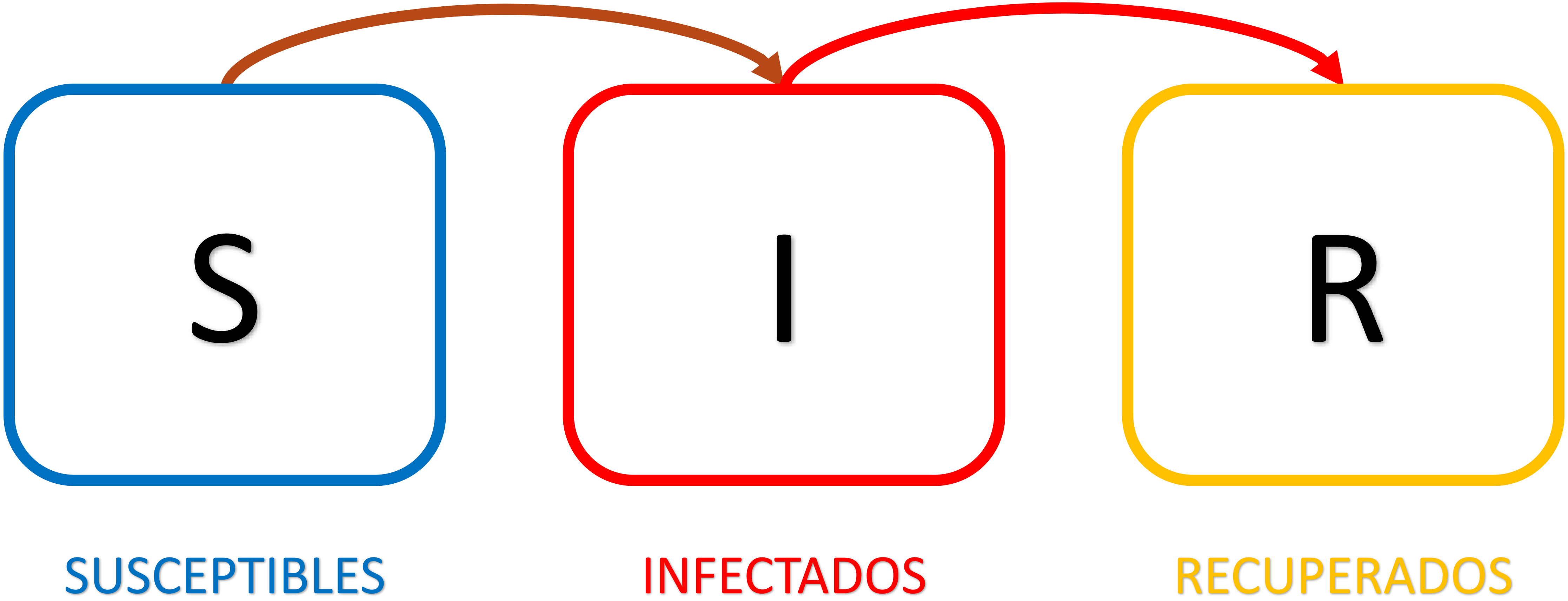
Modelo SIR

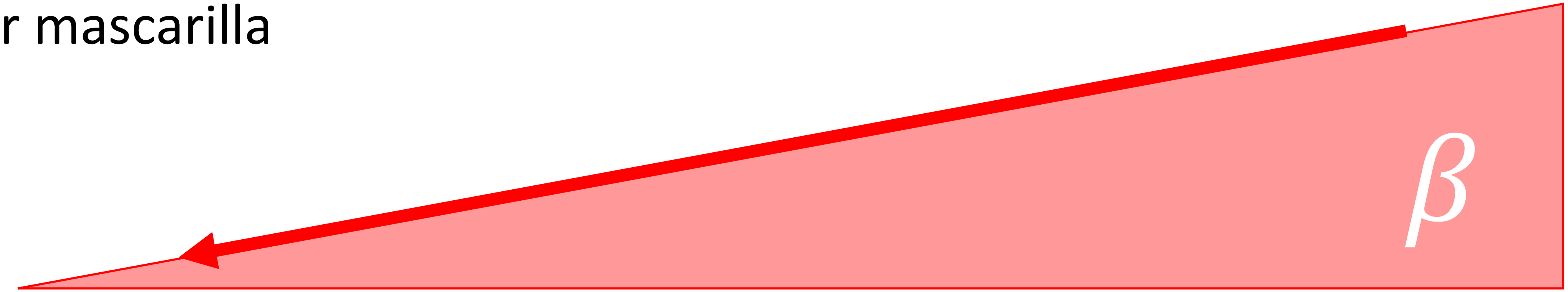
- Es un modelo de epidemiologia y es el modelo matemático mas simple que permite describir como evolucionan las pandemias
- Claves para entender el modelo SIR
- El modelo SIR divide la población en tres categorías.


S
I
R
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

- El cambio diario del grupo de los SUSCEPTIBLES = $-\beta IS$
- El cambio diario del grupo de los INFECTADOS = $-\beta IS - \gamma I$
- El cambio diario del grupo de los INFECTADOS = $-\gamma I$

- La gente SUSCEPTIBLE solo puede DECRECER
- El numero de INFECTADOS puede sufrir un PICO
- La gente RECUPERADA solo puede CRECER

- Distanciamiento Social
- Lavarse las manos
- Llevar mascarilla

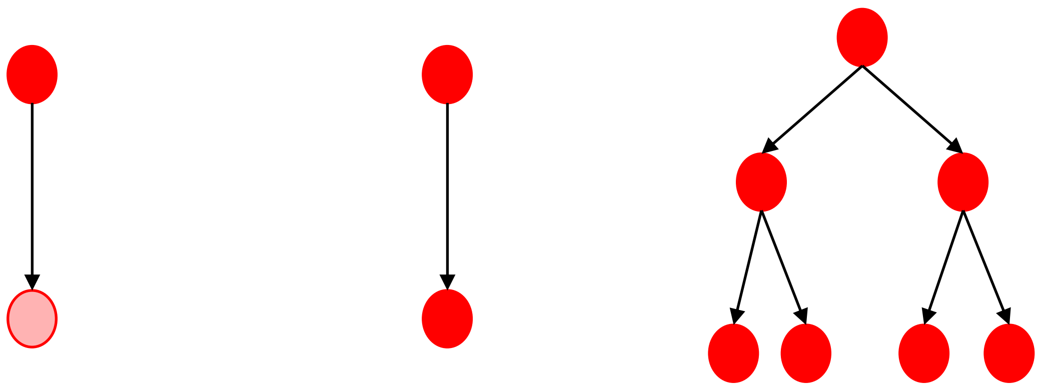


- Mejoras en la sanidad
- Tratamientos efectivos

TASA REPRODUCTIVA BÁSICA

- $R_0 = \frac{\beta}{\gamma} S_0$
- $R_0 =$ La cantidad de gente que un infectado es capaz de infectar mientras sea infeccioso

$R_0 = 0.5$ $\quad$ $R_0 = 1$ $\quad$ $R_0 = 2$



β

- β = 0.002
- β = Tasa de contagio diario

- Depende de como sea el patógeno en si mismo.

- Depende de como sean las vías de contagio y depende de como es la sociedad.

γ

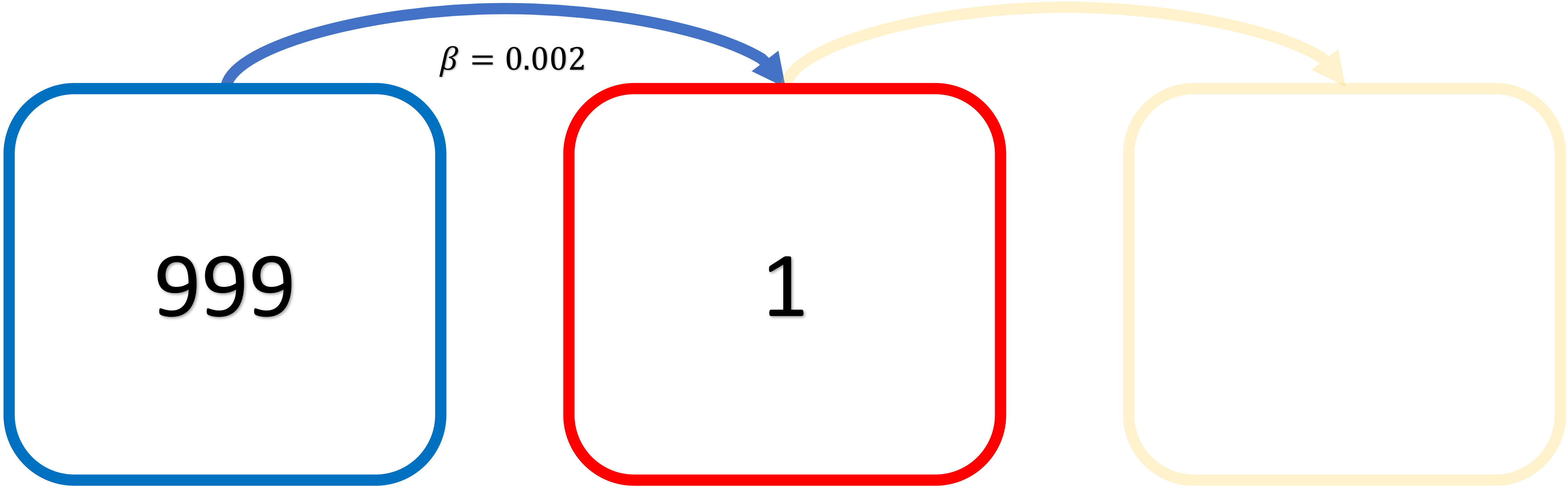
- γ = 0.5
- γ = 50 % (par de días infectado)

- γ = 0.25
- γ = 25 % (4 días infectado)
-
- $\gamma = \frac{1}{dias\ siendo\ infeccioso}$

