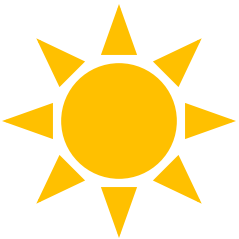
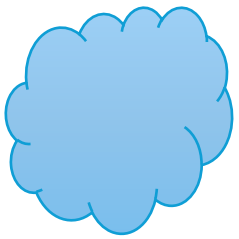
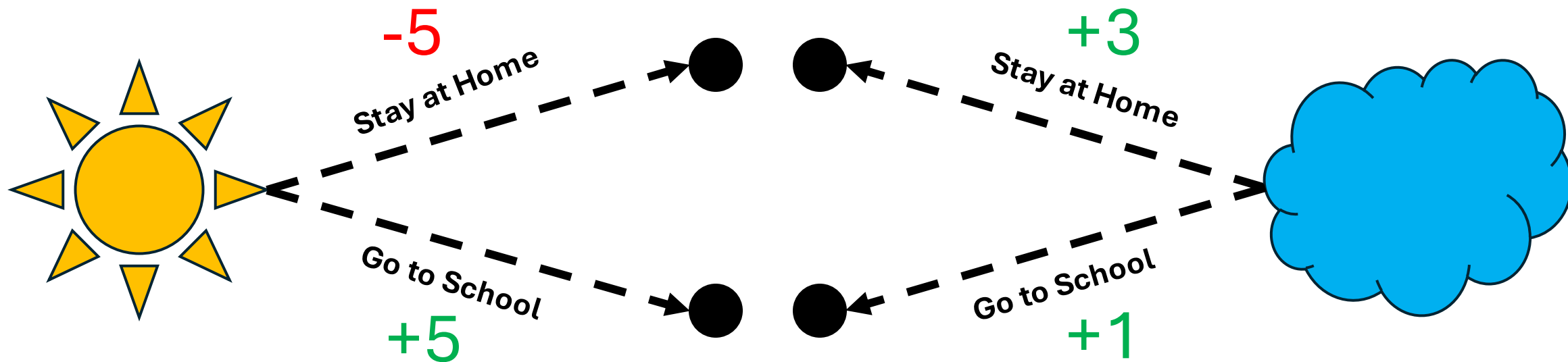


