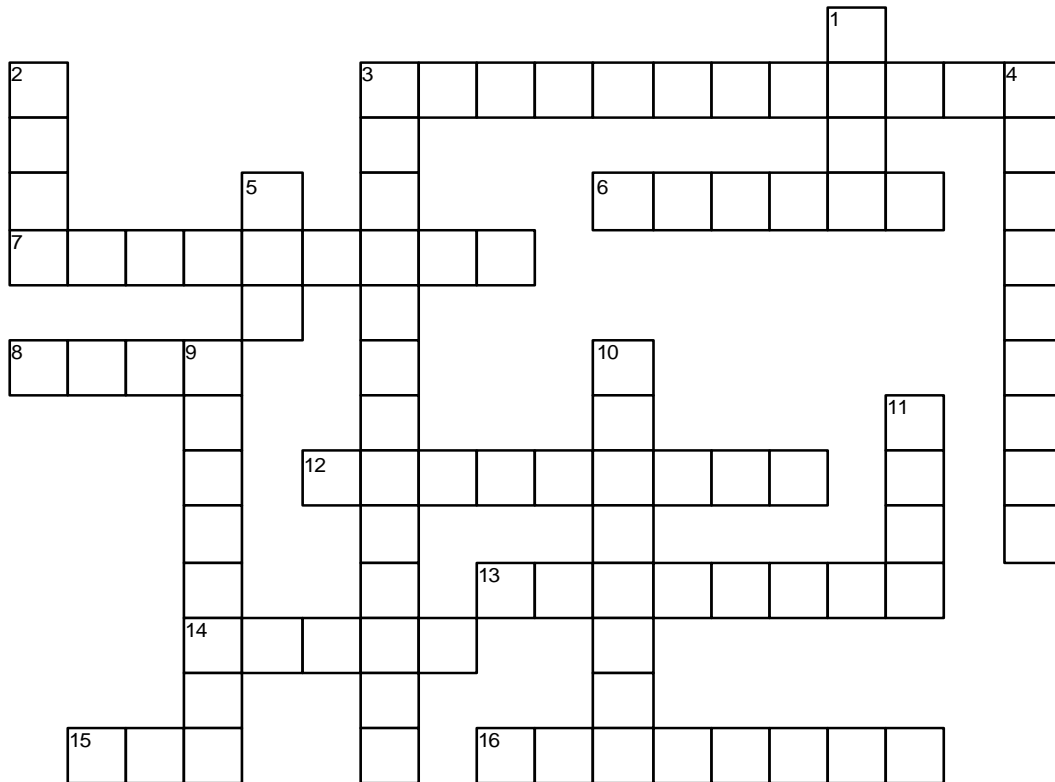


Engine Oil and Filters

Chapter 19



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ACROSS

- 3 _____ slow the breakdown of the base fluids caused by oxygen (air) and heat.
- 6 Either the engine or the filter is provided with a _____ valve that will allow the oil to go around the filter element.
- 7 The lowest temperature at which oil will pour is called its _____.
- 8 The _____ rates the oil according to A1-A5 for gasoline engines.
- 12 An index of the change in viscosity between the cold and hot extremes is called the _____ index.
- 13 _____ prevent acid formation (corrosion) in the form of sludges or varnishes.
- 14 The _____ developed an oil rating that consolidates the SAE viscosity rating and the API quality rating.
- 15 Engine oils are sold with a _____ grade number, which indicates the viscosity range into which the oil fits.
- 16 The _____ petroleum institute, working with the engine manufacturers and oil companies, has established an engine oil performance classification.

DOWN

- 1 ACEA oil requires low levels of sulfated ash, phosphorous and sulfur, abbreviated _____.
- 2 The levels of phosphate and zinc, commonly referred to as _____, have been reduced because they can cause damage to the catalytic converter.
- 3 Many oil filters are equipped with an _____ valve that prevents oil from draining out of the filter when the engine is shut off.
- 4 The term _____ means that it is a manufactured product and not refined from a naturally occurring substance.
- 5 The _____ performance or service classification and the SAE grade marking are the only information available to help determine which oil is satisfactory for use in an engine.
- 9 An _____ package is a number of chemicals that will help each other that can be used for each of the additive requirements.
- 10 Oils must also be _____, meaning they are capable of mixing with other oils without causing any problems such as sludge.
- 11 ACEA oil has a high temperature/high shear rate viscosity, abbreviated _____.