

19. *Acid Mixture* How many gallons of a 5% acid solution must be mixed with 5 gallons of a 10% solution to obtain a 7% solution?
20. *Acid Mixture* Bill Charlson needs 10% hydrochloric acid for a chemistry experiment. How much 5% acid should he mix with 60 milliliters of 20% acid to obtain a 10% solution?

21. *Alcohol Mixture* How many gallons of pure alcohol should be mixed with 20 gallons of a 15% alcohol solution to obtain a mixture that is 25% alcohol?
22. *Alcohol Mixture* A chemist wishes to strengthen a mixture from 10% alcohol to 30% alcohol. How much pure alcohol should be added to 7 liters of the 10% mixture?
23. *Saline Solution Mixture* How much water should be added to 8 milliliters of 6% saline solution to reduce the concentration to 4% saline?
24. *Acid Mixture* How much water should be added to 20 liters of an 18% acid solution to reduce the concentration to 15% acid?
25. *Antifreeze Mixture* An automobile radiator holds 16 liters of fluid. There is currently a mixture in the radiator that is 80% antifreeze and 20% water. How much of this mixture should be drained and replaced by pure antifreeze so that the resulting mixture is 90% antifreeze?
26. *Antifreeze Mixture* An automobile radiator contains a 10-quart mixture of water and antifreeze that is 40% antifreeze. How much should the owner drain from the radiator and replace with pure antifreeze so that the liquid in the radiator will be 80% antifreeze?

*Exercises 27 and 28 involve octane rating of gasoline, a measure of its antiknock qualities. In one measure of octane, a standard fuel is made with only two ingredients: heptane and isooctane. For this fuel, the octane rating is the percent of isooctane. An actual gasoline blend is then compared with a standard fuel. For example, a gasoline with an octane rating of 98 has the same antiknock properties as a standard fuel that is 98% isooctane.*

27. *Octane Rating of Gasoline* How many gallons of 94-octane gasoline should be mixed with 400 gallons of 99-octane gasoline to obtain a mixture that is 97-octane?
28. *Octane Rating of Gasoline* How many gallons of 92-octane and 98-octane gasoline should be mixed together to provide 120 gallons of 96-octane gasoline?