States s : {Sunny, Cloudy}

Actions a : {Go to School, Stay at Home}

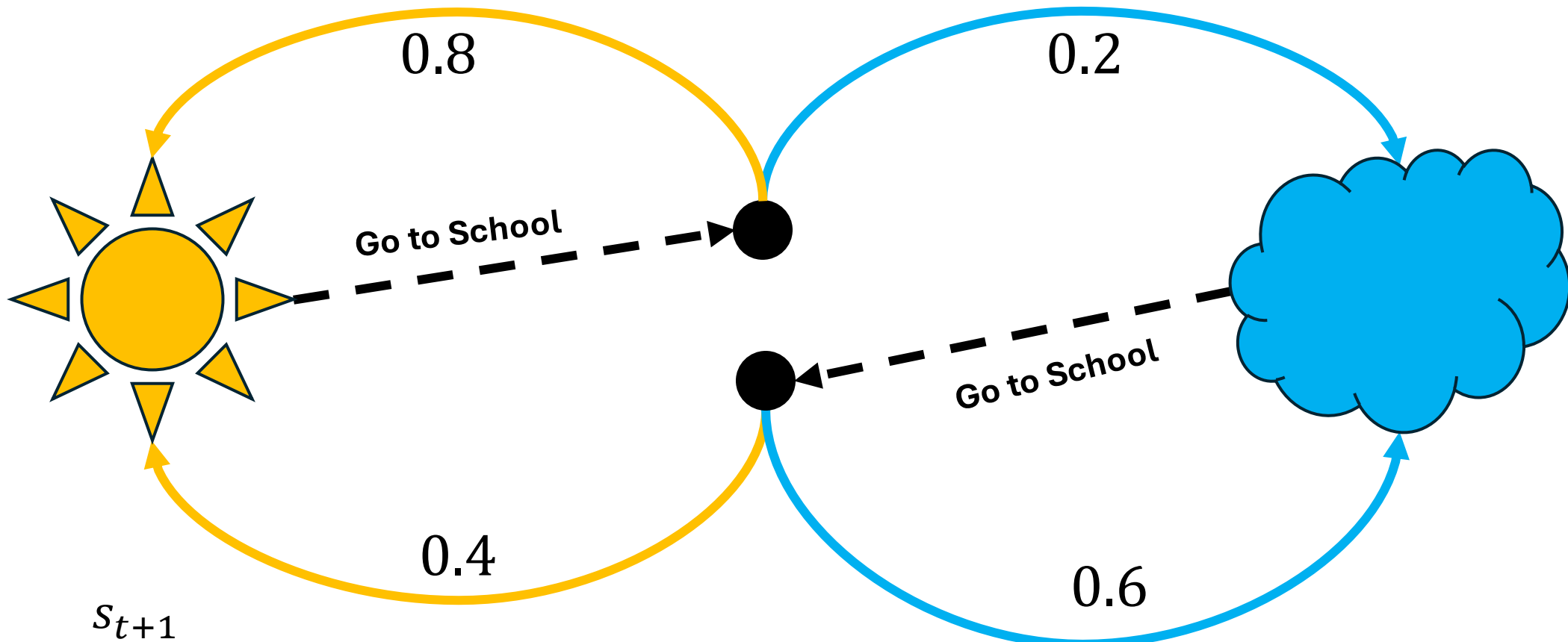
Discount $\gamma = 0.9$





	Go to School	Stay at Home
	+5	-5
	+3	+1



$$R_{school} = ?$$

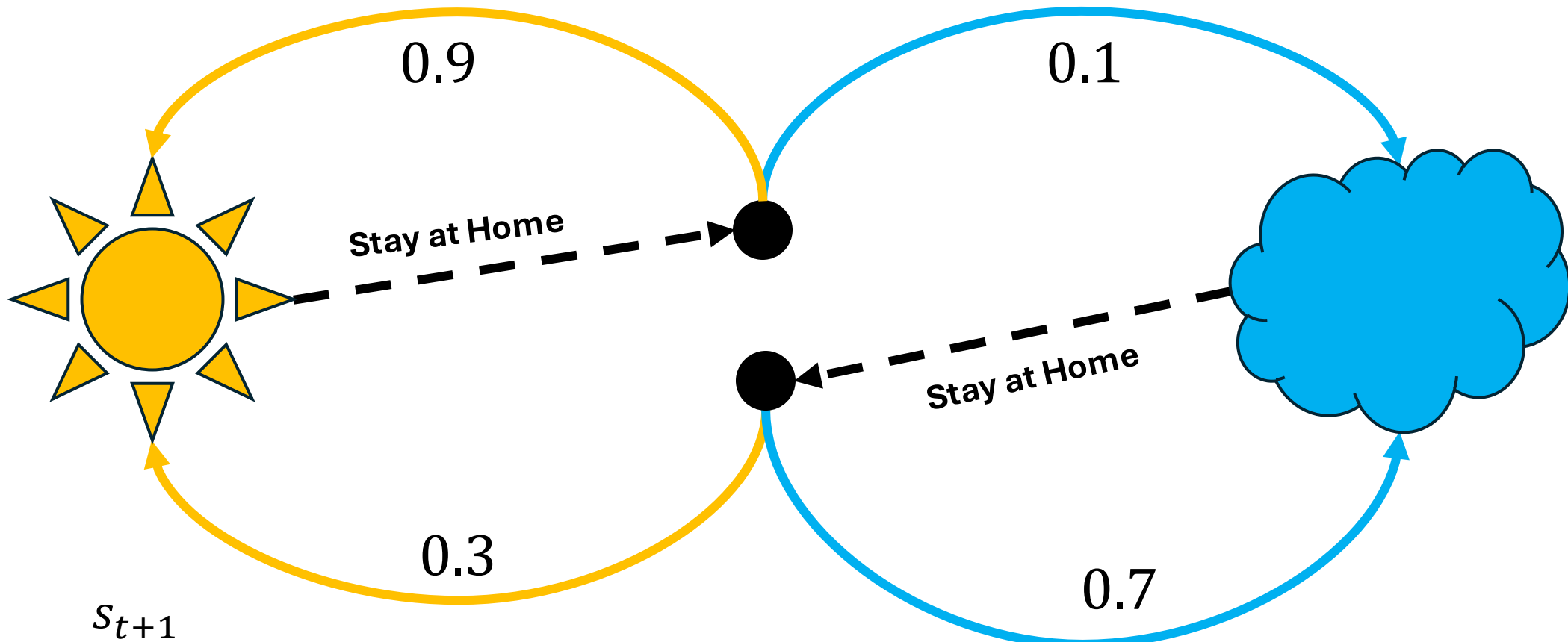
$$R_{stay} = ?$$







		
	0.8	0.2
	0.4	0.6

State Transition Matrix

$$P_{school} = \begin{bmatrix} 0.8 & 0.2 \\ 0.4 & 0.6 \end{bmatrix}$$



		
	0.9	0.1
	0.3	0.7

State Transition Matrix

$$P_{stay} = \begin{bmatrix} 0.9 & 0.1 \\ 0.3 & 0.7 \end{bmatrix}$$

Step 1: Compute state-wise average reward under the policy π

1. *Find r_π for sunny =?*

2. *Find r_π for cloudy =?*

3. *Find r_π matrix = ?*

Step 2: Compute the policy transition matrix

Row 1 (Sunny):

- $P\pi(1,1) = ??$
- $P\pi(1,2) = ??$

Row 2 (Cloudy):

- $P\pi(2,1) = ??$
- $P\pi(2,2) = ??$

$4. Find P_{\pi} = \begin{bmatrix} ? & ? \\ ? & ? \end{bmatrix}$
--

Step 3: Write the Bellman expectation equations $v_{\pi}(\textit{sunny})$

General Form:

