

**FIGURE P7-4**

Configuration and terminology for Problems 7-9 and 7-60

\*7-9 The link lengths, gear ratio ( $\lambda$ ), phase angle ( $\phi$ ), and the values of  $\theta_2$ ,  $\omega_2$ , and  $\alpha_2$  for some geared fivebar linkages are defined in Table P7-4. The general linkage configuration and terminology are shown in Figure P7-4. For the row(s) assigned, find  $\alpha_3$  and  $\alpha_4$  and the linear acceleration of point  $P$ .

†7-60 Write a program using an equation solver or any computer language to solve for the displacements, velocities, and accelerations in a geared-fivebar linkage as shown in Figure P7-4 (p. 357). Plot the variation in all link's angular and all pin's linear positions, velocities, and accelerations with a constant angular velocity input to the crank over one revolution for both open and crossed configurations of the linkage. To test the program, use data from row *a* of Table P7-4. Check your results with program FIVEBAR.

\* Answers in Appendix F.

† These problems are suited to solution using *Mathcad*, *Matlab*, or *TKSolver* equation solver programs. In most cases, your solution can be checked with program FIVEBR.

**TABLE P7-4 Data for Problem 7-9**

Row	Link 1	Link 2	Link 3	Link 4	Link 5	$\lambda$	$\phi$	$\theta_2$	$\omega_2$	$\alpha_2$	$R_{pa}$	$\delta_3$
<i>a</i>	6	1	7	9	4	2.0	30	60	10	0	6	30
<i>b</i>	6	5	7	8	4	-2.5	60	30	-12	5	9	25
<i>c</i>	3	5	7	8	4	-0.5	0	45	-15	-10	10	80
<i>d</i>	4	5	7	8	4	-1.0	120	75	24	-4	5	45
<i>e</i>	5	9	11	8	8	3.2	-50	-39	-50	10	9	300
<i>f</i>	10	2	7	5	3	1.5	30	120	-45	50	10	120
<i>g</i>	15	7	9	11	4	2.5	-90	75	100	18	4	300
<i>h</i>	12	8	7	9	4	-2.5	60	55	-65	25	6	20
<i>i</i>	9	7	8	9	4	-4.0	120	100	25	-25	9	80