

# **PHYSICAL ERGONOMICS**

**DR. ANKUR GUPTA  
IIT BHUBANESWAR**

# **APPLIED PROBLEMS ON PHYSICAL ERGONOMICS**

# PROBLEMS

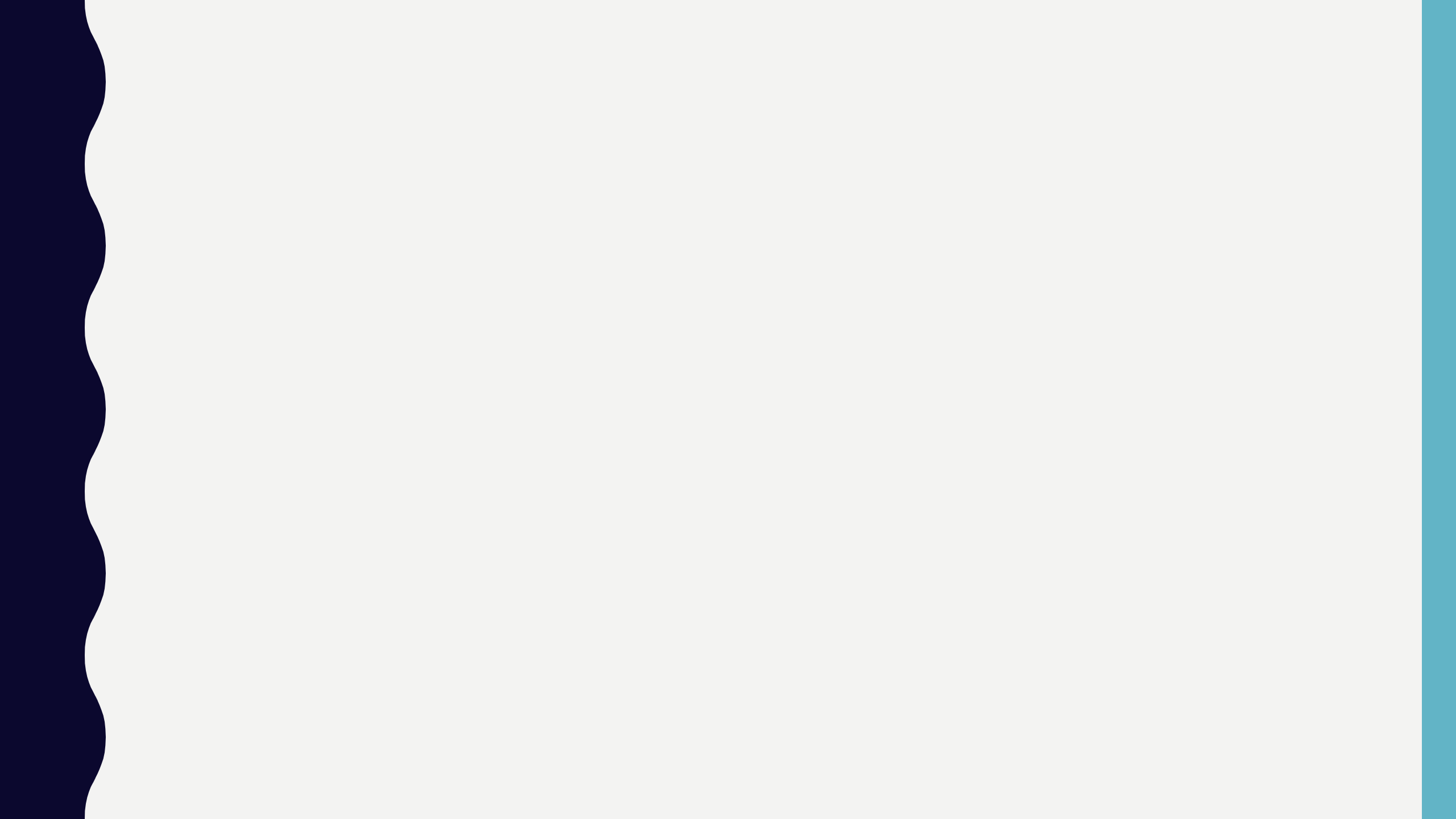
## (CALORIE CONTENTS IN FOODS)

