Virginia CTE

Principles of Technology 1 (9811)

UNIT 1: FORCE PT1.1	1	**Differentiate between scalar and vector.** PT1.1.1
	2	**Define force in general and in the context of mechanical, fluid, electrical, and thermal systems.** PT1.1.2
	3	**Give examples of complex technological devices where force must be controlled, measured, or applied.** PT1.1.3
	4	**Calculate force, pressure, voltage, and temperature difference.** PT1.1.4
	5	**Predict what happens to an object when forces on it are balanced and when forces on it are unbalanced.** PT1.1.5
	6	**Measure force in mechanical, fluid, electrical, and thermal systems.** PT1.1.6
	7	**Research occupations that require technicians to measure, control, or otherwise deal with force in complex devices.** PT1.1.7
UNIT 2: WORK PT1.2	1	**Define work in general and in mechanical, fluid, and electrical systems.** PT1.2.1
	2	**Compare the presence of force and movement in mechanical, fluid, and electrical systems.** PT1.2.2
	3	**Identify the International System of Units (SI) and English units for work in mechanical, fluid, and electrical systems.** PT1.2.3
	4	**Demonstrate the effects of work done in mechanical, fluid, and electrical systems.** PT1.2.4
	5	**Measure work in mechanical, fluid, and electrical systems.** PT1.2.5
UNIT 3: RATE PT1.3	1	**Define rate in general and in mechanical, fluid, electrical, and thermal systems.** PT1.3.1
	2	**Identify the SI and English units for rate in all four energy systems.** PT1.3.2
		:alculate rate in mechanical, fluid, electrical, and thermal systems. PT1.3.3

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	4 **Research workplace applications where rate is measured and/or controlled.** PT1.3.4
UNIT 4: RESISTANCE PT1.4	1 **Define resistance in general and in mechanical, fluid, electrical, and thermal energy systems.** PT1.4.1
	2 **Calculate resistance in each energy system relating to the unifying principle of a "force" divided by a rate.** PT1.4.2
	3 **Identify the SI and English units for resistance in each energy system.** PT1.4.3
	4 **Compare positive and negative effects of resistance in each energy system.** PT1.4.4
	5 **Explain workplace applications where technicians measure or control resistance.** PT1.4.5
	6 **Describe how resistance is affected in thermal systems at extremely high and low temperatures in materials, including superconductors.** PT1.4.6
	7 **Measure resistance in mechanical, fluid, electrical, and thermal energy systems** PT1.4.7
	8 **Construct a system that demonstrates positive vs. negative effects of resistance.** PT1.4.8
UNIT 5: ENERGY PT1.5	1 **Define energy in mechanical, fluid, electrical, and thermal systems.** PT1.5.1
	2 **Demonstrate potential energy.** PT1.5.2
	3 **Demonstrate kinetic energy.** PT1.5.3
	4 **Describe the relationship between the law of conservation of energy and potential energy, kinetic energy, and heat energy.** PT1.5.4
	5 **Interpret types of energy conversion in mechanical, thermal, electrical, and fluid systems.** PT1.5.5
	6 **Describe the relationship between work and energy.** PT1.5.6
	7 **Describe how principles of mechanics apply to celestial systems.** PT1.5.7
	8 **Identify the SI and English units for energy in each system.** PT1.5.8
	9 **Calculate energy in each energy system.** PT1.5.9
	10 **Research workplaces where technicians measure or control energy.** PT1.5.10

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UNIT 6: POWER PT1.6

1. **Define power in general and in mechanical, fluid, electrical, and thermal systems.** PT1.6.1
2. **Explain how thermal power and thermal rate are the same.** PT1.6.2
3. **Explain how power in each energy system relates to the unifying principle of work divided by time.** PT1.6.3
4. **Analyze why power can be described in terms of a force multiplied by a rate for mechanical, fluid, and electrical systems.** PT1.6.4
5. **Research workplace applications where technicians measure or control power.** PT1.6.5
6. **Construct a system that demonstrates the application of power.** PT1.6.6

UNIT 7: FORCE TRANSFORMERS PT1.7

1. **Define force transformers in general and in mechanical, fluid, and electrical systems.** PT1.7.1
2. **Evaluate the efficiency of energy conversion, using mathematical calculations.** PT1.7.2
3. **Explain why force transformers form a unifying principle in mechanical, fluid, and electrical systems.** PT1.7.3
4. **Research examples of force transformers in mechanical, fluid, and electrical systems.** PT1.7.4
5. **Construct a system that demonstrates the application of force transformers.** PT1.7.5