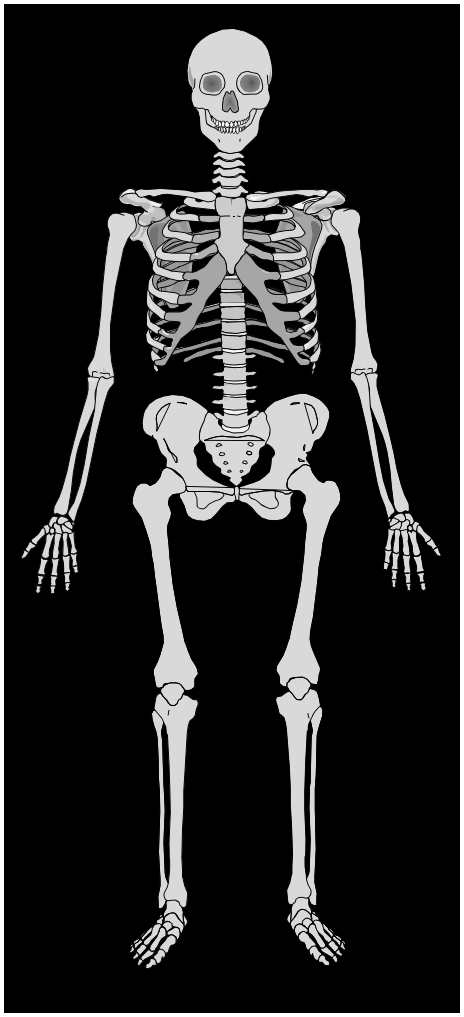
The Skeletal System



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Contents

Unit Overview

This unit is a grade five health education unit that follows the guidelines of the *Health Education: A Curriculum Guide for the Elementary Level* (1998). Ideas are also included for integration with other subjects.

The students learn about the skeletal system through a variety of activities including: research, experiments, book sharing, puzzles, word study, poster making, and role playing. Students' diverse needs are accommodated through a wide range of resources such as: information books, picture books, poetry books, audiocassette, video, and web sites. Resource materials listed may be substituted with similar resources available in your school. Suggestions for resources to use with this unit are included in the unit bibliography but there are others recommended in the *Health Education: A Bibliography for the Elementary Level (Grades 1-5)* (1999). This bibliography can be viewed on-line at the Saskatchewan Education web site http://www.sasked.gov.sk.ca/docs/health.html

Each lesson develops a particular focus and may take one class or several class periods to complete. Extending activities are provided for each topic.

Assessment and evaluation tools are included in each lesson. In addition, culminating activities provide opportunities for students to demonstrate what they have learned during the course of the unit.

Foundational Objectives

Knowledge

- Students will increase their knowledge of the skeletal system
- Students will identify sources of risk to healthy living

Skills and habits

- Students will act on their knowledge about maintaining or improving their health
- Students will treat themselves and other with respect
- Students will demonstrate safe behaviours
- Students will help members of their class achieve physical well-being
- Students will develop their ability to make decisions

Attitudes and values

- Students will develop attitudes necessary for healthy living

Adapted from *Health Education: A Curriculum Guide for the Elementary Level Grades 1-5*. Saskatchewan Education, 1998, pgs. 13-15.

Common Essential Learnings

In this unit, students will have opportunities to develop all of the CELs. Some examples are listed below but other opportunities may arise during the course of the unit.

Communication
- Group discussions
- Book sharing
- Oral presentation
- Word study

Numeracy
- Measuring bones
- Napier's Bones
- Reading charts

Critical and Creative Thinking
- Brainstorming
- Self-assessment
- Peer-assessment
- Scientific experiments
- Ask questions

Technological Literacy
- Use computers
- Use the Internet
- Artificial limbs

Personal and Social Values and Skills
- Cooperative learning
- Action plan
- Make choices

Independent Learning
- Choose resources
- Research
- Self-assessment

Adaptive Dimension

This unit accommodates a range of abilities in the grade five classroom. Further adaptations may include the following:

