# CHAPTER 09

1. For external flows it is usually easiest to use a coordinate system fixed to the object. True or False

**A. True**

**B.** False

2.Which of the following is an example of a blunt body?

**A.** car

**B.** airfoil

**C. parachute**

3.What method is typically used to obtain surface pressure distributions experimentally?

**A.** measuring differences in velocity at different angles of attack

**B. using static pressure taps along the surface**

**C.** extracting the pressure from lift measurements

4.Lift and drag coefficients have the same dimensions as the force they are associated with. True or False

**A.** True

**B. False**

5.As a rule of thumb, typical external flows with Reynolds numbers greater than 100 are dominated by what?

**A.** gravity

**B.** external effects

**C. inertial effects**

6.If a Reynolds number is small, the viscous effects are relatively strong. True or False

**A. True**

**B.** False

7.As the Reynolds number increases, the region ahead of the cylinder in which the viscous effects are important becomes _____.

**YOUR ANSWER: Smaller**

8.The fluid outside of the boundary layer and wake region flows as if it were inviscid. True or False

**A. True**

**B.** False

9.The boundary layer is needed to allow for the no-slip boundary condition. True or False

**A. True**

**B.** False

10.For a plate with infinite length, how do you calculate the Reynolds number?

**A.** same way as a finite length plate

**B. select a certain point on the plate**

**C.** you cannot find the Reynolds number

11.The boundary layer thickness is defined in terms of what kind of flowrate?

**A. volumetric**

**B.** geometric

**C.** viscous

12.The boundary layer theory exists based on the fact that the boundary layer is _____.

**A.** thick

**B. thin**

**C.** turbulent

13.The boundary layer equations can be written in terms of a _____ .

**A. Similarity variable**

**B.** Common variable

**C.** Repetitive variable

14.Shear stress decreases with increasing x due to _____.

**A.** the decrease in thickness of the boundary layer

**B.** the unchanging boundary layer

**C. the increase in the thickness of the boundary layer**

15.The _____ force on a flat plate is related to the momentum deficit within the boundary layer.

**YOUR ANSWER: Drag**

16. The accuracy of boundary layer results using the momentum integral equation depends on how closely the shape of the assumed velocity profile approximates the actual profile. True or False

**A. True**

**B.** False

17. The actual transition from laminar to turbulent boundary layer always occurs at a specific point on the surface. True or False

**A.** True

**B. False**

18. The flat plate drag coefficient is a function of relative roughness and _____.

**A.** Velocity

**B. Reynolds Number**

**C.** Boundary layer thickness

19. If you measured the pressure while moving across the boundary layer from the body to the boundary layer edge, one would find a significant pressure change. True or False

**A.** True

**B. False**

20. Viscous effects within the boundary layer cause boundary layer separation. True or False

**A. True**

**B.** False

21. Friction drag is that part of the drag that is due directly to _____.

**YOUR ANSWER: Shear Stress**

22. Pressure is constant along a curved surface. True or False

**A.** True

**B. False**

23. Pressure drag is also commonly referred to as what?

**A.** Laminar drag

**B.** Parallel drag

**C. Form drag**

24. If the viscosity were zero, the pressure drag on any shaped object in a steady flow would be _____ ?

**YOUR ANSWER: Zero**

25. For many shapes there is a sudden change in the character of the drag coefficient when the boundary layer becomes turbulent. True or False

**A. True**

**B.** False

26. If the velocity of the object is sufficiently large, _____ effects become important and the drag coefficient becomes a function of the Mach number.

**YOUR ANSWER: Compressibility**

27. Sharp-pointed bodies develop their maximum drag coefficient in the vicinity of what?

**A.** Around Mach 0.3

**B. Around Mach 1**

**C.** Much greater than Mach 1

28. The surface roughness, $\varepsilon$, is relatively unimportant in terms of lift. True or False

**A. True**

**B.** False

29. Usually most of the lift comes from what forces acting on the surface?

**A.** Viscous forces

**B. Pressure forces**

**C.** Wind forces

30. What is the term used to define the average lift per unit area of the wing?

**YOUR ANSWER: Wing loading**

31. Wing stall involves boundary layer transition. True or False

**A.** True

**B. False**

32.To manipulate lift and drag, modern airplanes utilize leading and trailing edge flaps. True or False

**A. True**

**B.** False

33.Inviscid flow analysis can be used to obtain ideal flow past airfoils. True or False

**A. True**

**B.** False

34.Why do the winglets on aircraft reduce drag?

**A.** Create more surface area

**B. Reduce the strength of wingtip vortices**

**C.** Increase energy flow across the wing

**35.**A rotating cylinder can generate lift. True or False

**A. True**

**B.** False