

# CHAPTER 07

1.The pressure drop per unit length that develops due to friction cannot generally be solved analytically.

**A. True**

B. False

2.A qualitative description of physical quantities can be given in terms of \_\_\_\_\_.

**YOUR ANSWER: Basic dimensions**

3.Dimensionality analysis is the when the results of an equation will be what in relation to the system of units chosen.

A. Dependent

**B. Independent**

C. Constant

4.Dimensionality analysis is based on the \_\_\_\_\_.

**YOUR ANSWER: Buckingham pi theorem**

5.The dimensions of the variable on the left side of the equation must be \_\_\_\_\_ the dimensions of any term that stands by itself on the right side of the equal sign.

A. Greater than

**B. Equal to**

C. Fewer than

6.The required number of pi terms is what compared to the number of original variables?

A. Greater than

B. Equal to

**C. Fewer than**

7.The most difficult step in the method of repeating variables is \_\_\_\_\_.

**A. Listing all of the variables that are involved in the problem**

B. Express each of the variables in terms of basic dimensions

C. Determine the required number of pi terms

8.The number of variables is desired to be kept to a minimum so that the amount of \_\_\_\_\_

can be kept to a minimum.

**YOUR ANSWER: Laboratory work**

9. When using the repeating variables method, the number of repeating variables that are selected should be what compared to the number of reference dimensions?

A. Greater than

**B. Equal to**

C. Less than

10. The pi terms must always be what?

A. Negative

B. Equal in dimensions

**C. Dimensionless**

11. How many steps are there in the method of repeating variables?

**YOUR ANSWER: 8**

12. If too many pi terms appear in the final solution then the problem may be difficult, time consuming, and \_\_\_\_\_ to eliminate these experimentally.

**YOUR ANSWER: Expensive**

13. Variables can be classified into three general groups: geometry, material properties, and external effects.

**A. True**

B. False

14. An external effect is used to denote any variable that produces or tends to produce what?

A. Inaccurate results

B. Constant results

**C. Change in the system**

15. How many different points are there to consider in the selection of variables?

A. 3

**B. 6**

C. 8

16. Typically, in fluid mechanics the required number of reference dimensions is \_\_\_\_.

**YOUR ANSWER: Three**

17. Where does any other set of pi terms besides the original set come from?

**YOUR ANSWER: Manipulation of a correct original set of terms**

18. The number of required pi terms is fixed in accordance with the pi theorem.

**A. True**

B. False

19. How many restrictions are there for pi terms?

A. None

B. Two

**C. Three**

20. Pi terms can be formed by inspection by simply making use of the fact that each pi term must be dimensionless.

**A. True**

B. False

21. Which of the following is equivalent to the repeating variable method?

**A. Forming pi terms by inspection**

B. Forming pi terms by dimensional analysis

C. Determination of reference dimensions

22. A useful physical interpretation can often be given to dimensionless groups.

**A. True**

B. False

23. Write the Reynolds number equation.

$$Re = \frac{\rho V l}{\mu}$$

**YOUR ANSWER:**

24. What is the symbol for the Cauchy number?

A. Cn

**B. Ca**

C. Cu #

25. The Weber number is a relationship between the inertial force and what other force?

**A. Surface tension**

B. Kinetic

C. Frictional

26. Flows with very small Reynolds numbers are commonly referred to as “\_\_\_\_\_”.

**YOUR ANSWER: Creeping flows**

27. The Euler number is undoubtedly the most famous dimensionless parameter in fluid mechanics.

A. True

**B. False**

28. The Mach number and what other number cannot be used in the same problem?

A. Euler number

B. Reynolds number

**C. Cauchy number**

29. The flow of river water is significantly affected by surface tension.

A. True

**B. False**

30. The fewer the number of pi terms the more simple the problem.

**A. True**

B. False

31. For problems involving only two pi terms, results of an experiment can be conveniently presented in \_\_\_\_\_.

**YOUR ANSWER: A simple graph**

32. For complicated problems it is often less feasible to use models to predict specific characteristics of the system than to develop general correlations.

A. True

**B. False**

33. A representation of a physical system that may be used to predict the behavior of the system in some desired respect is what?

A. Prototype

**B. Model**

C. Facsimile

34. Model design conditions are also called similarity requirements or modeling laws.

**A. True**

B. False

35. The second similarity requirement indicates that the model and the prototype must be operated at \_\_\_\_.

**YOUR ANSWER: The same Reynolds number**

36. When velocity ratios and acceleration ratios are constant throughout the flow field, kinematic similarity exists between the model and the prototype.

**A. True**

B. False

37. For true models, how many scales will there be?

A. None

**B. One**

C. As many as needed

38. Models for which one or more of the similarity requirements are not satisfied are called \_\_\_\_ models.

**YOUR ANSWER: Distorted**

39. Distorted models cannot be successfully used, only true models can be accurately used.

A. True

**B. False**

40. Geometric and Reynolds number similarity is usually not required for models involving

flow through closed conduits.

A. True

**B. False**

41. For large Reynolds numbers, the inertial forces are \_\_\_\_\_ the viscous forces?

A. Less than

B. Approximately the same as

**C. Larger than**

42. For a Length Scale of 1/10 and a prototype velocity of 30 mph, what is the required model velocity?

**YOUR ANSWER: 300 mph**

43. How do the dimples on a golf ball effect drag?

**A. they reduce drag**

B. they increase drag

C. they do not effect drag

44. When the Mach number becomes greater than approximately \_\_\_\_\_, the influence of compressibility becomes significant.

**YOUR ANSWER: 0.3**

45. Flows in canals, rivers, spillways, and stilling basins are all examples of flows with a free surface.

**A. True**

B. False

46. At temperatures of  $-20^{\circ}\text{F}$ , what is the ice growth rate that can be achieved.

A. 1-mm per hour

**B. 2-mm per hour**

C. 3-mm per hour

47. The drag on a ship depends on both the Reynolds number and the Froude number.

A. True

**B. False**

48. Similarity laws can be directly developed from the \_\_\_\_\_ governing the phenomenon of interest.

**YOUR ANSWER: Equations**

49. For time-dependant problems, which of the following is crucial for successfully finding a solution?

A. The derivative of the equation

**B. Initial conditions**

C. The velocities at all points

50. Governing equations expressed in terms of dimensionless variables lead to the appropriate dimensionless groups.

**A. True**

B. False

51. The Froude number arises because of the inclusion of what in a problem?

A. Pressure

B. Velocity

**C. Gravity**

52. From this section it can be concluded that for the steady flow of a compressible fluid without free surfaces, dynamic and kinematic similarity will be achieved.

A. True

**B. False**