



Muscles work in pairs

Autumn 1 · Week 4 · Lesson A · 40 minutes

Learning objective

Explain how biceps and triceps take turns contracting to bend and actively straighten the elbow, using a safe model.

Evidence to look for

Record the pupil decision or explanation and the support used. Accept pointing, signing, adult scribing or directing the model. A photograph alone does not establish understanding; no photography or public sharing is required.

Source lesson timing

Elapsed minutes	Source stage	Minutes
0–1	Overview	1
1–5	Arrival Task	4
5–7	Today at a Glance	2
7–12	I Do 1	5
12–17	I Do 1b	5
17–23	We Do 1	6
23–27	We Do 1b	4
27–31	I Do 2	4
31–40	We Do 2	9

Split slide times are added within their original source stages. Printed tasks and adaptations replace activity within these timings; they do not add extra lesson time.

Equipment and preparation

- Adult-prepared card arm model with two card strips and a secured split-pin elbow
- Two loose strings attached to forearm tabs for gentle opposite-side pulls
- Biceps/triceps and CONTRACTS/RELAXES labels; pupil sheet



TEACHING SEQUENCE

Guide the lesson

Use the source stage times; choose prompts appropriate to the pupil.

Slide 1: Muscles work in pairs · 1 minute

Monday P3, 11:00-11:40. This one-minute overview is included in the 40-minute lesson.

Slide 2: Watch a bend and a straighten · 4 minutes

Use a card model, not compulsory body movement. Supported: point to the pull. Standard: predict which muscle acts. Stretch: compare both actions. Retrieve last week's internal skeleton; do not assume anatomical vocabulary beyond it.

Slide 3: Three things we will do · 2 minutes

Introduce biceps/triceps, contract/relax with spoken repetition and printed labels. Adult manipulates the model first; pupils do not handle pins or stretched elastic.

Slide 4: A model helps us see a pull · 5 minutes

Original simplified card-arm diagram, not anatomical scale. Adult demonstrates gentle manual pull with a loose string anchored to a forearm tab. Model is supported at the upper strip. A string stands for the effect of a pulling muscle but does not shorten itself. Keep small split pin fixed; adult makes holes.

Slide 5: The body has a working pair · 5 minutes

Map card to bone, pin to elbow and string to muscle pull. Contracting muscle develops tension and can shorten to pull; at this level use the simple shortening model. Do not say relaxed muscle is disconnected or that every lowering action requires triceps contraction: gravity can lower an unsupported arm. Teach active movement in this chosen model.

Slide 6: Choose the pulling muscle · 3 minutes

All pupils commit before teacher confirms. Bend = biceps contracts while triceps relaxes in the simplified elbow model. Offer colour/word labels together so colour is not the only identifier.



TEACHING SEQUENCE / CONTINUED

Guide the lesson - continued

Keep the source stage times; pause and check understanding as needed.

Slide 7: Now swap the action · 3 minutes

Active straighten = triceps contracts, biceps relaxes. Ask pupil to direct adult model movement. Do not require pupil to show their own arm; accept pointing to word labels.

Slide 8: Model and muscle: compare · 4 minutes

Ask how two different materials represent the same relationship. Both movements need a pulling action; a string cannot push the forearm. A model has limits and is not a complete anatomical explanation.

Slide 9: Explain both muscle jobs · 4 minutes

Model a full sentence including both muscles rather than “the top one moves.” Accept placing CONTRACTS/RELAXES beside biceps/triceps labels. Adult notes the decision and explanation; photo of the model alone is insufficient.

Slide 10: True or needs correcting? · 5 minutes

True: muscles pull; biceps/triceps form pair. False: muscles push bones. Add source claim “bones move on their own” as false if time: muscles generate forces moving bones at joints. Preserve response before discussion.

Slide 11: Direct two moves and keep labels · 4 minutes

Final four minutes completes nine-minute source We Do 2 and exact 40 minutes. Let pupils direct adult movements if fine-motor access is a barrier. Do not begin Wednesday construction early. All elastic-band source ideas are replaced with loose strings under adult control.

**TEACHER ANSWERS**

Worked answers and expected evidence

Use after an attempt. Accept equivalent correct explanations; record support given.

1. The model and the body

Card = bone; pivot/join = elbow joint; loose string = effect of muscle pull. A string does not contract by itself, card is not living bone, and model omits many structures.

2. Complete the muscle-pair table

Bend: biceps contracts, triceps relaxes. Active straighten: triceps contracts, biceps relaxes. Qualify to model action; gravity can lower an arm without the same active contraction pattern.

3. Keep or correct the statement

True; false (muscles pull, opposite-side muscles can pull the other way); true; false (muscle action can move bones at joints).

4. Explain one movement

A full pair statement should name both roles correctly for the chosen active movement. Model operation without explanation is not the entire evidence.

Misconceptions and corrections

- Muscles push: they exert pulling force; antagonistic muscles can pull the opposite way.
- One muscle does both model actions alone: this model uses a pair.
- String contracts itself: it represents the pulling effect only.



Teach safely; keep the evidence

The source record identifies this conversion; it is not a claim of publication.

Safety

- Adult cuts card, makes holes and secures the split pin.
- Use loose strings, not stretched elastic; pull gently with the model on a table.
- No string around fingers, neck or body; no pupil must move or expose an arm.
- Adult-operated model and verbal direction are equally valid science routes.

Access and offline alternatives

- Point to the named muscle and CONTRACTS/RELAXES label while adult operates.
- Explain both roles during bend and active straighten.
- Explain one limitation of the model and distinguish active straighten from gravity lowering.
- Adult receives one real pupil observation or access request, acts on a feasible change and explains limits. A learner can pass privately.

Close and continue

Finish at 40 minutes. Keep named cards and records for Wednesday Week 4; do not start the workshop early.

Source and revision

Repository: [MattRoper1977/Lessons](https://github.com/MattRoper1977/Lessons)

Source path: [Science_Teesside/Build/SCI_B_W4_Muscle_Pairs.html](#)

Source file Git blob: [25c277b919c5fcc62a4891abf2f7cbecf4999396](#)

Current source link (mutable): https://github.com/MattRoper1977/Lessons/blob/main/Science_Teesside/Build/SCI_B_W4_Muscle_Pairs.html

Document revision: 2026-09-06

Uploaded supporting sources

- White Rose Education, Year 3 Autumn Block 2 (2024): Movement, steps 1 Joints and 2 How we move. Public materials use original text and native diagrams; the accepted website string model replaces source stretched elastic.

Recorded conversion changes

- Original editable classroom text, scientific diagrams and pupil tasks follow the current weekly HTML, not the older retained A/B teaching version.
- White Rose uploads inform concepts and task choices; no publisher-owned slide, photograph, worksheet page or video is redistributed in these public files.
- Website animations and drag-and-drop controls become teacher-led reveals, movable paper labels and accessible spoken/drawn responses. No internet connection or video is needed.
- Autumn 1 Weeks 1-2 were baseline assessment. This is a Weeks 3-7 teaching pack, not a claim that baseline assessments or the separate Week 8 enrichment are included.