

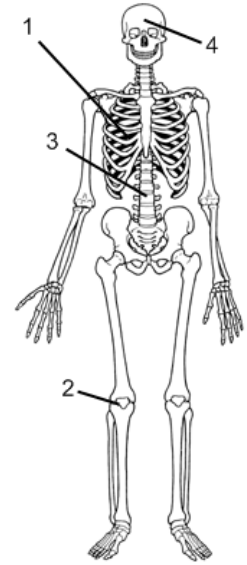
The Skeletal System

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Note on vocabulary: Throughout the unit, useful vocabulary words, both technical and non-technical have been placed in **BOLD** print. As you work through the unit, make sure that you take time to look-up or, better yet, discuss with a colleague the meaning of these terms.

Reading

The skeletal system is made up of 206 bones. The skeletal system also includes **cartilage**, **ligaments**, and **connective tissue** that join bones together at **joints**. Bone tissue or **osseous tissue** is a type of connective tissue with a hardened, **calcified matrix**. A brief review of connective tissues can be found at http://en.wikipedia.org/wiki/Connective_Tissue and a brief review of osseous tissue can be found at <http://en.wikipedia.org/wiki/Bone>. It is important to realize that each bone is composed of other tissues besides osseous tissue. For example each bone includes other tissues such as **blood** (liquid connective tissue), **endothelial tissue**, **smooth muscle tissue**, **nerve tissue**, **adipose tissue**, and **lymphatic tissue**. The skeletal system serves several functions, these include: (1) **Leverage** – to maximize the efficiency of movement and strength; (2) Blood cell production – many bones contain **red bone marrow** where **erythropoiesis** provides a continuous supply of blood cells to keep pace with the billions of red blood cells that are **routinely** destroyed each day; (3) Support – the skeletal system provides support for the soft tissues of the body; (4) Mineral storage – bones can act as a **reservoir** for **calcium (Ca)** and **phosphate ions (PO₄⁻)**, both ions are critical to the normal function of the body; bone can provide these ions if they are **deficient** in the diet; (5) Protection – bones of the **skull** and the **vertebrae** of the **vertebral column** provide protection of the brain and spinal cord, respectively, while the bones of the **thoracic cage** provide protection for the heart and lungs and to a more limited extent some of the organs in the upper abdominal cavity.

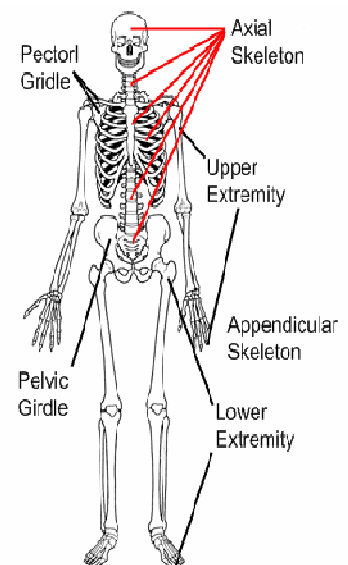


Instructions: Put the term in the space that corresponds to its number on the figure.

Skull, vertebrae, joint, thoracic cage,

1. _____
2. _____
3. _____
4. _____

The bones of the skeletal system can be subdivided into two large groups, the **axial** skeleton, and the **appendicular** skeleton. The axial skeleton consists of 80 bones arranged along the central vertical axis of the body. The axial skeleton includes the skull and associated bones (29 bones), the vertebrae (26 bones) and the thoracic cage {rib cage} (25 bones). The appendicular skeleton consists of the bones of the **upper extremities** (60 bones), the **pectoral girdle** (4 bones), **lower extremities** (60 bones), and the **pelvic girdle** (2 bones). When describing the bones of the skeleton it is important to differentiate between **paired** and **unpaired** bones. Bones in the hands, arms, legs, and feet are paired bones. There is a left and right for each bone. Some bones of the skull and the vertebrae are unpaired bones. For these particular bones there is only one bone in the body with that name. Examples of unpaired bones include the **frontal** bone, **occipital** bone, **hyoid** bone, and **sternum**.



Reading

Joints (articulations)

Bones are not **particularly flexible** but the skeleton **as a whole** is very flexible. In order for the skeleton to be flexible bones must be able to move or **articulate** relative to one another. This is accomplished through the use of joints. There are many different types of joints and most, but not all, **allow** for some degree of movement between the bones that make up the joint. Joints can be subdivided or classified based on their structure or on the amount of movement that can take place at the joint. A **typical synovial** joint is the knee. The knee is the articulation between the

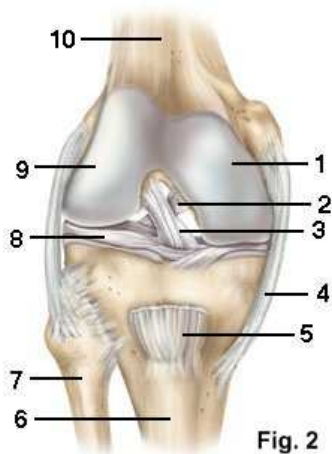


Fig. 2

femur (Fig. 1 and 2 {10}) and the **tibia** (Fig. 1 {7}, Fig. 2 {6}). Note the **fibula** (Fig. 2 {7}) does not articulate with the femur and is not part of the knee joint, however, it does articulate with the tibia (see Fig. 2). The articulation between the tibia and fibula is a good example of a joint that allows little movement between bones. The joints between the bones of the skull, called sutures, are good examples of joints with no movement. The knee is a **synovial hinge** joint that allows movement (**flexion** and **extension**) mainly, along one axis. Muscles work across hinge joints supplying the power to flex or extend the joints. Muscles are **attached** to bones by strong connective tissue components called **tendons** (Fig. 1 {2}). Within the **joint capsule**