DIA 1

$.002 * 999 * 1 \approx 2$

$\beta *$ S * I



SUSCEPTIBLES

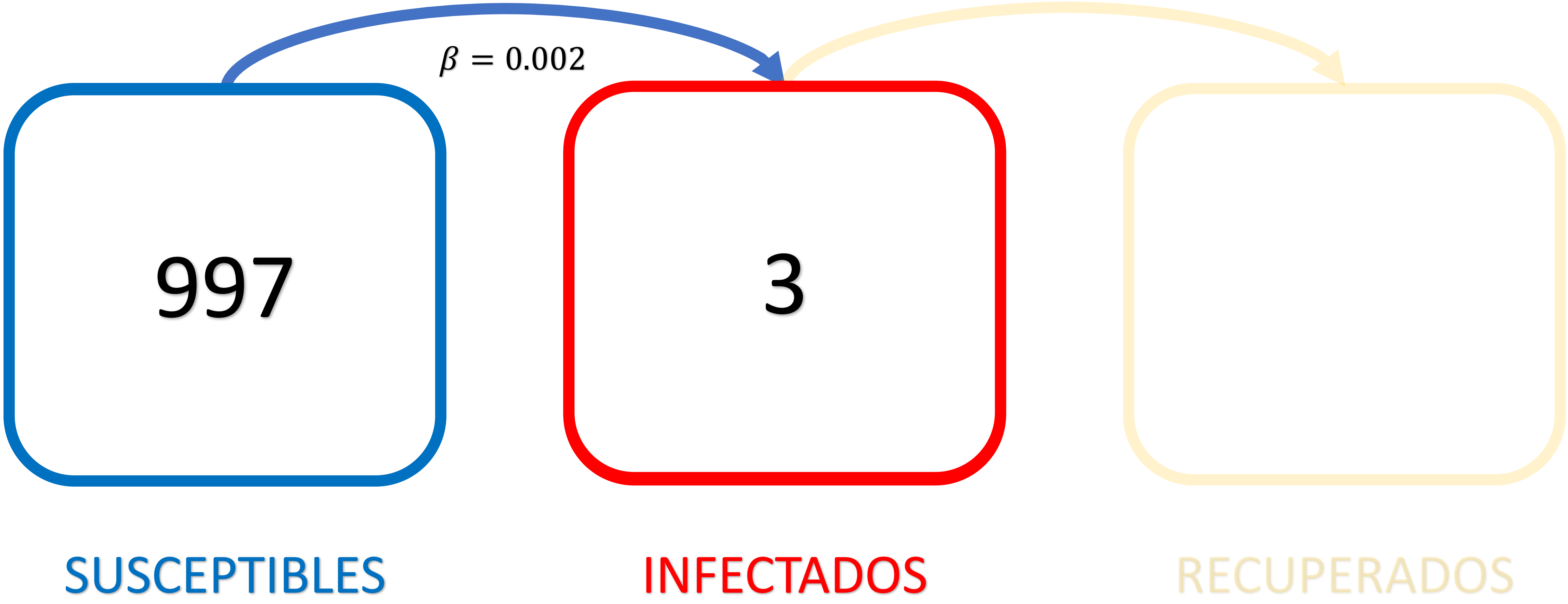
INFECTADOS

RECUPERADOS

DIA 2

$$.002 * 999 * 1 \approx 2$$

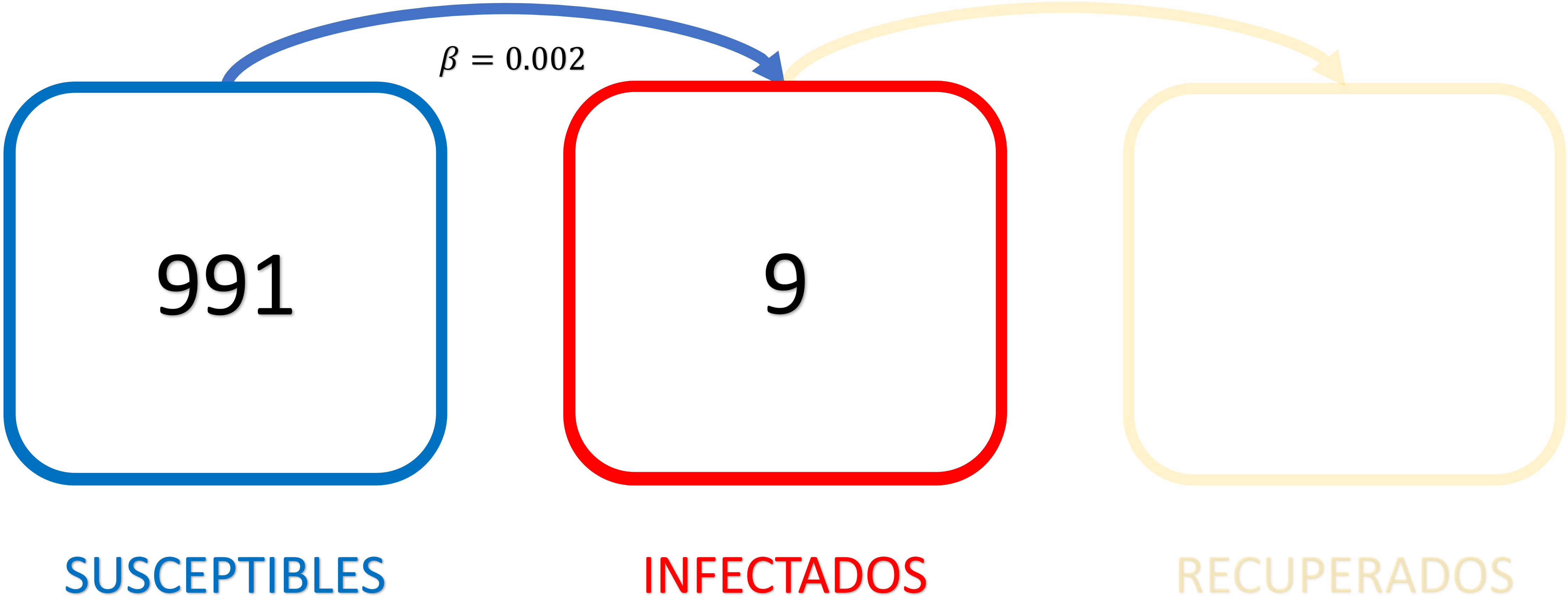
$$\beta * S * I$$



DIA 3

$.002 * 997 * 3 \approx 6$

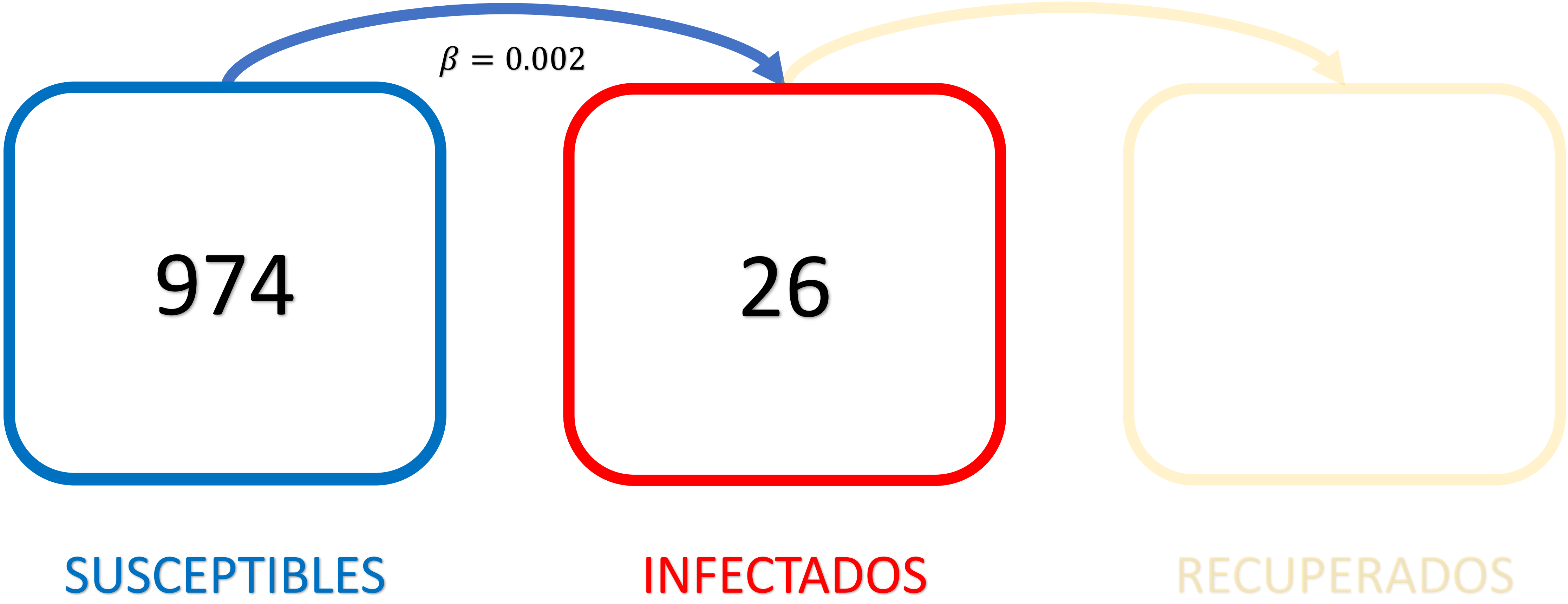
$\beta * S * I$



DIA 4

$$.002 * 991 * 9 \approx 17$$

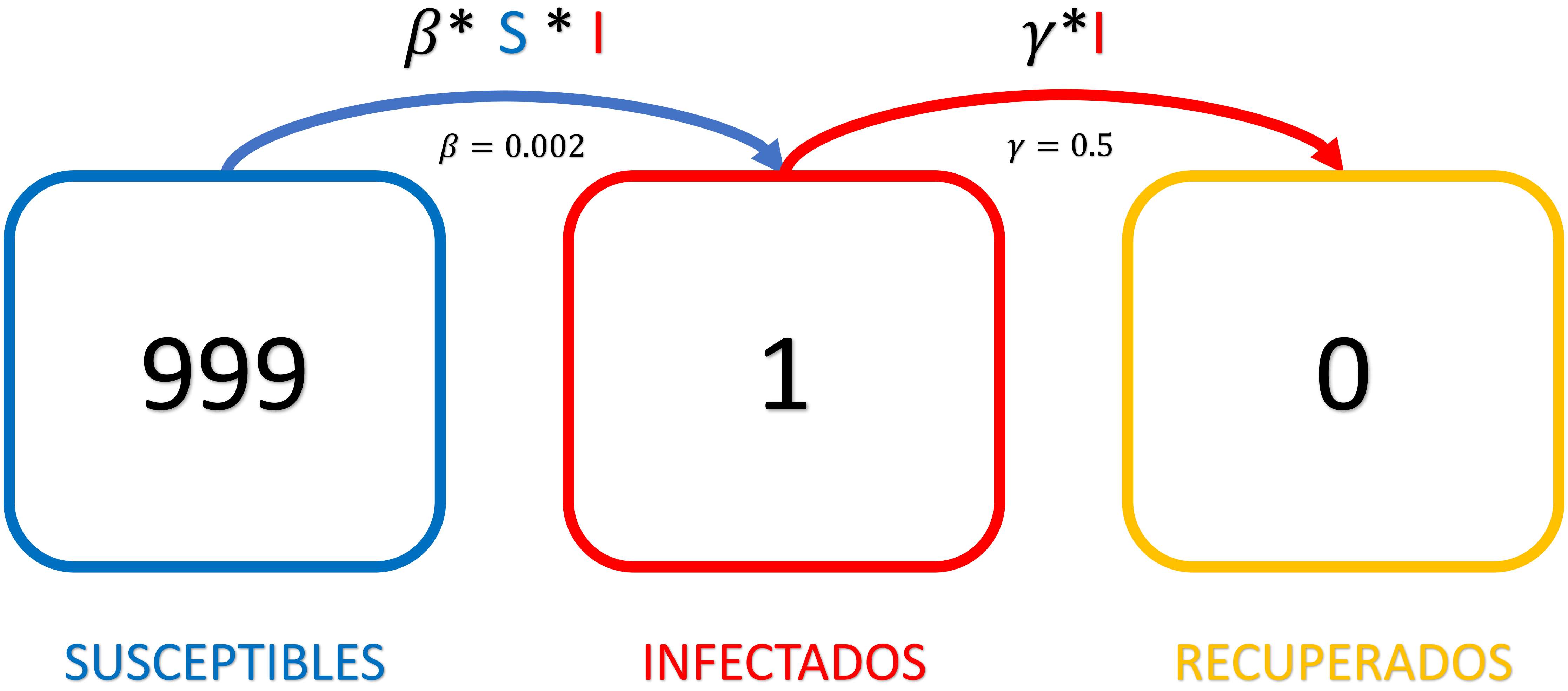
$$\beta * S * I$$



DIA 1


$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
999
1
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 1

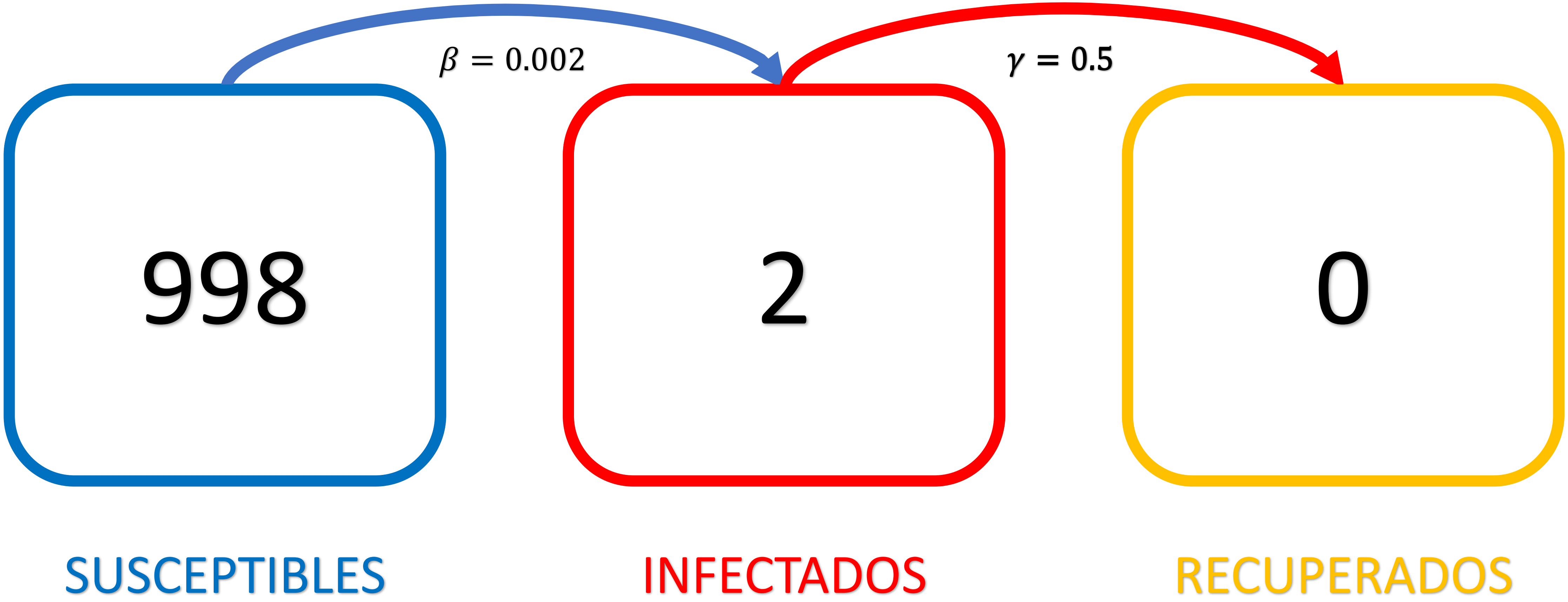


$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
$\gamma = 0.5$
999
1
0
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 2