- Use a variety of resources.
- Choose alternate resources to suit the needs of the students.
- Adapt expectations to the abilities of the students.
- Alter the pace of activities.
- Group students in a variety of ways for varying purposes.
- Choose from the suggested activities to suit your personal teaching style and the needs of the students.
- Consider the students' background learning experiences.
- Activate prior knowledge to increase relevance.
- Alter assessment instruments to suit the needs of the students.
- Consider student interest in determining the length of the unit.
- Allow for student choice.
- Develop a feeling of student ownership for the various projects.
- Encourage student involvement in planning and evaluation.

Multiple Intelligences

This unit includes activities for using seven intelligences to varying degrees. Some examples are as follows:

Verbal/Linguistic
- Reading, writing, speaking, and listening activities that involve word puzzles, word study, research, stories, role playing, and presentations.

Logical/Mathematical
- Experiment with chicken bones
- Charting calcium needs
- Calculating relationships between bones

Spatial
- Skeletal drawings
- Read charts

Bodily-Kinesthetic
- Posture exercises
- Actions to songs
- Role playing

Musical
- Learn traditional songs

Interpersonal
- Cooperative learning
- Give and receive feedback
- Peer-assessment

Intrapersonal
- Self-assessment
- Reflecting on the unit
- Reflecting on possible career choice

Lesson One: What Do You Know About Bones?

Objectives
The students will:
- activate prior knowledge of the skeletal system.

Resources
- K-W-L chart (see *Health Education: A Curriculum Guide for the Elementary Level Grades 1-5* p. 58-59 and Appendix A1)
- Song: “Dry Bones” – Appendix B

Assessment
- Observe group discussion skills using checklist - Appendix C

Engaging Activities
- Brainstorm names of bones and list on overhead or chart.
- Listen to the song “Dry Bones” and add to the list.

Exploring Activities
- Divide the students into small groups and brainstorm what they know about the skeletal system.
- As a whole group, record the students’ facts on the K-W-L chart. Record known facts under the “K” column (what we know about bones). If uncertain about information presented, record as a question under the “W” column (what we want to find out about bones). See Appendix A2 for sample.
- Students will copy K-W-L chart.

Lesson Extensions
- Encourage the students to find resources to answer their questions. Discuss information sources. These sources may include: resource people (parents, professionals, etc.) encyclopedias, newspapers, television, full text on-line databases such as Infotrac, Internet, information books, picture books and so on.

Lesson Two: Book Share

Objectives
The students will:
- access and share information about the skeletal system.
- use an index and table of contents to find information.
- choose information that answers questions from the K-W-L chart and reflects personal interest.

Resources
- *A Book About Your Skeleton* with audiotape
- A collection of information books available in your library
- K-W-L chart overhead transparency – Appendix A1

Assessment
- Oral Presentation Assessment Checklist - Appendix D

Engaging Activities
- Revisit column "W" (what we want to find out about bones) on the K-W-L chart and review the questions students generated in the previous lesson. Add any new information or questions to the chart.
- Model accessing information from a resource by listening to the tape that accompanies *A Book About Your Skeleton* (annotated in *Health Education: A Bibliography for the Elementary Level* p. 15) and viewing the illustrations. As a whole group, choose relevant information to add to the chart.

Exploring Activities
- Have the students work with partners to locate information about the skeletal system from an information book suited to their abilities. Record 5 facts in their own language in their notebooks. Star (*) items related to the K-W-L chart.
- Have the students choose one fact to share with the class. The students may wish to write their fact on the K-W-L overhead chart for the rest of the group to copy. Assess their presentation using the checklist – Appendix D.

Lesson Extensions

- Encourage students to independently continue their research and add to their K-W-L chart.
- Provide information books and encourage students to read them during SSR time. Students may share their books with reading buddies from other grades.
- Discuss how reading for information differs from reading fiction. Some ideas for discussion are:
  - noting illustrations and captions
  - reading heading
  - skimming and scanning for key words and phrases
  - noticing words in bold print
  - using a table of contents, index and glossary
  - adjusting reading rate to the material
  - rereading when necessary
  - evaluating source for suitable, current, accurate information
- Incorporate on-line resources. Two sites geared to student use are: http://kidshealth.about.com/kids/ and http://www.yucky.com/body/.

