

Table 6.4.1 and Figure 6.4.2 show the varying prey and predator populations as time advances through 12 months. Shortly after the squirrel or prey population increases, the hawk or predator population does likewise. As the predators kill off their food supply, the number of predators decreases. Then, the cyclic process starts over.

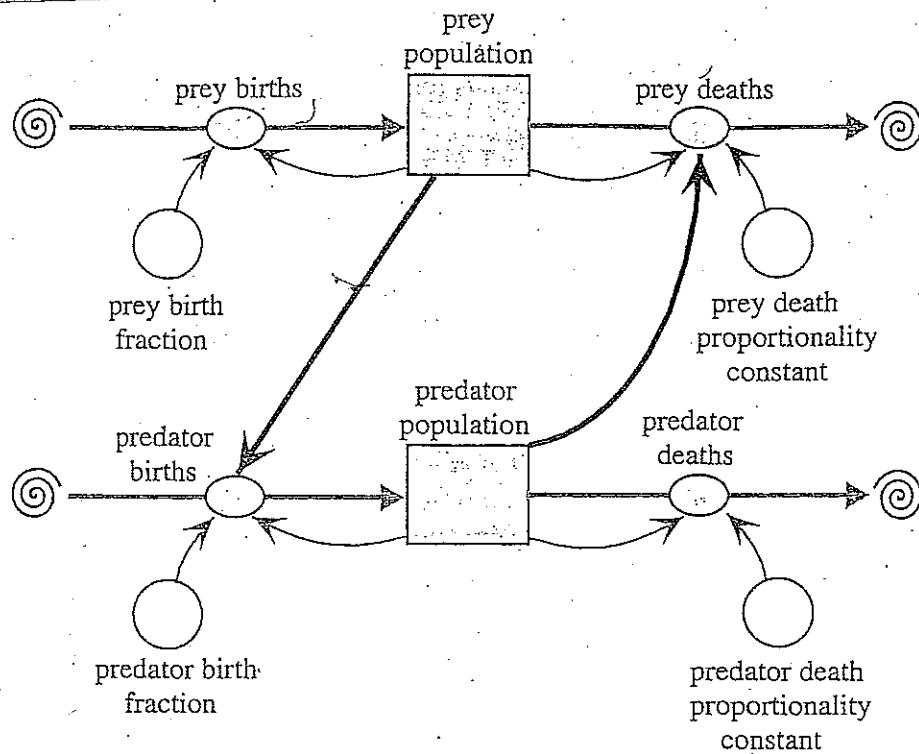


Figure 6.4.1 Predator-prey diagram

- d. Which number represents the predator death proportionality constant?
- e. Which number represents the prey death proportionality constant?
- f. What is the initial number of predators?
- g. What is the initial number of prey?

### Particular Situations

Returning to the hawks and squirrels example, some of the model's equations and constants appear in Equation Set 6.4.1. In that example, *prey\_birth\_fraction* ( $k_s$ ) = 2, *prey\_death\_proportionality\_constant* ( $k_{hs}$ ) = 0.01, *predator\_birth\_fraction* ( $k_{sh}$ ) = 0.01, *predator\_death\_proportionality\_constant* ( $k_h$ ) = 1.06, the initial *prey\_population* ( $s_0$ ) = 100, and the initial *predator\_population* ( $h_0$ ) = 15.

### Equation Set 6.4.1

Some of the equations and constants for model in Figure 6.4.1

```

predator_population(0) = 15
predator_birth_fraction = 0.01
predator_births = (predator_birth_fraction * prey_population) *
    predator_population
predator_death_proportionality_constant = 1.06
predator_deaths = predator_death_proportionality_constant *
    predator_population
prey_population(0) = 100
prey_birth_fraction = 2
prey_births = prey_birth_fraction * prey_population
prey_death_proportionality_constant = 0.02
prey_deaths = (prey_death_proportionality_constant * predator_population) *
    prey_population
  
```