$$.002 * 991 * 1 \approx 1 \qquad 0.5 * 1 \approx 0$$

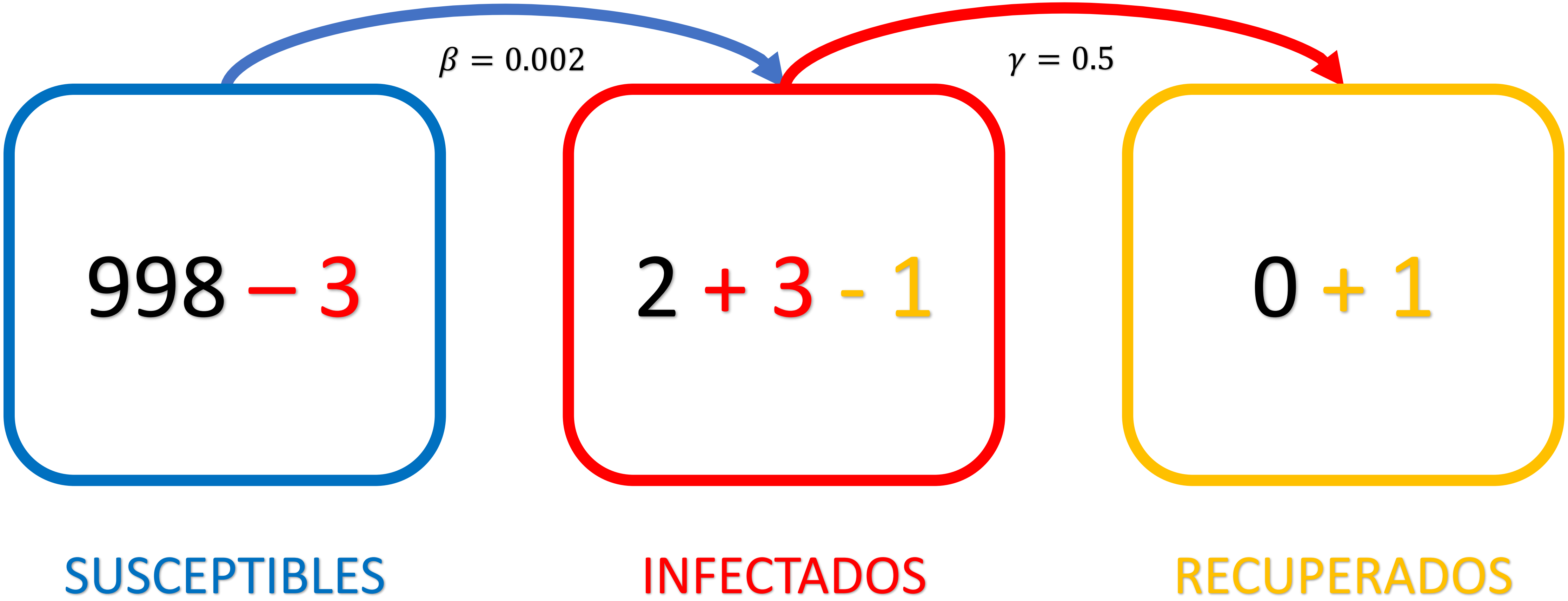
$$\beta * S * I \qquad \gamma * I$$



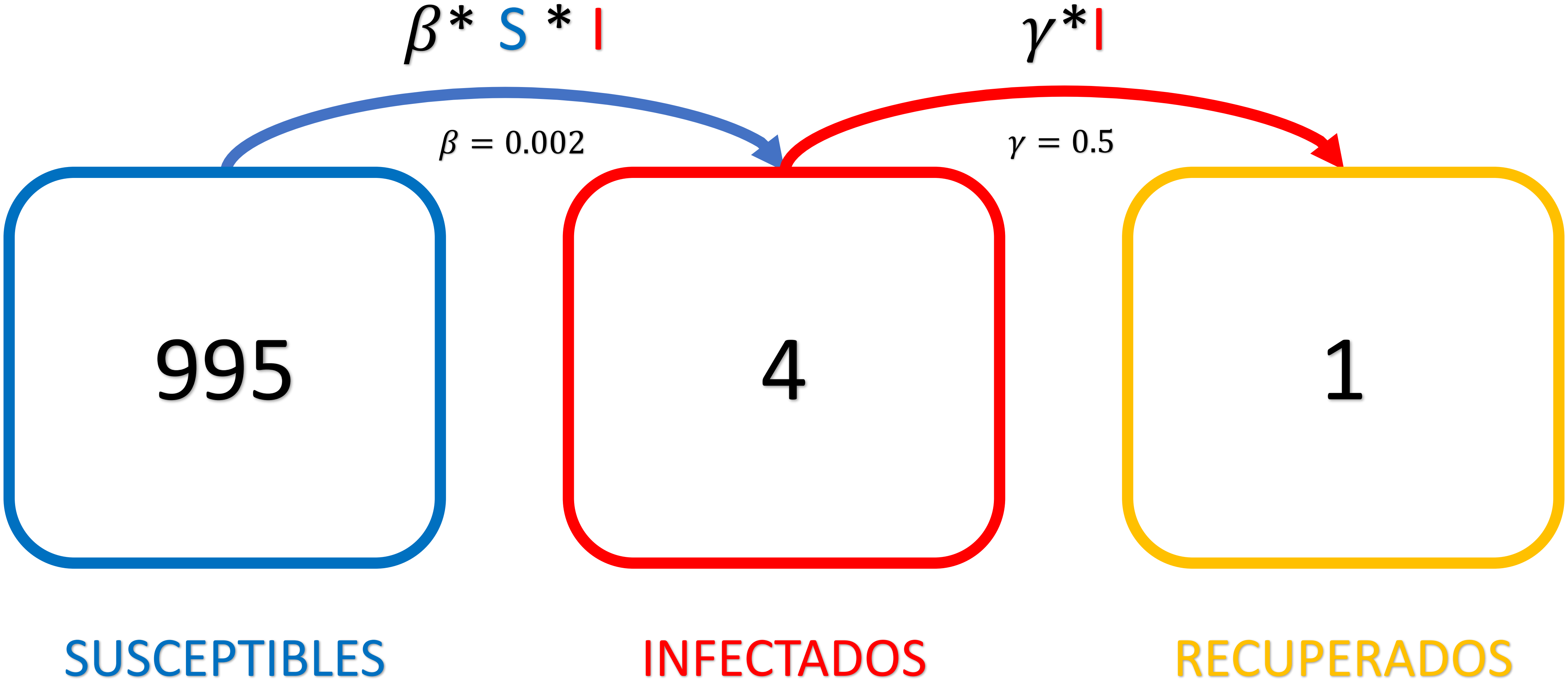
DIA 2 -> 3

$.002 * 998 * 2 \approx 3$ $\quad$ $0.5 * 2 \approx 1$

$\beta * S * I$ $\quad$ $\gamma * I$



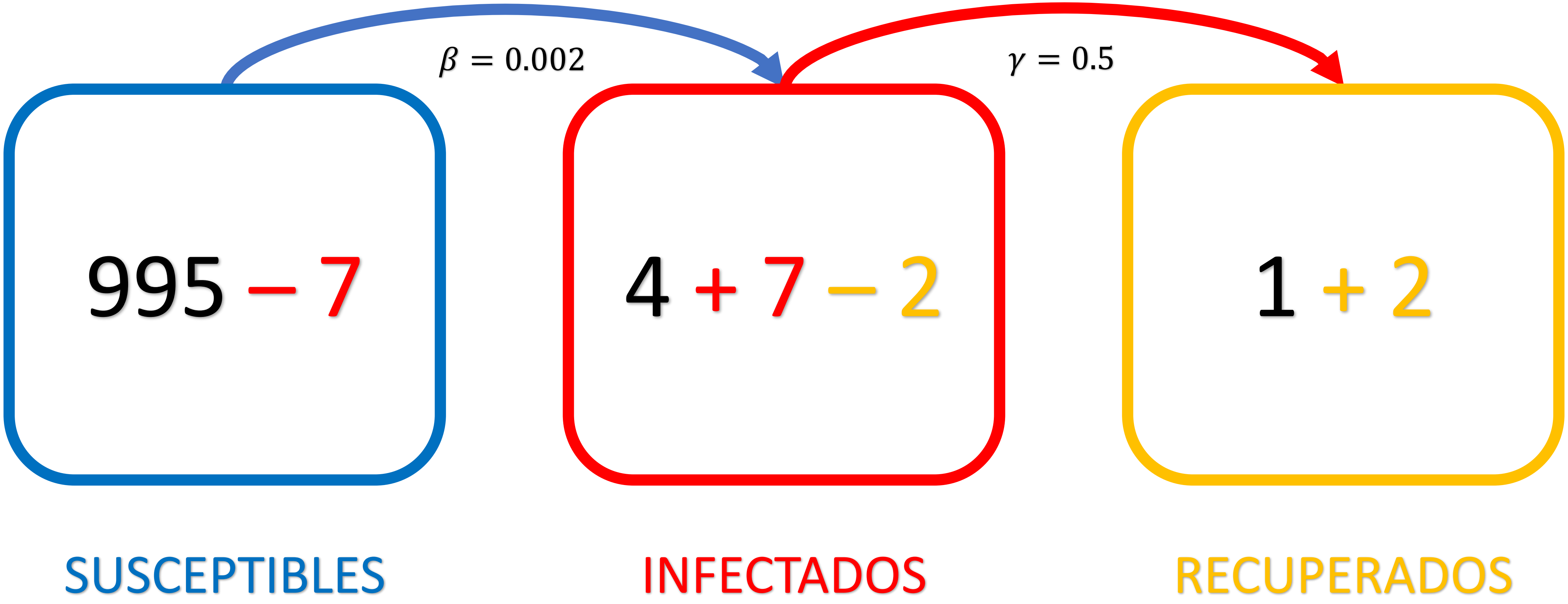
DIA 3


$\beta * S * I$
$\beta = 0.002$
$\gamma * I$
$\gamma = 0.5$
