

Build and challenge an orbit model

Autumn 1 · Week 6 · Lesson B · 40 minutes

Learning objective

Describe Earth and the other planets orbiting the Sun: order eight planets, group rocky/giant planets, and explain the Sun's inward gravitational pull.

Source lesson timing

Elapsed minutes	Source stage	Minutes
0–4	Workshop · retrieve	4
4–24	Workshop · build and compare	20
24–26	Workshop · check	2
26–32	Workshop · correct and tidy	6
32–36	Pupil feedback	4
36–40	Exit Ticket	4

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

- Eight planet-name cards or the supplied word bank
- Sun and Earth paper labels; two counters; two paper arrows
- Pencils, paper and supplied approximate orbital-period table

TEACHING SEQUENCE

Guide the lesson

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

Workshop · retrieve · 4 minutes

First minute of the source 4-minute retrieval, not an extra starter. Return Monday's order strip. Today's 32-minute workshop includes all setup, work, check and tidy; feedback and exit follow.

Order Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Provide all eight cards; adult can hold or read them. At current model position, gravity points inward; motion tangent. Support may direct an adult, draw or use counters. This completes the source 4-minute retrieval.

Workshop · build and compare · 20 minutes

First 4 of the 20-minute model/data phase. Supported: order names with support and Earth/Mars comparison. Standard: order and group, two arrows, two data pairs. Stretch: test farther-out/longer-year prediction and model limits. No bodily movement required. Supply paper ruler only if useful for layout; this is not distance measurement.

Pupils manipulate their own or adult-operated model. Inward arrow represents gravitational force, tangent arrow represents direction of motion. They are not two opposing forces. Native schematic is an explanation aid; hand motion supplies movement in classroom model. No claim that counter orbit demonstrates gravity experimentally.

Current source approximate orbital periods. Compare one pair supported; two pairs standard. All numbers share unit Earth days. Ask which finishes a single orbit first when starting together; shorter year finishes first. These are supplied scientific data, not student measurements. NASA Space Place years-on-other-planets and NASA planets are source facts; no internet needed.

Worked answer for adult after attempt: Mars 687 > Earth 365, so Mars takes longer and Earth completes one orbit first; Neptune 60,190 > Jupiter 4,333, so Neptune longer. Mercury 88 < Earth 365, so Mercury shorter. Stretch checks farther-out pattern using given order and table. No invented relation that planets move at equal speed.

Final 2 minutes of source 20-minute build/data phase. Scribe or accept dictated/pointed evidence. Model shows Sunward pull direction and curving path/order; does not show accurate size, distance, speed or actual gravitational mechanism. Pupils can use two supported sentence halves rather than full paragraph. Keep own predictions visible.

Workshop · check · 2 minutes

Exact source 2-minute check inside 32. Expected yes: longer time, not a bigger physical planet. Use 365/687 to verify unit understanding. Adult records actual demonstrated science and independence. An incorrect first arrow is an opportunity to correct, not proof of failure.

Workshop · correct and tidy · 6 minutes

First 3 of source 6-minute correction/tidy. Examples shows orbit path and inward pull direction; does not show scale, speed or real gravitational movement. Differentiate: adult records a spoken model limit, standard writes one, stretch explains why a hand-moved counter is no gravity experiment.

Completes 32-minute workshop. Keep or record evidence without assuming a photograph/public display. Adult can record direct observation instead of forcing writing. No extension consumes feedback/exit. Do not award external accreditation solely because a worksheet exists.

Pupil feedback · 4 minutes

First 2 of source 4-minute Lundy/pupil feedback. Ask about science or access, e.g. colour distinction, movement demand, instruction pace. Offer chosen partner to convey feedback. Do not require public performance or disclosure.

Adult makes one possible change, e.g. labelled paper arrows instead of colour alone, static drawing instead of movement. Explain real limits and check response. Pupil may pass. A brief private note can preserve voice/action; no unnecessary photograph or sharing.

