Signals That Adapt

Trace how engineering changes a familiar technology

FSL.2.1 "Research and present a technology that was developed through engineering design. Identify its purpose, how it has advanced through alterations in design (e.g., systems that provide homes and businesses with utilities, parking structures..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the traffic signal's purpose. Circle the fixed-time, vehicle-actuated, and adaptive designs, then number those three designs in the order they appeared.

Why Traffic Signals Change

1. At a busy intersection, drivers, cyclists, and people walking all need a safe way to take turns. A traffic signal is an engineered system that assigns right of way with colored lights. Its purpose is to organize movement and reduce conflicting crossings, not to prevent every crash. Engineers must account for turning vehicles, crossing distances, and the time people need to react. Early automated, fixed-time signals changed lights according to a preset schedule, whether the road was crowded or empty. Some early electric signals were operated by people, so fixed timing was one design approach, not the beginning of all electric signals.

2. A fixed schedule can waste time when one street has traffic and the other does not. Vehicle-actuated signals addressed this problem by using detectors, such as wire loops buried in pavement, to sense waiting vehicles. A controller then selects when to change or extend a green light within programmed safety rules. Engineers also added features for people walking, including push buttons that request a crossing interval and signals that tell pedestrians when to cross. A button does not guarantee an instant walk signal. These changes show how engineers adjust a design for different users while keeping traffic movements separated.

3. At some intersections, adaptive signal control takes the next step. It uses current traffic information to adjust timing as traffic patterns change, and it may coordinate several nearby signals. For example, timing can respond to a surge of cars leaving a stadium rather than following one fixed schedule all evening. The goal is to reduce delays while preserving safe crossing intervals. Traffic engineers study intersection data and decide how signals should operate. Signal technicians install, test, and repair detectors, controllers, and lights. Both careers help keep this technology useful after the first design is built.

2 ANSWER WITH EVIDENCE

Use the passage

1. What is a traffic signal designed to do for people using an intersection?

2. What problem with fixed-time signals did vehicle-actuated signals address, and what design change made that possible?

3. How can adaptive signal control respond to a stadium crowd differently from a fixed-time signal?

4. Name two careers connected to traffic signals. How does each support their use?

3 YOUR TURN

Your own words

Choose a different engineered technology and consult a source supplied by your teacher or one you find. In 4 to 5 sentences, present its purpose, a documented design change and its effect, a career connected to its use, and the name of your source.

ANSWER KEY

Signals That Adapt

HIGH SCHOOL · FSL.2.1

PART 1 · READ AND MARK

Underline the traffic signal's purpose. Circle the fixed-time, vehicle-actuated, and adaptive designs, then number those three designs in the order they appeared. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What is a traffic signal designed to do for people using an intersection?	**It assigns right of way to organize movement and reduce conflicting crossings.**
2	What problem with fixed-time signals did vehicle-actuated signals address, and what design change made that possible?	**Fixed schedules can waste time on an empty street. Vehicle-actuated signals use detectors to sense waiting vehicles and help determine when to change or extend a green light.**
3	How can adaptive signal control respond to a stadium crowd differently from a fixed-time signal?	**It can use current traffic information to adjust timing for the surge of cars rather than follow the same preset schedule all evening.**
4	Name two careers connected to traffic signals. How does each support their use?	**Traffic engineers study intersection data and plan signal operation. Signal technicians install, test, and repair signal equipment.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A passenger elevator moves people between floors. According to Encyclopaedia Britannica's "Elevator," early elevators used steam power, and electric elevators appeared later. Using an electric motor changed how the elevator was powered, replacing the need for a steam engine to drive it. An elevator mechanic is a career connected to this technology. Mechanics maintain elevator equipment so people can continue to use it safely.

Accept accurate examples of a technology's purpose, a documented design alteration and its effect, and a relevant career. The student should name an identifiable source for the design change.