Objective: After studying this chapter, you will be able to understand the construction of an engine’s top end and the parts that make up this engine section.

Cylinder Head Construction

1. Define *bare cylinder head*.

2. What is a bare cylinder head normally made of?

3. The construction of a cylinder head varies with engine ____ and ____.

4. A(n) ____ valve guide is part of the cylinder head casting.

5. A(n) ____ valve guide is a separate sleeve forced into an oversize hole machined in the cylinder head.

6. Name the two types of valve seats.

7. Define *valve seat angle*.

8. The most common valve seat angles are ____.
   (A) 25° and 35°
   (B) 45° and 35°
   (C) 45° and 30°
   (D) None of the above.

9. A(n) ____ angle is a 1/2°–1° difference between the valve seat face angle and the angle of the valve face.

10. A diesel prechamber cup is pressed into the cylinder head and encloses the tips of the ____ and ____.
11. Identify the two different types of valve guides and seats. Also, label the names of the related components.

(A) __________________________
(B) __________________________
(C) __________________________
(D) __________________________
(E) __________________________
(F) __________________________
(G) __________________________
(H) __________________________
(I) __________________________
(J) __________________________

Valve Train Construction

12. What is the function of an engine's valve train?

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

13. Automotive engines commonly use ____ or ____ valves.


_________________________________________________________________________
_________________________________________________________________________

15. ____, hollow-stem valves are used when extra valve cooling action is needed.

16. A stellite valve is often used in engines designed to burn ____ fuel.

17. A(n) ____ valve seal is shaped like a cup and can be made of neoprene rubber or plastic.

18. A(n) ____ valve seal is a small round seal that fits into an extra groove cut in the valve stem.

19. A valve spring ____ is normally used with an O-ring type oil seal.

20. Define valve spring tension.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
21. Valve spring **is** the length of the valve spring when removed from the engine.

22. Define **valve spring open length.**

23. Valve spring **is** the length of the valve spring when installed on the engine with the valve closed.

24. Valve **occurs** when the valve fails to close entirely at high rpms because the spring is too weak.

25. A valve spring **is** a very thin, accurately machined washer used to increase spring tension.

26. What is the function of **valve retainers and keepers**?

27. A valve spring **is** a cup-shaped washer installed between the cylinder head and the bottom of the valve spring.

28. Explain the purpose of **valve rotators**.

29. A valve **helps** prevent stem and rocker arm wear.

30. What is the function of an engine's **camshaft**?

31. Cam lobe shape can be used to control **.**
   (A) when each valve opens in relation to piston position
   (B) how long each valve stays open
   (C) how far each valve opens
   (D) All of the above.
32. Identify the top end components of the dual overhead cam engine illustrated below.

33. Camshaft ____ is how far the valves open.

34. Camshaft ____ determines how long the valve stays open.

35. Define valve timing.

36. ____ is the time when both the intake and exhaust valves in the same cylinder are open.
37. Describe the purpose of a *camshaft thrust plate*.

38. The camshaft journals ride in the cam **.**

39. Explain the term *cam housing*.

40. A cam cover serves the same purpose as a(n) ** cover on an overhead valve engine.**

41. Valve ** ride on the camshaft lobes and transfer motion to the other parts of the valve train.**

42. ** lifters are common because they operate quietly by maintaining zero valve clearance.**

43. ** lifters are not self-adjusting and require periodic setting.**

44. A roller lifter can be either mechanical or **.**

45. How is valve clearance normally adjusted on engine's equipped with OHC followers?

46. Identify the parts of the following hydraulic lifter illustrated below.

(A) **

(B) **

(C) **

(D) **

(E) **

(F) **

(G) **

(H) **

(I) **

(J) **

(K) **
47. ______ are used in cam-in-block engines to transfer motion from the lifters to the rocker arms.

48. Describe the function of rocker arms.

49. Rocker arms are usually made of either ______ or ______.

50. ______ rocker arms are used to change the valve train clearance.

**Intake Manifold Construction**

51. An intake manifold holds the ______ and has passages (runners) going to each cylinder head port.

52. What is an intake manifold normally made of?

53. ______ are internal passages formed in the intake manifold to carry either the air-fuel mixture or air to the cylinder head ports.

54. Define flame arrester.

55. A(n) ______ system has two sets of intake runners controlled by butterfly valves to aid engine efficiency and performance.

**Exhaust Manifold Construction**

56. Describe the function of an exhaust manifold.

57. A few high-performance or sports car engines use lightweight, free-flowing steel tubing exhaust manifolds called ______.