Unit D: Integumentary System

**Program Area:** Health Occupations Education

**Course Title:** Medical Sciences I  
**Number:** 7221

**Unit Title:** Integumentary System

**Suggested Time for Instruction:**
- 5 class periods (90 minute classes)
- 11 class periods (55 minute classes)

**Course Percent:** 6%

**Unit Evaluation:** 100% Cognitive

**Competency:** MD04. Analyze the anatomy and physiology of the skin.

**Specific Objectives:**

- MD04.01 Describe the structure of the skin.
- MD04.02 Analyze the function of the skin.
- MD04.03 Analyze characteristics and treatment of common skin disorders.
D. Integumentary System

MD04.01 Explain the structure of the integumentary system.

A. Layers of the skin
   1. Epidermis – outer layer
      a. Stratum corneum
         i. Outermost of three epidermal layers
         ii. Contains keratin
      b. Stratum germinativum
      c. Melanocytes and melanin
      d. Papillae
   2. Dermis – inner layer
      a. Connective tissue
      b. Blood vessels
      c. Nerve endings
      d. Muscles
      e. Hair follicles
      f. Oil and sweat glands
      g. Fat cells
   3. Subcutaneous
      a. Adipose

B. Appendages
   1. Hair
      a. Cortex and medulla
      b. Root and shaft
      c. Hair follicle
      d. Papilla
      e. Arrector pili muscle
   2. Nails
      a. Matrix
      b. Keratin
   3. Glands
      a. Sudoriferous glands
         i. Sweat = 99% water
         ii. Location
         iii. Pores
         iv. Activated by heat, pain, fever and nervousness
      b. Sebaceous glands
         i. Sebum – protects and lubricates skin

MD04.02 Analyze the functions of the integumentary system.

A. Skin
   1. Protection
      a. Intact skin best protection
      b. Skin generally too dry for microbial growth
      c. Most skin bacteria associated with hair follicles or sweat glands
      d. Best way to prevent spread of disease is handwashing
   2. Regulation of body temperature
   3. Manufactures vitamin D
4. Sensory perception
5. Storage
6. Sun screen
7. Absorption

B. Glands
1. Sudoriferous glands (sweat glands)
   a. Perspiration is 99% water
   b. Distributed over the entire skin surface, large numbers under the arms, palms of hands, soles of feet and forehead
   c. Perspiration excreted through pores
   d. May be activated by heat, pain, fever and nervousness
   e. Underarm odor caused by bacteria mixed with sweat
   f. Ave fluid loss = 500 cc/day
2. Sebaceous glands
   a. Sebum - oil
   b. Protects and lubricates skin

**MD04.03 Discuss characteristics and treatment of common skin disorders.**

A. Acne
1. Disorder of sebaceous glands
2. Sebum plugs pores and area fills with leukocytes
3. Also, blackheads, cysts, pimples and scarring

B. Albinism – absence of melanin

C. Alopecia – baldness

D. Athlete’s foot
1. Contagious fungal infection
2. Usually contracted in public baths and showers
3. Rx – antifungal agents

E. Boils (carbuncles)
1. Painful, bacterial infection of hair follicle or sebaceous glands
2. Rx – antibiotics, excision and drainage of affected area

F. Dermatitis
1. Non-specific skin inflammation
2. Rash – reaction to soap, plants, etc.
3. Skin blotches – caused by stress

G. Eczema
1. Acute or chronic inflammatory skin disease
2. Skin dry, red, itchy and scaly
3. Rx – remove cause, hydrocortisone to help alleviate symptoms

