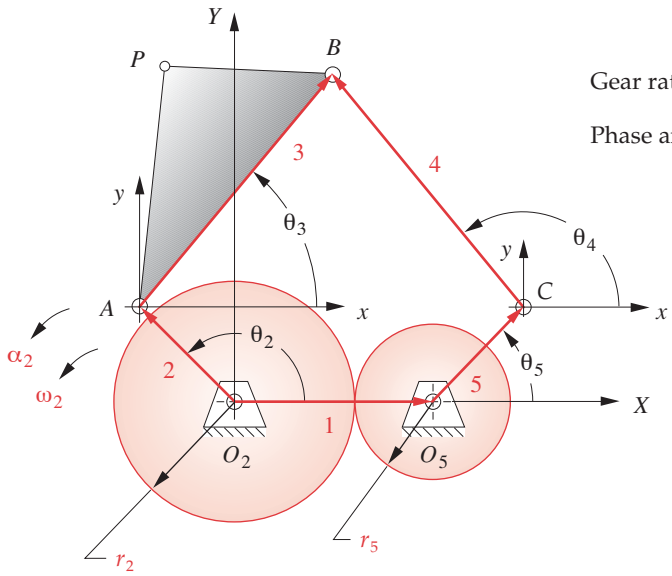

Gear ratio $\lambda = \pm \frac{r_2}{r_5}$

Phase angle $\phi = \theta_5 - \lambda\theta_2$

FIGURE P7-4

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

*7-9 The link lengths, gear ratio (λ), phase angle (ϕ), and the values of θ_2, ω_2, and α_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 α_3 and α_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	λ	ϕ	θ_2	ω_2	α_2	R_{pa}	δ_3
a	6	1	7	9	4	2.0	30	60	10	0	6	30
b	6	5	7	8	4	– 2.5	60	30	– 12	5	9	25
c	3	5	7	8	4	– 0.5	0	45	– 15	– 10	10	80
d	4	5	7	8	4	– 1.0	120	75	24	– 4	5	45
e	5	9	11	8	8	3.2	– 50	– 39	– 50	10	9	300
f	10	2	7	5	3	1.5	30	120	– 45	50	10	120
g	15	7	9	11	4	2.5	– 90	75	100	18	4	300
h	12	8	7	9	4	– 2.5	60	55	– 65	25	6	20
i	9	7	8	9	4	– 4.0	120	100	25	– 25	9	80