$18. 12x^2 + 3x + 4 = 0 \quad a = 12, b = 3, c = 4$$

$$x = \frac{-3 \pm \sqrt{9 - 4 \cdot 12 \cdot 4}}{2 \cdot 12}$$

$$= \frac{-3 \pm \sqrt{9 - 192}}{24} = \boxed{\frac{-3 \pm \sqrt{-183}}{24}}$$

<C>

$$19. 5n^2 - 8n - 9 = 12$$

$$5n^2 - 8n - 21 = 0 \quad a = 5, b = -8, c = -21$$

$$n = \frac{8 \pm \sqrt{64 - 4 \cdot 5 \cdot -21}}{2 \cdot 5}$$

$$= \frac{8 \pm \sqrt{64 + 420}}{10}$$

$$= \frac{8 \pm \sqrt{484}}{10} = \boxed{\frac{8 \pm 22}{10}} \Rightarrow \begin{matrix} n = 3 \\ n = -14/10 \end{matrix}$$

(B)

$$20. \quad 8b^2 + 1 = -8$$

$$8b^2 + 1 + 8 = 0$$

$$8b^2 + 9 = 0 \quad a=8, b=0, c=9$$

$$b = \frac{\pm \sqrt{-4 \cdot 8 \cdot 9}}{2 \cdot 8}$$

$$= \frac{\pm \sqrt{-288}}{16} = \frac{\pm i \sqrt{144} \times \sqrt{2}}{16}$$

$$= \pm i \frac{12 \sqrt{2}}{16}$$

$$= \pm i \frac{3 \sqrt{2}}{4} \quad \langle E \rangle$$