H. Excoriation - abrasion

I. Herpes
1. Genital herpes
   a. Viral blister in genital area
   b. Spread through sexual contact
   c. Periods of remission and exacerbation
   d. Rx – Acyclovir
   e. Can be passed to newborn during genital delivery
2. Herpes simplex I
   a. Viral
   b. Fever blister or cold sore
3. Shingles (herpes zoster)
   a. Viral infections of nerve endings
   b. On chest or abdomen, accompanied by severe pain
J. Impetigo
   1. Acute, inflammatory and contagious
   2. Seen in babies and young children
   3. Caused by staphylococcus or streptococcus
   4. Vesicles that rupture and develop distinct yellow crusts
K. Pruritis - itching
L. Psoriasis
   1. Chronic inflammatory skin disease
   2. Dry reddish patches covered with silvery-white scales
M. Ringworm
   1. Contagious fungal infection
   2. Raised, itchy circular patches with crusts
N. Scabies
   1. Communicable
   2. Severe itching
   3. Mite burrows in skin, lays eggs, eggs hatch
O. Skin cancer
   1. Associated with exposure to sun (UV rays)
   2. Most common type of cancer in people
   3. Basal cell carcinoma
      a. Most common, least malignant
      b. Usually on face
      c. Rx – surgical removal or radiation
   4. Squamous cell carcinoma
      a. Mostly scalp and lower lip
      b. Grows rapidly, metastasizes to lymph nodes
      c. Rx – surgical removal or radiation
      d. Prognosis good with early diagnosis
   5. Melanoma
      a. Malignant
      b. Occurs in melanocytes
      c. Metastasizes to other areas quickly
      d. Brown or black irregular patch that occurs suddenly
      e. Change in existing wart or mole may indicate melanoma
      f. Rx – surgical removal of melanoma and surrounding area and chemotherapy
P. Burns
   1. First degree
      a. Superficial, skin red and dry
      b. Involves only epidermis
      c. Rx – cold water
      d. Heals in one week
   2. Second degree
      a. Epidermis and dermis
      b. Pain, swelling, redness and blistering
      c. Subject to infection
      d. Rx – pain medication, dry sterile dressing
      e. Healing within two weeks
   3. Third degree
      a. Epidermis, dermis, and subcutaneous layers (full thickness)
      b. Loss of skin, blackened skin
      c. May be life threatening
      d. Rx – prevention of infection, fluid replacement, skin grafting
   4. Rule of nines – method of measuring percent of body burned
Q. Skin lesions
   1. Pustule
   2. Tumor
   3. Ulcer (superficial and decubitus)
   4. Vesicle

R. Urticaria (hives)
   1. Itchy wheals or welts
   2. Usually allergic reaction to drugs, food, etc.
   3. Rx – avoid allergen

S. Warts (verrucae)
   1. Caused by virus
   2. Some disappear spontaneously, others removed with liquid nitrogen, chemicals or laser
Unit D: Integumentary System

Competency MD04: Analyze the anatomy and physiology of the skin.

Materials/Resources


Teaching/Learning Indicators: The following letters are used to indicate specific skills/areas required in the instructional activity.

R Reading SS Social Studies
W Writing S Science
M Math A The Arts
H Health professional/parent/community involvement
Objective MD04.01  Describe the structure of the skin.

Teaching/Learning Activities

- **Basic Skills**  S
  Have students read the appropriate pages in *Body Structures & Functions* and participate in a teacher-led class discussion about the structure of the integumentary system. The teacher may give the students the unit terminology list (*Appendix MD04.01A*) as a discussion reference.

- **Cognitive**  S
  As a follow-up to the discussion of the structure of the integumentary system, have students complete the “Matching Anatomy” worksheet. This assignment could earn a quiz grade, or be graded/corrected in class. (*Appendix MD04.01B*)
  Have students label the diagram of the skin. (*Appendix MD04.01C*)

- **Teamwork**  S
  Assign teams of two and instruct each team in making “Skin”. (*Appendix MD04.01D*)
  Once the recipe is completed correctly, have students answer the questions provided about the activity.

- **Critical Thinking**  S, W
  Have students write a paper using the terms listed in the “Word Splash” Activity. (*Appendix MD04.01E*)

- **Technology**  S
  Instruct students to visit the website [www.innerbody.com/indexbody.htm](http://www.innerbody.com/indexbody.htm).
  Have them write a one page comparison of the anatomy of the integumentary system as it is found on that website and as it is found in the text.

- **Special Needs**
  Each student will reach the highest level of mastery in the least restrictive environment as recommended in the student’s IEP.
Objective MD04.02  Analyze the functions of the skin.

**Teaching/Learning Activities**

- **Cognitive**  
  Instruct students in the activity “Pairs Compare” (*Appendix MD04.02A*). Students ask questions to each other to find matches of the terms and functions. You may use any number of terms, or have several students playing the same terms.