Lesson Three: Chicken Bones

Objectives

The students will:

- understand the function of the skeleton.
- understand the importance of calcium for bone strength.

Resources

- "Ballad of a Boneless Chicken" by Jack Prelutsky from *The New Kid on the Block (*Annotated in *English Language Arts: A Bibliography for the Elementary Level,* 1992 p. 198*).*
- *Health Education: A Curriculum Guide for the Elementary Level Grades 1-5,* p. 304.
- Posters and charts of the skeletal system

Assessment

- Work samples
- Peer-assessments of skeletal drawings

Engaging Activities

- Read to students "Ballad of a Boneless Chicken" and discuss the function of the skeleton. The skeleton gives our bodies shape and support, allows movement, protects tissues and organs, and produces blood cells.

Exploring Activities

- Bring cooked chicken bones and do the following activity from the Saskatchewan Health Curriculum.
  Have students try to break cooked chicken bones. Ask them to record their observations in their notebooks. Soak some of the chicken bones in vinegar. Ask students to predict what will happen and to record their predictions. After a week, ask students to try and break the bones. Have them compare the results of this experiment to their predictions. Explain that the vinegar took the calcium out of the bones. Discuss the importance of calcium for bone growth and strength.

  Health Education: A Curriculum Guide for the Elementary Level Grades 1-5, p. 304.

- Have students reflect and write what they have learned from the experiment. Assess this work sample for student understanding and provide feedback as needed.

  ** NOTE: This activity is continued in Lesson Five.*

Lesson Extensions

- Have students work in pairs to trace the outline of their partner and draw the skeletal system using diagrams and charts. Develop a list of assessment criteria with the students prior to beginning the project – Appendix E.
- Have students track the calcium content of food they eat in one day. Some web sites students could access for information on calcium are:
  http://www.dietitians.ca/english/profile/reports/calc_2.html
  http://www.teachnutrition.org/ie/index.html
  http://ag.arizona.edu/maricopa/fcs/bb/highCalciumFds.html

Lesson Four: Boning-up on Bones

Objectives

The students will:

- use information from a variety of sources to create activities for use by classmates.
- incorporate computer skills in the creation of activities.
- review and extend their knowledge of the skeletal system.

Resources

- Puzzlemaker: http://puzzlemaker.school.discovery.com
- Wacky World of Words: http://www.members.home.net/teachwell/

Assessment

- Observation of computer skills
- Conference with students

Engaging Activities

- Visit and explore websites using an LCD projector in the classroom.
- List types of puzzles and word activities.

Exploring Activities

- Have students choose at least two types of puzzles/word activities from the list generated by the class and create their puzzles/word activities.
- Have students exchange and solve the puzzles/word activities.

Lesson Extensions

- Have students create additional activities in the form of vocabulary matching, cloze activities, and multiple choice questions.
- Create a Word Wall using vocabulary related to the skeletal system. See *Early Literacy: A Resource for Teachers.* Saskatchewan Education, February 2000, p. 122-124. This Word Wall could be used for mini lessons regarding prefixes, suffixes, root words, compounds, word origins and for daily spelling.

Lesson Five: Calcium for Strong Bones

** NOTE: This is a continuation of the Exploring Activity described in Lesson Three.*

Objectives

The students will:

- understand the importance of calcium for building and maintaining strong bones.
- set goals to develop healthy eating habits for strong bones.