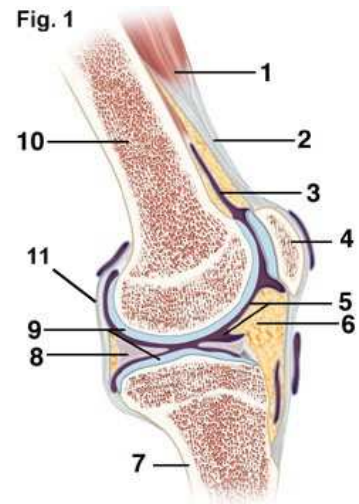


Fig. 1

(Fig. 1 {11}) of the knee, there are 2 cartilage pads, **menisci**, made from **fibrocartilage** (Fig. 1 and 2 {8}), that **cushion** and protect the ends of the bones. In addition to the cartilage **pads**, the end of each bone is covered with a protective layer of **hyaline** cartilage (Fig. 1 {9} and Fig. 2 {1, 9}). The remaining space within the joint capsule is filled with synovial fluid (Fig. 1 {5}) which **lubricates** and **nourishes** the interior of the joint. Associated with the knee are a number of supportive **ligaments** (Fig. 2 {2, 3, 4, and 5}) that help **stabilize** the joint. Ligaments are made of a similar connective tissue as tendons. The difference is that ligaments hold bones together, while tendons **attach** muscles to bones.

Check Point -- Vocabulary

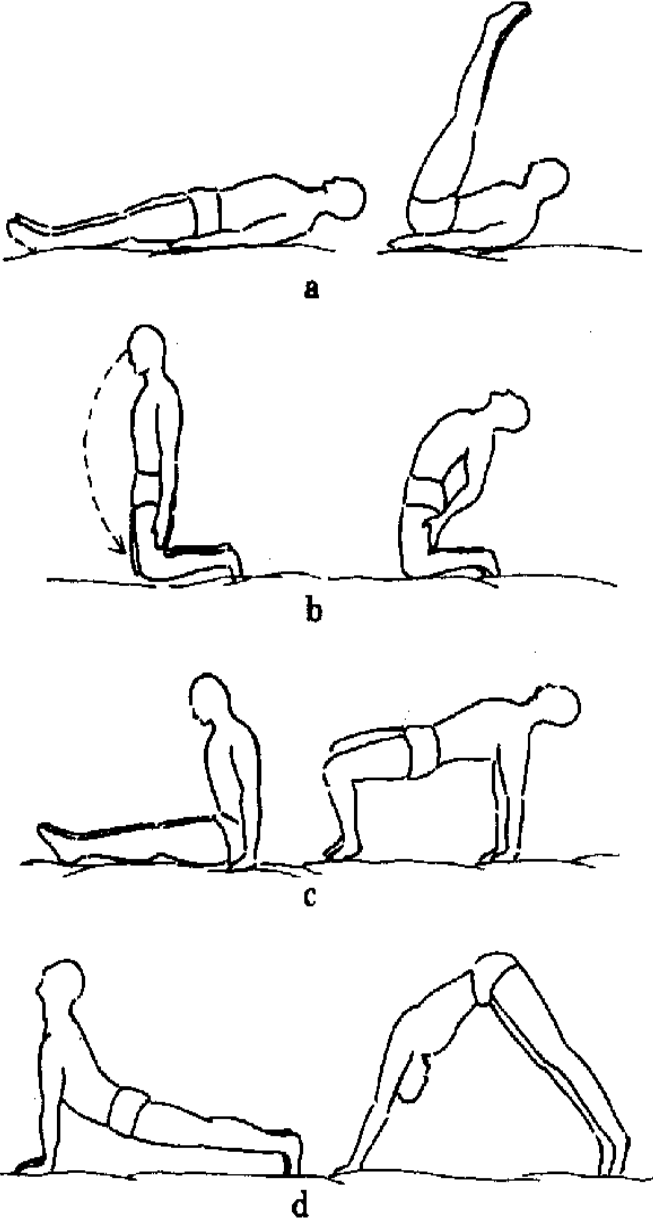
Match the words with their antonyms.	
Deficient	Unusual
Allow	Abundant
Typical	Forbid

Check Point – Vocabulary

Technical Vocabulary	Bone names	Specialized Vocabulary
Adipose tissue Appendicular skeleton Articulate Axial skeleton Calcified matrix Calcium (Ca) Cartilage Connective tissue Epithelial tissue Erythropoiesis Extend Fibrocartilage Flex Hyaline Ion Joint capsule Knee Ligaments Lymphatic tissue Menisci Nerve tissue Osseous tissue Pectoral girdle Pelvic girdle Phosphate ion Red bone marrow Skull Smooth muscle tissue Synovial Tendons Thoracic cage Vertebrae	Femur Fibula Frontal Hyoid Occipital Sternum Tibia	Attach Blood Cushion Flexible Hinge Joint Leverage Limbs Lower extremity Lubricate Nourish Pads Paired bones Reservoir Stabilize Unpaired bones Upper extremity

Check Point – Giving Instructions

Instructions: Work with a partner and discuss the best way how to instruct a patient to carry out the movements seen in the figures in column A. Use the space in column B to write down some of the key verbs you found essential to providing these instructions.

A	B
 <p>a</p> <p>b</p> <p>c</p> <p>d</p>	

Check Point – Grammar (1st and 2nd Conditionals)

Instructions: Use a word pair from row A to fill in the verb blanks along with a word from row B. Use the correct tense for the verbs. Which sentences make sense as both first of second conditionals? Which ones should only be first conditionals and which ones should only be second conditionals. Discuss your opinions with your partner.