Exit Ticket · 4 minutes

Pupil chooses agreed source tier; not all three compulsory. Responses may be spoken/pointed/drawn. Answers on next slide/teacher notes after independent attempt. Source assessed outcomes: order, orbit description, gravitational explanation. Prompting level should be recorded.

Source answers. Stretch: its sideways motion and inward gravitational pull combine to produce a continuing curved orbit rather than a radial fall. Avoid false 'gravity cancels forward motion' or 'there is no gravity'. Ask pupil to correct one word or arrow. This completes 40 minutes, not a new activity.

TEACHER ANSWERS

Worked answers and expected evidence

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

1. Retrieve and choose your model ·4 min

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Gravity Sunward, motion tangent. Provide named cards/adult operation as needed.

2. Model and compare ·20 min

Model arrows are Sunward gravity and tangential motion. Supplied years are not measured by this classroom model. Supported Earth/Mars; other comparisons may vary.

3. Record the comparison

Example Earth/Mars: Mars $687 > 365$, Earth finishes first. Example Jupiter/Neptune: Neptune 60,190 $> 4,333$, Jupiter finishes first. Same Earth-day units throughout.

4. Pause and check ·2 min

A longer year is more time for one orbit. Adult checks a genuine arrow and numerical comparison; record actual independence.

5. Correct and tidy ·6 min

Shows an orbit path and inward-pull direction. Does not accurately show size, distance or speed; a person moves the counters, so it does not test gravity.

6. Pupil feedback ·4 min

Personal feedback has no prescribed answer. Agree a possible access/science change, explain limits and check its effect; passing is allowed.

7. Exit ·4 min

Supported Earth. Standard Sun's gravity. Stretch Earth's continued sideways motion and inward gravity combine into a curving orbit rather than a straight radial fall.

Misconceptions and corrections

- The Sun is a star, not the ninth planet in this list.
- Most planetary orbits are close to circular; schematic circles and arrows are not size/distance/speed scales.
- The gravity arrow is a force; the tangent motion arrow is direction of motion, not a second opposing force.
- Without gravity in the idealised model, the planet follows the straight-on tangent, not a line straight out from the Sun.
- A year means one orbit, so another planet's year need not be 365 Earth days.
- Hand-moving a counter illustrates an explanation; it does not experimentally demonstrate gravity.

PREPARATION / ACCESS / SOURCE RECORD

Teach safely; keep the evidence

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

Safety

- Use counters or a drawing on a desk; public walking is optional.
- Do not swing objects on strings.
- No viewing the Sun, lasers, electrical kit or physical force experiment is required.

Access and offline alternatives

- Pointing, signing, speech, drawing or an adult-scribed response can show the same science.
- Provide named arrows as well as colour; supported pupils can direct the adult-held model.
- All activity data and instructions are supplied offline; no NASA page or video is needed.
- No photograph, public performance or sharing is assumed; record actual independence.

Close and continue

W7 studies the Moon's orbit, reflected sunlight and ordinary phases. Preserve the source 40-minute plan: no extra practical or full-term assessment is implied.

Source and revision

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

Source path: [Science_Teesside/Grow/SCI_G_W6_Earth_And_Planets.html](https://github.com/MattRoper1977/Lessons/blob/main/Science_Teesside/Grow/SCI_G_W6_Earth_And_Planets.html)

Source file Git blob: [4a5f555bb496b2ba8f691b4811ca23a0a0c2b1e3](https://github.com/MattRoper1977/Lessons/blob/main/Science_Teesside/Grow/SCI_G_W6_Earth_And_Planets.html)

Current source link (mutable): https://github.com/MattRoper1977/Lessons/blob/main/Science_Teesside/Grow/SCI_G_W6_Earth_And_Planets.html

Document revision: 2026-09-06

Recorded conversion changes

- Tuesday exact source structure: 32-minute workshop including 4-minute retrieval,20-minute construction/comparison,2-minute check,6-minute correction/tidy; then 4-minute feedback and 4-minute exit.
- Native editable arrows/counters and included numerical data support offline use.
- All year values retained from current source; not a new measured experiment.
- Public writing or walking not required; no string-swinging model or publisher media.