1. Average $F_{s,max}$ = 3.383 ± .048 , average F_K = 2.321 ± .065 for 1.0 kg and average $F_{s,max}$ = 4.4626 N ± 0.6565 N, average F_K = 3.2574 ± 0.1065 for 1.5 kg

Uncertainty = (max - min / 2) so for example, 5.142 - 3.829 / 2 =

Trial (1 Kg)	F_s max (N)	F_K (N)
1	3.511	2.507
2	3.295	2.217
3	3.315	2.360
4	3.383	2.280
5	3.410	2.243

Trial (1.5 Kg)	F_s max (N)	F_K (N)
1	5.142	3.344
2	3.829	3.173
3	4.391	3.386
4	4.668	3.181
5	4.283	3.203

2. 1.5kg: u_s = 0.304 ± 0.447 and u_K = 0.222 ± 0.007
1kg: u_s = 0.345 ± 0.005 and u_K = .239 ± .007

These values are similar and nearly within each other's uncertainty.

3. The measured force once the object starts sliding decreases as the friction goes from static to kinetic, and we know that static friction is greater than kinetic friction (more force required to start motion than keep something in motion).
4. The inclusion of the force sensor does not significantly change the friction in the experiment as the mass of the blocks is a lot greater than that of the force sensor (so even though there is friction between the sensor and the surface it should be negligible). We could verify this by potentially pulling the sensor at angle and then taking the cosine of the applied force for our friction calculation.
5. Mgsin(theta) = coefficient of static friction * mgcos(theta)
   Coefficient of friction = mgsin(theta)/mgcos(theta)
   Coefficient of friction = tan(theta)
   Theta = inverse tan (coefficient of friction)

6. Our average values for the critical angle with each set of masses was:

0.5 kg → 15.88˚ ± 1˚

1.0 kg → 14.48˚ ± 0.3˚

Trial (0.5 Kg)	Angle (˚)
1	16.9
2	14.9
3	16.2
4	15.7
5	15.7

Trial (1 Kg)	Angle (˚)
1	14.6
2	14.7
3	14.4
4	14.1
5	14.6

7. Our coefficient of static friction for each set of masses was:

0.5 kg → 0.28 +- 0.02

1 kg → 0.26 +- 0.01

8. These do not agree, the angle measuring sensor could have been wrong (max said it was "janky")

9. "In this lab, we embarked on a comprehensive exploration of frictional forces, specifically focusing on understanding static and kinetic friction. Our objective was to measure the coefficients of friction (μs and μk) for a wooden block on a metal surface while considering different masses and incline angles. While the experiments yielded valuable insights, we encountered certain discrepancies that require careful consideration.

Firstly, when analyzing our results, we noticed some inconsistencies in the values of μs obtained using two distinct methods. One method involved direct measurements of the maximum static friction (fs,max) and kinetic friction (fk) forces for both 1.0 kg and 1.5 kg setups. The other method relied on determining the critical angle at which the block began to slide on an inclined surface and subsequently calculating μs using a tangent relationship.

These discrepancies can be attributed to several factors. Experimental uncertainties, inherent variations in the experimental setup, minor surface imperfections on the metal track, and potential variations in the wooden block's behavior all contribute to these differences. Additionally, the accuracy of the angle-measuring sensor used to determine the critical angle could introduce errors into our measurements.

Regarding the tangent relationship between μs and the angle, it plays a pivotal role in understanding the discrepancies. When the block is on the brink of sliding down the inclined plane, it reaches equilibrium with the force of gravity acting along the incline and the maximum static frictional force (fs,max) opposing it. This equilibrium can be expressed as fs,max = μs * mgcos(θ), where θ is the critical angle.

By rearranging the equation, we find that μs = tan(θ), highlighting the direct relationship between μs and the tangent of the critical angle. While this relationship theoretically allows us to determine μs by measuring θ, the discrepancies observed in our lab suggest that experimental precision and potential sources of error can affect the accuracy of this method.

In conclusion, this lab provided invaluable hands-on experience in grasping the complexities of frictional forces, especially in distinguishing between static and kinetic friction. It underscored the significance of meticulous measurements, precise experimental setups, and the awareness of experimental uncertainties. While we encountered discrepancies, these challenges serve as valuable lessons in experimental physics, highlighting the importance of critical analysis and refinement in future investigations."