

## OPTIMIZATION PROBLEMS INVOLVING RATIONAL FUNCTION MODELS

Here we go with word problems again! The only difference with these problems is that we now have to watch out for continuity issues and we may need to use the quotient rule.

### Examples

- 1) Erin and Tony are creating rectangular banners for the companies attending a convention. Each banner must have a coloured border and a white centre. The width of the border will be 20 cm at the top and bottom and 15 cm along the sides. Because of the number of companies and the available wall space, each banner must have an area of 2.43 metres squared. What are the dimensions of the banner if the area of the white centre is maximized?
- 2) Helena is designing a cylindrical can. The can will hold 280 mL of juice. The metal for the side of the can costs \$0.75/m<sup>2</sup>. The metal for the top and bottom, which is thicker, costs \$1.40/m<sup>2</sup>. The side of the can is one rectangular sheet. The circular top and bottom are stamped out from another rectangular sheet. The unused metal from this rectangle is donated to charity. The charity exchanges the scrap metal for money. What dimensions for the can will minimize the cost of materials?
- 3) On the highway, a truck burns fuel at a rate of  $\left(0.003x + \frac{3}{x}\right)$  litres per kilometer when its speed is  $x$  kilometers per hour. Fuel costs \$0.65/L. The driver is paid \$16/h. What steady speed will minimize the operating costs for a 400 km trip on a highway where the posted speed limit is 90 km/h.