Class Starters & Enders

Making the Most of Instructional Time
Five Minute Lessons

Class Starters and Enders help utilize the last minutes of class when a lesson ends but there is not enough time to start another, or for an interest approach at the beginning of class. Mini-lessons correlate to GPS in the programs areas below.

Protective Textiles: Law Enforcement and Military

Program Areas: Law & Justice, Textile Science, Engineering & Technology

Instructions: Read the narrative and make notes of important points, answer questions, if provided, and be ready to discuss this topic.

Many professions rely on textiles with high-performance fibers to protect them from occupational hazards: firefighters need protection against heat and radiation, welders need shielding from molten metals, and law enforcement officers wear tactical gear to minimize the danger of projectiles. In bulletproof jackets, special **aramid fibers** are used which have high **tenacity**, high **thermal** resistance and low shrinkage. Glass fiber is used in fireproof jackets due to its high strength resistance to chemicals and flames. Protective clothing is also worn by astronauts when they go into space; lunar landing suits are coated with chemicals such as lead to shield from solar radiation. Body armor designed to stop stabbing attacks, bullets, and explosive shrapnel are of critical importance in the military and in law enforcement. Because metal armor is often heavy and cumbersome, many modern armors are based on fabrics. **Kevlar** is the most well-known material used in bulletproof armor, but new technologies hold promise for improved performance and reduced weight. One key need is for soft textiles, which can stop not only handgun rounds, which is within current capabilities, but also rifle rounds, which can pierce current versions of soft textile armors. Research is being done on the chemical composition of fibers and weaving methods, with one example being the possible **biomimicry** of spider silk. A related area of research is **nanomaterials**; the incorporation of carbon fibers into body armor is of particular interest. Another application of protective textiles is military use: NBC (nuclear, biological, and chemical) suits are a piece of military personal equipment designed to protect the wearer from radioactive, biological, and chemical substances. The design of materials for NBC suits is particularly challenging because of the many criteria which they must meet; they must shield against radiation, block liquid and gaseous chemicals, and resist contamination/degradation by biological substances. Additionally, they must meet the needs of military personnel in high performance situations by being durable, lightweight, flexible, and breathable. Consider the difficulty in designing a material that permits the wearer's evaporated sweat to exit while preventing **mustard gas** from entering; these are the challenges textile engineers face.

Language Connection

Research and write definitions for the terms in notes.

aramid fibers	biomimicry
Kevlar	mustard gas
nanomaterials	nanotechnology
tenacity	thermal

Review

1. List four professions that use protective textiles.
2. What type of fiber is used in fireproof jackets?
3. What do NBC suits protect against?
4. Why are modern armors based on fabrics rather than metal?
5. What is a key need for textile armors that is currently being researched?
6. What are two new avenues of research for improving protective textiles?
7. What qualities must NBC suits have to facilitate use by military personnel?
8. Which of these protective suits do you think is more useful to law enforcement? Why?
9. Explain the importance of engineering and technology to law and justice, military, etc.
10. List seven hazards against which protective textiles guard.

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