A:	Break - Be / Get - Do / Give - Want / Have - Have / Injure - Need / Keep - Have Need - Want / Rest - Reduce / See - Call / Stop - Get
B:	Would / Will
<p>1. If you _____ this joint again, you _____ to have cortisone injections.</p> <p>2. If I _____ my leg skiing, it _____ the end of my Olympic hopes.</p> <p>3. If I _____ a traffic accident, I _____ for help and try to assist the injured.</p> <p>4. If you _____ jogging, you _____ continued pain and inflammation in this tendon.</p> <p>5. If you _____ the muscle now, you _____ the recovery time.</p> <p>6. If you don't _____ walking without crutches, your knee _____ never _____ better.</p> <p>7. If I _____ an operation, I _____ it done under local anesthetic.</p> <p>8. If I _____ a baby, I _____ natural childbirth.</p> <p>9. If I _____ birth, I _____ lots and lots of drugs.</p> <p>10. If I _____ cosmetic surgery, I _____ it over the winter holidays.</p>	

Check Point – Vocabulary

Instructions: Combine the words in column A with as many words as possible in Column B to make meaningful phrases. Use the space provided to write the words or phrases you create.

A	B
1. appendicular	A. axis
2. axial	B. between
3. bone	C. bone
4. calcium	D. cage
5. connective	E. column
6. differentiate	F. extremity
7. epithelial	G. girdle
8. lower	H. ion
9. osseous	I. limb
10. pectoral	J. muscle
11. pelvic	K. skeleton
12. rib	L. tissue
13. smooth	
14. soft	
15. unpaired	
16. upper	
17. vertebral	
18. vertical	

Use the space provided to write in your word combinations.

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____

- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____
- 17. _____
- 18. _____

- 19. _____
- 20. _____
- 21. _____
- 22. _____
- 23. _____
- 24. _____
- 25. _____
- 26. _____
- 27. _____

Check Point – Vocabulary

Instructions: Match the words in column A with a suitable definition from column B.

A	B
1. Appendicular skeleton	A. “U” shaped, non-articulating bone found in the neck
2. Axial skeleton	B. A place where a reserve of some substance is stored
3. Calcium	C. Atom that has gained or lost one or more electrons
4. Cartilage	D. Consists of the clavicle and the scapula
5. Erythropoiesis	E. Consists of the paired bones of the upper and lower extremities and the paired bones of the pectoral and pelvic girdle
6. Hyoid bone	F. Consists of the skull, vertebrae, hyoid, ribs and sternum
7. Ion	G. Includes the ribs, sternum, and thoracic vertebrae
8. Joint	H. Location of erythropoiesis
9. Occipital bone	I. Major alkaline earth metal making up the matrix of bone
10. Paired	J. Means that there is a left and a right version of the structure or object
11. Pectoral girdle	K. One of many bones making up the vertebral column
12. Red bone marrow	L. Process of making new red blood cells
13. Reservoir	M. The place where two bones come together
14. Sternum	N. The ribs articulate with this bone on the anterior aspect of the thoracic cage
15. Thoracic cage	O. Type of connective tissue found between bones at joints
16. Vertebrae	P. Unpaired bone on the posterior aspect of the cranium

Clinical Corner

Acromegaly: A bone condition caused by the over production and over secretion of growth hormone after puberty. Because the condition develops after puberty the overall stature of the person is not affected since bone lengthening has concluded. However, some bones and cartilage continue to grow throughout life. As a result these structures grow more than usual. Examples of bones that can continue to grow after puberty include the bones of the hands and the mandible.

Arthritis: An inflammatory condition of joints. The surfaces inside joints are normally extremely smooth to allow bones and tissues to move freely with no friction. These **smooth** surfaces prevent damage to the structures that must slide past each other. Damage to a joint can lead to inflammation which disrupts the character of the joint. This results in **swollen** painful joints and painful movement of the joint. Rheumatoid arthritis is an autoimmune condition that results in chronic inflammation of the joints.

Cast: The word cast can be used a noun or a verb. A cast is a **rigid dressing** used to **immobilize** a broken bone. It is typically made by treating a bandage with plaster of Paris. The bandage is then wrapped around cotton **batting** which keeps it off the skin.

Closed (simple) fracture: Fractures that do not break the skin. These types of fractures are completely internal.

Compound (open) fracture: Fracture in which ends of the broken bones penetrate the skin.

Fracture: Breaking of a bone. Fractures have a variety of different names based on which bones are broken and how they are broken.

Gigantism: A bone condition caused by the over production and over secretion of growth hormone before puberty. Unlike acromegaly, this condition occurs before bone lengthening has concluded. As a result the overall stature of the person is affected and the person grows much taller than normal. Heights can reach between 225 and 240 cm.

Greenstick fracture: A type of fracture in which the fracture is incomplete and occurs only on one side. This is more common in children since their bones are not as **brittle** as those of an adult.

-malacia: Suffix meaning “softening.”

-osis: Suffix meaning “abnormal condition.” When used with blood terms it also suggests an increase in numbers.

Osteo: Prefix meaning “bone.”

Osteomalacia: A condition that leads to “soft” bones through demineralization. The condition is commonly caused by nutritional **deficits** of vitamin D or calcium or both. This results in the loss of bone which can lead to pain and spontaneous fractures. The vertebrae of the lower back are areas frequently affected. Treatment usually includes vitamin D supplementation and an increase in dietary calcium.

Osteomyelitis: Inflammation of a bone usually caused by a bacterial infection.

Osteopenia: A reduction in bone density due to the loss of calcium. This condition often, but not always, precedes osteoporosis. Usually seen in post-menopausal women and is associated with declining levels of estrogen.

Osteoporosis: The bone cells that make new bone are called osteoblasts, while the cells that destroy bone are called osteoclasts. Osteoporosis results from an imbalance between the activities of these cells. When osteoblast activity is reduced then a loss of bone density follows. The reduced activity as has been linked to the reduction in estrogen production which occurs in post-menopausal women. As a result, post-menopausal women are at high risk of developing this condition.

