Useful Information

When an object is thrown straight upwards, its height $S$ in meters is approximated by the quadratic equation

$$S = -5t^2 + vt + h,$$

where

$v$ = initial upward velocity of the object in m/s,
$h$ = height above ground from which the object is thrown in meters,
$t$ = time in seconds.

1. Factor: $25x^2 + 30x + 9$.
2. Factor: $25a^2 - 81b^2$.
3. Factor: $12x^2 - 30x + 12$.
4. Factor: $\frac{1}{8}x^3 - 27$.
5. Solve for $x$: $(x - 5)(x + 2) = -4(x + 1)$.
6. Solve for $x$: $4x^2 - 3x + 1 = -7x$.
7. Solve for $x$: $\frac{10x^2 - 25x}{12} = 5$.
8. Solve for $x$: $2x^2 - 7x + 6 = 0$.
9. Jules is standing on a platform 6 meters high and throws a ball straight up as high as he can at a velocity of 13 meters per second. At what time $t$ will the ball hit the ground? Assume the ball is 6 meters from the ground when it leaves Jules hand.
10. The area of a rectangle is 6 ft$^2$. The length is 10 ft longer than 4 times the width. Determine the dimensions of the rectangle.

Solutions

1. $(5x + 3)^2$
2. $(5a + 9b)(5a - 9b)$
3. $(6(2x - 1))(x - 2)$
4. $\left(\frac{x}{2} - 3\right)\left(\frac{x^2}{4} + \frac{3x}{2} + 9\right)$ or $\frac{1}{8}(x - 6)(x^2 + 6x + 36)$
5. $x = 2, x = -3$
6. $x = -\frac{1}{2}$
7. $x = -\frac{3}{2}, x = 4$
8. $x = \frac{3}{2}, x = 2$
9. 3 seconds.
10. 1/2 ft by 12 ft.