  Another activity, “Guess the Fib”, may also be used after students have read or participated in a discussion on function. (*Appendix MD04.02 B*)

- **Critical Thinking**  
  Have students write an essay on the effect on the body of any of the following conditions and present to class:
  1. Absence of sebaceous or sudoriferous glands
  2. Absence of nerve endings
  3. Overproductive sudoriferous or sebaceous glands

- **HOSA**  
  Using the Competitive Event Guidelines for “Extemporaneous Speaking”, have the students speak on “The Most Important Function of the Integumentary System”.

- **Basic Skills**  
  Assign students to read about the functions of the integumentary system on page 56 in the text. Have them create a bulletin board which depicts those functions.

- **Special Needs**  
  Each student will reach the highest level of mastery in the least restrictive environment as recommended in the student’s IEP.
Objective MD04.03  Analyze characteristics and treatment of common skin disorders.

Teaching/Learning Activities

- **Technology  S**
  Assign a research project to the class on one or more diseases/disorders of the integumentary system. Students are to utilize research from the internet or computerized references. Students are to present their findings using a *Powerpoint* or *Hyperstudio* Presentation. The following areas should be addressed:
  - Signs/Symptoms
  - Diagnosis
  - Prognosis
  - Treatment

  In the event presentation software is NOT available, students could use posterboard or flip chart paper to develop and present their research.

- **Basic Skills  S, R**
  Students are to read information on skin disorders of the text. Have them complete page 54 in the workbook.

- **HOSA/Teamwork  S, A**
  Students work in pairs to complete a “Career Health Display,” using Competitive Event Guidelines.

- **Employability Skills  S, H**
  Invite a health care professional to speak with the class about diseases and disorders of the skin. Prepare students for this visit through discussion and have them brainstorm a list of what they want to learn from the speaker. They can use their list as a source of questions for the speaker.

  If you are located near a Cancer Center, you may choose to take a field trip to that site. Another option is to invite a panel from the center to come visit the class. Have the panel discuss how their area of expertise impacts on the skin cancer patient.

- **Critical Thinking  S, M**
  After discussing burns with the class, have them complete the “Rule of Nines” Worksheet (*Appendix MD04.03 A*). Have students correct their answers with help from fellow students.

- **Cognitive  S**
  Have students complete the chart, “Disorders of the Skin.” Students may be encouraged to look in other text books or on the web to find good photographs of specific skin disorders, to use as a model when drawing the illustration of each disorder. (*Appendix MD04.03B*)

- **Special Needs**
  Each student will reach the highest level of mastery in the least restrictive environment as recommended in the student’s IEP.
## Daily Lesson Plans