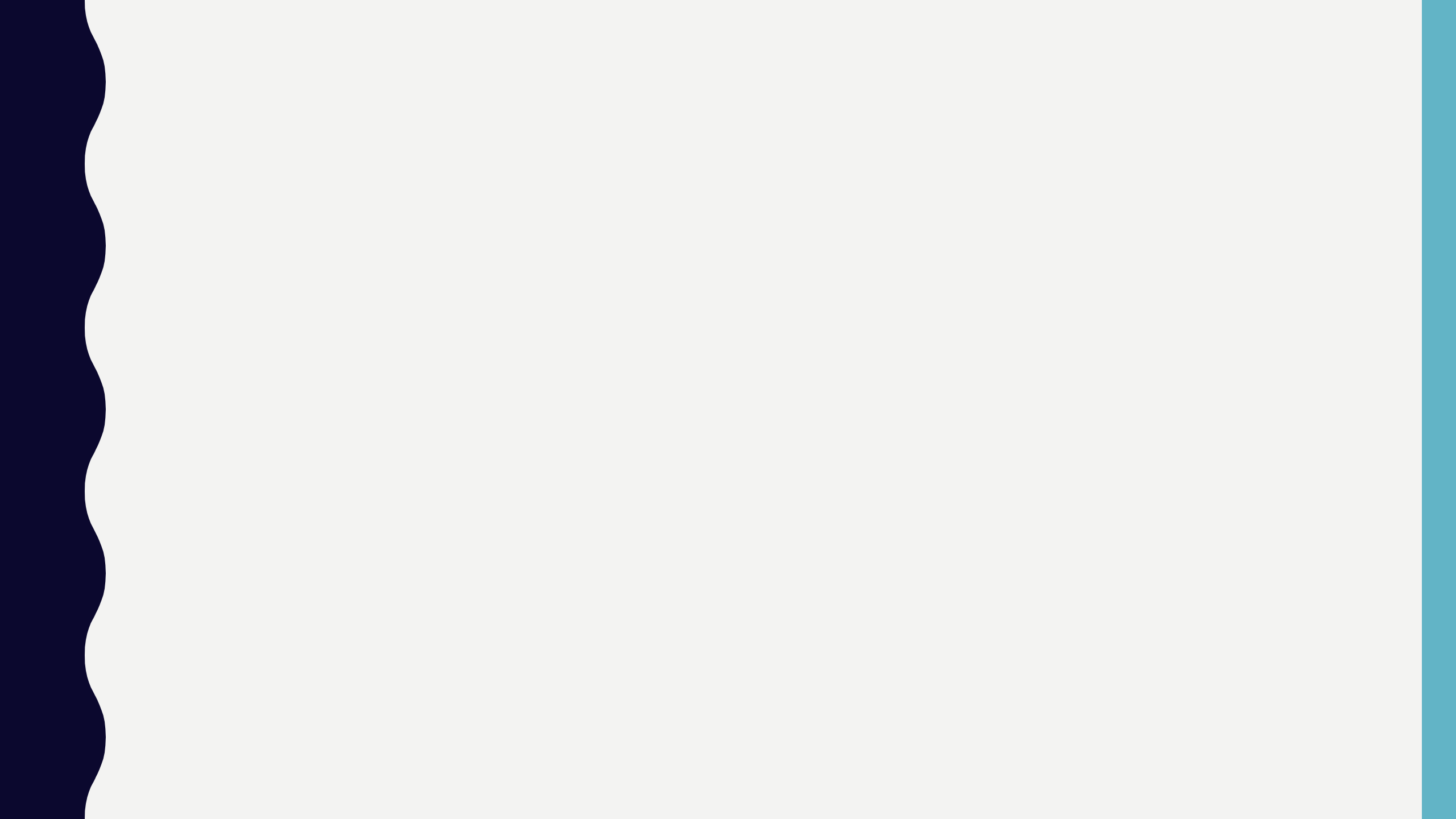
- A 3-oz package of dry soup ingredients is mixed with boiling water to make one serving of cheddar cheese and noodle soup. The mix contains 1,190 mg of sodium (in salt), 16 g of fat, 38 g of carbohydrate (including 1 g of sugars), and 7 g of protein. Use the energy data in Table to determine the number of calories (kcal) in the serving.

# PROBLEMS

## (METABOLISM)

- A male worker consumes food containing a total of 3,500 calories (3,500 kcal) each day. He is 60 years old and weighs 200 lb. He sleeps 8 hours each night, and his average energy expenditure rate while sleeping is assumed to be his basal metabolic rate. When he is not working or sleeping, his energy expenditure rate averages 1.7 kcal/min (no correction for weight). What must be his average energy expenditure rate (kcal/min) for the eight hours he works, if it is perfectly balanced with his food calorie intake? His digestive metabolism is assumed to be 10 percent of the total of his basal and activity metabolic rates over the 24-hours of the day.





- A male worker performs a task during the four hours of the morning that has an energy expenditure rate of 6.0 kcal/min. Determine how much of this four-hour period should be allowed for rest breaks. The energy expenditure rate during the rest breaks is 1.5 min. Use a maximum time-weighted average energy expenditure rate of 5.0 kcal/min as the standard or recommended level.

$$T_{rst} = 4.0(6.0 - 5.0)/(6.0 - 1.5) = 0.8889 \text{ hr} = 53.33 \text{ min}$$
$$T_{wrk} = 240 - 53.33 = 186.7 \text{ min}$$

- Compute the body mass index of a person who weighs 190 lb and is 5 ft, 9 in tall. How would this person be classified using the BMI classification?

$$\text{BMI} = 703(190)/(69)^2 = 28.06. \text{ Overweight.}$$



# HUMAN FACTOR ENGINEERING

## Human Factors

Physical and mental work capacity

Fatigue

Body forces, strength and posture

Body sizes

Thermal comfort/ heat/cold stress

Vision

Hearing

Perception

Information processing

Decision making

Performance and efficiency

Behavior & social relations

## Engineering

Industrial design

Work place design

Product design

Furniture design

Machine design

Ventilation

Lighting

Acoustics

Engineering control  
(Chemical & Physical)

Building orientation

# AIMS OF ERGONOMICS

→ Ensures that human needs for safe and efficient working are met in the design of work system

→ To design

→ Appliances

→ Technical Systems

→ Tasks

In such a way to improve

→ Human Safety

→ Health

→ Comfort and

→ Performance

- **Efficiency in purposeful activity**
- **To achieve desired result without**
  - **Waste**
  - **Error**
  - **Damage to persons**
- **Working situation in harmony with the activities of the worker**

# **BENEFITS OF ERGONOMICS**

- **Productivity**
- **Product quality**
- **Safety**
- **Health**
- **Reliability**
- **Job satisfaction**
- **Personal development**

A decorative graphic on the left side of the image consisting of two parallel, wavy vertical lines. The inner line is a light blue color, and the outer line is white. They start from the top left and extend towards the bottom left, creating a stylized, organic shape.

**THANK YOU ....**