Paget’s disease: A condition usually seen in people over 40 years old. Bone is constantly being remodeled. During remodeling old bone is removed and new bone is added back in its place. The net effect is that the bone shape and size does not change. In Paget’s disease, named after the surgeon James Paget, remodeling does not precede in an organized manner. The result is the bone changes its shape and size which can put pressure on blood vessels, nerves and other soft structures.

-penia: Suffix meaning “a reduced number or amount” i.e. osteopenia = reduced amount of calcium in bones; leucopenia = reduced number of white blood cells.

-porosis: Suffix combining “por” which means pore or passage with “osis” meaning abnormal. The resulting suffix means abnormal opening, pores, or passages. In the case of osteoporosis, a radiograph of effected bones shows up as increases in the size of naturally occurring passages within the bone. The bone looks porous or spongy.

Pott’s fracture: Type of fracture which the medial malleolus of the tibia and fibula are both broken.

Reduction: The correction of a bone fracture. A reduction can be “open” or “internal” requiring surgery or “closed,” in which the bone are **set** through **manipulation**.

Rickets: A common childhood disease in developing countries, it is caused by nutritional deficiencies in calcium and vitamin D or severe malnutrition in general. The weakened bones can **bend** under the pressure of the child’s weight which can lead to bone deformities in adulthood.

Splint: A temporary device used to immobilize a broken bone or an injured joint. Typically a splint is made from wood, but other materials are also used.

Spiral fracture: A common sports fracture resulting from a twisting injury which produces a “**cork screw**” fracture line that spirals up the long axis of the bone. These are difficult to diagnosis radiographically and difficult to stabilize.

Check Point – Vocabulary

Instructions: Word with a partner and match the disease or condition in column B with the description in column A. As you work with your partner on this exercise, try to define the words in bold print.

A	B
<ol style="list-style-type: none"> 1. Bony process found on the distal tibia and distal fibula. 2. Something easily broken. 3. Childhood condition resulting from nutritional deficiencies of vitamin D and calcium. 4. A fracture that occurs without an external trauma or force. 5. Inflammation of a joint. 6. Prefix meaning “bone.” 7. Suffix meaning “reduced numbers.” 8. Suffix meaning “inflammation of.” 9. Suffix meaning “softening.” 10. Suffix meaning “abnormal passages.” 11. Temporary device used to immobilize a broken bone or injured joint. 12. Fracture in which a broken bone projects through the skin. 13. Results from over production of growth hormone prior to puberty. 14. Fracture in which the broken bone(s) remain internal (do not penetrate the skin). 15. The years of a woman’s life after menopause. 16. Fracture created by a twisting trauma. 17. Fracture in which only one side of the bone is fractured. 18. Normally defined as the age at which sexual reproduction is first possible (generally 14 for males and 12 for females). 19. Reduction of the calcium phosphate content of bone. 20. Normally defined as the age at which permanent cessation of menstruation (ages 45 – 55). 21. Term meaning reduction in bone density. 22. Condition of excess production of growth hormone after puberty. 23. A rigid external bandage used to immobilize a broken bone until it heals. 24. Reduction in osteoclastic activity that can follow menopause. 25. Demineralization of bone linked to reduced estrogen levels following menopause. 	<ol style="list-style-type: none"> A. Acromegaly B. Arthritis C. Brittle D. Cast E. Closed fracture F. Compound fracture G. Demineralization H. Gigantism I. Greenstick fracture J. –itis K. –malacia L. Malleolus M. Menopause N. Osteo– O. Osteomalacia P. Osteopenia Q. Osteoporosis R. –penia S. –porosis T. Post-menopausal U. Puberty V. Rickets W. Splint X. Spiral fracture Y. Spontaneous fracture

Check Point – Prepositions

Instruction: Use the prepositions in the box to fill in the blanks in the sentences below. Note the word combinations using the preposition “to.”

To, In, Off, On, For, Down, Of, From, Above, At, Into, Over

1. You have broken your arm. I'm going to have _____ put it _____ cast it.
2. I'm going to have _____ cut _____ the sleeve of your shirt _____ order to examine your arm.
3. When do I get my cast _____?
4. How long does the cast have _____ stay _____?
5. The cast will have _____ stay _____ your arm _____ 6 weeks.
6. Q: How did this happen? A: I feel _____ my bike.
7. I'm going to send you _____ to X-ray. They will take some films _____ your arm.
8. When the patient came back _____ X-ray they received an injection _____ relieve the pain.
9. You've broken your arm just _____ the wrist.
10. This medication will take the edge _____ your pain. You should feel some relief _____ 2 or 3 minutes.
11. Q: Do you feel any pain now? A: No, not _____ the moment.
12. The doctor needed _____ manipulate the bones to bring them back _____ alignment.
13. A cast can be made _____ either fiberglass or plaster of Paris.
14. The patient's arm was wrapped _____ a fiberglass shell.
15. As the medication wore _____ the patient began _____ experience some pain.
16. The patient was told _____ sleep with their arm elevated _____ the next 2 weeks.
17. The patient was told _____ sleep with their arm up _____ 2 or 3 pillows.
18. Q: Can I take a shower with the cast _____? A: Yes, but spend as little time _____ the shower as possible and make sure you put a plastic bag _____ your arm and secure it with rubber bands.
19. The patient was told _____ keep their arm _____ a sling during the day.
20. Q: When should I come back _____ a check up? A: Unless you are having problems, you don't need _____ come back _____ six weeks. But if you experience pain or persistent swelling you should come back right away.

