

Density Rainbows and the Great Viscosity Race Worksheet **Answers**

1. Record the colors of your fluids in the table below.

Fluid	Color
Corn syrup	
Alcohol	
Shampoo	
Oil	Yellow
Strawberry syrup	Red

2. What is density? What are some properties of dense fluids?

It is the measure of mass per unit volume, including the number and weight of molecules of a fluid per unit volume. Dense fluids tend to move slowly. They are heavy.

3. If you are reminded that density is the measure of mass per unit volume, what can you say about the mass of two cups that contain the same volumes of different fluids? Which one will be heavier? Will the cup filled with the denser fluid be heavier or lighter than the other?

They will not weigh the same, unless the fluids have the same densities. The cup filled with the denser fluid will be heavier.

4. Predict the order of the fluids from heaviest to lightest. Which fluid is going to sink all the way to the bottom?

The densest fluid will be at the bottom; the least dense at the top.

5. When you poured in the fluids, did they stay in the order you poured them? Or did some that you thought were denser move up a layer? Why did the fluids set in that order?

Buoyancy makes the densest stay at the bottom and the least dense travel to the top. If some layers switched, it was because their guess about the order of densities in question 4 was wrong. If the layers stayed, then their guess was correct. The final order should be: corn syrup, strawberry syrup, shampoo, oil, and alcohol.

The Great Viscosity Race

6. What is viscosity?

It is the resistance of a fluid to flow or to shear.

7. A lot of dense fluids tend to be viscous, such as corn syrup. Yet viscosity and density are different properties of a fluid. Is ketchup denser than chocolate syrup?

No, chocolate syrup is denser than ketchup (as seen when we poured the chocolate syrup and ketchup into a glass).

8. Which one do you think is more viscous?

Answer will vary with each student.

9. Predict which fluid will win the race down the paper, ketchup or chocolate syrup?

Answer will vary with each student.

10. Was your prediction correct? Which of the two fluids was the *least* viscous (won the race)? Was this fluid also the *least* dense?

Chocolate syrup was the less viscous fluid. No, the syrup was also the densest.

11. Viscosity measures the resistance of a fluid to flow. If a fluid is viscous, it does not flow easily and therefore it moves very slowly when you pour it. Is a dense fluid necessarily viscous? (Hint: Review the definition of viscosity; does it mention density?)

No, they are different properties and should not be mistakenly connected.

12. Of the fluids used for the rainbow, which do you think was the *most* viscous? Which was the *least* viscous?

Most viscous: shampoo, then corn syrup, then strawberry syrup, then oil, then alcohol.