

LineUp with Math

Math-Based Decisions in Air Traffic Control

STUDENT WORKBOOK B

Resolving Air Traffic Conflicts by Changing Route

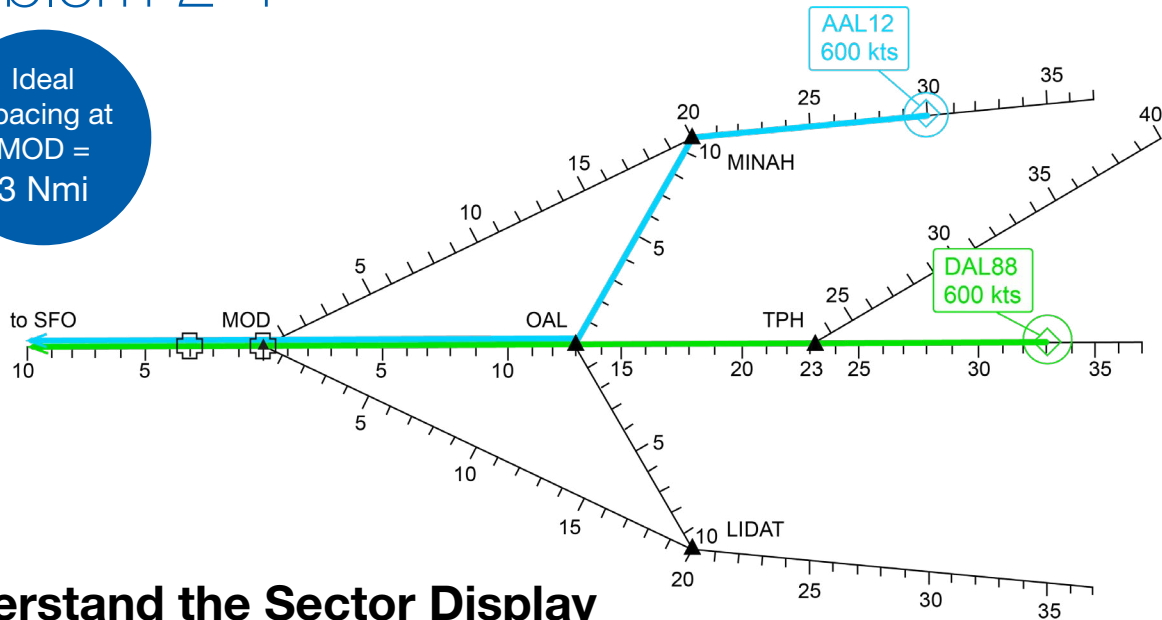
- * 2 planes, each at the same speed
- * Worksheets for simulator problems 2-1, 2-2, 2-3

Simulator at: <https://atcsim.nasa.gov/simulator/sim2/sector33.html>

WORKSHEET #1

Problem 2-1

Ideal Spacing at MOD = 3 Nmi



Understand the Sector Display

- The plane speeds are: Same Different
- The plane routes intersected first at: _____

Predict Aircraft Positions

- Which plane is closer to OAL? _____ Headstart = _____ nautical miles (This plane has a headstart.)
- Which plane will arrive first at OAL? _____ Spacing = _____ nautical miles
- When that plane arrives at OAL, the spacing will be the same as or different from the headstart.