### Unit D: Integumentary System

**Lessons:** 5  
**Hours:** 7 1/2 clock hours

<table>
<thead>
<tr>
<th>Steps</th>
<th>Lesson #1</th>
<th>Lesson #2</th>
<th>Lesson #3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus and Review</strong></td>
<td>Give a teacher prepared mini quiz on terms learned in the Terminology and Body Systems unit that will be used in this unit.</td>
<td>Have students exchange homework assignment (skin diagram) and correct the labeling of structures, using their text as a reference. The teacher will circulate and answer questions.</td>
<td>Collect homework assignment and ask the questions. See if students can reason out the answers. Answer the questions that need answering.</td>
</tr>
<tr>
<td><strong>Statement of Objectives</strong></td>
<td>Objective MD04.01 Describe the structure of the skin.</td>
<td>MD04.02 Analyze the function of the skin.</td>
<td>MD04.03 Analyze characteristics and treatment of common skin disorders.</td>
</tr>
<tr>
<td><strong>Teacher Input</strong></td>
<td>Review the main structures of the skin and appendages. Use a model if one is available. Make “skin” in class. MD04.01D</td>
<td>Review the functions of the skin.</td>
<td>Introduce students to diseases/disorders of the skin. Assign each student a disorder. Have them create a poster describing the disorder. (Homework) Review related terms that were not made a part of the homework assignment.</td>
</tr>
<tr>
<td><strong>Guided Practice</strong></td>
<td>Have students complete “Matching Anatomy” in class.</td>
<td>Have students participate in the “Pairs Compare” activity. MD04.02A</td>
<td>Have students use classroom, Internet, and media center resources to find information on their assigned disorder.</td>
</tr>
<tr>
<td><strong>Independent Practice</strong></td>
<td>Homework – Have students label the diagram of the skin.</td>
<td>Homework – have students analyze the structure and function of the skin, and write 5 “critical thinking” questions for the teacher/class to answer.</td>
<td>Have students develop a rough draft of their poster (see instructional input) on 8 ½ x 11” paper – to be transferred to poster paper as a homework assignment.</td>
</tr>
<tr>
<td><strong>Closure</strong></td>
<td>Ask critical thinking questions related to skin structure – 1. If you are scratched and it bleeds, what layer(s) of the skin are involved? How do you know? 2. Why does hair that is cut grow back? What about hair that is “plucked”? How can you prevent hair from growing back?</td>
<td>Review important terms related to the structure and function of the skin. Remind students about the homework assignment. Alert students to the fact that they will need a piece of poster board for the following night’s assignment.</td>
<td>Review A&amp;P of the skin. Inform students that they will be presenting their poster and teaching their assigned disorder to the class. Also, be sure students know that the poster must follow the criteria on the Extemp. Health Poster rating sheet.</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Skin diagram (Handouts) Matching Anatomy (Handouts) Materials for making skin in class (see MD04.01D)</td>
<td>Pairs Compare (Handout)</td>
<td>Classroom books that have skin disorder information.</td>
</tr>
<tr>
<td>Steps</td>
<td>Lesson #4</td>
<td>Lesson #5</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Focus and Review</strong></td>
<td>Before class, prepare a list of 10 questions about skin A&amp;P. Have students number a scrap piece of paper from 1-10, and ask the question as a quiz.</td>
<td>Grade the “Rule of Nines” math activity. Answer student questions.</td>
<td></td>
</tr>
<tr>
<td><strong>Statement of Objectives</strong></td>
<td>MD04.03 Analyze characteristics and treatment of common skin disorders.</td>
<td>MD04.03 Analyze characteristics and treatment of common skin disorders.</td>
<td></td>
</tr>
<tr>
<td><strong>Teacher Input</strong></td>
<td>One at a time, have students show their poster explain about their assigned disease/disorder. Grade the presentations using the HOSA Extemporaneous Health Poster guidelines. After each presentation, review the important points to remember from each disease. (May use overheads.) Put the posters around the room where they can be seen up until test time.</td>
<td>TEST – Integumentary System</td>
<td></td>
</tr>
<tr>
<td><strong>Guided Practice</strong></td>
<td>Have students complete the “Rule of Nines” math activity.</td>
<td>Take Unit Test. Grade test in class.</td>
<td></td>
</tr>
<tr>
<td><strong>Independent Practice</strong></td>
<td>Study for unit test on the Integumentary System.</td>
<td>Have students look up the answers to the questions they got wrong and turn in their corrected test.</td>
<td></td>
</tr>
<tr>
<td><strong>Closure</strong></td>
<td>Review important facts about skin diseases and disorders. Remind students to study for the test and re-read the chapter to reinforce understanding of skin functions.</td>
<td>Introduce the next unit. Use remaining class time for HOSA business/update.</td>
<td></td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>List of 10 teacher-prepared questions for Focus and Review. EHP rating sheets, one per student Overhead projector.</td>
<td>Test and key Green pens for grading tests.</td>
<td></td>
</tr>
</tbody>
</table>
# Unit D: Integumentary System

## Terminology List

1. adipose  
2. arrector pili  
3. cortex  
4. dermis  
5. epidermis  
6. gland  
7. hair follicle  
8. keratin  
9. matrix  
10. medulla  
11. melanin  
12. melanocytes  
13. papilla  
14. papillae  
15. root  
16. sebaceous gland  
17. sebum  
18. shaft  
19. stratum corneum  
20. stratum germinativum  
21. subcutaneous  
22. sudoriferous gland

## Disorders and Related Terminology

1. acne  
2. albinism  
3. alopecia  
4. athlete’s foot  
5. basal cell carcinoma  
6. boils (carbuncles)  
7. first degree burn  
8. second degree burn  
9. third degree burn  
10. dermatitis  
11. eczema  
12. excoriation  
13. genital herpes  
14. herpes simplex I (cold sores)  
15. impetigo  
16. melanoma  
17. pruritis  
18. psoriasis  
19. pustule  
20. ringworm  
21. rule of nines  
22. scabies  
23. shingles (herpes zoster)  
24. squamous cell carcinoma  
25. tumor  
26. ulcer (superficial and decubitus)  
27. urticaria (hives)  
28. vesicle  
29. warts (verrucae)