995
4
1
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

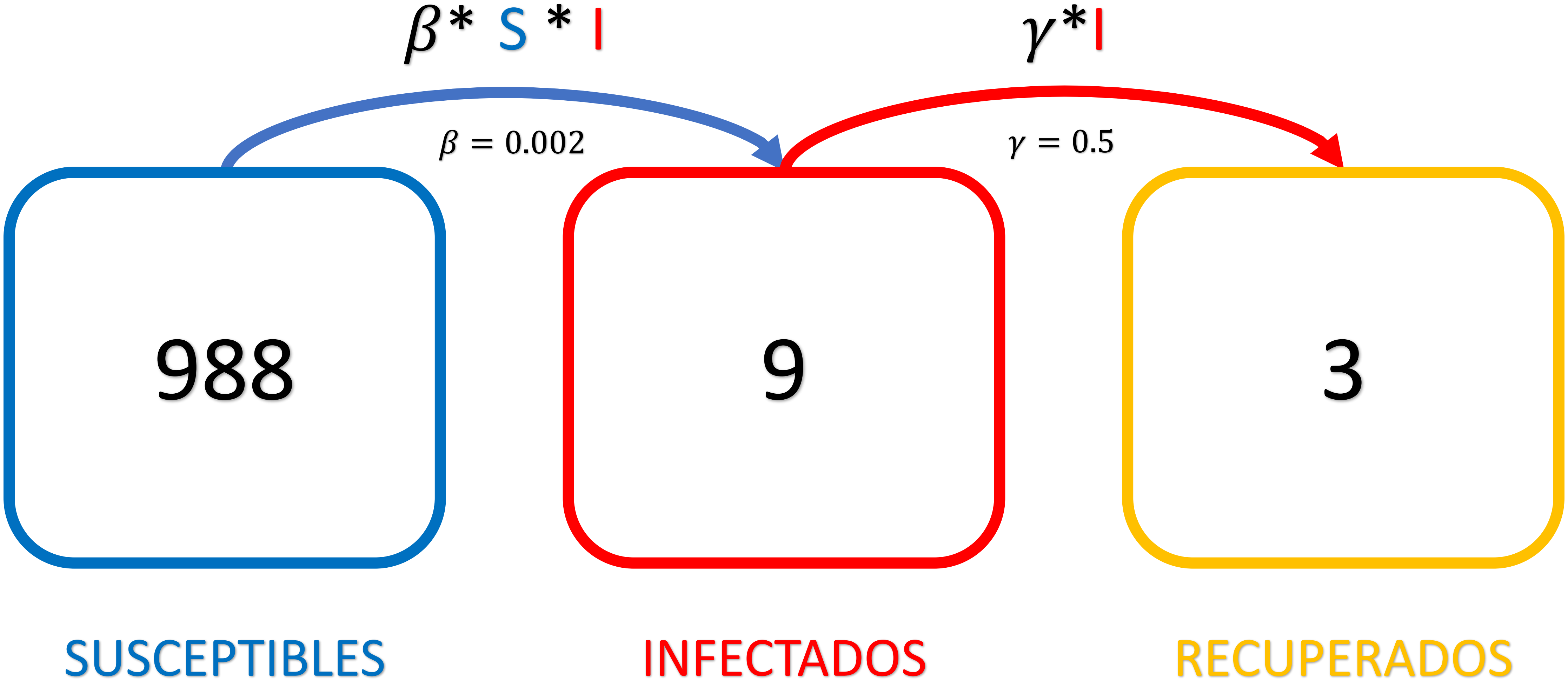
DIA 3 -> 4

$$.002 * 995 * 4 \approx 7 \qquad 0.5 * 4 \approx 2$$

$$\beta * S * I \qquad \gamma * I$$



DIA 4

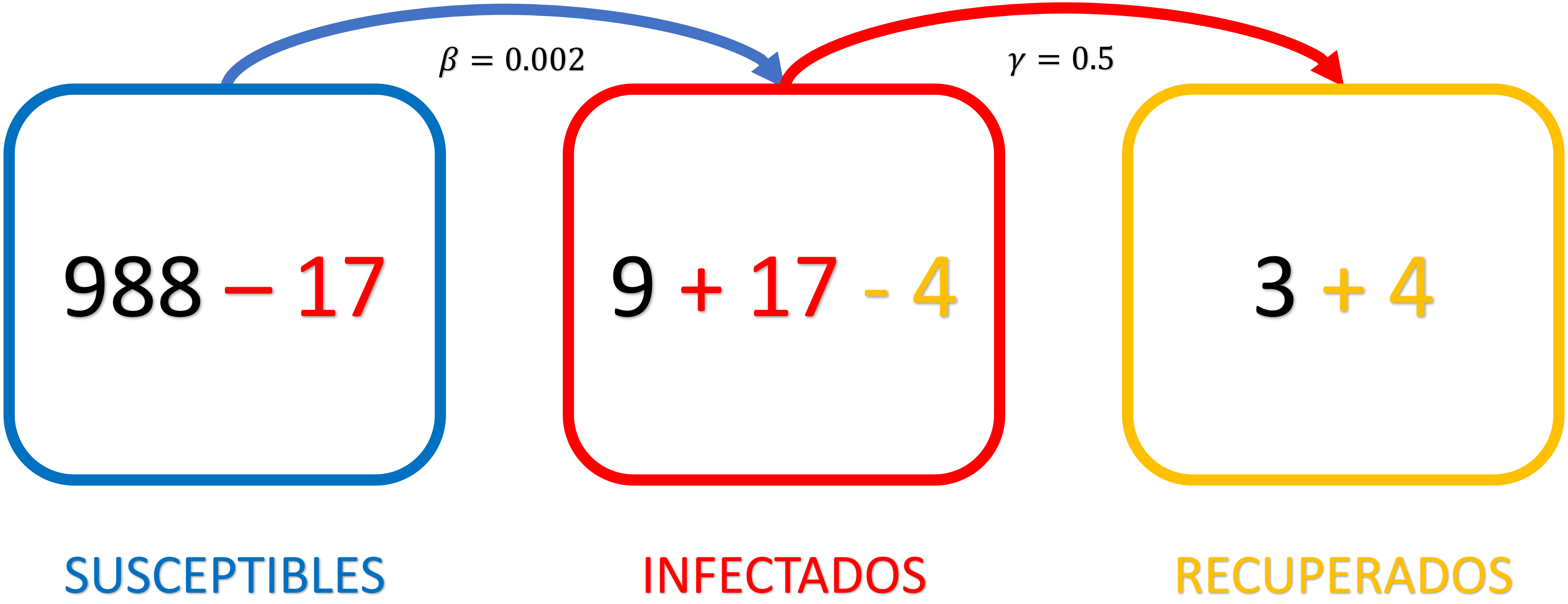


$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
$\gamma = 0.5$
988
9
3
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