Check Separation

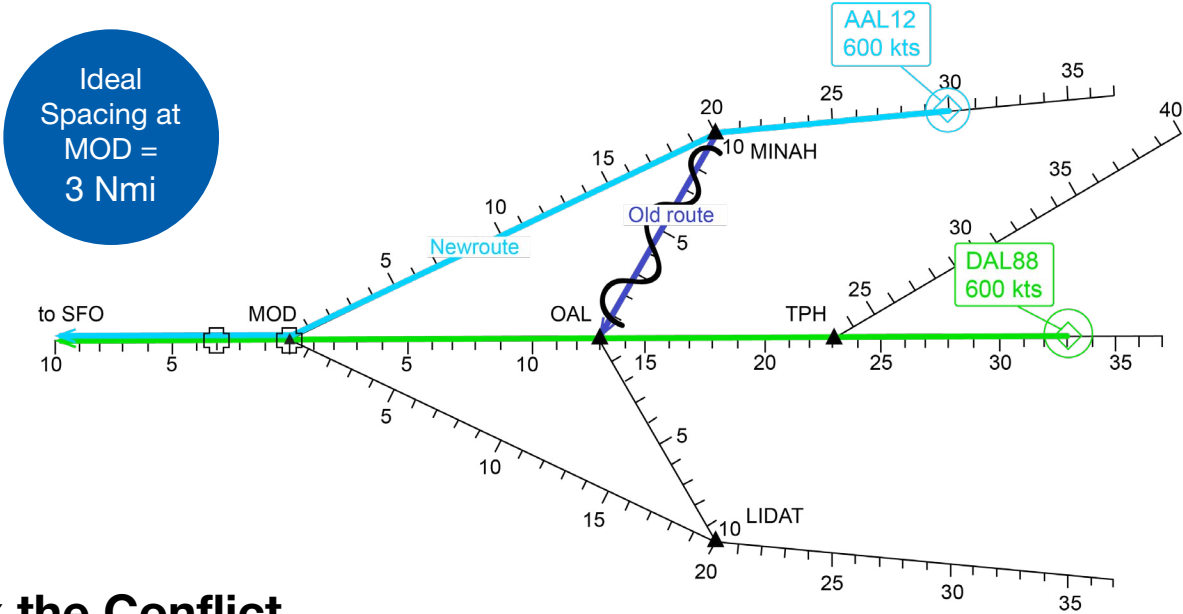
- Will the spacing at OAL be at least minimum separation of 2 nautical miles? Yes No
- How much extra spacing is needed to have ideal spacing? _____ nautical miles
- What could the controller do to achieve at least ideal spacing?

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WORKSHEET #1 continued

Problem 2-1



Fix the Conflict

To achieve ideal spacing, reroute AAL-12 directly from MINAH to MOD as shown above.

9. On the diagram above, circle the intersection where the new AAL12 route meets the DAL88 route.

Predict Aircraft Positions

10. Which plane now has a headstart? _____ New Headstart = _____ nautical miles
11. Which plane will arrive first? _____ New Spacing = _____ nautical miles
12. Why does the new route provide additional spacing? _____

Check New Separation

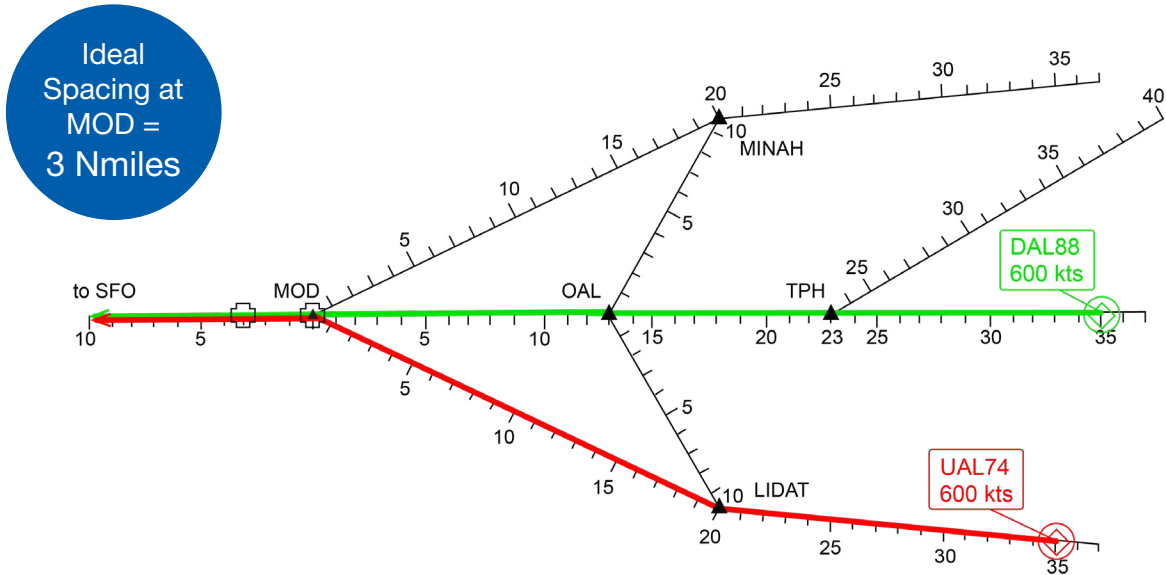
13. Is the new spacing at least minimum separation of 2 nautical miles? Yes No
If No, try again!
14. Does the new spacing equal ideal spacing? Yes No

Route changes don't always give Ideal Spacing

WORKSHEET #2

Problem 2-2

 Information for each plane, including it's position, is shown on the sector display.