*Appendix MD04.01A*
## Matching Anatomy – Integumentary System

Name_______________________  Class_________________ Date_______________

Directions: Match the term in Column A with the appropriate description in Column B. Write the correct letter in the blank provided.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____1. Epidermis</td>
<td>a) nonliving protein substance</td>
</tr>
<tr>
<td>_____2. Melanin</td>
<td>b) they produce a thick, oily substance</td>
</tr>
<tr>
<td>_____3. Subcutaneous</td>
<td>c) caused by an absence of melanin</td>
</tr>
<tr>
<td>_____4. Shaft</td>
<td>d) outermost covering</td>
</tr>
<tr>
<td>_____5. Keratin</td>
<td>e) cells that contain skin pigment</td>
</tr>
<tr>
<td>_____6. Dermis</td>
<td>f) considered the true layer of skin</td>
</tr>
<tr>
<td>_____7. Sudoriferous</td>
<td>g) adipose layer</td>
</tr>
<tr>
<td>_____8. Hair Follicle</td>
<td>h) the part of the hair implanted in the skin</td>
</tr>
<tr>
<td>_____9. Arrector Pili</td>
<td>i) inflammation of the skin</td>
</tr>
<tr>
<td>_____10. Matrix</td>
<td>j) contains capillaries that nourish the hair follicle</td>
</tr>
<tr>
<td>_____11. Dermatitis</td>
<td>k) the outer cuticle layer of the hair shaft</td>
</tr>
<tr>
<td>_____12. Melanocytes</td>
<td>l) can have a black, brown or yellow tint</td>
</tr>
<tr>
<td>_____13. Albinism</td>
<td>m) another term for nailbed</td>
</tr>
<tr>
<td>_____14. Papillae</td>
<td>n) smooth muscle causing “goosebumps”</td>
</tr>
<tr>
<td>_____15. Cortex</td>
<td>o) protrudes from skin surface</td>
</tr>
<tr>
<td>_____16. Root</td>
<td>p) baldness</td>
</tr>
<tr>
<td>_____17. Sebaceous glands</td>
<td>q) permanent ridges of the skin</td>
</tr>
<tr>
<td>_____18. Sebum</td>
<td>r) tube that holds the hair root</td>
</tr>
<tr>
<td>_____19. Papilla</td>
<td>s) lubricates the skin, keeping it soft and pliable</td>
</tr>
<tr>
<td>_____20. Alopecia</td>
<td>t) sweat gland</td>
</tr>
</tbody>
</table>

Appendix MD04.01B
ANSWER KEY: Matching Anatomy – Integumentary System

1. d
2. l
3. g
4. o
5. a
6. f
7. t
8. r
9. n
10. m
11. i
12. e
13. c
14. q
15. k
16. h
17. b
18. s
19. j
20. p
Locate the following structures, and color them as noted:

- hair shaft (black)
- suderiferous gland (tan)
- stratum germinativum (green)
- follicle (blue)
- stratum corneum (pink)
- papilla (red)
- subcutaneous layer (yellow)
- sebaceous gland (orange)
- hair root (purple)
- dermis (gray)
- arrector pili (brown)
- epidermis (label bracket)
Skin Recipe

1. Fill the bottom of a clear, plastic cup with Corn Puffs Cereal or yellow jello.
2. Add red jello on top of the Corn Puffs (or yellow jello). The red jello represents the dermis.
3. Using the following ingredients, place them appropriately in the red jello according to their actual placement in the dermis.
   · M & M Peanuts represent the sebaceous glands.
   · Grapes represent the sudoriferous glands.
4. Spread a layer of whipped cream (thickness) on top to represent the stratum germinativum. Remember to check the thickness.
5. You may use cocoa to add melanin to your “skin” color.
6. Sprinkle a fine coating of crushed up Corn Flakes on top of the whipped cream to represent the stratum corneum.
7. Insert a licorice stick (hair) through the whipped cream into the dermis.

Now answer the following questions about this activity.