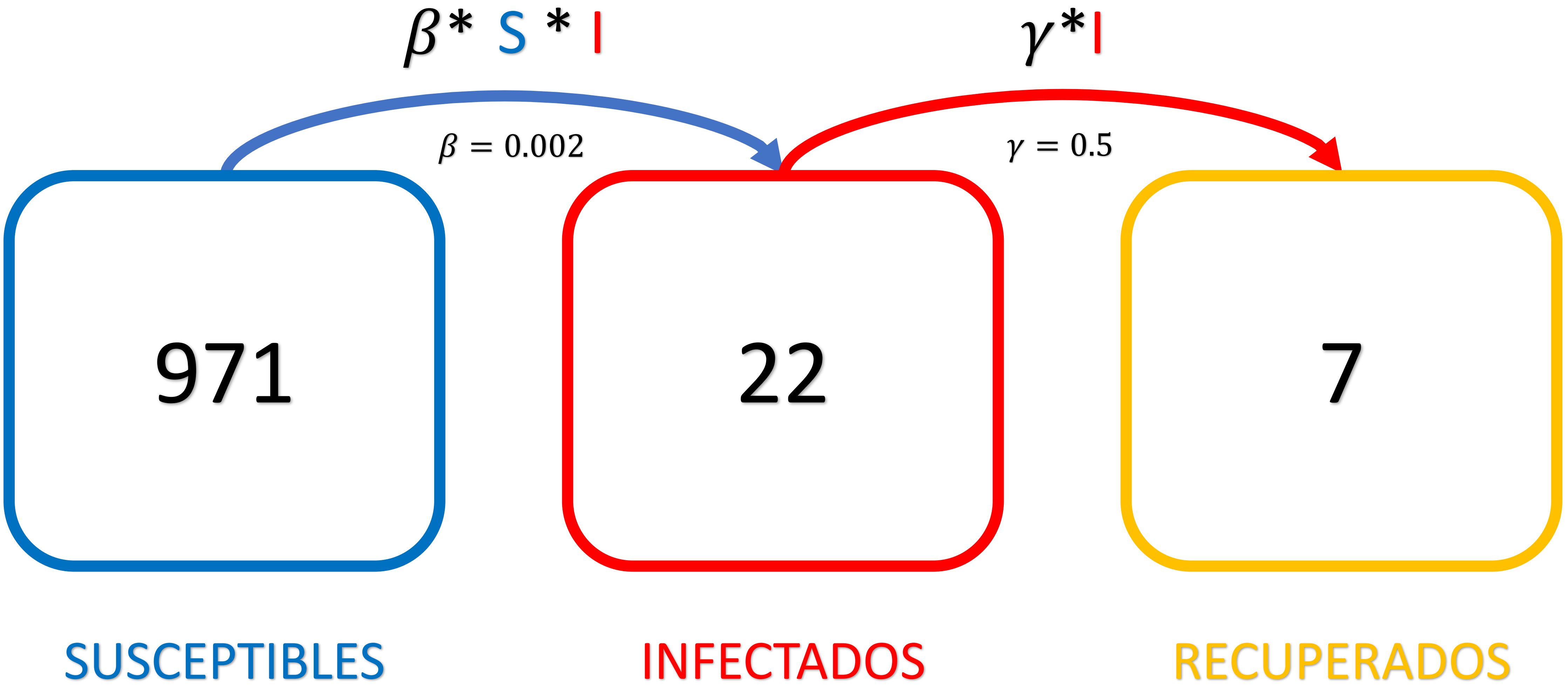
DIA 4 -> 5

$.002 * 988 * 9 \approx 17$ $\quad$ $0.5 * 9 \approx 4$

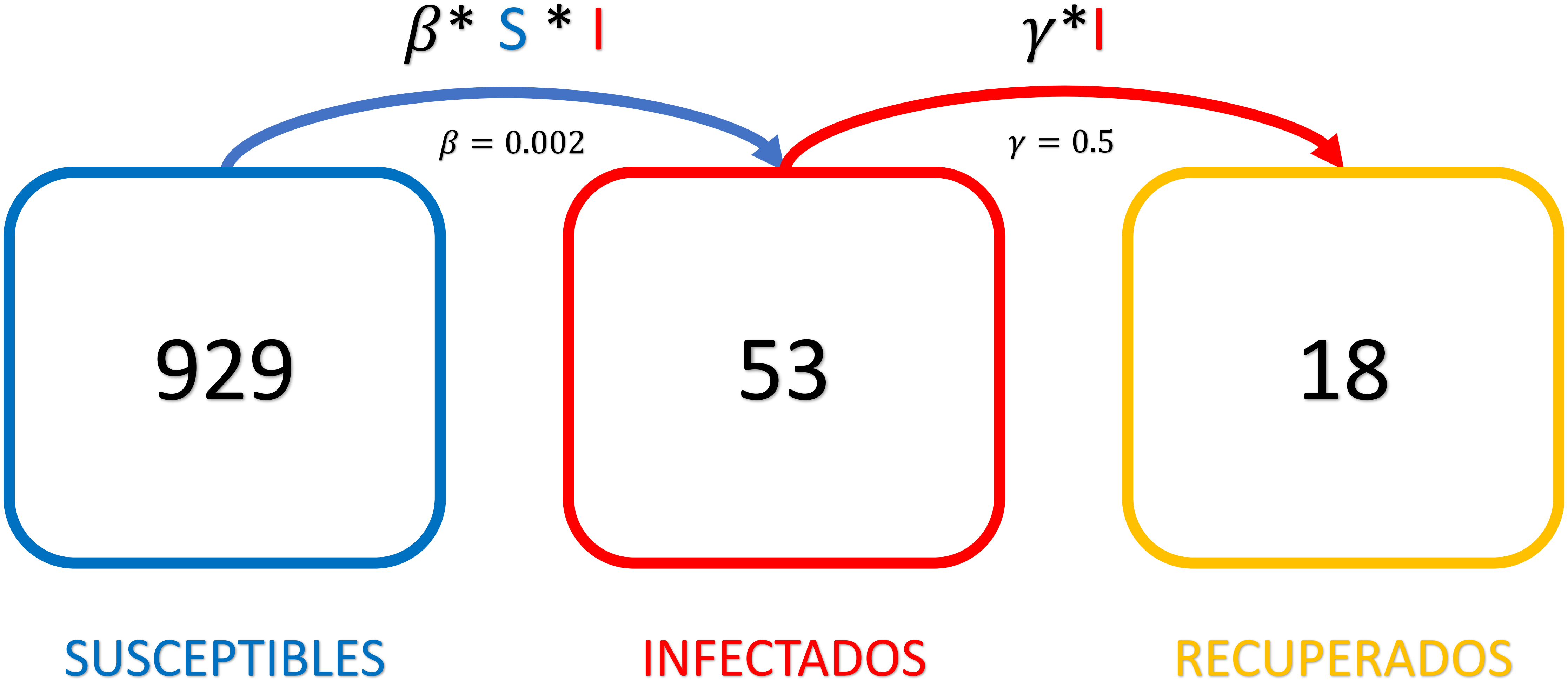
$\beta * S * I$ $\quad$ $\gamma * I$



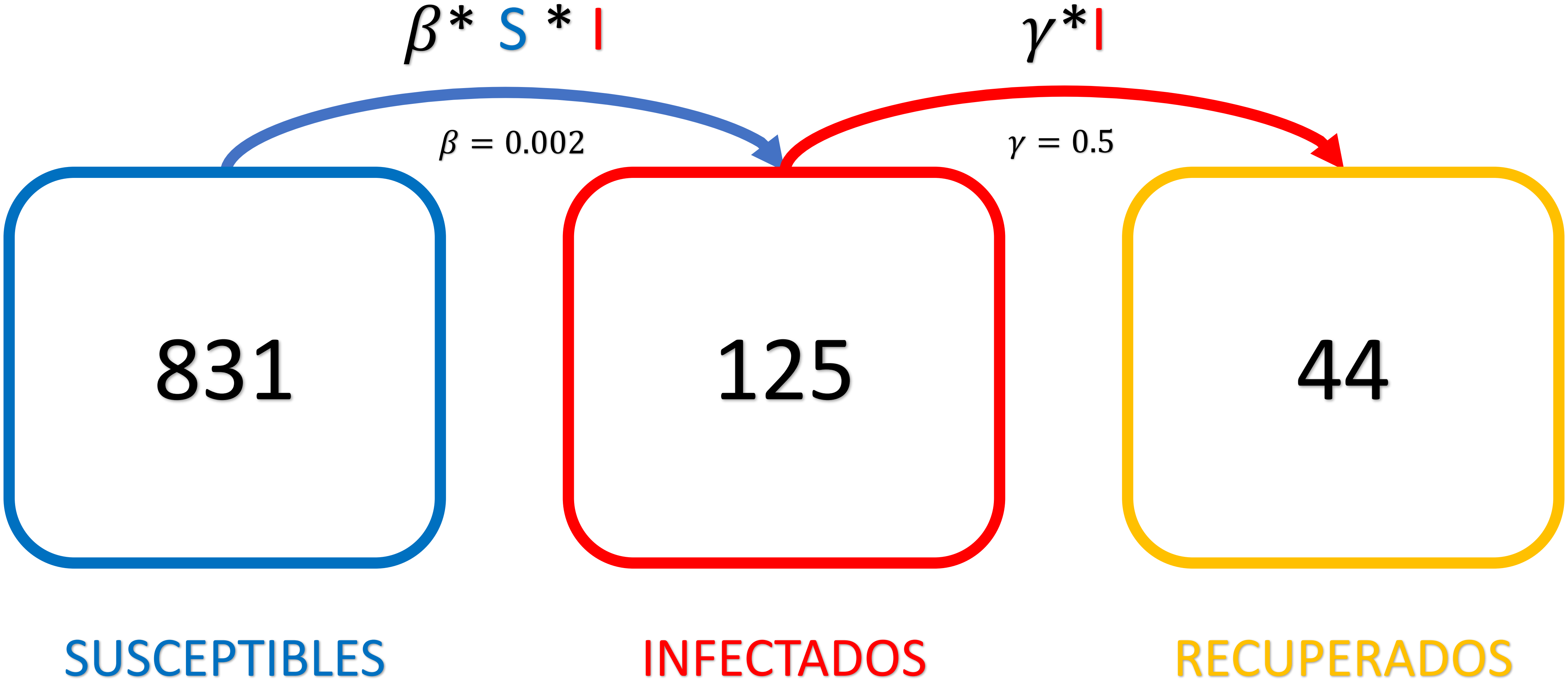
DIA 5


$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
$\gamma = 0.5$
971
22
7
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 6

