

# Worksheet: Stretching and Injury Prevention with STEM Sports®

PART 1: Match the common injuries with the stretch/warm-up activity that you think would prevent that injury. Each stretch/warm-up may prevent more than one injury. (Middle School: please explain your reasoning for each selection).

- A. Ankle sprain
- B. Groin pull
- C. Hamstring strain
- D. Shin splint
- E. Knee injury
- F. Tennis elbow



B



A



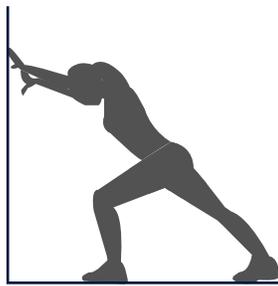
F



C



F



D



E



B

# PART 2:

For each injury diagram, describe the angle and force relationship that caused the injury.

## 1. What is the force acting on the ankle? Use one of Newton's three laws to describe the cause of the injury?

The force acting on their ankle is body weight, or an equal reaction from pushing on the ground from the fall is the ground pushing back -- all that force from their body weight and acceleration is pushed back into their ankle's bones and tendons.

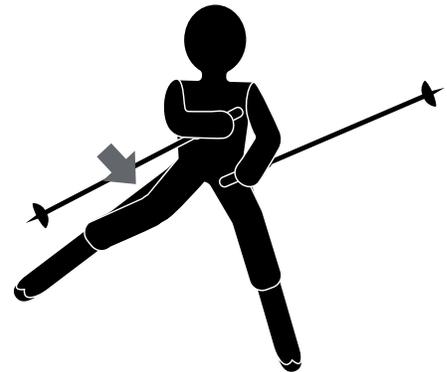


## 2. What is the impact of the angle on the ankle?

While parts of our body can be stretched and loosened at a 45° angle, the angle in this particular image is outside a 45° angle or a normal/healthy angle. In turn, the impact on the ankle is extreme, causing an ankle injury.

## 3. What is the force acting on the knee? Use one of Newton's 3rd Laws to describe the cause of the injury?

The force acting on the knee is an "unbalanced force", created by leaning to one side, thereby placing force from their body weight to the knee.



## 4. What is the impact of the angle on the knee?

The skier's position is exceeding the normal 45° angle to stretch or loosen the muscles. In this particular diagram, their angle is "unnatural or extreme". In turn, an impact on the knee that would cause injury.

## 5. What is the force acting on the groin (inner thigh)? Use one of Newton's three laws to describe the cause of the injury?

The force acting on their groin is created from pushing their legs to stretch toward the ground and the ground pushing back.

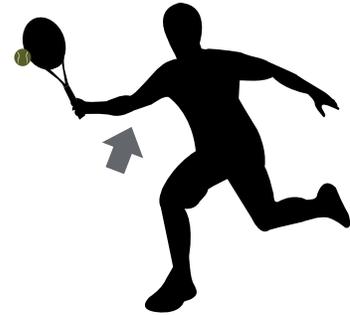
## 6. What is the impact of the angle on the groin (inner thigh)?

This position is at a 90° angle, which is an extreme angle that impacts the muscles and joints significantly.



**7. What is the force acting on the elbow? Use one of Newton's 3rd Laws to describe the cause of the injury?**

The force acting on the player's elbow is an unbalanced force from their body weight to their elbow when hitting the ball. This, combined with their acceleration to hit the ball can put tremendous strain on their elbow.



**8. What is the impact of the angle on the elbow?**

This position is not an extreme angle, yet an angle and force that has had an impact on the player's elbow over time.

**9. What is the force acting on the shin? Use one of Newton's three laws to describe the cause of the injury?**

Similar to the ankle sprain, the pushing force acting on the ankle is created by leaning forward on an even surface. In other words, an equal reaction from pushing on the ground from the fall is the ground pushing back -- all that force from their body weight and acceleration is pushed back into their shin/bones.



**10. What is the impact of the angle on the shin?**

This angle is impacted because of an unbalanced force. In turn, impacting injury on the shin significantly.

**11. What is the force acting on the hamstring? Use one of Newton's three laws to describe the cause of the injury?**

The force acting on the hamstring is a push/pull force from the acceleration of the basketball player jumping off the ground.



**12. What is the impact of the angle on the hamstring?**

This position is not an extreme angle, yet an angle and force that has had an impact on the player's hamstring over time.