Talking with the Patient

Instructions: Work with a partner and read through the patient / doctor dialog. Observe the form and intent of the questions asked by the doctor. The preposition “to” has been highlighted throughout the dialog. Note the word combinations associated with “to.”

1. D: Good afternoon Ms. Pepperkorn, I’m doctor Roberts, I’ll be treating you today.
2. P: Hi doctor.
3. D: The paramedic who first treated you seems **to** think you might have a broken arm.
4. P: Well it sure feels like it.
5. D: How did you hurt yourself?
6. P: I was riding my bike and I dog ran across my path. I swerved to miss it and crashed.
7. D: And the dog?
8. P: I missed it.
9. D: Well let me take a look. Please let me know if anything I do increases the pain.
10. P: Don’t worry; you’ll be the first **to** know.
11. D: Does this hurt?
12. P: Yes, a little.
13. D: How about this?
14. P: YES!!!
15. D: Okay – I think it’s best **to** send you down **to** X-ray and get some films of your arm. The technician will be here in just a minute **to** wheel you down **to** the X-ray department.
16. P: Okay. Can you do anything about the pain?
17. D: I would prefer **to** wait until after the X-ray. Can you hold on for another 10 or 15 minutes?
18. P: Yeah, I think so.
19. D: Great.

20. D: Well Ms. Pepperkorn, I have your X-rays and you definitely have a broken arm. You have broken your right radius just above the wrist. This is a fairly common fracture and occurs when we put our arm out straight **to** break a fall.
21. P: Uh, about the pain?
22. D: Oh yeah, let me give you an injection **to** take the edge off. Do you have any medicine allergies?
23. P: I’m allergic to penicillin.
24. D: Okay. Anything else?
25. P: Yeah, I’m allergic to injections?
26. D: There won’t be much pain with the injection and the medication will enter your system much faster that way. Pills will take 20 or 30 minutes **to** have an effect.
27. P: Okay.
28. D: There! You should get some relief in just a couple of minutes.
29. P: Thanks.
30. D: Your fracture is a simple fracture with no complications. So I’m going **to** do what is called a closed reduction. There will be some discomfort, but the medicine I have given you will keep it **to** a minimum. During a closed reduction I have **to** manipulate the bones **to** bring them into alignment so that they will heal straight.
31. P: Okay, I guess.
32. D: Is the pain medicine working yet? Are you getting some relief?
33. P: Yes, it’s working pretty well.
34. D: Okay then – let’s get started.

35. D: Well that went perfectly. How do you feel?
36. P: It wasn’t something I would want **to** do everyday, but it wasn’t as bad as I expected.
37. D: Glad **to** hear it. Now we need **to** cast your arm.
38. D: This is cotton batting^{*}. It will make a nice soft layer next **to** your skin. Next I’m going **to** wrap your arm in a fiberglass shell. What color would you like?
39. P: I thought casts were white and made of plaster.
40. D: Plaster can be used but fiberglass is cooler, much lighter and it’s waterproof. Plus it comes in all these neat colors.
41. P: Neat? I haven’t heard anyone use that word since Anne Hall.
42. D: Be that as it may, what color would you like?
43. P: I think I’ll go with lemon yellow.
44. D: Excellent choice.

45. D: Well we’re all done. You’ve got a nice yellow cast and your arm will heal nicely.

46. P: How long do I have **to** keep it on?
47. D: Usually it's takes about 6 weeks. We'll make an appointment for you in 6 weeks. When you come in we'll take another X-ray and make sure everything is healed. If everything looks good, we'll take the cast off and give you some rehab exercises.
48. P: Rehab?
49. D: Yes, you'll need a little rehab. After 6 six weeks of immobility your forearm muscles will need some strengthening. Usually rehab consists of squeezing a ball of rehab putty three or four times a day for 5 – 10 minutes for 3 weeks. As you get strength back we'll stiffen the putty for more resistance.
50. P: Oh okay, that doesn't sound too bad.
51. D: Now, you can expect some pain as the medication I gave you wears off. I'm going **to** give you a prescription for some mild painkillers. I would be best if you start taking them right away and continue them for 2 or 3 days. I'll give you enough for a week, but after 3 days, you should only take them as needed. You can also switch **to** over-the-counter painkillers for times when the pain is mild. After a week, I don't think you will have any more discomfort.
52. P: Okay.
53. D: I also want you **to** keep your arm elevated as much as possible for the next week. Swelling is **to** be expected and it can also cause pain. You'll find that any pain you might have will be dramatically reduced when your arm is elevated, especially at night. So try **to** sleep with your arm up on 2 or 3 pillows at your side. During the day I want you **to** use a sling for the first week or two. This will help keep blood from pooling in your hand and wrist.
54. P: Okay, I can do all those things pretty easily. Can I use the fingers of my cast hand?
55. D: For the first week or so I wouldn't do much with that hand. Moving your fingers will likely make your arm hurt worse. After two weeks you can do some little things with the fingers on that hand.
56. P: Can I drive?
57. D: I wouldn't. Without the full use of your right hand and arm I think driving would put you and everyone else in danger, however, most people do drive. But if you must, be sure **not to** drive after taking the pain medications; they can affect your ability **to** drive.
58. P: Can I take a shower? You said the cast was waterproof.
59. D: The cast is waterproof, but the cotton batting against your skin isn't. You should buy some medium sized plastic garbage bags and some big rubber bands. Put your arm into the bag and use rubber bands **to** secure the bag around your arm above the cast. Use 2 or 3 bands spaced apart so that you have a good seal.
60. P: Okay. Thanks for everything.
61. D: You're welcome. If you have any problems you can either call your family doctor or come back **to** the emergency room. You can ask for me, but if I'm not on duty, someone else will be glad **to** assist you.
62. P: Great, thanks.
63. D: Take care and happy cycling.
64. P: Bye.