$$v_{\pi}(s) = r_{\pi}(s) + \gamma \sum P_{\pi}(s, s') v_{\pi}(s')$$

5. *find* $v_1 = ??$

Step 3: Write the Bellman expectation equations $v_{\pi}(\textit{cloudy})$

General Form:

$$v_{\pi}(s) = r_{\pi}(s) + \gamma \sum P_{\pi}(s, s') v_{\pi}(s')$$

6. Find $v_2 = ?$

Step 4: Solve for $v_{\pi}(\textit{cloudy})$

$$7. v_{\pi}(\textit{cloudy}) = ??$$

Step 4: Solve for $v_{\pi}(\textit{sunny})$

$$8. v_{\pi}(\textit{sunny}) = ???$$

Step 5: Write the Bellman optimality equations

General Form:

$$v_*(s) = \max_a \{R(s, a) + \gamma \sum_{s'} P(s' | s, a) v_*(s')\}$$

Find Sunny (v_1) using Go to School:

$$9. v_*(sunny) = ???$$

Find Cloudy (v_2) using Go to School:

$$10. v_*(cloudy) = ???$$

Step 6: Solve for v_* (cloudy)

$$11. v_*(\text{cloudy}) = ???$$

Step 6: Solve for v_* (sunny)

$$12. v_*(\text{cloudy}) = 21.538$$

Step 7: Solve for q_*

$$13. q(1, School) = ??$$

$$14. q(1, Home) = ??$$

$$15. q(2, School) = ??$$

$$16. q(2, Home) = ??$$