

# Lab 8      Digestion and nutrition

Name \_\_\_\_\_

Seat number \_\_\_\_\_

## **Objectives:**

- A. The gastrointestinal tract*
- B. The teeth and jaws*
- C. The digestive process*
- D. Nutrition label calculation*
- E. Body Mass Index calculation*
- F. BMR/SDA and WtHR*

## **A. The gastrointestinal tract**

Identify the following parts on the torso model

1. Major sections
  - a. Mouth
  - b. Pharynx
  - c. Esophagus
  - d. Stomach
  - e. Small intestine, including duodenum
  - f. Large intestine
  - g. Rectum
  - h. Anus
2. Accessory organs
  - a. Salivary gland
  - b. Liver
  - c. Gall bladder
  - d. Pancreas

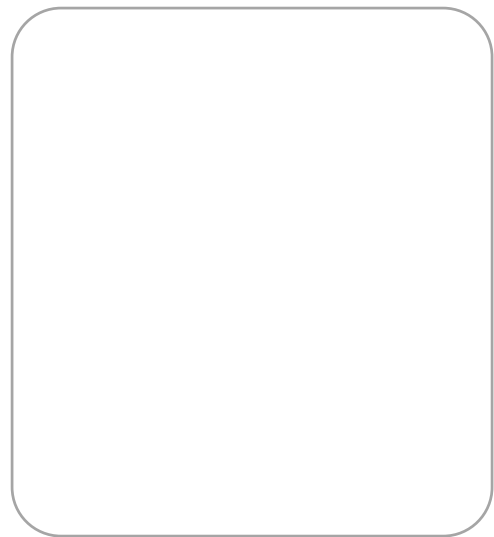
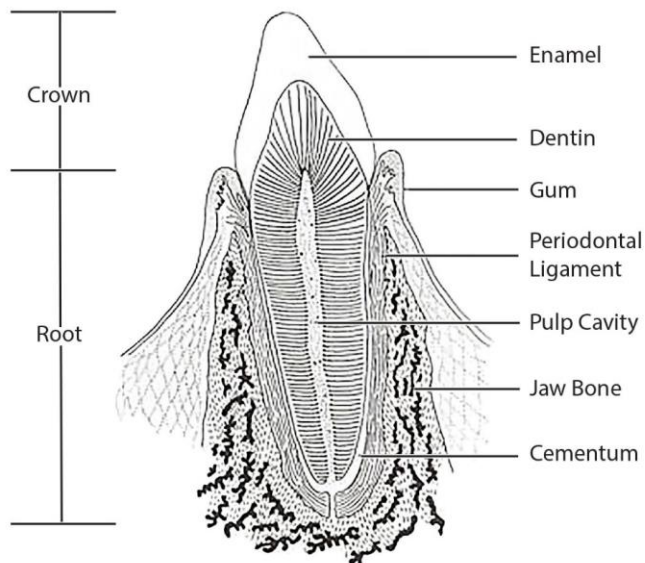
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## B. The teeth and jaws

Identify the following parts on the half jaw model

3. Divisions of teeth
  - a. Incisors
  - b. Canines (cuspids)
  - c. Premolars (bicuspid)
  - d. Molars
  
4. Parts of a tooth
  - a. Enamel
  - b. Crown
  - c. Pulp
  - d. Root
  - e. Dentin

Draw a tooth under the microscope. Measure the length of the tooth. Record magnification. Label the same 5 items you identified on the model.



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### C. The digestive process

#### 1) CARBOHYDRATES

- Name a food that is mostly carbohydrate. \_\_\_\_\_
- Where does carbohydrate digestion first occur? \_\_\_\_\_
- Where does it finish? \_\_\_\_\_
- What is the end product of carbohydrate digestion? \_\_\_\_\_

#### 2) PROTEIN

- Name a food that is mostly protein. \_\_\_\_\_
- Where does protein digestion first occur? \_\_\_\_\_
- Where does it finish? \_\_\_\_\_
- What is the end product of protein digestion? \_\_\_\_\_

#### 3) FAT

- Name a food that is mostly fat. \_\_\_\_\_
- Where does fat digestion first occur? \_\_\_\_\_
- Where does it finish? \_\_\_\_\_
- What is the end product of fat digestion? \_\_\_\_\_

### D. Nutrition label calculation

Fats have 9 Calories/gram; Carbohydrates and proteins each have 4 Calories/gram. How many Calories does 1 serving of walnuts have if they have 20 grams of fat, 5 grams of protein and 4 grams of carbohydrate?

