Inclined Planes Questions from A4.4

Show your work, round to the correct significant figures, circle your answers, and label them with units. The signs use the convention that up the plane is positive, and down, negative. Label your <u>forces</u> either "Up the plane" or "Down the plane" explicitly. Label every <u>acceleration</u> as either "accel" = "acceleration" (speeding up) or "decel" = "deceleration" (slowing down)

No - F∥ of 23.6 N is much bigger than FFs of 9.95 N -2.31 m/s/s (accel) +6.80 m/s/s (accel) +2.41 N Up the plane +25.3 N Up the plane	**1. A 3.10 kg block of wood is on a 51.0⁰ inclined plane where the static coefficient of friction is 0.520, and the kinetic is 0.380** a. Will the block stay on the plane if it is initially at rest? Back up your answer with numbers. b. What is the acceleration of the block if it is sliding down the plane and there is a force of 9.20 N up the plane? c. What is the acceleration of the block if it is sliding up the plane and there is a force of 52.0 N up the plane? d. What applied force would cause the block to slide down the plane with an acceleration of 4.50 m/s/s down the plane? e. What applied force would cause the block to slide up the plane with a <u>deceleration</u> of 1.80 m/s/s?
-3.54 m/s/s (accel) -7.96 m/s/s (accel) -7.37 m/s/s (decel) +9.99 N Up the plane +13.0 N Up the plane	**2. A 1.40 kg block of wood is on a 27.0⁰ inclined plane where the static coefficient of friction is 0.220, and the kinetic is 0.105** a. What is the acceleration of the block if it is sliding freely down the plane? b. What is the acceleration of the block if it is sliding down the plane and there is a force of 6.20 N down the plane? c. What is the acceleration of the block if it is sliding up the plane and there is a force of 2.80 N down the plane? d. What applied force would cause the block to slide down the plane with an <u>deceleration</u> of 3.60 m/s/s? e. What applied force would cause the block to slide up the plane with an acceleration of 3.90 m/s/s up the plane?
-4.53 m/s/s (accel) +4.19 m/s/s (accel) -0.935 m/s/s (accel) -26.9 N Down the plane +7.58 N Up the plane	**3. A 4.50 kg block of wood is on a 39.0⁰ inclined plane where the static coefficient of friction is 0.365, and the kinetic is 0.215** a. What is the acceleration of the block if it is sliding freely down the plane? b. What is the acceleration of the block is it is sliding up the plane and there is a force of 54.0 N up the plane? c. What is the acceleration of the block if it is sliding down the plane, and there is a force of 16.2 N acting up the plane? d. What applied force would make the block slide up the plane, but <u>decelerate</u> at 13.8 m/s/s? e. What applied force would make the block slide down the plane with an acceleration of 2.85 m/s/s down the plane?
-1.63 m/s/s (accel) -3.96 m/s/s (accel) +0.612 m/s/s (accel) +290. N Up the plane -93.9 N Down the plane	**4. A 24.0 kg block of wood is on a 22.0⁰ inclined plane where the static coefficient of friction is 0.385, and the kinetic is 0.225** a. What is the acceleration of the block if it is sliding freely down the plane? b. What is the acceleration of the block if it is sliding down the plane and there is a force of 56.0 N down the plane? c. What is the acceleration of the block if it is sliding up the plane and there is a force of 152 N up the plane? d. What applied force would cause the block to slide up the plane with an acceleration of 6.37 m/s/s up the plane? e. What applied force would cause the block to slide down the plane with an acceleration of 5.54 m/s/s down the plane?
Yes - the FFs of 93.9 N is slightly bigger than the F∥ of 93.4 N -17.1 m/s/s (decel) -13.6 m/s/s (accel) +244 N Up the plane +88.7 N Up the plane	**5. A 16.2 kg block of wood is on a 36.0⁰ inclined plane where the static coefficient of friction is 0.730, and the kinetic is 0.415** a. Will the block stay on the plane if it is initially at rest? Back up your answer with numbers. b. What is the acceleration if the block is sliding up the plane, and there is a force of 130. N down the plane? c. What is the acceleration of the block if it is sliding down the plane, and there is a force of 180. N down the plane? d. What applied force is needed to make the block slide up the plane and accelerate up the plane at 6.00 m/s/s? e. What applied force is necessary to make the block slide down the plane, but <u>decelerate</u> at 3.00 m/s/s?