

1. A small family owned bakery specializes in making cookies. They make only two kinds of cookies – plain and iced. They need to decide *how many dozens* of each kind of cookie to make for tomorrow.

They know that each dozen of their *plain* cookies requires 1 pound of cookie dough (and no icing), and each dozen of their *iced* cookies requires 0.7 pounds of cookie dough and 0.4 pounds of icing. Each dozen of the plain cookies requires about 0.1 hours of preparation time, and each dozen of the iced cookies requires about 0.15 hours of preparation time. Let's assume that they will be able to sell all of the cookies that they make.

The decision as to how many dozens of each kind to make is limited by three factors

- The ingredients they have on hand – they have 110 pounds of cookie dough and 32 pounds of icing.
- The amount of oven space available – they have room to bake a total of 140 dozen cookies for tomorrow.
- The amount of preparation time available – together they have 15 hours for cookie preparation.

Plain cookies sell for \$6.00 a dozen and cost \$4.50 a dozen to make. The iced cookies sell for \$7.00 a dozen and cost \$5.00 a dozen to make.

*How many dozens of each kind of cookie should the store owners make in order to maximize their profit.*

2. The Carbon Coal Company has 2 mines, a surface mine and a deep mine. It costs \$200 a day to operate the surface mine and \$250 a day to operate the deep mine. Each mine produces two kinds of coal – medium grade and hard grade – but in different proportions. The surface mine produces 12 tons of medium grade and 6 tons of hard grade ore each day. The deep mine produces 4 tons of medium grade and 8 tons of hard grade ore each day. The company has a contract to produce at least 600 tons of medium grade coal and 480 tons of hard grade coal within 60 days.

*Devise a production schedule so that the contract can be filled at minimum cost.*