*Show your work for credit*

### E. Body Mass Index calculations

The body mass index (BMI) can be found by dividing your weight in pounds by height in inches squared and multiplying by a conversion factor of 703. Show your work.

$$\frac{\text{weight in pounds}}{(\text{height in inches})^2} \times 703$$

If your **BMI** is:

|                              |                      |
|------------------------------|----------------------|
| Less than 18.5 = Underweight | 25–29.9 = Overweight |
| 18.5–24.9 = Normal Weight    | 30 and above = Obese |

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- 1) According to the guidelines above, is your BMI suggesting underweight, normal weight, overweight, or obese?
- 2) Describe a type of athlete who might have a BMI that according to the guidelines is not healthy, but actually is.

### F. BMR/SDA and WtHR

Total Calories that an individual needs depends on three things. Basic Metabolic Rate (BMR), Specific Dynamic Action (SDA), and physical activity.

Basic Metabolic Rate (BMR) is a calculation of the amount of energy a person needs to meet all metabolic functions. Do the following calculations to come up with your BMR.

1. Change your weight in pounds to kilograms:

$$\text{_____} \div 2.2 \frac{\text{lbs}}{\text{kg}} = \text{_____} \text{ kg}$$

2. Multiply your weight in kilograms by the BMR factor:

$$\text{_____} \text{ kg} \times .9 \frac{\text{kcal}}{\text{kg-hour}} = \text{_____} \frac{\text{kcal}}{\text{hour}}$$

3. Multiply the kilocalories used in one hour by the hours in the day

$$\text{_____} \frac{\text{kcal}}{\text{hour}} \times 24 \frac{\text{hours}}{\text{day}} = \text{_____} \frac{\text{kcal}}{\text{day}}$$

*This is your BMR*

Specific Dynamic Action (SDA) is the amount of energy used to digest, absorb, and process proteins carbohydrates and fat. It is about 10% of your BMR.

1. Calculate your SDA

$$\text{_____} \frac{\text{kcal}}{\text{day}} \times 0.1 = \text{_____} \frac{\text{kcal}}{\text{day}}$$

*This is your SDA*

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### Physical Activity

| Activity Level    | Examples                                 | Effect on BMR |
|-------------------|--|---------------|
| Inactive          | Driving, watching TV, desk work, etc.    | +30%          |
| Lightly Active    | Walking, golf, house cleaning, etc.      | +50%          |
| Moderately Active | Fast walking, skiing, tennis, etc.       | +75%          |
| Very Active       | Aerobic exercises with a high heart rate | +90%          |

Use the following formula to calculate your total caloric needs per day.

*Show your work for credit*

$$(\text{_____ \% activity} \times \text{BMR}) + \text{BMR} + \text{SDA} = \text{_____} \frac{\text{total kcal}}{\text{day}}$$

Studies now indicate that Waist to Height Ratio (WHtR) is a much better measure than BMI for assessing obesity and cardiovascular risk. Determine whether your Waist to Height Ratio is in a healthy range. The WHtR is calculated by dividing waist size by height, and takes gender into account. As an example, a male with a 32 inch waist who is 5'10" (70 inches) would divide 32 by 70, and then multiply by 100 to get a WHtR of 45.7%.

Calculate your WHtR and use the chart below to determine if your WHtR falls in the healthy range. Show your work.

| <b>Women</b>  | <b>Men</b>    |                      |
|---------------|---------------|----------------------|
| less than 35% | Less than 35% | Underweight          |
| 35-42%        | 35-43%        | Extremely slim       |
| 42-46%        | 43-46%        | Slender and healthy  |
| 46-49%        | 46-54%        | Normal weight        |
| 49-54%        | 54-58%        | Overweight           |
| 54-58%        | 58-63%        | Seriously overweight |
| Over 58%      | Over 63%      | Highly obese         |