* **batting**: wool, cotton or other fibers which are processed into large sheets called *batts*. The fibers can be used for padding or for stuffing pillows or quilts.

Talking with the Patient

Instructions: Review the interview and find line numbers that correspond to the interview elements listed below. In some cases different aspects of the same interview element may be addressed in different parts of the interview – one such case has been done as an example. The questions in the table below are not in the sequence of the interview.

Interview element	Line numbers
Patient greeting.	
Request for information about how the accident happened.	
Request for patient feedback regarding pain caused by the doctor.	
Patient making a request for pain medication.	
Request for information regarding allergies.	
Explanation regarding the use of injectable medications.	
Request for patient feedback regarding effect of pain medication.	
Statements providing patient with an explanation of the procedure.	
Doctor statement offering reassurance following a successful procedure.	
Explanation regarding the use of material (fiberglass) for a specific procedure.	
Statements regarding the time line for healing.	
Statements regarding prognosis.	
Statements of instruction regarding rehab.	
Statements of instruction regarding showering with a cast.	
Statements regarding the use of medications.	
Statements of warning regarding driving.	
Request for next appointment to see the patient.	
Conclusion of patient visit.	

Asking Questions and Giving Answers

Practice asking and answering the following:	Formulate questions for the following answers:
<ol style="list-style-type: none"> 1. What was the patients' problem? 2. What caused the problem? 3. What is the patient allergic to? 4. Why did the patient receive an injection of pain medication instead of tablets? 5. How long will the patient have to wear the cast? 6. How should the patient take the prescribed pain medication? 7. What sleeping instructions did the patient receive? 8. What showering instructions did the patient receive? 9. When does the doctor want to see the patient next? 10. Under what conditions does the doctor want to see the patient sooner? 	<ol style="list-style-type: none"> 1. Riding my bicycle. 2. I was trying to avoid hitting a dog that ran across her path. 3. I have a simple fracture of the right radius. 4. Just above the wrist. 5. For six weeks. 6. Fiberglass. 7. It's lemon yellow. 8. Because they are cooler, lighter and they are waterproof. 9. Yes, for 3 weeks after I get the cast off. 10. I will have to squeeze a ball of rehab putty several times a day.

Instructions 1: Work with a partner and recreate, from memory, (don't reread) the interview with one person playing the role of the doctor and the other person playing the role of a patient. Use the table above as a quick guide for the types of questions to ask as part of the interview. Try to make the interview as conversational as possible. Try to use some of the conversational words and phrases found in the dialog. Switch roles and repeat the reenactment.

Instructions 2: Work with a partner. Create a new interview using the dialog above as a template and patient profiles below. Use the table above as a quick guide for the types of questions to ask as part of the interview. Try to make the interview as conversational as possible. Try to use some of the conversational words and phrases found in the dialog. Add additional questions so that you can get all the information presented in the profiles.

Patient A profile:	Patient B profile:
<p>Age: 75 years old; Sex: female Ht: 168 cm, Wt: 82 kg Condition: Simple fracture of distal right radius from fall in home. Current medical problems: type 2 diabetes (10 years), osteoporosis (15 years), and age appropriate dementia. Medications: metformin and estrogen replacement therapy.</p>	<p>Age: 57 years old; Sex: male Ht: 182 cm, Wt. 91 kg Condition: Simple fracture of right collar bone from fall from motor scooter. Minor contusions and lacerations on right forearm and right patellar region. Current medical problems: high blood pressure (10 years), high cholesterol (15 years), and atrial asystole treated with pacemaker. Medications: telmisartan, Lipitor, and low dose aspirin.</p>

Check Point – Common Names of Bone

Instructions: Some of the bones of the body have common English names in addition to their Latin based names. Work in groups of 3 or 4 and match the Latin names with the common English names.

Common Names	Latin Based Names
1. funny bone _____	A. calcaneous
2. knee cap _____	B. carpals
3. collar bone _____	C. clavicle
4. hip bone _____	D. coxa
5. thigh bone _____	E. coccyx
6. jaw bone _____	F. femur
7. ankle bones _____	G. mandible
8. heel bone _____	H. medial malleolus of the tibia or lateral malleolus of the fibula
9. wrist bones _____	I. olecranon process of the ulna
10. cheek bone _____	J. patella
11. shoulder blade _____	K. scapula
12. breast bone _____	L. sternum
13. shin bone _____	M. tibia
14. tail bone _____	N. zygomatic

Check Point – Grammar

Instructions: Work with a partner to fill in the blanks.

Fill in the blanks with the indefinite article “a” or “an” or the definite article “the”.

Acromegaly is ____ bone condition caused by ____ over production and over secretion of growth hormone after puberty. Because ____ condition develops after puberty ____ overall stature of ____ person is not affected since bone elongation has concluded. However, some bones and cartilage continue to growth throughout life. As ____ result these structures grow more than usual. Examples of bones that can continue to grow after puberty include ____ bones of ____ hands and ____ mandible.

Check Point -- Phrases

Instructions: Work with a partner to combine the words in column A with a word or words in column B to make meaningful combinations.

A	B
1. age	A. appropriate
2. calcium	B. as needed
3. childhood	C. band(s)
4. closed	D. batting
5. compound	E. cast
6. cotton	F. counter
7. fiberglass	G. disease
8. growth	H. fracture
9. hinge	I. hormone
10. lemon	J. joint
11. over the	K. medicine
12. pain	L. reduction
13. reduce	M. reservoir
14. rubber	N. swelling
15. simple	O. supplement
16. take	P. yellow
17. vitamin D	

Write your combinations in the spaces below.