1. Fill in the blanks to determine if the 2 planes have ideal spacing where the routes meet.

Where do the routes meet? _____ Headstart (NM) _____ Spacing at MOD, (NM) _____

Ideal spacing at MOD? Yes No Additional spacing required for ideal spacing? _____ NM

2. If spacing is **NOT** ideal, enter the flight plan change need to add more spacing at MOD.

Plane: _____ Route Change: _____ To: _____ To: _____

3. To check your new route, fill in the following questions.

Where do the routes meet?	Lead Plane?	Headstart Nmiles	Spacing at OAL, Nmi	Is Spacing at MOD Ideal?
_____	_____	_____	_____	_____

→ **Does the route change work?** If Yes, Congratulations! If no, try again!

→ **Mark out the old route and darken the new route change on the diagram above.** Be sure to use the correct route when checking the solution with the ATC simulator.

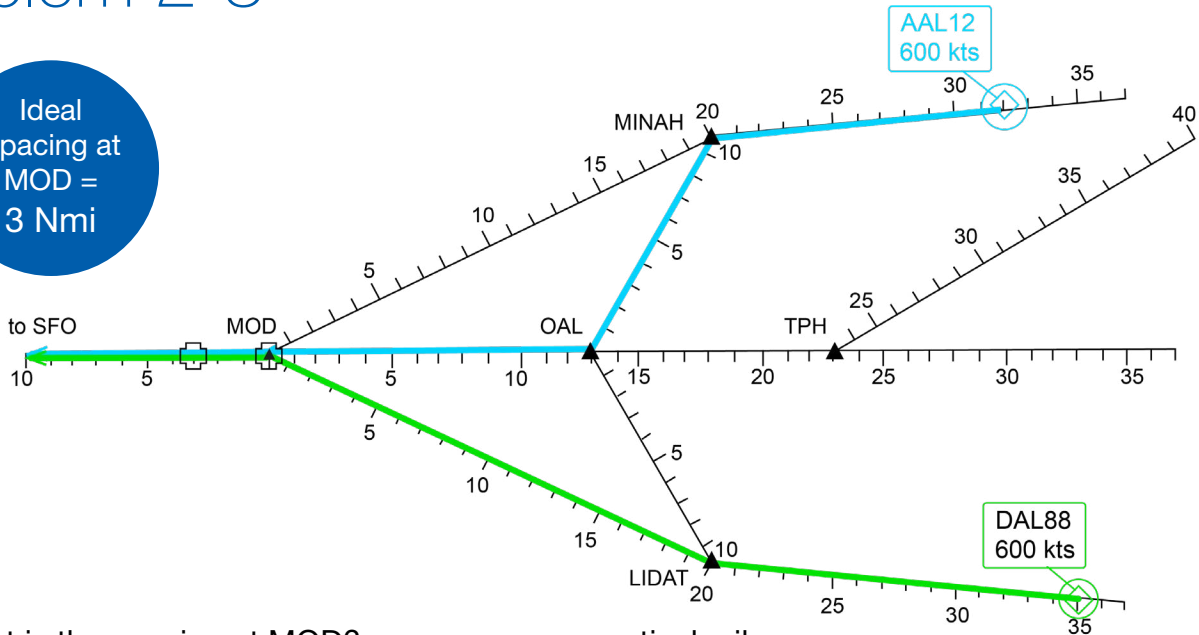
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WORKSHEET #3

Problem 2-3

Ideal Spacing at MOD = 3 Nmi



1. What is the spacing at MOD? _____ nautical miles
2. Is this ideal spacing? Yes No
3. Why or why not? _____

4. If the flight plan does **NOT** give ideal spacing, enter the flight plan change used to solve the problem.
Plane: _____ New Route: _____
- **Mark out the old route and darken the new route change on the diagram above.** Be sure to use the correct route when checking the solution with the ATC simulator.
5. What is the new spacing at MOD? _____ nautical miles
6. Is the new spacing now ideal?
 Yes No
7. Why or why not? _____

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