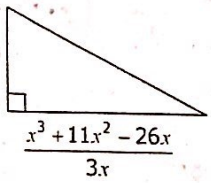
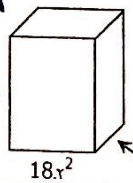
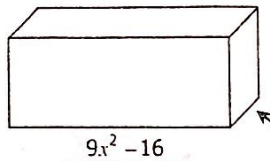
Rational Expressions Applications

Example	Work and Solution
1. Find an expression to represent the **area** of the rectangle.  $\frac{2x}{x^2-12x+27}$ by $\frac{x^2-81}{4x^3+36x^2}$	$A = lw$ $A = \left(\frac{x^2-81}{4x^3+36x^2}\right)\left(\frac{2x}{x^2-12x+27}\right)$ $A = \frac{(x+9)(x-9)}{4x^2(x+9)} \cdot \frac{2x}{(x-9)(x-3)} = \frac{1}{2x(x-3)}$
2. Find an expression to represent the **area** of the rectangle.  $\frac{x^2+3x-10}{7x-14}$ by $\frac{3x^2-11x-20}{25-x^2}$	
3. If the **area** of a rectangular garden is $\frac{a^2}{b}-b$ and the length is $\frac{a}{b}+1$, find an expression to represent the width of the garden. $A = lw$	$\frac{\left(\frac{a^2}{b}\right)-b}{\left(\frac{a}{b}\right)+1} = w$ $\frac{a^2-b^2}{a+b} = w$ $\frac{(a+b)(a-b)}{a+b} = w$ $a-b = w$
4. Find an expression to represent the **area** of the triangle below.  $\frac{9x+18}{6x^3-24x}$ by $\frac{x^3+11x^2-26x}{3x}$	$A = \frac{1}{2}bh$ $A = \frac{1}{2} \cdot \frac{(x^3+11x^2-26x)}{3x} \cdot \frac{9x+18}{6x^3-24x}$ $A = \frac{1}{2} \cdot \frac{x(x^2+11x-26)}{3x} \cdot \frac{9(x+2)}{6x(x^2-4)}$ $A = \frac{1}{2} \cdot \frac{x(x+13)(x-2)}{3x} \cdot \frac{3 \cdot 3(x+2)}{6x(x+2)(x-2)}$ $A = \frac{x+13}{4x}$
5. Find an expression to represent the **volume** of the rectangular prism shown below. $V = lwh$  $\frac{5x^2-32x+12}{10x^3}$ by $\frac{18x^2}{45x^2-18x}$ by $\frac{x^2+14x+48}{36-x^2}$	

$V = lwh$

6. The **volume** of a rectangular prism below is $12x + 16$. Find the height of the prism.



$12x+16 = \left(\frac{9x^2-16}{x^2+2x-35}\right)\left(\frac{8x^2-40x}{3x-4}\right)h$

$4(3x+4) = \frac{(3x+4)(3x-4)}{(x+7)(x-5)} \cdot \frac{8x(x-5)}{3x-4} \cdot h$

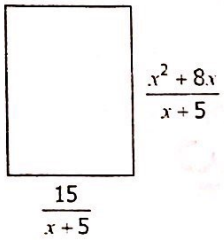
$4(3x+4) = \frac{8x(3x+4)}{x+7} \cdot h$

$\frac{8x(3x+4)}{x+7} \quad \frac{8x(3x+4)}{x+7}$

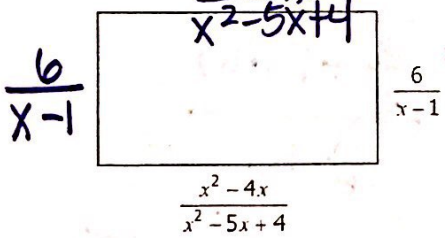
$4(3x+4) \cdot \frac{(x+7)}{8x(3x+4)} = h$

$\boxed{\frac{x+7}{2x} = h}$

7. Find an expression to represent the **perimeter** of the rectangle.



8. Find an expression to represent the **perimeter** of the rectangle.

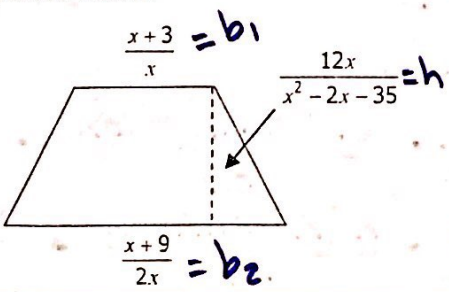


$P = \frac{2}{1}\left(\frac{6}{x-1}\right) + 2\left(\frac{x^2-4x}{x^2-5x+4}\right)$

$P = \frac{12}{x-1} + \frac{2x^2-8x}{x^2-5x+4}$ $\quad P = \frac{12}{x-1} + \frac{2x}{x-1}$

$P = \frac{12}{x-1} + \frac{2x(x-4)}{(x-4)(x-1)}$ $\quad \boxed{P = \frac{2x+12}{x-1}}$

9. Write an expression to represent the **area** of the trapezoid below.



$A = \frac{1}{2}h(b_1 + b_2)$

$A = \frac{1}{2} \cdot \left(\frac{12x}{x^2-2x-35}\right)\left(\frac{x+3}{2 \cdot x} + \frac{x+9}{2x}\right)$

$A = \frac{1}{2}\left(\frac{12x}{x^2-2x-35}\right)\left(\frac{2x+6}{2x} + \frac{x+9}{2x}\right)$

$A = \frac{1}{2}\left(\frac{12x}{x^2-2x-35}\right)\left(\frac{3x+15}{2x}\right)$

$A = \frac{1}{2}\left(\frac{12x}{(x-7)(x+5)}\right)\left(\frac{3(x+5)}{2x}\right)$

$\boxed{A = \frac{9}{x-7}}$

10. Write an expression to represent the **surface area** of the rectangular prism below.