1. Why was yellow jello or Corn Puff Cereal used to represent the subcutaneous layer?
   ______________________________________________________________________
   ______________________________________________________________________

2. Why is the subcutaneous layer a desirable site for some injections?
   ______________________________________________________________________

3. Explain why the red jello was used to represent the dermis. ______________________
   ______________________________________________________________________

4. Which is the deepest layer of the integumentary system? ______________________

5. The licorice represents the hair shaft. Explain why you pushed it through the whipped cream and jello:
   ______________________________________________________________________
   ______________________________________________________________________

6. Which glands are the most numerous? ______________________________________

7. In what layer are sebaceous glands located? ______________ What is their function?_____________________________________________________________

8. Using the characteristics of the epidermis, why was whipped cream a better representation than the red jello?
   ______________________________________________________________________
   ______________________________________________________________________

Appendix 004.01D
Integumentary Word Splash

Scatter following words in random pattern across the blackboard:

Epidermis
Dermis
Subcutaneous
Melanin
Arector pili
Adipose
Excretion
Protection
Matrix
Root
Shaft
Two

Have students write a newspaper article using these words. They will need to be creative in determining “what happened” – the story they are reporting on.

Students may work in teams to produce their article. Each team will present their “story” to the class.

Before the presentations, ask each student to bring four pennies to class. The teacher will need to create a container or envelope for each team.

After all the stories are told, allow students to vote by placing one penny in the container of the team who had:

- The most professional article.
- The team who was the most believable.
- The team that was the most creative.
- And the team with the overall best presentation.

Go over guidelines for “most professional paper”, “most believable team”, “most creative team”, and the team “with the best overall presentation” prior to any presentation.
Teacher Directions:

1. Using the Terminology Word List, choose 10 structures of the skin. Print each word on a separate piece of construction paper.
2. Print each function of your chosen structures on a separate sheet of construction paper.
3. Pin the “structures” or “functions” on each student.
4. Do not tell the student the term.
5. While moving around the room, students may ask each other up to three questions for clues to their term. They may not ask, a direct question such as, “What term am I?”.
6. When they guess which structure or function they are, they get to sit down. When everyone is finished, or time runs out, each person will stand, state the term and the clues which helped him/her find the answer.

Note: If time allows, instruct the students to find their “pair” match and they may sit down together and give their report together.

You may have a few sets of the terms, such as 4 students labeled skin, 4 labeled sebaceous glands, etc.
Guess The Fib

Three of the statements in each set are true, one is false. The student guessing the most fibs wins!

1. The two functional layers of the epidermis are the stratum corneum and the stratum germinativum.
2. The epidermis is considered the true layer of skin.
3. Skin pigmentation cells are found in the epidermis.
4. The epidermis is your first barrier protection from disease.

1. One function of the integumentary system is temperature regulation.
2. One function is to hold muscles and bones in place.
3. Another function of the integumentary system is to provide protection.
4. The skin allows us to feel hot, cold, pain, and pleasure.

1. The dermis is your outermost layer of skin.
2. The dermis is known as the “true layer” of skin.
3. Your sensory nerves for touch, temperature, and pain are located in your dermis.
4. Pressure receptors are located deep in the dermal layer.

1. In dark hair, your cortex contains pigment granules; as you age this is pigment is replaced by air, which looks grey or white.
2. The root is the part of the hair that is inside the skin.
3. The root is embedded in an area of the epidermis called the hair follicle.
4. The arrector pili muscle is attached to each hair follicle in the opposite direction of the slope of the hair.

1. The subcutaneous layer is not a true layer of skin.
2. Intramuscular injections are often given in the subcutaneous layer.
3. Approximately one-half of the stored fat in the body is found in the subcutaneous layer.
4. The subcutaneous layer is located directly below the dermis.

1. The nail is located on the ventral side of the phalanges.
2. The surface of the nail is hard due to fusion between keratin and epidermal cells.
3. The matrix is another term for the nail bed in your hands and feet.
4. If the matrix is damaged, the nail will no longer grow.

Appendix MD04.02B
Answer Key: Guess the Fib

1. 2
2. 2
3. 1
4. 4
5. 2
6. 2
Rule of Nines Math Activity

Answer the following math problems using the “Rule of Nines” chart found on page 63 of the text. Show all work.

1. What percentage of the body is burned if a 16 year old male burned his back, the back of his left leg, and his entire right arm?

2. Suzie, an active 6 year old, was burned while playing around a fireplace. Her Nightgown caught on fire and she burned both legs, her back, her left arm, and one side of her face. What percentage of body tissue was burned?

3. A 25 year old involved in a car accident burned his chest and perineal areal. What percentage of his body was burned?

4. Marion was burned by exploding gas while trying to start his lawn mower. He burned both legs above the knees up through his chest, half of both arms, and the perineal area. What percentage of his body did he burn?