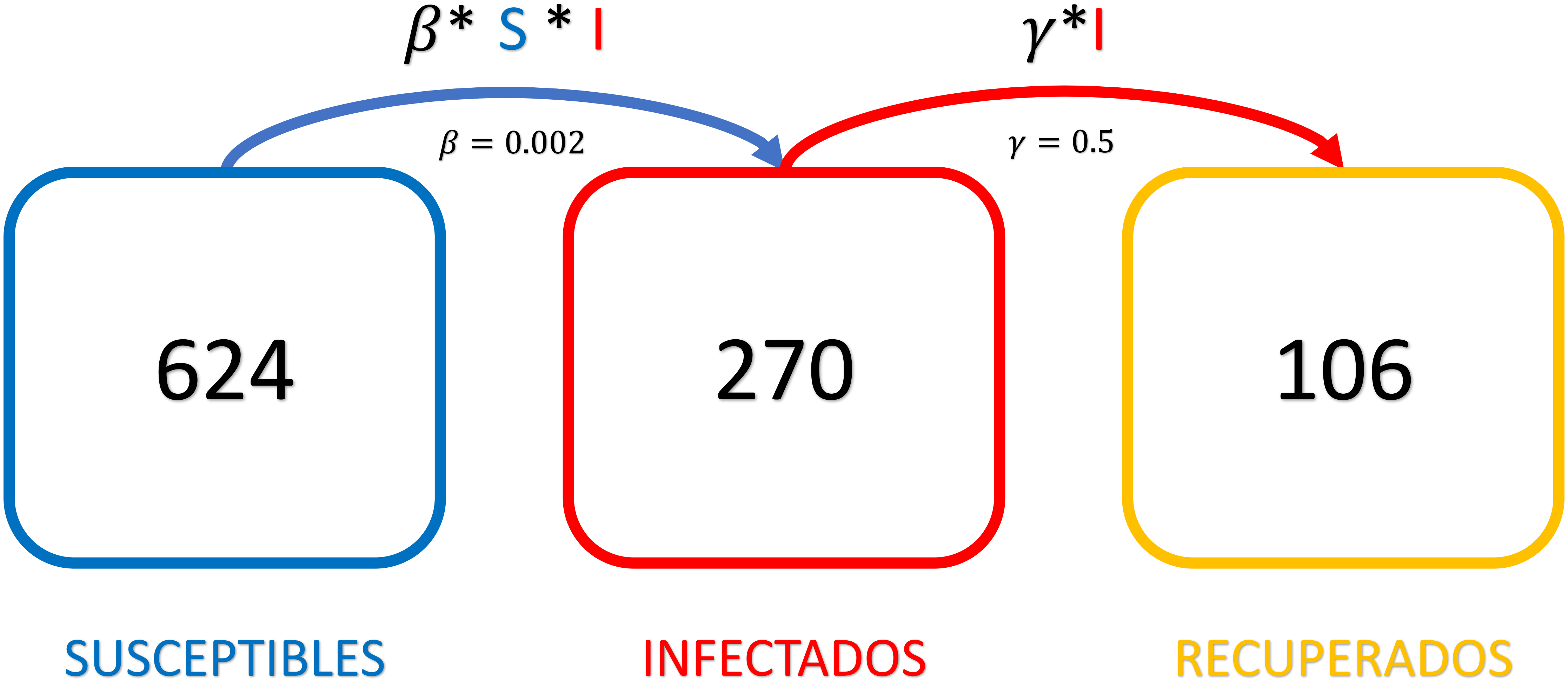

β* S * I
γ*I
$\beta = 0.002$
$\gamma = 0.5$
929
53
18
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 7



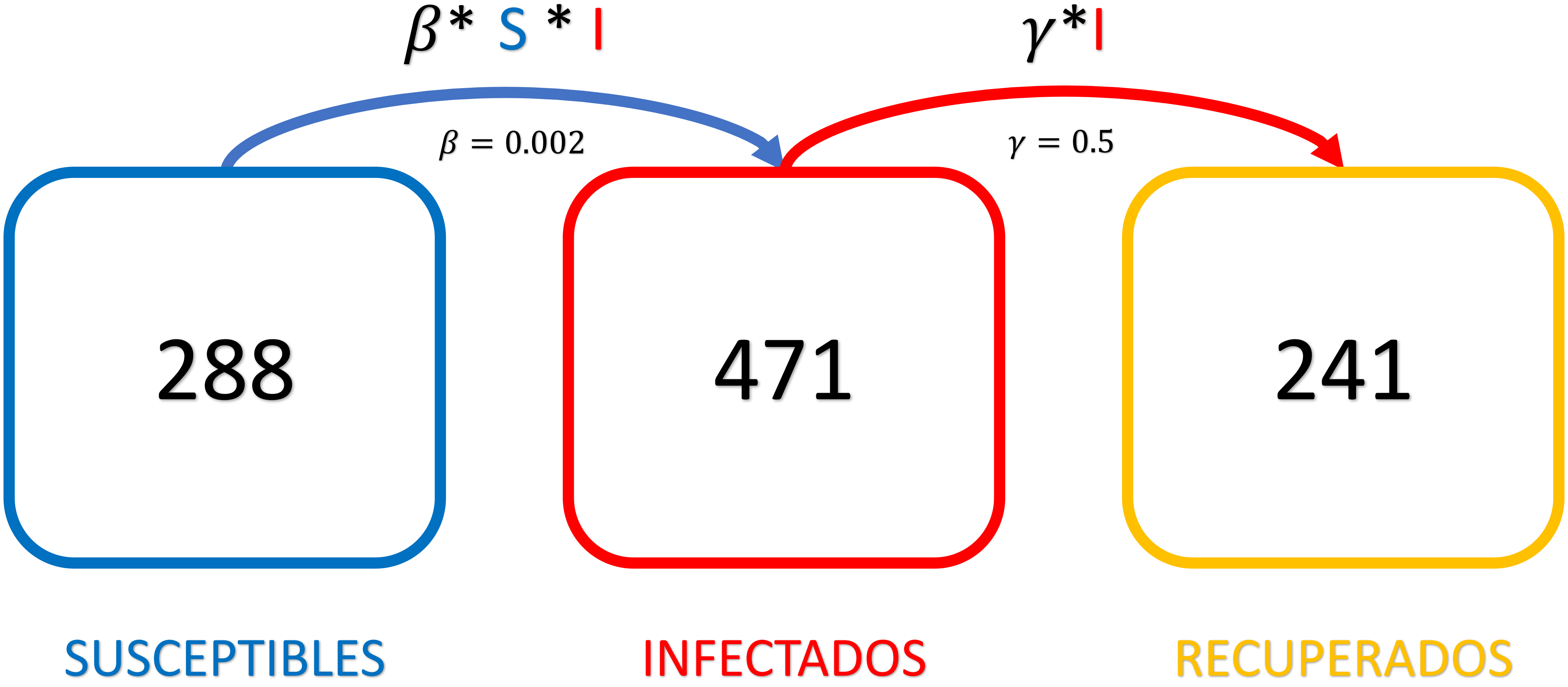
β* S * I
γ*I
$\beta = 0.002$
$\gamma = 0.5$
831
125
44
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 8

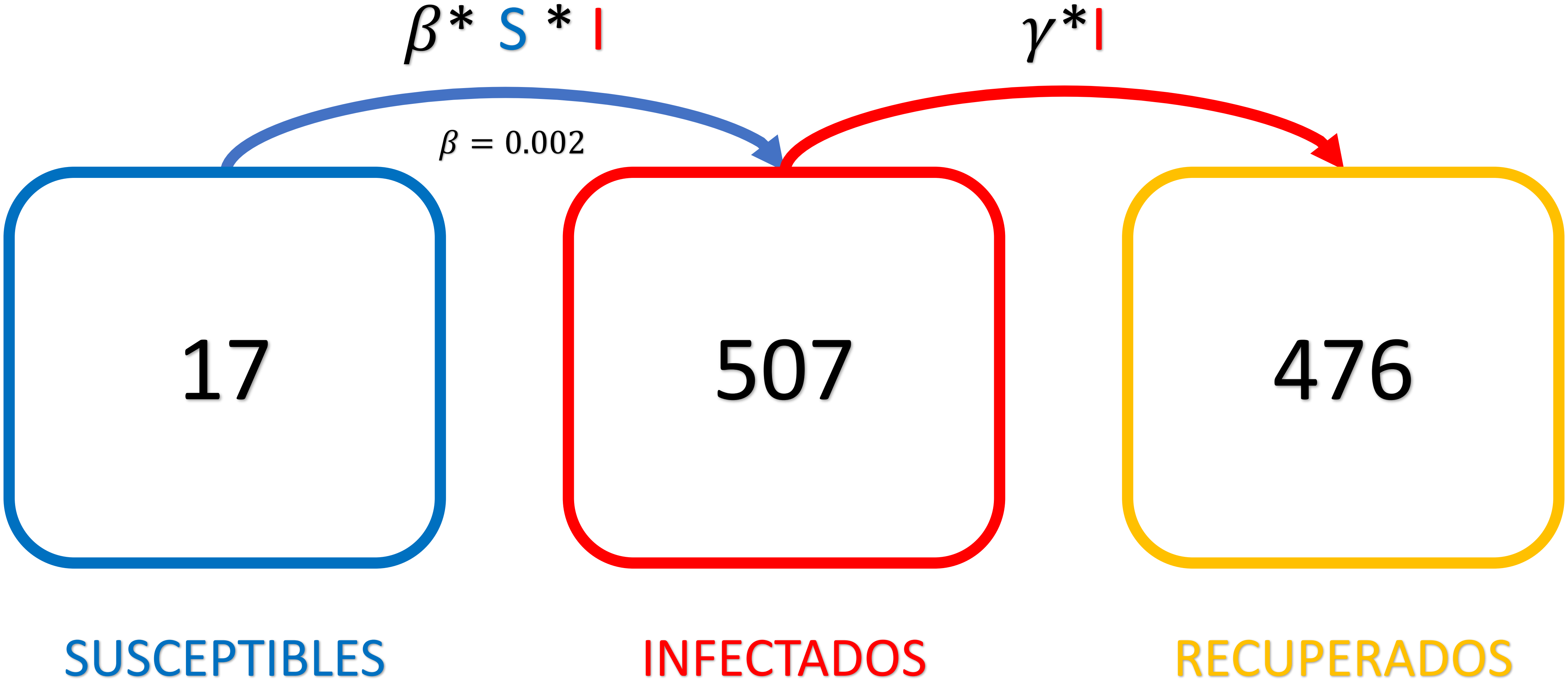


$\beta *$ S * I
$\gamma *$I
$\beta = 0.002$
$\gamma = 0.5$
624
270
106
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

