Flipping Physics Lecture Notes:

Do Anti-lock Brakes use Static or Kinetic Friction?
by Billy

ABS Brakes stands for Anti-lock Braking System:

- Anti-lock brakes attempt to keep the wheels Rolling *without* Slipping
- Sensors detect tire slippage, decrease braking pressure and reduce tire slippage
- Rolling *without* Slipping uses static friction
    - Static friction because the surfaces do *not* slide relative to one another

Without anti-lock brakes, the brakes will cause the wheels to lock up and Roll *with* Slipping

- Rolling *with* Slipping uses kinetic friction
    - Kinetic friction because the surfaces *do* slide relative to one another

For any two surfaces the coefficient of static friction is larger than the coefficient of kinetic friction. This is why static friction will slow a vehicle down more quickly than kinetic friction.

Calculations:

During the stop there are $404\,\frac{frames}{tire}$, however, there are four tires so:

$$4\ tires \times \frac{404\ frames}{tire} = 1616\ total\ frames$$

and there are 44 total frames where tires slip: $6+19+10+9=44\ slipping\ frames$

The percentage of frames where the tires slip and therefore use kinetic friction is:

$$\frac{44}{1616}\times 100 = 2.723 \approx 3\%\ kinetic\ friction$$

Therefore ABS Brakes, in this experiment, are $\boxed{97\%\ static\ friction}$!!