5. Julian burned half of his chest, a third of his back, and two-thirds of his left leg. What percentage of his body is burned?

Appendix MD04.03A
Answers to Rule of Nines Math Activity

1. 36%
2. 47.25%
3. 19%
4. 19%
5. 21%
## Disorders of the Skin

Complete the chart of skin disorders, including a color illustration.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Cause</th>
<th>Description</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acne vulgaris</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psoriasis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herpes Simplex I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eczema</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herpes Zoster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melanoma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ringworm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Appendix MD04.03B*
Unit D: Integumentary System
Skin = Integument = Cutaneous Membrane

7 Functions:

1. Protective covering
2. Regulates body temperature
3. Manufactures Vitamin D
4. Sensory function
5. Temporary storage of fat, glucose, water and salts
6. Screens out harmful ultraviolet radiation
7. Absorbs certain drugs
STRUCTURE OF THE SKIN

2 basic layers

Epidermis
- Outermost covering
- Epithelial cells
- Avascular

Dermis
- True skin
- Connective tissue
- Vascular

EPIDERMIS

2 (of 3) epidermal layers are:

- Stratum corneum
- Stratum germinativum
STRATUM CORNEUM

♦ Outermost layer
♦ In cells, cytoplasm replaced by KERATIN – making them waterproof.
♦ Flat and scale-like cells that flake off
♦ First line of defense against surface bacteria
♦ Thickest palms of hands, soles of feet

STRATUM GERMINATIVUM

♦ Innermost epidermal layer
♦ Reproductive layer – cells form and push their way up, become keratinized, and replace the top layer
♦ Contains MELANOCYTES – cells that contain a pigment = MELANIN

Melanin

★ Black, brown, or has a yellow tint – depending on racial origin
★ The more melanin, the darker the skin
★ Caucasians don’t have much melanin in their melanocytes.
★ Freckles = patches of melanin
★ Albinism = no melanin
Tanning

Sunlight stimulates melanocytes to make more melanin
Tanning produced by UV rays.

STOP Prolonged exposure may lead to skin cancer!

PAPILLAE

- Ridges in stratum germinativum that arise from dermis
- Create permanent ridges in fingers, palms and soles of feet
- These “摩擦 ridges” help with grip
- Cause “fingerprints”
DERMIS

Thicker inner layer that contains:

- Connective tissue
- Blood vessels
- Nerve endings
- Muscles

- Hair follicles
- Oil and sweat glands
- Fat cells
Nerve Receptors in Dermis
- Sensory nerves – heat, cold, touch, pain and pressure
- Touch receptors close to the surface
- Pressure receptors are deeper

Subcutaneous Layer
- Lies under the dermis (not really part of integumentary system)
- Made up of loose connective tissue
- Contains half of the body’s stored fat

Appendages of the Skin

HAIR
- Almost everywhere on the body
- Length, thickness, type and color varies

Outer layer = CORTEX
Inner layer = MEDULLA
Part under the skin = ROOT
Part outside the skin = SHAFT
FOLLICLE = pocket in epidermis, hair inside
PAPILLA = tuft of tissue in root, contains capillaries
ARRECTOR PILI MUSCLE = smooth muscle attached to follicle. How does this muscle cause goose bumps?

NAILS
- Nail is formed in the nail bed or MATRIX
- Epidermal cells fused together and fill with keratin

SWEAT GLANDS
- Perspiration is 99% water
- SUDORIFEROUS GLANDS
- Distributed over the entire skin surface
- Large numbers under the arms, palms of hands, soles of feet and forehead
- Duct extends to form a pore in the skin, perspiration excreted through the pores
- May be activated by heat, pain, fever and nervousness
- Average fluid loss is 500 ml per day

SEBACEOUS GLANDS
- Secret oil (SEBUM) that protects and lubricates the skin
Skin and Microorganisms

♦ Intact skin = best protection against pathogens, toxins and water loss

♦ Skin generally too dry for microbial growth – they do grow in moist areas

♦ Most skin bacteria associated with hair follicles or sweat glands

♦ Underarm perspiration odor caused by bacteria and perspiration

The best way to prevent the spread of disease is by hand washing.
Disorders of the Skin

ACNE VULGARIS
♦ Common and chronic disorder of sebaceous glands
♦ Sebum plugs pores ➔ area fills with leukocytes
♦ Also – blackheads, cysts, pimples and scarring