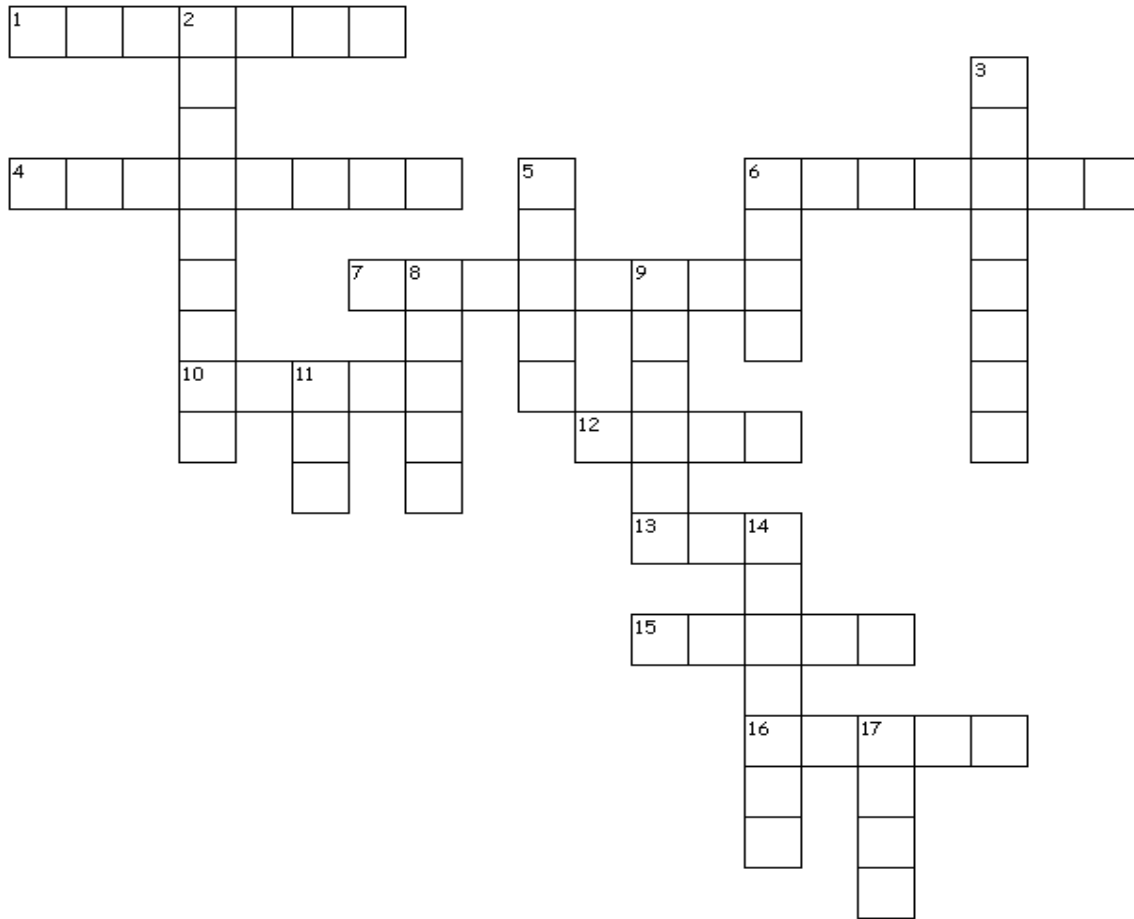
- | | |
|-----------|-----------|
| 1. _____ | 19. _____ |
| 2. _____ | 20. _____ |
| 3. _____ | 21. _____ |
| 4. _____ | 22. _____ |
| 5. _____ | 23. _____ |
| 6. _____ | 24. _____ |
| 7. _____ | 25. _____ |
| 8. _____ | 26. _____ |
| 9. _____ | 27. _____ |
| 10. _____ | 28. _____ |
| 11. _____ | 29. _____ |
| 12. _____ | 30. _____ |
| 13. _____ | 31. _____ |
| 14. _____ | 32. _____ |
| 15. _____ | 33. _____ |
| 16. _____ | |
| 17. _____ | |
| 18. _____ | |

Check Point – Sentences

Instructions: Using the phrases you created above, create a sentence which contains the phrase. Work with a partner or in a small group with each person creating one sentence that uses each phrase. Discuss the sentence structure with your colleagues, or work together to create and discuss sentences.

Cross Word Puzzle

Instructions: work with a partner to complete the crossword puzzle using the vocabulary from this unit.



Across	Down
1. Also know as the shoulder blade.	2. Gland that produces growth hormone.
4. Joint between the humerus and the shoulder blade.	3. Also know as the collar bone.
6. The bones that make up the wrist.	5. Another name for the place where bones articulate.
7. A pad of cartilage found between the femur and the tibia.	6. Rigid external bandage used to immobilize a fracture.
10. Abbreviation for rehabilitation.	8. The joint between the humerus and the ulna / radius.
12. Bone that articulates with the trochlea of the humerus.	9. A thicken area of bone that forms where a bone fracture has healed.
13. Term used to describe the manipulation of a broken bone to realign the broken ends.	11. Joint between the femur and the coxa.
15. A radiographic image.	14. The bones that make up the ankle.
16. Joint between the tibia / fibula and the talus.	17. Joint between the femur and the tibia.

Check Point – Sentence construction

Instructions: Work with a partner to match the first part of the sentence (column A) with the second part in (column B). The sentences in column A appear in the correct order for the paragraph. Put the letter of your choice in column B in the blank following its matching sentence in column A.

A	B
1. Arthritis is an inflammatory ____ 2. Normally the surfaces inside of joints are extremely ____ 3. These smooth surfaces prevent damage ____ 4. Damage to a joint can lead to inflammation ____ 5. This results in swollen tender joints ____ 6. Rheumatoid arthritis is another type of arthritis which is an autoimmune ____	A. and painful movement of the joint. B. condition of joints. C. disease that results in chronic inflammation of the joints. D. smooth to allow bones and tissues to move freely with no friction. E. to the structures that must slide past each other when you move a joint. F. which disrupts the smooth interior character of a joint.