Resources

- *Calcium for Life* pamphlet available from Dairy Bureau of Canada
- Food labels found on packaging
- Dairy Bureau Web Site: http://www.dairybureau.org/engl/nutrition/faq/calcium.html

Assessment

- Work samples
- Poster Self-assessment Checklist – Appendix F

Engaging Activities

- Revisit and complete Lesson Three: Chicken Bones (Exploring Activities).
- Discuss the amount of calcium required by preteens. According to the Dairy Bureau Web Site: http://www.dairybureau.org/engl/nutrition/faq/calcium.html. , preteens require 1300 milligrams of calcium per day.

Exploring Activities

- Brainstorm and list foods that contain calcium. Use the *Calcium for Life* pamphlet to extend the list.
- Have the students choose ten foods that they would like to eat from the list. Record the amount of calcium found in a serving of each of these foods.
- Have the students create a poster to show four options for their daily calcium requirements. Students will self-assess their posters using a checklist. See Appendix F.

- Have the students write an action plan to show how they will change or continue their eating habits in order to maintain daily calcium requirements.

Lesson Extensions

- Have students visit http://www.dairybureau.org/engl/nutrition/faq/calcium.html to gather information on how calcium helps the body in addition to building strong bones. Students could find a picture from a magazine and label with the key facts found on the web page. Alternatively, a small group of students could create a bulletin board display presenting this information.

Lesson Six: Posture

Objectives
The students will:
- learn how to maintain a healthy spine through good posture.

Resources
- Posture Chart overhead transparency – Appendix G
- Saskatchewan Education Media Group - *Slim Goodbody Presents All Fit: Posture* V459. Annotated in *Learning Resource Materials Update 2001*, p. 176 and individual program is annotated in *Educational Video Duplication Service 2000-2001* catalogue from Media Group on p. 221.
  *Video available for duplication ($1.00 + applicable taxes)
- *A Teacher's Guide to: All Fit.* Program 10 – Posture (Print)
- Lesson #5 from *Teachers' Guide Five Lesson Plans* by The Chiropractors' Association of Saskatchewan

Assessment
- Observe student participation and keep anecdotal records.

Engaging Activities
- Use the Think-Pair-Square strategy to define the word *posture.* Ask students to write what the word *posture* means. Share writing with a partner and combine ideas to form one definition. Partners join with another pair to form a group of four. Again combine ideas to form one definition to share with the class.
- Use the Posture Chart overhead to discuss and list the benefits and negative effects of good and poor posture. See Appendix G2 for sample.

Exploring Activities
- Have the students watch the video, *Slim Goodbody Presents All Fit: Posture* V459 to find the main ideas presented. Students are encouraged to interact with the video by participating in the activities. Discuss and summarize main ideas.
- Watch the video again. Pause, discuss and summarize as needed.

- Role play situations involving correct and poor posture. Examples may include: posture associated with different feelings, lifting and moving objects, body positions for sitting, standing, sleeping, walking, etc., exercises to develop good posture. See Guidelines for Better Posture - Activity Sheet 10 from *A Teacher's Guide to: Slim Goodbody Presents All Fit,* p. 46.
- Review the exercises presented in the video and take regular exercise breaks to establish an exercise routine that can be utilized throughout the year. A further resource for exercises is Lesson #5 from *Teachers' Guide Five Lesson Plans* by The Chiropractors' Association of Saskatchewan.
  (*This resource of 5 lesson plans was sent to all schools at the time of Spinal Health Care Week in May).

Lesson Extensions

- Create a collage showing good and/or poor posture.
- Conduct a posture relay by having students balance an object, such as an eraser, on their head while they run across the room, pick up an item from the floor and return to the starting position as suggested in *A Teacher's Guide to: All Fit,* p.25.

Ideas for Integration with Other Subjects

Language Arts

- Introduce the picture book, *The Bone Talker* by Shelley A. Leedahl (Red Deer Press ISBN 0-8899-5214-0), by having students predict the meaning of the title. The discussion may include the following topics: predicting the weather by feeling changes in your bones, aging and creaking bones, diseases such as arthritis, osteoporosis, rheumatism. Read the book to the students and create a character web of Grandmother Bones. Some other activities may involve story mapping, role playing, poetry writing, Readers' Theatre, and story retelling.
- Have the students collect poems about bones such as those found in *Bone Poems* by Jeff Moss (Scholastic Inc. ISBN 0-439-04692). Copy and display the poems on bone shapes. Students may wish to choose only part of a poem for this activity. Students could use the word processor and experiment with various fonts.