ATHLETE’S FOOT
♦ Contagious fungal infection
♦ Usually contracted in public baths and showers
♦ Rx – antifungal agents

DERMATITIS
♦ Non-specific inflammation of skin
♦ Can be rash – reaction to soap, plants, etc.
♦ Can be emotional – stress can cause skin blotches

ECZEMA
♦ Acute or chronic, inflammatory skin disease
♦ Dry, red, itchy and scaly
♦ Rx – remove or avoid causative agent, hydrocortisone to help alleviate the symptoms

WARTS (VERRUCAE)
♦ Caused by virus
♦ Some disappear spontaneously, others removed with liquid nitrogen, chemicals or laser
**IMPETIGO**
- Acute, inflammatory and contagious
- Seen in babies and young children
- Caused by staphylococcus or streptococcus
- Characterized by the appearance of vesicles which rupture and develop distinct yellow crusts

**PSORIASIS**
- Chronic inflammatory skin disease
- Characterized by dry reddish patches which are covered with silvery-white scales
- Affects the skin surface over elbows, knees, shins, scalp and lower back
- Cause – unknown
- Onsets triggered by stress, trauma or infection

**RINGWORM**
- Highly contagious fungal infection
- Raised, itchy circular patches with crusts
- Skin, scalp or underneath nails
- Rx – griseofulvin (drug)

**URTICARIA or HIVES**
- Itchy wheals or welts
- Usually an allergic reaction to drugs, food, etc.
- Rx – avoid allergen
BOILS (CARBUNCLES)
♦ Painful, bacterial infection of hair follicle or sebaceous glands
♦ Caused by staphylococcus organism
♦ Rx – antibiotics, excision and drainage of affected area

SHINGLES (HERPES ZOSTER)
♦ Viral infection of nerve endings
♦ Chest or abdomen, accompanied by severe pain
♦ Rx – medication for pain and itching

HERPES SIMPLEX I
♦ Viral
♦ Fever blister or cold sore

GENITAL HERPES
♦ Viral
♦ Blister in genital area
♦ Spread through sexual contact
♦ Periods of remission and exacerbation
♦ Rx – Acyclovir
♦ Can be passed to newborn during vaginal delivery

SCABIES
♦ Communicable, severe itching
♦ Mite burrows in skin, lays eggs, eggs hatch
SKIN CANCER
♦ Associated with exposure to sun (UV rays)
♦ Most common type of cancer in people

BASAL CELL CARCINOMA
♦ Most common, least malignant skin cancer
♦ Usually occurs on face
♦ Rx – surgical removal or radiation

SQUAMOUS CELL CARCINOMA
♦ Mostly scalp and lower lip
♦ Grows rapidly and metastasizes to lymph nodes
♦ Rx – surgical removal or radiation
♦ Prognosis good with early diagnosis

MALIGNANT MELANOMA
♦ Occurs in melanocytes
♦ Metastasizes to other areas quickly
♦ Appears as brown or black irregular patch that occurs suddenly
♦ A change in an existing wart or mole may indicate melanoma
♦ Rx – surgical removal of melanoma and surrounding area and chemotherapy
BURNS

♦ Caused by radiation, sun, boiling water, chemicals, fire or electricity

♦ **RULE OF NINES** – Measures percent of body burned. Body divided into 11 area, each is 9% of body surface.

FIRST DEGREE

♦ Superficial
♦ Skin red and dry
♦ Involves only epidermis
♦ Rx – cold water
♦ Healing within one week

SECOND DEGREE

♦ Epidermis and dermis
♦ Pain, swelling, redness and blistering
♦ Skin may be exposed to infection
♦ Rx – pain medication, dry sterile dressing
♦ Healing within 2 weeks

THIRD DEGREE

♦ Epidermis, dermis and subcutaneous layers
♦ Symptoms – loss of skin, blackened skin
♦ May be life threatening
SKIN LESIONS

- **PUSTULE** – acne
- **ULCER** – venous stasis ulcer (superficial or decubitus)
- **TUMOR** – benign epidermal tumor, basal cell carcinoma
- **VESICLE** – chickenpox, herpes simplex

Terms

**ALBINISM** – absence of melanin
**ALOPECIA** – baldness
**EXCORIATION** - abrasion
**PRURITIS** – itching