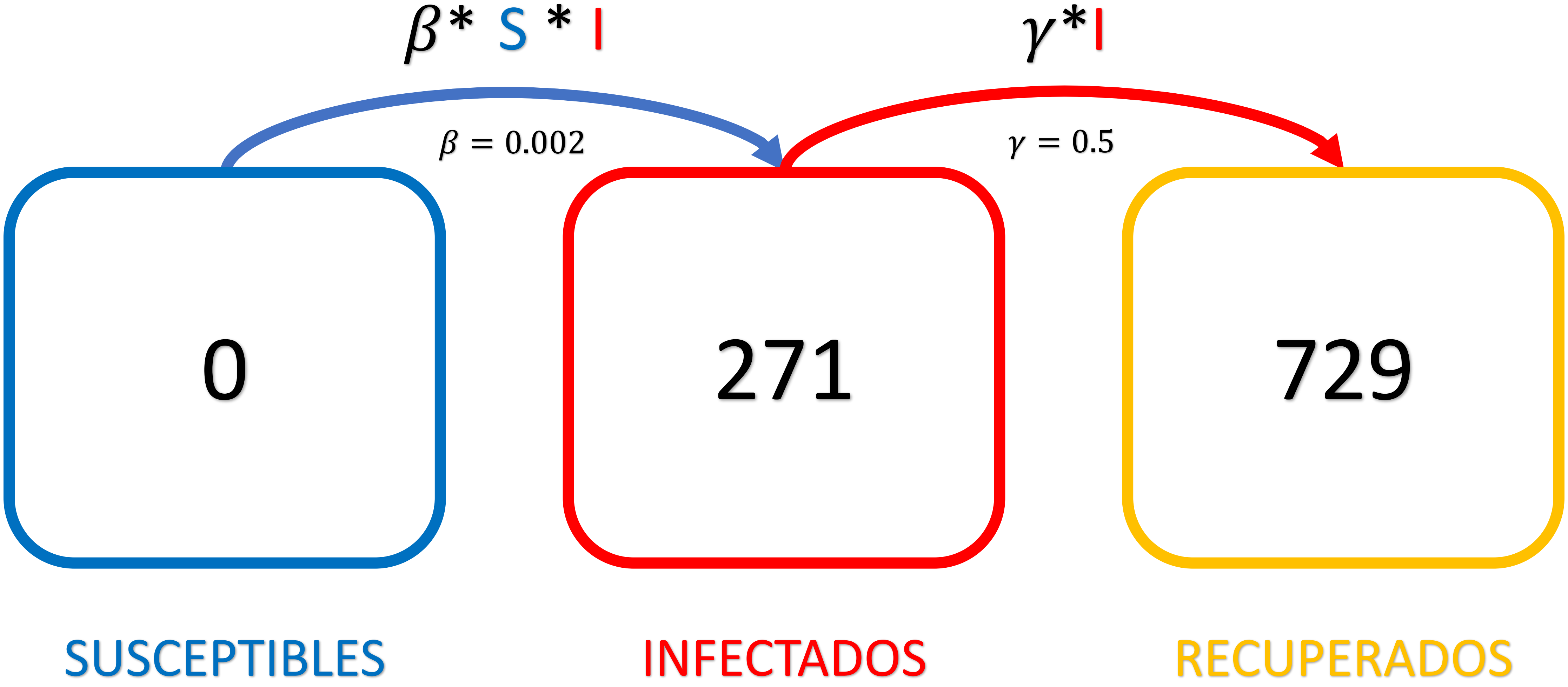
DIA 9


$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
$\gamma = 0.5$
288
471
241
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

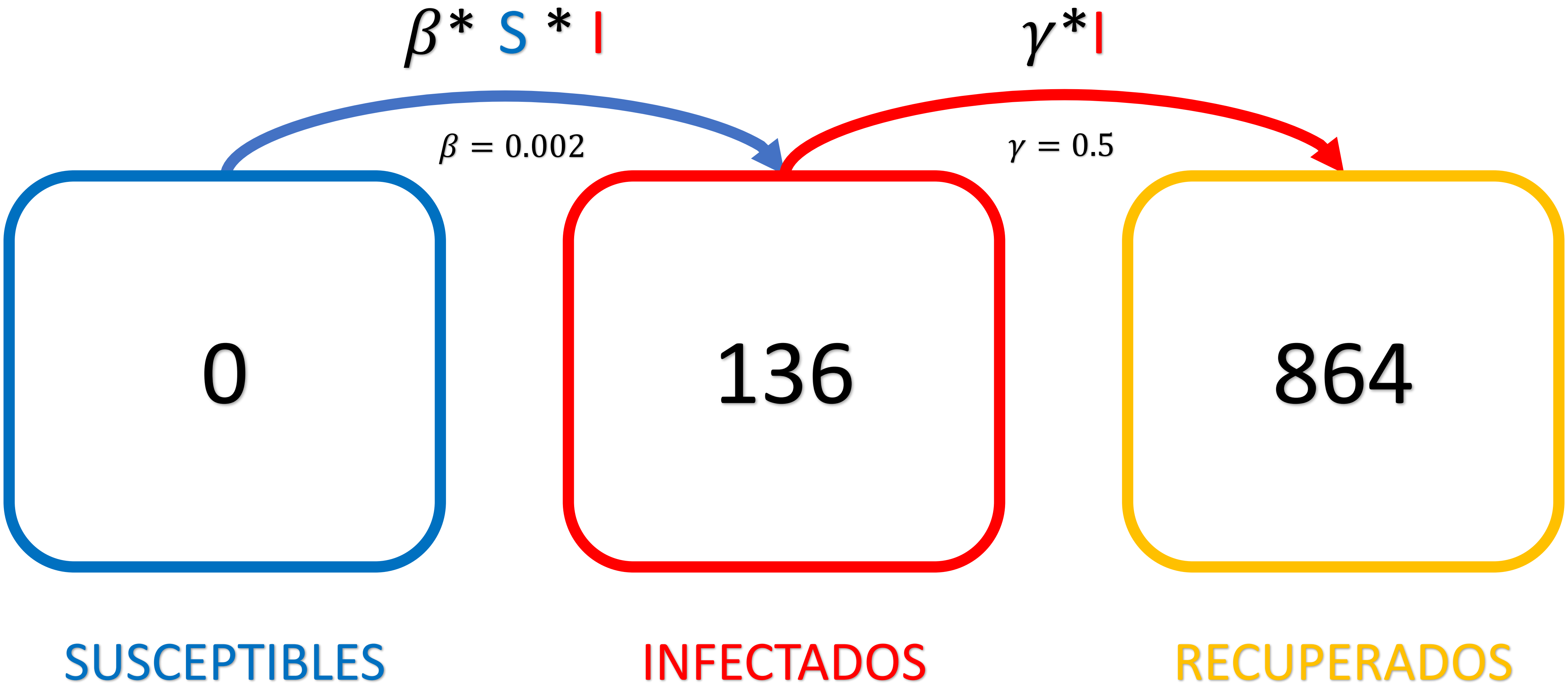
DIA 10


$\beta *$ S * I
$\gamma *$ I
$\beta = 0.002$
17
507
476
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 11

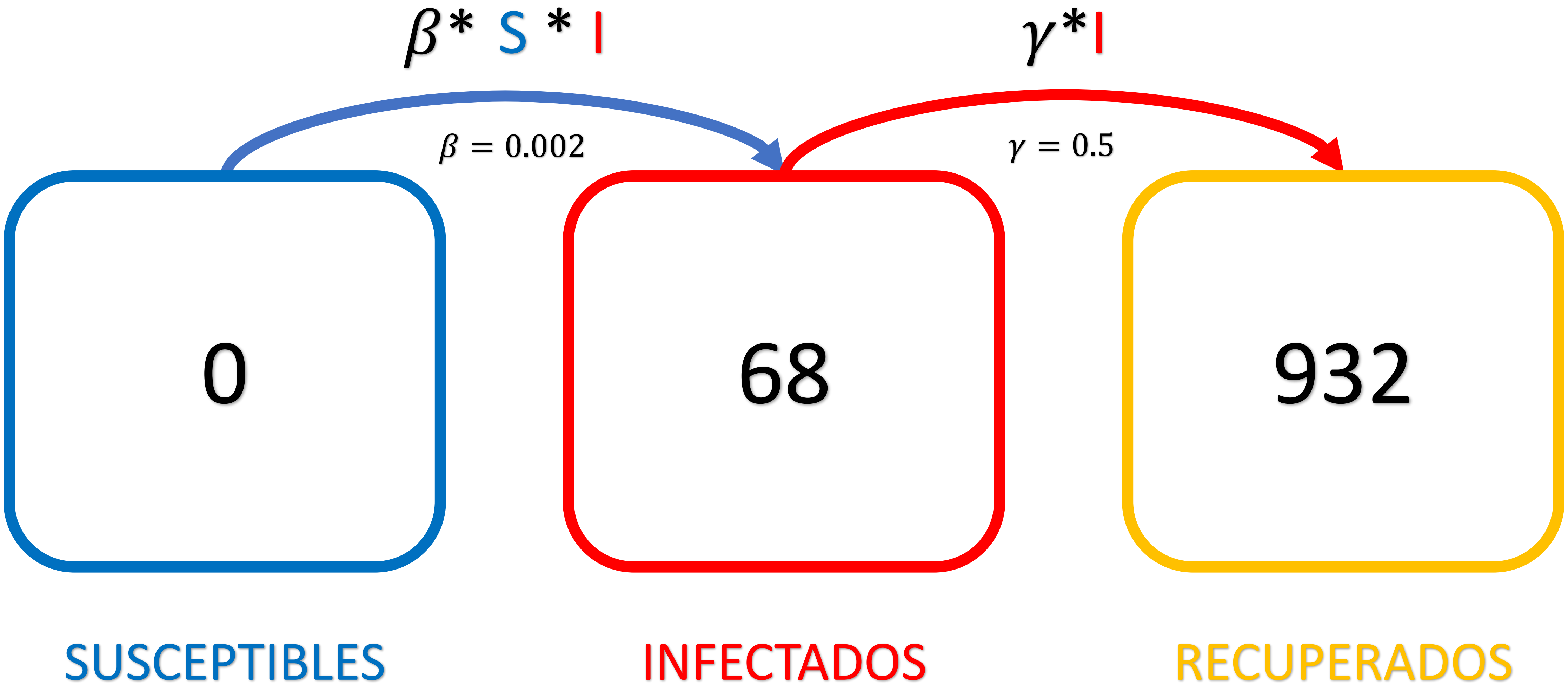

β* S * I
γ*I
$\beta = 0.002$
$\gamma = 0.5$
0
271
729
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 12



