WHAT ARE THE PATHWAYS IN THE CENTRAL NERVOUS SYSTEM THAT PROCESS PAIN & TEMPERATURE?

They are collectively called the anterolateral system.

The anterolateral system has 3 main components: the spinothalamic tract, the spinoreticular tract, and the spinotectal tract. Each of these tracts of the anterolateral system has a different primary function.
WHY IS IT CALLED THE ANTEROLATERAL SYSTEM?

Remember: Pain and temperature fibers of the dorsal roots bifurcate after entering the zone of Lissauer. The axons then travel short distances rostrocaudally and then enter the superficial regions of the dorsal horn.

These cells in the superficial regions of the dorsal horn then send their axons across the midline (in the ventral white commissure). After crossing the midline, the axons project to the anterior part of the lateral column of white matter (the term anterior here is borrowed from the human or bipedal terminology), hence the term anterolateral system. At this anterolateral region of the cord, the axons do not synapse but rather turn rostrally and project to different regions of the nervous system.

Note: In the dorsal-column medial lemniscal system, the crossing of information from one side of the body to the other takes place at the medulla. However, in the anterolateral system, the crossing of information takes place at the spinal cord, near the rostrocaudal level of entry.
WHAT IS THE GENERAL ANATOMICAL AND FUNCTIONAL ORGANIZATION OF THE SPINOthalamic TRACT?

After crossing the midline, some of the axons in the anterolateral region project to the thalamus. These axons comprise the spinothalamic tract.

Some of these spinothalamic tract axons project to the ventral posterior lateral nucleus of the thalamus (VPL). VPL in turn projects to primary somatosensory cortex.

There is somatotopic order in the spinothalamic tract. As you can see in the diagram below, there is an orderly representation of the body among the spinothalamic tract axons in the anterolateral region of the cord. However, this map is not as detailed as the maps in the dorsal-column medial lemniscal system.

Given the somatotopic map in the spinothalamic tract at the level of the cord, combined with the fact that many of its axons project to VPL of thalamus, the spinothalamic tract plays an important role in the localization of painful or thermal stimuli. (Remember, there is a nice somatotopic map of the body in VPL of thalamus).
WHAT IS THE GENERAL ANATOMICAL ORGANIZATION AND FUNCTION OF THE SPINORETICULAR TRACT?

After crossing the midline, some of the axons of the anterolateral region project to and synapse within the brainstem reticular formation. These axons comprise the spinoreticular tract.

The brainstem reticular formation sends its axons to several different places. Some of the axons project to the thalamus. Specifically, they project to the intralaminar nuclei of the thalamus. The intralaminar nuclei of the thalamus project to very widespread regions of cerebral cortex.

The intralaminar nuclei of thalamus also project to other thalamic nuclei, which in turn send their axons to cerebral cortex. Thus, activity in the spinoreticular tract can eventually activate many cells in cerebral cortex.

As if this weren't enough, axons from the brainstem reticular formation also project to the contralateral brainstem reticular formation. The same circuitry exists on the contralateral side. Thus, activity in one spinoreticular tract can lead to widespread bilateral activation of cerebral cortex.

Thus, the spinoreticular tract plays a major role in general alertness and arousal in response to painful stimuli.
WHAT IS THE GENERAL ANATOMICAL AND FUNCTIONAL ORGANIZATION OF THE SPINOTECTAL TRACT?

After crossing the midline, some of the axons of the anterolateral region project to and synapse within the rostral colliculus. These axons comprise the spinothalamic tract. (Tectum is a general anatomical term referring to the dorsal part of the midbrain).

The spinothalamic tract is also called the spinomesencephalic tract.

The rostral colliculus plays a major role in orienting the eyes and head toward relevant stimuli. Thus, the spinothalamic tract plays a role in orientation toward potentially harmful somatosensory stimuli.

WHAT IS THE GENERAL FUNCTION OF THE ANTEROLATERAL SYSTEM?

Activation (spinoreticular tract) in response to potentially harmful stimuli.

Localization (spinothalamic tract) of potentially harmful stimuli.

Orientation (spinoreticular tract) toward potentially harmful stimuli.

So let's say you get stuck with a pin on your arm. Your spinoreticular system says, "WHooooaaaaa, wake up, something is happening". Your spinothalamic system says, "Hmmm... where is that coming from?" and your spinoreticular system says, "Let's take a peek at where that is coming from".

P.S. The spinoreticular tract also sends fibers to an area of the midbrain called the periaqueductal gray matter. Cells in this region are known to contribute to descending pathways to the dorsal horn of the spinal cord that can suppress incoming pain information. Thus, the spinoreticular tract may be involved in initiating certain pain control processes.