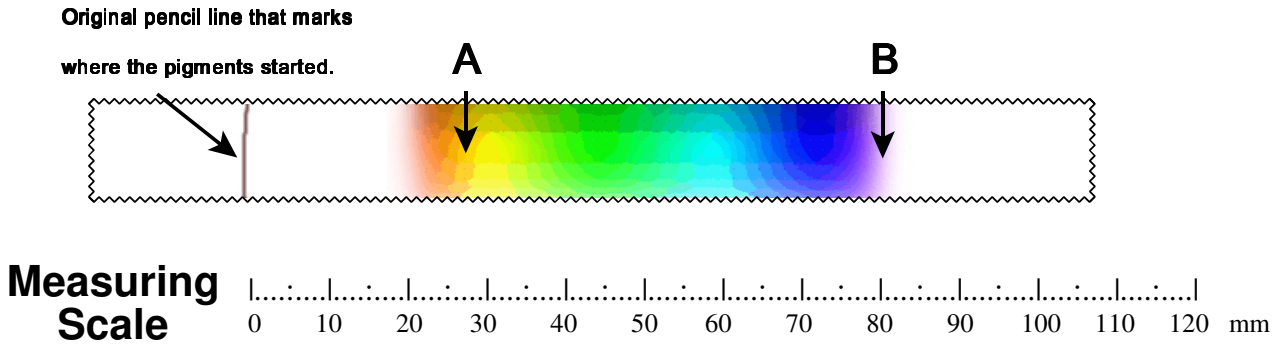
Chromatography Lab ✷ **MAKE UP** ✷ _____ ____
Name per

1. Read the information on the back side of this paper and then fill in the blanks in the following paragraph using these terms.

polar, osmosis, cohesion, density, adhesion, developer, chromatography, dissolve, paper fibers, rates of migration, brown, pigments, amino acids,

The original mixture used in this experiment was _____ color. This experiment will allow us to determine if the ink is made of brown molecules, or if it is the combination of many _____. Scientist can use procedures such as _____ to separate the different components of a mixture. The developer used must be able to _____ the substances in the mixture. Since the water being used as the _____ is polar, the pigments must be _____, or else they will not be carried up by the water. Due to the _____ of water molecules to each other, and the adhesion of water molecules to the _____, the water will soak into the paper and migrate through it. The different components of the mixture will have different _____ due to the differences in size and shape of their molecules.



2. The image above represents the results of doing chromatography on a brown marker's pigments. What was the distance the developer traveled (distance from the pencil line to top of developer "B")? _____**mm**

3. What was the migration of the **fastest** moving pigment.(pencil line to top of highest color "B")? _____**mm**

4. What was the relative rate of migration (**R_f**)of that pigment? (as explained on back side of this page) _____

5.. What was the migration of the **slowest** moving pigment (pencil line to top of lowest color "A")? _____**mm**

6. What was the relative rate of migration (**R_f**) of that pigment? _____

7. How many different molecules (colors) were in this mixture? _____

Chromatography

When water molecules stick to one another it is called **cohesion**. When water molecules stick to other types of molecules it is called **adhesion**. Because of cohesion and adhesion water will crawl through a small tube in a process called **capillary action. Capillary action** also causes water to be absorbed into and migrate through paper.

The liquid being absorbed in a chromatography experiment is called the **developer.** A highly polar developer (such as water) is best at dissolving (and moving) polar substances or pigments. A relatively non-polar substance such as pure alcohol is best at dissolving non-polar pigments such as oils and waxes.

As the developer (water) migrates through the paper it will drag with it any other molecules it finds in its path. These substances usually will move slower than the water. Since different substances end up **migrating** at different rates through the paper, chromatography can be used by biologist to separate the various components of a mixture based on how fast they move.

The speed of the substance (relative to the speed of the water) can be measured. This speed is known as the **relative rate of migration** (R_f) and can be calculated using the following formula:

$$R_f = \frac{\text{distance pigment migrated}}{\text{distance developer migrated}}$$

Centrifugation:

Another common method of separating the component parts of a mixture is to spin them in a centrifuge, this is called **centrifugation**. Centrifugation will separate the substances in a mixture based on their **densities**. Chromatography separates substances based on how fast they can travel through paper (which varies depending on the size and shape of a molecules).