

VIRTUAL KNEE SURGERY

Common Core Standards

CCSS Middle School ELA

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CCSS High School Math

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CCSS High School ELA

RST.9-10.2 Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

National Science Standards

Content Standards

Grades 5-8:

1. Understandings about scientific Inquiry.
2. Understanding of structure and function in living systems, reproduction and heredity.
3. Abilities of technological design and understandings about science and technology.
4. Personal health risks and benefits, science and technology in society.

Grades 9-12:

1. Understandings about scientific inquiry.
2. Matter, energy and organization in living systems and behavior of organisms.
3. Abilities of technological design, understandings about science and technology.
4. Natural and human-induced hazards, science and technology in local, national, and global challenges.
5. Understanding of the nature of scientific knowledge and science as a human endeavor.

Virtual Knee Surgery

Tell students that they are a group of orthopedic surgeons specializing in the treatment of bones, joints, nerves and muscles and they are faced with a problem to help patients regain their mobility by performing a knee surgery!

Ask students to go to the website <http://www.edheads.org/activities/knee/> and **write a sequence paragraph** of the steps involved in the surgery. While students are working on the Virtual Knee Surgery, they will also answer the questions in their worksheet (formative assessment). (*See attached Formative Assessment*).

When students are finished, ask them to share out their write-ups using RoundRobin Strategy. After sharing, show them the Total Knee Replacement Video which is found on <http://www.cosi.org/educators/educator-ivc/item/total-knee-replacement>.

As an exit ticket, pair up students and they will answer the question, "What do you think the FIRST knee replacement surgery was like and how do you think it differed from today's surgery?". Ask a volunteer to share out their answers.

FORMATIVE ASSESSMENT

Virtual Knee Replacement

1. Who checks the vital signs once the patient is in the operating room?
2. What step is taken to prevent wrong surgeries?
3. At what angle does the leg need to be to fully expose the bones of the knee?
4. List the three bones of the knee.
5. With what part of the body is the tibial cutting jig aligned?
6. What is the range of motion for a typical knee?
7. How long does the cement take to harden once the permanent components of the knee are in place?
8. What is the first layer sutured back together after the permanent components are in place?
9. How long does the average patient remain in the hospital?
10. What is the average number of steps a person takes in a day?

Sequencing Rubric

6	<ul style="list-style-type: none">• Accurately conveys the chronological order of all events/steps• Elaborates essential details• Infers a major outcome, moral stance or lesson• Synthesizes key themes, if appropriate• Explores the impact or affect of events/steps if they are not in chronological order
5	<ul style="list-style-type: none">• Accurately conveys the chronological order of all events/steps• Gives essential details• Synthesizes key themes, if appropriate• Explores the impact or affect of events/steps if they are not in chronological order
4	<ul style="list-style-type: none">• Adequately conveys the chronological order of most events/steps• Gives some essential details• May include minor inaccuracies
3	<ul style="list-style-type: none">• Minimally conveys the chronological order of events/steps; some essential information is missing• Gives some details• May include some inaccuracies
2	<ul style="list-style-type: none">• Does not adequately convey the chronological order of events/steps• May be out of sequence• Includes some inaccuracies (details, etc.)
1	<ul style="list-style-type: none">• Conveys a minimal amount of information about the chronological order of events/steps• May include information that is off topic