Mathematics

- Use Napier's Bones to multiply by a one-digit number. See *MathQuest Five*, p. 85 for further information. (Annotated in *Mathematics: A Bibliography for the Elementary Level*, 1992 p. 62)
- Measure and compare lengths of bones in your body. Examples: radius to foot, femur to height, arm span to height, wrist to hand span, etc. Students may make up their own problems.

Social Studies

- Research names of Saskatchewan places that refer to bones using *What's in a Name: The Story Behind Saskatchewan Place Names* by E.T. Russell (Annotated in *Social Studies: A Bibliography for Grade 7: Canada and the World Community*, 1988 p. 52). and *People Places: The Dictionary of Saskatchewan Place Names* by Bill Barry (Canadian Plains Research Centre ISBN 0-88977-114-6). Examples: Regina (Pile of Bones), Moose Jaw, Elbow, Indian Head, Little Bone, Skull Creek, Bone Creek, etc.

Science

- Investigate archeology as a possible career choice.
- Find out how scientists determine the age of bones and fossils.
- Research artificial limbs. See Addison Wesley *Science and Technology 5: The Human Body*, pp. 39-41. (Annotated in *Learning Resource Materials Update 2001* p. 272)
- Make a model of the bones and muscles in the human arm to see how they work together. Sketch your model, describe it, and demonstrate how it works. See Addison Wesley *Science and Technology 5: The Human Body*, pp. 23-24.

Physical Education

- Incorporate scientific names of the bones in warm-up sessions, body awareness activities and games.

Dance/Music

- Substitute scientific names of the bones in songs such as “Hokey Pokey” and “Father Abraham had Seven Sons”.

Culminating Activities

- Create a unit test to assess the concepts highlighted in the unit.
- Students prepare questions to play Jeopardy.
- Watch the video “The Bone Show”, (Annotated in *Health Education: A Bibliography for the Elementary Level*, 1998 p. 14). V6715 available from Media Group.
- Produce a class video containing skits, advertisements, information, safety awareness, poetry, jokes, and so on.
- Write and perform a play about bones. Some possible topics are: a fracture resulting from a sports injury, growing old, posture and self-esteem, posture at school or on the job, and so on.
- Organize a “Calcium Snack Day” and have students bring foods that are high in calcium.
- Have students reflect on their learning by completing the Unit Reflection Guide provided in Appendix H. The students may wish to share their thoughts and feelings about the unit with a partner, small group or the class.

Bibliography

Barry, Bill. *People Places: The Dictionary of Saskatchewan Place Names.* Regina: People Places Publishing Ltd., 1998.

Berg, Susan et al. *Science and Technology 5: The Human Body*. Toronto: Addison Wesley, 1999.

Gabor, Don and John Burstein. *A Teacher's Guide to All Fit.* New York: Slim Goodbody Corporation, 1987.

Gress, Beth. "Poster Making Guidelines". *The Mailbox* Aug/Sept 2000, p. 42.

Gross, Ruth. *A Book about Your Skeleton.* Toronto: Scholastic, Inc., 1978.

Leedahl, Shelley A. *The Bone Talk*er. Red Deer: Red Deer Press, 1999.

Moss, Jeff. *Bone Poems.* New York: Scholastic Inc., 1997.

Prelutsky, Jack. *The New Kid on the Block*. New York: Greenwillow Books, 1984.

Russell, E.T. *What's in a Name: The Story Behind Saskatchewan Place Names.* Saskatoon: Western Producer Prairie Books, 1973.

Saskatchewan Education Media Group. *Slim Goodbody Presents All Fit: Posture,* V459.

Saskatchewan Education Media Group. *The Bone Show*, V6715.

