Clean engine oil is the lifeblood of any engine.

The SAE viscosity rating required is often printed on the engine oil filter cap.
FIGURE 18.3 API doughnut for an SAE 5W-30, SN engine oil. When compared to a reference oil, the "energy conserving" designation indicates a 1.1% better fuel economy for SAE 10W-30 oils and 0.5% better fuel economy for SAE 5W-30 oils.

FIGURE 18.4 The International Lubricant Standardization and Approval Committee (ILSAC) starburst symbol. If this symbol is on the front of the container of oil, then it is acceptable for use almost any gasoline engines.

FIGURE 18.5 ACEA ratings are included on the back of the oil container. In general, any of the standards, ACEA ratings apply only to European vehicles such as BMW, Mercedes, Audi, and VW.
Viscosity index (VI) improver is a polymer and feels like finely ground rubber. When dissolved in the oil, it expands when hot to keep the oil from thinning.

Mobil 1 synthetic engine oil is used by several vehicle manufacturers in new engines.

Dexos is the oil specified used in all Renault Motors engines starting with the 2011 model year.
European vehicle manufacturers usually specify engine oil with broad viscosity ranges, such as SAE 5W-40, and their own unique standards, such as the Mercedes specification 229.51. Always use the oil specified by the vehicle manufacturer.

Using a zinc additive is important when using SM or SN rated oil in an engine equipped with valve bottom lift, especially during the break-in period.

A cutaway of a typical spin-on oil filter. Engine oil enters the filter through the inlet hole around the center of the filter and flows through the pleated paper filtering media and out the large hole in the center of the filter. The center metal cylinder with holes is designed to keep the paper filter from collapsing under the pressure.
A rubber diaphragm acts as an anti-drain back valve to keep the oil in the filter when the engine is stopped and the oil pressure drops to zero.

A typical filter crusher. The hydraulic ram forces out most of the oil from the filter. The oil is trapped underneath the filter and is recycled.

Many vehicle manufacturers can display the percentage of oil life remaining, whereas others simply turn on a warning lamp when an oil change is required.
FIGURE 18.15 Always check to make sure that the oil drain plug is the plug being removed as vehicles also have transmission or transfer cases that also have drain plugs. This oil pan has a label with an arrow pointing to the engine oil drain plug.

FIGURE 18.16 Greasing tie rods. Some joints do not have a hole for excessive grease to escape, and excessive grease can destroy the seal.

FIGURE 18.17 Part of steering linkage lubrication is applying grease to the steering stops. If these stops are not lubricated, a grinding sound may be heard when the vehicle hits a bump when the wheels are turned all the way in one direction or the other. This often occurs when driving into or out of a driveway that has a curb.
To check an idler arm, most vehicle manufacturers specify that 25 lb force be applied by hand up and down to the idler arm. The idler arm should be replaced if the total movement (up and down) exceeds 1/4 in. (6mm).

Steering system components should be replaced if any noticeable looseness is detected when moved by hand.

All joints should be checked by hand for any lateral or vertical play.
This differential assembly has been leaking fluid. The root cause should be determined and the unit filled to the proper level using the specified lubricant, to help prevent early failure and an expensive repair later.

Always ensure that the fill plug can be accessed and removed before draining the fluid from a manual transmission.

A broken coil spring was found during an under-vehicle inspection. The owner was not aware of the problem and it did not make any noise, but the vehicle stability was affected.
FIGURE 18.24: This corroded muffler was found during a visual inspection, but was not detected by the driver because it was relatively quiet.

FIGURE 18.25: A drive axle shaft equipped with two flexible rubber grease boots at each of the wheels. Look for signs of grease leaking from these boots.

UNFIGURE 18.01: Before entering the customer’s car for the first time, be sure to install a seat cover as well as a steering wheel cover to protect the vehicle’s interior.
Run the engine until it is close to operating temperature. This will help the used oil drain more quickly and thoroughly.

Raise the vehicle on a hoist, and place the oil drain container in position under the oil drain plug. Be sure to wear protective gloves.

Remove the plug and allow the hot oil to drain from the engine. Use caution during this step, as hot oil can cause painful burns!
While the engine oil continues to drain, remove the engine oil filter using a filter wrench. Some oil will drain from the filter, so be sure to have the oil drain container underneath when removing it.

Compare the new oil filter with the old one to be sure that it is the correct replacement.

The wise service technician adds oil to the oil filter whenever possible. This provides faster filling of the filter during start-up and a reduced amount of time that the engine does not have oil pressure.
Apply a thin layer of clean engine oil to the gasket of the new filter. This oil film will allow the rubber gasket to slide and compress as the oil filter is being tightened.

Clean the area where the oil filter gasket seats to be sure that no part of the gasket remains that could cause an oil leak if not fully removed.

Install the new oil filter and tighten it by hand. Do not use an oil filter wrench to tighten the filter. Most filters should be tightened 3/4 of a turn after the gasket contacts the engine.
UNFIGURE 18.11 Carefully inspect the oil-drain plug and gasket. Replace the gasket as needed. Tighten the drain plug and tighten firmly but do not overtighten.

UNFIGURE 18.12 Lower the vehicle and clean around the oil-fill cap before removing it.

UNFIGURE 18.13 Use a funnel to add the specified amount of oil to the engine at the oil-fill opening. When finished, replace the oil-fill cap.
Start the engine and allow it to idle while watching the oil pressure gauge and/or oil pressure warning lamp. Oil pressure should be indicated within 15 seconds of starting the engine.

Stop the engine and let it sit for a few minutes to allow the oil to drain back into the oil pan. Look underneath the vehicle to check for oil leaks at the oil drain plug or oil filter.

Remove the oil-level dipstick and wipe it clean with a shop cloth.
UNFIGURE 18.17 Reinstall the oil-level dipstick. Remove the dipstick a second time and read the oil level.

UNFIGURE 18.18 The oil level should be between the MIN and the MAX lines. In this case, the oil level should be somewhere in the cross-hatched area of the dipstick.