P4.3 Physics - Friction Questions

Use the convention that to the <u>right</u> is positive, and to the <u>left</u> is negative.

Label every force **<u>right</u>** or **<u>left</u>**; Label every acceleration as either **<u>accel</u>** - speeding up or **<u>decel</u>** - slowing down

Part e from every question is not on the summative assessment, they are there for a challenge (The assessments are like 0. and a. through d.)

7.13 N, 9.68 N Yes: 15.0 N > 9.68 N +2.43 m/s/s (decel) -2.70 m/s/s (decel) -10.0 N (left) -32.6 N (left) +39.7 N (right)	**1. There is a coefficient of kinetic friction of 0.140 and a static of 0.190 between a 5.20 kg box and the level floor.** 0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 15.0 N, **would the block begin to move**? Support your answer with numbers. a. If the box is sliding to the left, and we exert a force of 5.50 N to the right, what is the acceleration? b. If the box is sliding to the right, and we exert a force of 6.90 N to the left, what is the acceleration? c. The box is sliding to the right, but is decelerating at 3.30 m/s/s, what outside force besides friction is acting on it? d. If the box is sliding and accelerating to the left at 4.90 m/s/s, what force must be acting on it? Optional: e. The box slides from rest to the right reaching a velocity of 14.5 m/s in a distance of 16.8 m. What outside force was acting?
4.89 N, 20.9 N No: 19.0 N < 20.9 N +0.697 m/s/s (accel) +0.461 m/s/s (decel) +25.3 N (right) +28.8 N (right) +6.75 m/s (right)	**2. There is a coefficient of kinetic friction of 0.105 and a static of 0.450 between a 4.75 kg block of wood and the level floor.** 0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 19.0 N, **would the block begin to move**? Support your answer with numbers. a. If there is a force of 8.20 N to the right, and the block is sliding to the right, what is the acceleration? b. If the block is sliding to the left, and there is a force of 2.70 N to the left, what is the acceleration of the block? c. What applied force would make the block accelerate and slide to the right at 4.30 m/s/s? d. If the block is sliding to the left, but is decelerating at 7.10 m/s/s, what force must be applied to it? Optional: e. If you apply 8.90 N to the right and the block starts to slide to the right from rest, what will be the velocity in 8.00 seconds?
25.4 N, 38.5 N Yes: 45.0 N > 38.5 N -1.48 m/s/s (decel) -4.52 m/s/s (decel) -1.99 N (left) -36.1 N (left) +72.4 N (right)	**3. There is a coefficient of kinetic friction of 0.310 and a static of 0.470 between an 8.35 kg block of wood and the level floor.** 0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 45.0 N, **would the block begin to move**? Support your answer with numbers. a. If the block is sliding to the right, and there is a force of 13.0 N to the right, what is the acceleration? b. If the block is sliding to the right, but there is a force of 12.4 N to the left, what is the acceleration? c. If the block is sliding to the left, but is decelerating at 2.80 m/s/s, what outside force must be acting? d. If the block is sliding to the right, but is decelerating at 7.36 m/s/s, what is the force acting on the block? Optional: e. From rest the block reaches a speed of 15.0 m/s from rest in a distance of 20.0 m. What force was acting?
4.71 N, 7.90 N No: 6.00 N < 7.90 N -2.87 m/s/s (decel) -0.520 m/s/s (accel) +18.5 N (right) -10.1 N (left) -13.7 N (left)	**4. There is a coefficient of kinetic friction of 0.155 and a static of 0.260 between a 3.10 kg block of wood and the level floor.** 0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 6.00 N, **would the block begin to move**? Support your answer with numbers. a. If the block is sliding to the right, and you exert a force of 4.19 N to the left, what is the acceleration? b. If the block is sliding to the left, and you exert a force of 6.32 N to the left, what is the acceleration? c. If the block is sliding and accelerating to the right at 4.45 m/s/s, what force must be applied? d. If the block is sliding to the left and accelerating to the left at 1.75 m/s/s, what force must be applied? Optional: e. The block displaces itself to the left 12.0 m from rest in 2.87 s. What force must have acted?
20.4 N, 33.4 N Yes: 34.0 N > 33.4 N +0.778 m/s/s (decel) +1.62 m/s/s (accel) -37.1 N (left) -8.97 N (left) +10.9 m/s (right)	**5. There is a coefficient of kinetic friction of 0.235 and a static of 0.385 between an 8.85 kg box and the level floor.** 0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 34.0 N, **would the block begin to move**? Support your answer with numbers. a. If the box is sliding to the left, and there is a force of 13.5 N to the left, what is the acceleration? b. If the box is accelerating to the right, and there is a force of 34.7 N to the right, what is the acceleration? c. If the box is sliding to the right, but is decelerating at 6.50 m/s/s, what force must be acting on the box? d. If the box is sliding to the left, but is decelerating at 1.29 m/s/s, what must be the force acting on the box? Optional: e. If the box is sliding to the right, and there is a force of 32.0 N to the right, what will be its final velocity from rest when is has gone 45.0 m?