

Advanced Engineering Systems and Design

Name: _____

Activity 5.1.5 Atmosphere & Forces of Flight

Period: _____

Part I – The Atmosphere

1. Why is air necessary for conventional flight?

2. Which layer of the atmosphere do most airplanes fly in?

3. How does air density change with altitude?

4. Why does lower air density make flight more difficult?

Part II – Real-World Application

5. Why do airplanes need longer runways at high-altitude airports (like Denver)?

Part III – The Four Forces of Flight

6. List the four forces of flight:

a) _____

b) _____

c) _____

d) _____

7. Draw and label the four forces acting on an airplane in flight.



8. What condition must be true for steady, level flight?

Part IV – Individual Forces

9. What does weight depend on?

10. How do engines produce thrust?

11. What causes drag?

12. Why does a streamlined shape reduce drag?

13. What factors affect lift?

Part V – Understanding Lift

14. Explain lift using Bernoulli's Principle.

15. Explain lift using Newton's 3rd Law.

16. Why are both explanations valid?

Part VI – Force Interactions

17. What happens if lift becomes greater than weight?

18. What happens if drag becomes greater than thrust?

Part VII – Connecting to Space

19. Why can airplanes not fly in space?

Part VIII – Reflection

20. Which force do you think is most difficult for engineers to control?

Support your answer with physics reasoning.
