Expand. $(R - 5)^2 = (R)^2 - 2(R)(5) + (5)^2$

The square of a binomial formula:

$(a+b)^2 = a^2 + 2ab + b^2$

$= \boxed{R^2 - 10R + 25}$

Factor completely.

$\sqrt{w^2} - 12w + \sqrt{36} = \boxed{-(w-6)^2}$

$w \quad \cdot \quad 6$

$= 6w$

Since b = 2(6w) this factors into
two terms that are the same: (w-6)
Notice the sign of b in the original trinomial
is the same as the sign of the two identical factors.

---

A **perfect square trinomial** is the product you obtain when you square a binomial. An example is $x^2 + 10x + 25$, which can be written as $(x + 5)^2$. The first term and the third term of the trinomial are always positive, as they represent the squares of the two terms of the binomial. The middle term of the trinomial is two times the product of the terms of the binomial.
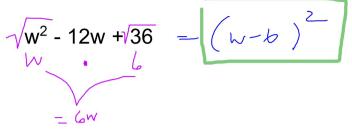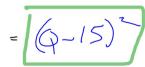
| Property | Factoring Perfect Square Trinomials |
|---|---|
| $a^2 + 2ab + b^2 = (a + b)^2$ | $a^2 - 2ab + b^2 = (a - b)^2$ |

Factor each completely.

1. $\sqrt{Q^2} - 30Q + \sqrt{225}$

$Q \quad \cdot \quad 15$

since b is 2ab=2(Q)(15) = 30Q
this factors using the
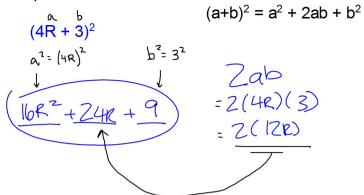perfect square trinomial
factoring method

$= \boxed{(Q-15)^2}$

2. $8n^3 + 192n^2 + 1152n$

$8n\left(\sqrt{n^2} + 24n + \sqrt{144}\right)$

$n \qquad\qquad 12$

since b is 2ab=2(n)(12) = 24n
this factors using the
perfect square trinomial
factoring method

$= \boxed{8n(n+12)^2}$

Expand

$(4R + 3)^2$    $(a+b)^2 = a^2 + 2ab + b^2$

$a$   $b$

$a^2 = (4R)^2$        $b^2 = 3^2$

$16R^2 + 24R + 9$

$2ab$
$= 2(4R)(3)$
$= 2(12R)$

---

Factor Completely.

$\sqrt{16n^2 - 40n +}\sqrt{25}$

$4n$              $5$

since b is 2ab=2(4n)(5) = 40n
this factors using the
perfect square trinomial
factoring method

$(4n - 5)^2$

---

Factor each completely.

1. $\sqrt{4b^2 - 28b +}\sqrt{49}$

$2b$              $7$

since b is 2ab=2(2b)(7) = 28b
this factors using the
perfect square trinomial
factoring method

$= (2b - 7)^2$

2. $\sqrt{9d^2 + 60d +}\sqrt{64}$

$3d$     $8$

since b isn't 2ab=2(3d)(8) ≠ 60d
this doesn't factor using the perfect
square trinomial factoring method.
Therefore, factor this trinomial using
the usual method.

$57b$

$48 \times 12$

$60$

|       | $3d$ | $+16$ |
|-------|------|-------|
| $3d$  | $9d^2$ | $48d$ |
| $+4$  | $12d$ | $+64$ |

$= (3d + 16)(3d + 4)$