Saskatchewan Education. *Health Education: A Curriculum Guide for the Elementary Level Grades 1-5.* 1998.

Saskatchewan Education. *Early Literacy: A Resource for Teachers.* 2000.

The Chiropractors' Association of Saskatchewan**.** *Teachers' Guide: Five Lesson Plans.*

Websites

Dem Bones:
http://www.worldkids.net/entertainment/music/lyrics/kidssongs/drybones.htm

http://kidshealth.about.com/kids/

http://www.yucky.com/body/

Puzzlemaker: http://puzzlemaker.school.discovery.com

Wacky World of Words: http://www.members.home.net/teachwell/

Calcium for Life pamphlet
http://www.dairybureau.org/engl/nutrition/faq/calcium.html

K-W-L Chart

K What we know about bones	W What we want to find out about bones	L What we learned about bones

K-W-L Chart

K What we know about bones	W What we want to find out about bones	L What we learned about bones
-Calcium makes bones strong. *-Bones can break (fracture).* *-Your ears and nose are made of cartilage.* *-Bones hold your body together like a frame.* *-Bones protect you- ribs, skull, spine* *-Bones help you move.* *-There is bone marrow inside your bones.*	*-What is cartilage?* *-Do you have more bones when you are young?* *-Is smoking bad for your bones?* *-Are your teeth bones?* *-How may bones are there?* *-Are knuckles bones?* *-What is arthritis?* *-What are vertebrae?* *-What are other bone diseases?*	

DEM Bones

K What we know about bones	W What we want to find out about bones	L What we learned about bones
-Calcium makes bones strong. *-Bones can break (fracture).* *-Your ears and nose are made of cartilage.* *-Bones hold your body together like a frame.* *-Bones protect you- ribs, skull, spine* *-Bones help you move.* *-There is bone marrow inside your bones.*	*-What is cartilage?* *-Do you have more bones when you are young?* *-Is smoking bad for your bones?* *-Are your teeth bones?* *-How may bones are there?* *-Are knuckles bones?* *-What is arthritis?* *-What are vertebrae?* *-What are other bone diseases?*	

Ezekiel connected dem dry bones
Ezekiel connected dem dry bones
Ezekiel connected dem dry bones
I hear the word of the Lord.

Your toe bone connected to your foot bone,
Your foot bone connected to your ankle bone,
Your ankle bone connected to your leg bone,
Your leg bone connected to your knee bone,
Your knee bone connected to your thigh bone,
Your thigh bone connected to your hip bone,
Your hip bone connected to your back bone,
Your back bone connected to your shoulder bone,
Your shoulder bone connected to your neck bone,
Your neck bone connected to your head bone,
I hear the word of the Lord!

Dem bones, dem bones gonna walk aroun'
Dem bones, dem bones, gonna walk aroun'
Dem bones, dem bones, gonna walk aroun'
I hear the word of the Lord!
Disconnect dem bones, dem dry bones
Disconnect dem bones, dem dry bones
Disconnect dem bones, dem dry bones
I hear the word of the Lord!

Your head bone connected from your neck bone,
Your neck bone connected from your shoulder bone,
Your shoulder bone connected from your back bone,
Your back bone connected from your hip bone,
Your hip bone connected from your thigh bone,
Your thigh bone connected from your knee bone,
Your knee bone connected from your leg bone,
Your leg bone connected from your ankle bone,
Your ankle bone connected from your foot bone,
Your foot bone connected from your toe bone,
I hear the word of the Lord!
I hear the word of the Lord!

Dry Bones

Appendix B2

Ezekiel cried, "Dem dry bones!"

Ezekiel cried, "Dem dry bones!"

Ezekiel cried, "Dem dry bones!"

"Oh, hear the word of the Lord."

The foot bone connected to the leg bone,

The leg bone connected to the knee bone,

The knee bone connected to the thigh bone,

The thigh bone connected to the back bone,

The back bone connected to the neck bone,

The neck bone connected to the head bone,

Oh, hear the word of the Lord!