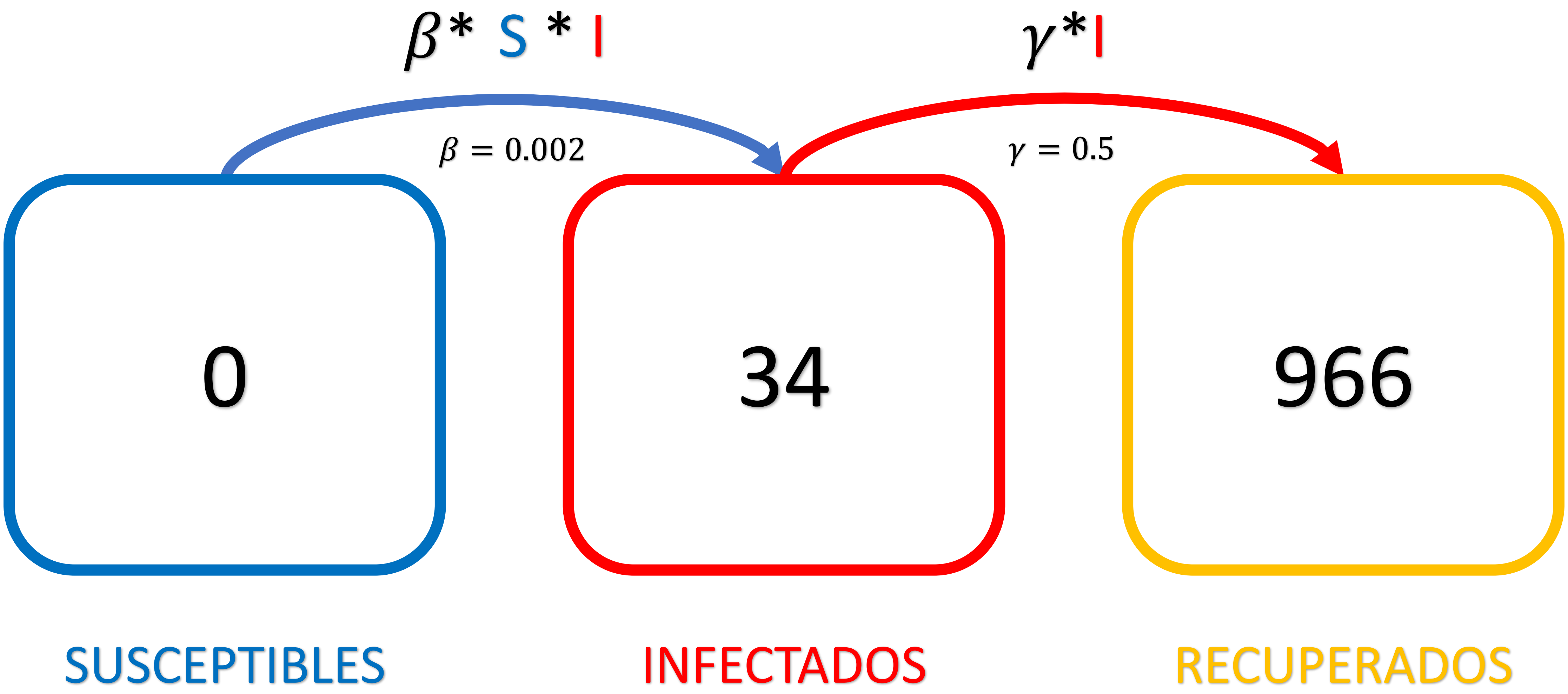
$\beta *$ S * I
$\gamma *$ I
$\beta = 0.002$
$\gamma = 0.5$
0
136
864
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 13



$\beta * S * I$
$\gamma * I$
$\beta = 0.002$
$\gamma = 0.5$
0
68
932
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

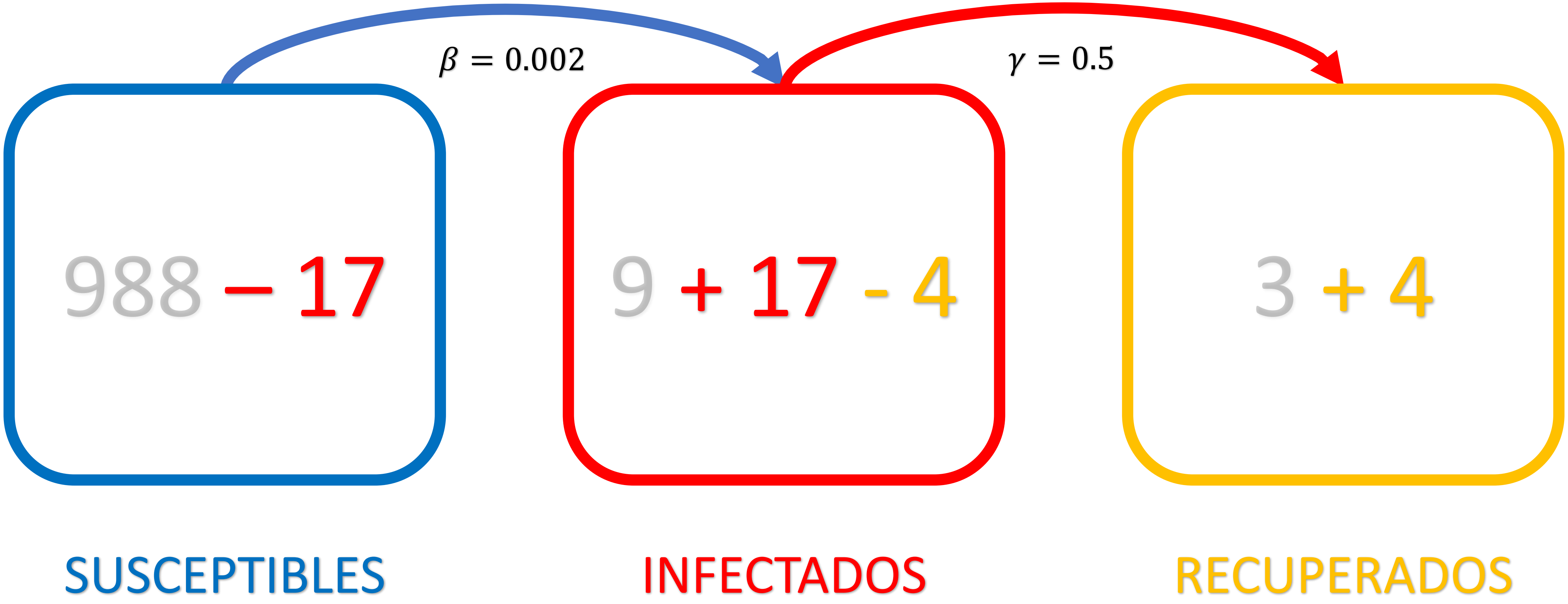
DIA 14


$\beta *$ S * I
$\gamma *$I
$\beta = 0.002$
$\gamma = 0.5$
0
34
966
SUSCEPTIBLES
INFECTADOS
RECUPERADOS

DIA 4 -> 5

$.002 * 988 * 9 \approx 17$ $\quad$ $0.5 * 9 \approx 4$

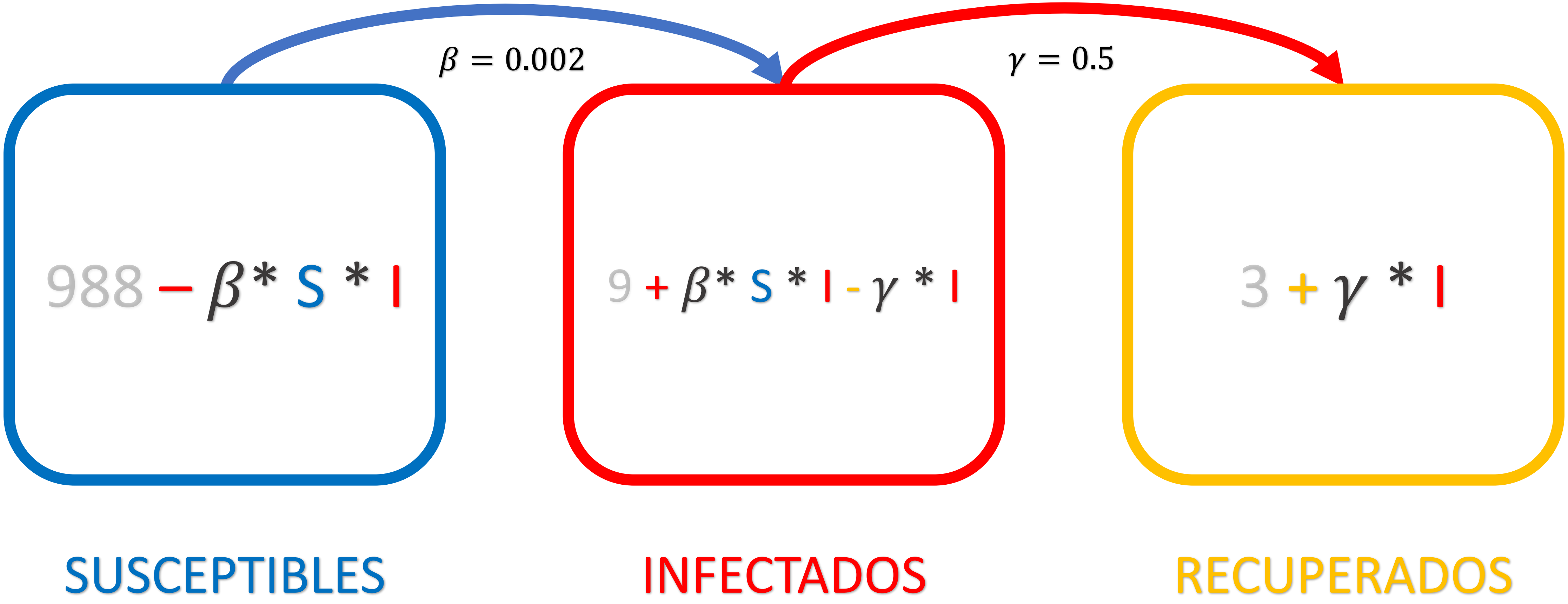
$\beta * S * I$ $\quad$ $\gamma * I$



DIA 4 -> 5

$.002 * 988 * 9 \approx 17$ $\qquad$ $0.5 * 9 \approx 4$

$\beta * S * I$ $\qquad$ $\gamma * I$



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