Check your answer by referring to the Clinical Corner section.

Instructions: Put the sentences in the correct order to make a meaningful paragraph. Enter your choices for the correct order in column B.

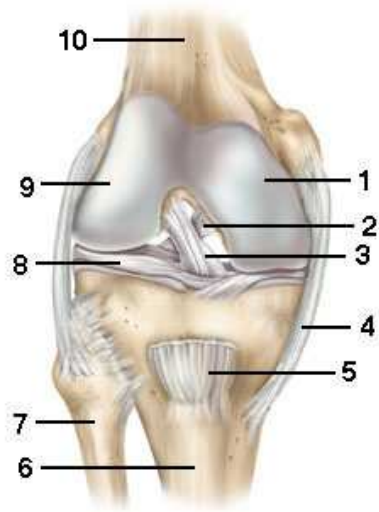
A	B
A. As a result, post-menopausal women are at high risk of developing this condition. B. Osteoporosis results from an imbalance between the activities of these cells. C. The bone cells that make new bone are called osteoclasts, while the cells that destroy bone are called osteoblasts. D. The reduced activity as has been linked to the reduction in estrogen production which occurs in post-menopausal women. E. When osteoclast activity is reduced then a loss of bone density follows.	1. _____ 2. _____ 3. _____ 4. _____ 5. _____

Check your answer by referring to the Clinical Corner section.

Check Point -- Review

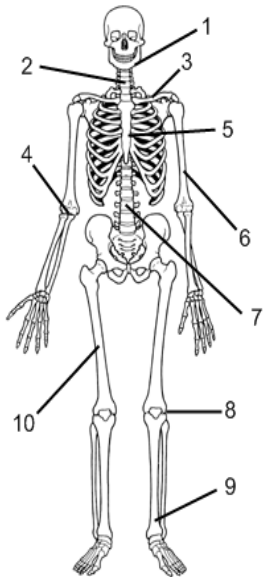
Instructions: Work with a partner and pick words in the boxes to name the labeled items on the figures of the anterior view of the knee joint and the anterior view of the skeleton.

Anterior cruciate ligament, Femur, Fibula, Lateral condyle of femur, Lateral meniscus, Medial condyle of femur, Posterior cruciate ligament, Quadriceps tendon, Tibia, Tibial collateral ligament



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Cervical vertebrae, Collar bone, Elbow, Femur, Humerus, Jaw, Knee, Lumbar vertebrae, Sternum, Tibia



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Self Test

Instructions: Take the self-test below to see how well you remember the information presented in this unit.

1. The vertebrae are part of the:
 - a. Axial skeleton
 - b. Appendicular skeleton
2. Erythropoiesis refers to the production of:
 - a. Bone
 - b. Cartilage
 - c. Red blood cells
 - d. White blood cells
3. The expression “take the edge off” means:
 - a. To shorten
 - b. To delay
 - c. To reduce the intensity
 - d. To enhance the sharpness of something
4. The suffix –itis means:
 - a. Redness
 - b. Inflammation
 - c. An increase in number
5. A synonym for articulation is:
 - a. Bone
 - b. Skeleton
 - c. Hinge
 - d. Joint
6. The Latin based name for the shoulder blade is:
 - a. Humerus
 - b. Scapula
 - c. Collar bone
 - d. Tibia
7. The common name for the zygomatic bone is:
 - a. Cheek bone
 - b. Face bone
 - c. Buccal bone
 - d. Temporal bone
8. The elbow and the knee are both examples of:
 - a. Synovial joints
 - b. Hinge joints
 - c. Both A and B
9. Common material used for a cast include:
 - a. Fiberglass
 - b. Plaster of Paris
 - c. Wood
 - d. A and B only
 - e. A, B and C
10. Estrogen is used to treat:
 - a. Arthritis
 - b. Rheumatoid arthritis
 - c. Osteoporosis

11. Lipitor is used to treat;

- a. High blood pressure
 - b. Arthritis
 - c. High cholesterol
12. The suffix –penia means:
- a. Softening
 - b. Reduced numbers
 - c. Porous
13. Which of the following is NOT a paired bone?
- a. Humerus
 - b. Tibia
 - c. Hyoid
 - d. Patella
14. The menisci in the knee are made from:
- a. Bone
 - b. Adipose tissue
 - c. Cartilage
15. The joint distal to the knee is the:
- a. Wrist
 - b. Ankle
 - c. Elbow
 - d. Hip
16. The ribs are part of the:
- a. Axial skeleton
 - b. Appendicular skeleton
17. Most of the bones in the skeleton are part of the:
- a. Axial skeleton
 - b. Appendicular skeleton
18. Tendons _____ muscles to bones.
- a. Attach
 - b. Secure
 - c. Join
 - d. Hold
19. Growth hormone is produced by the:
- a. Parathyroid gland
 - b. Thyroid gland
 - c. Anterior pituitary gland
 - d. Hypothalamus
20. Ligaments attach bones to other bones.
- a. True
 - b. False

Suggested Mini-Lectures

The mini-lectures listed below can be used as topics for instructors to add additional information to this unit or the topics can be assigned to students for classroom presentations.

- ✚ Understanding osseous tissue
 - Types of bone
 - Compact bone
 - Spongy bone
 - Elements and structure of the osteon (Haversian system)
 - Central canal
 - Perforating canals
 - Concentric lamellae
 - Canaliculi
 - Lacunae
 - Osteocyte
- ✚ Calcium balance
 - Dietary calcium and vitamin D (skin)
 - Parathyroid hormone (Parathyroid gland)
 - Calcitonin (Thyroid C cells)
- ✚ Rickets