Dem bones, dem bones gonna walk aroun',

Dem bones, dem bones, gonna walk aroun'

Dem bones, dem bones, gonna walk aroun'

Oh, hear the word of the Lord.

The head bone connected to the neck bone,

The neck bone connected to the back bone,

The back bone connected to the thigh bone,

The thigh bone connected to the knee bone,

The knee bone connected to the leg bone,

The leg bone connected to the foot bone,

Oh, hear the word of the Lord!

Appendix C

Group Discussion Assessment

Name:

Date:

_____ Moves to group quickly and quietly.

_____ Contributes to the discussion.

_____ Listens respectfully to others.

_____ Shows interest.

_____ Stays focused.

Comments:

Appendix D

Oral Presentation Assessment

Student's name:

Date:

_____ Chose an important fact to share.

_____ Organized ideas.

_____ Spoke loudly enough to be heard by audience.

_____ Spoke clearly.

_____ Showed interest in topic and enthusiasm to share knowledge.

Comments:

Adapted from *English Language Arts 1-5 Draft 01108101.* Saskatchewan Education.

Appendix E

Peer-assessment of Skeletal System Diagram

Rate each criterion on a scale of 1 to 4 with 4 being the top rating and 1 being the lowest rating.

Name:_____

Date: _____

Scale	highest	4	3	2	1	lowest
Complexity of diagram (detail)		4	3	2	1	
Proportion Accurate Labeling		4	3	2	1	
Spelling		4	3	2	1	
Neatness		4	3	2	1	
Overall Mark		4	3	2	1	

Comments:

Assessed by: _____

Appendix F

Poster Self-assessment Checklist

Name: _____

Date:_____

_____ My poster includes four options for achieving the daily calcium requirement of 1300 milligrams.

_____ My poster includes a title, my name, my grade and the date.

_____ My food pictures are labelled and include the calcium content.

_____ My title is in larger lettering to show its importance.

_____ My letters are neat and easy to read.

_____ My letters are of uniform size and space.

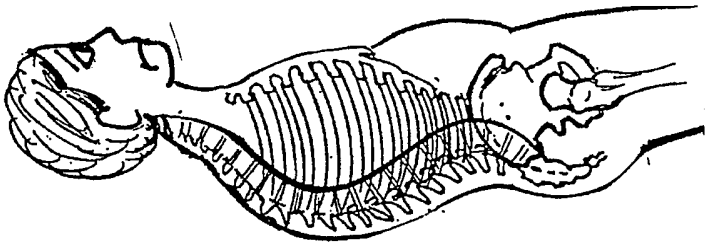
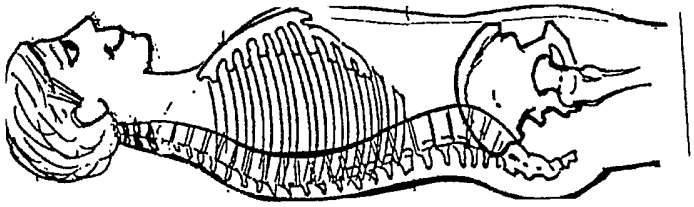
_____ I used a ruler to keep my printing straight.

_____ My poster looks balanced.

_____ My poster shows creativity.

Comments:

Adapted from “Poster Making Guidelines” by Beth Gress. *The Mailbox: Intermediate.* Aug/Sept 2000, p. 42.

Poor Posture	
Good Posture	

Good Posture	Poor Posture
-helps your spine stay healthy	-leads to back problems
-Lungs fill with air easily and oxygen is transported through the body.	-hard for lungs to get enough air so your brain gets tired and you can"t think as well -vertebrae gets tired
-is attractive and suggests healthy self-esteem -positive body language	-is unattractive and suggests poor self-esteem -negative body language

Unit Reflection Guide **Appendix H**

The Skeletal System

Name:_____ Date: _____

1. What activities did you complete in this unit?

2. What activity did you enjoy the most? Why?

3. What did you learn that has importance in your life?

4. What suggestions do you have for improving the unit?