1. __________________ is the process of reducing friction between sliding surfaces by placing a smooth or slippery substance between them.

2. **Lubricants are available in 3 basic forms:**
   - ________________ which is powder (graphite) or can be a coating on a surface (Teflon)
   - ________________ which can be greases, pastes, or thick gear lubricants (SAE # 80-140)
   - ________________ which can be oils or chemical additives to liquids like engine coolant

3. ________________ is resistance to motion between surfaces in contact which causes heat & wear.

4. As friction & heat increase between mating parts, wear increases to the point when parts either ________ themselves together or expand so much that they seize and can no longer move.

5. Excessively worn parts that don’t weld or seize might even become too __________ to function properly.

6. ________________ is a low friction alloy of ____________, ____________, and antimony. It is often used to coat precision insert bearing surfaces. It has a low coefficient of friction, especially when lubed.

7. ________________ tabs prevent rotation of precision insert bearing halves in the con rod or main caps.

8. Engine oil ________________ parts, keeps parts ________, transfers heat to ________ parts, & seals parts like the piston rings against the cylinder walls. *(LSCC - lubricates, cleans, cools, & seals)*

9. ________________ or full-film lubrication is the complete, unbroken film of lube between surfaces.

10. __________ lubrication is intermittent metal-to-metal contact between high spots on sliding surfaces.

11. __________ (C) or “soot” as well as __________ (H\textsubscript{2}O) vapor and acids formed during combustion will “blow-by” (escape past) the piston rings and contaminate the oil in the crankcase.

12. ________________/________________________ additives are blended into engine oils to suspend fine particles of contaminants until filters can trap them or until the oil is changed. @25-50 hours

13. If it weren’t for anti-______________ additives, the motion of the crankshaft would whip the oil into bubbles or foam which would neither cool nor lubricate very well. *Foamy oil reduces oil pressure.*

14. SAE stands for ______________ of ______________ ______________.

15. API stands for ______________ ______________ ______________.

16. ________________ is a measure or rating of oil’s resistance to flow. *(thickness or fluidity)*

17. The “W” in an oil’s viscosity rating *(5W30)* indicates that it is suitable for _________ surrounding temperatures *(ambient)*, such as in winter.
18. A _______ oil in low temperature operation, makes a cold engine very difficult to crank and may even deprive critical parts for lubrication until the engine warms from combustion heat.

19. ________-viscosity oils meet the viscosity grade ratings of 2 or more oils. (example: 5W30)

20. The API ratings are __________ classification ratings. API ratings are expressed with the letter S or C.

   The letter “S” stands for oils to be used in __________ ignition (gasoline, propane, butane, LP-gas) engines.

   The letter “C” stands for oils to be used in ____________________ ignition (diesel) engines.

21. The top API rating for gasoline engine oils is ______. Viscosity of SAE 30 is best for use above 40°F.

22. Automobile engine oil is not suitable for use in ______ cycle, air-cooled engines. Because the oil is burned with the fuel in 2 cycles, deposits would foul the spark plug & clog ports if regular oil was used.

23. 2 cycle engines get a fresh oil change during every upstroke because the oil is mixed with the ______.

24. 2 cycle engines must use oils that have additives which will actually _______ without leaving residue.

25. _________________ lubrication systems are often used in regular-duty, 4 cycle, air-cooled engines.

26. In full pressure oiling systems, passages are drilled in the block and through the crankshaft to deliver lubrication to critical points such as the ________________, main, and connecting rod bearings. **NOTE: A pressure filtering system is different than a full pressure lubrication system.**

27. A ________________________ valve controls maximum oil pressure in a full pressure oiling system where oil is pumped by either a gear, vane, or gerotor-type pump.

28. A _______-_______ and _______ system will use either a float or a submerged sensor to interrupt the primary ignition circuit & shut-off the engine if oil level is dangerously low.

29. Most oil filters contain a relief or by-pass valve so that if the filter becomes totally ____________, unfiltered oil will be allowed to flow to critical lubrication points. Many Industrial/Commercial engines now have Low Oil Shut-down devices that stop the spark if there is an insufficient oil level.

30. ________ pressure lubrication systems with positive displacement _________ and _______ -flow filtering systems are used in Industrial/Commercial engine because they are best at maximizing engine life by minimizing wear on internal parts. Lack of proper lube is a major cause of engine failure!