

1. Simplify  $-7\sqrt{27}+3\sqrt{75}-5\sqrt{108}$

- (a)  $-36\sqrt{9}$       (b)  $-9\sqrt{9}$       (c)  $-36\sqrt{3}$       (d)  $-9\sqrt{3}$       (e)  $-9\sqrt{27}$

2. Simplify  $3\sqrt{150}-2\sqrt{54}$

- (a)  $9\sqrt{6}$       (b)  $-9\sqrt{6}$       (c)  $57\sqrt{6}$       (d)  $18\sqrt{5}-12\sqrt{3}$

3. Simplify completely  $\sqrt{2}(\sqrt{6}-3\sqrt{2})$

- (a)  $4\sqrt{3}$       (b)  $3\sqrt{2}-2\sqrt{3}$       (c)  $3\sqrt{2}-6$       (d)  $2\sqrt{3}-6$       (e)  $2\sqrt{3}-3\sqrt{2}$

4. Simplify completely  $\frac{\sqrt{2}\sqrt{84}}{\sqrt{7}}$

- (a)  $2\sqrt{6}$       (b)  $\sqrt{24}$       (c)  $6\sqrt{2}$       (d)  $4\sqrt{6}$       (e) 24

5. Multiply and simplify  $(2+2\sqrt{7})(2-2\sqrt{7})$

- (a)  $32-8\sqrt{7}$       (b) -24      (c)  $32+8\sqrt{7}$       (d) 32      (e) 0

6. Multiply and simplify  $(1-2\sqrt{10})^2$

- (a)  $41-4\sqrt{10}$       (b)  $-19-4\sqrt{10}$       (c)  $41+4\sqrt{10}$       (d) 41      (e) -39

**Answers:**

1. C                      2. A                      3. D                      4. A                      5. B                      6. A

**Solutions:**

$$1. \quad -7\sqrt{27} + 3\sqrt{75} - 5\sqrt{108} = -7\sqrt{3}\sqrt{9} + 3\sqrt{3}\sqrt{25} - 5\sqrt{3}\sqrt{36} = -7\cdot\sqrt{3}\cdot 3 + 3\cdot\sqrt{3}\cdot 5 - 5\cdot\sqrt{3}\cdot 6 =$$

$$\begin{array}{ccc} \triangle & \triangle & \triangle \\ \blacktriangledown & \blacktriangledown & \blacktriangledown \\ 3\cdot 9 & 3\cdot 25 & 3\cdot 36 \end{array} \qquad = -21\sqrt{3} + 15\sqrt{3} - 30\sqrt{3} = -36\sqrt{3}$$

$$2. \quad 3\sqrt{150} - 2\sqrt{54} = 3\sqrt{25}\sqrt{6} - 2\sqrt{9}\sqrt{6} = 3\cdot 5\sqrt{6} - 2\cdot 3\sqrt{6} = 15\sqrt{6} - 6\sqrt{6} = 9\sqrt{6}$$

$$\begin{array}{cc} \triangle & \triangle \\ \blacktriangledown & \blacktriangledown \\ 25\cdot 6 & 9\cdot 6 \end{array} \qquad \begin{array}{c} \uparrow \\ \sqrt{25}=5 \\ \sqrt{9}=3 \end{array}$$

$$3. \quad \sqrt{2}(\sqrt{6} - 3\sqrt{2}) = \sqrt{2}\sqrt{6} - 3\sqrt{2}\sqrt{2} = \sqrt{12} - 3\sqrt{4} = \sqrt{4}\sqrt{3} - 3\cdot 2 = 2\sqrt{3} - 6$$

$$\begin{array}{cc} \uparrow & \uparrow \\ \sqrt{2}\sqrt{6} = \sqrt{12} & 12 = 4\cdot 3 \\ \sqrt{2}\sqrt{2} = \sqrt{4} & \end{array}$$

$$4. \quad \frac{\sqrt{2}\sqrt{84}}{\sqrt{7}} = \sqrt{\frac{2\cdot 84}{7}} = \sqrt{24} = \sqrt{4\cdot 6} = \sqrt{4}\sqrt{6} = 2\sqrt{6}$$

$$5. \quad (2+2\sqrt{7})(2-2\sqrt{7}) = 4 - 4\sqrt{7} + 4\sqrt{7} - 4\sqrt{7}\sqrt{7} = 4 - 4\sqrt{49} = 4 - 4\cdot 7 = 4 - 28 = -24$$

$$\begin{array}{cc} \uparrow & \uparrow \\ \sqrt{7}\sqrt{7} = \sqrt{49} & \sqrt{49} = 7 \end{array}$$

or recall the difference of squares:  $(a^2 - b^2) = (a - b)(a + b)$

$$(2+2\sqrt{7})(2-2\sqrt{7}) = (2)^2 - (2\sqrt{7})^2 = 4 - 4(\sqrt{7})^2 = 4 - 4\cdot 7 = 4 - 28 = -24$$

$$6. \quad (1-2\sqrt{10})^2 = (1-2\sqrt{10})(1-2\sqrt{10}) = 1 - 2\sqrt{10} - 2\sqrt{10} + 4\sqrt{10}\sqrt{10} = 1 - 4\sqrt{10} + 4\sqrt{100} = 1 - 4\sqrt{10} + 4\cdot 10 =$$

$$\begin{array}{cc} \uparrow & \uparrow \\ \sqrt{10}\sqrt{10} = \sqrt{100} & \sqrt{100} = 10 \end{array}$$

*combine like terms*

$$= 1 - 4\sqrt{10} + 40 = 41 - 4\sqrt{10}$$

or recall the formula:  $(a - b)^2 = a^2 - 2ab + b^2$

$$(1-2\sqrt{10})^2 = (1)^2 - 2\cdot 1\cdot 2\sqrt{10} + (2\sqrt{10})^2 = 1 - 4\sqrt{10} + 4(\sqrt{10})^2 = 1 - 4\sqrt{10} + 4\cdot 10 = 41 - 4\sqrt{10}$$