

TEACHING AND PRACTICE PACKET

Similarity through transformations



Grade 8 • NC.8.G.4

Use dilation experiments and transformation sequences to justify similarity.

Seven instructional sections • 30 multiple-choice tasks • 30 open and performance tasks

Teacher scripts, worked models, reproducible workspaces, complete keys and observation tools

Reusable over multiple lessons. Select tasks to match the evidence you need; this is not a 60-item single-sitting assessment.

Free sample | Contents

NC.8.G.4 | Eighth Grade mathematics

This sample contains 24 complete selected pages from the 139-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-17, 32-35, 92, 107-108

Representative activities

M01: sample PDF page(s) 18; original page(s) 17

M02: sample PDF page(s) 18; original page(s) 17

O01: sample PDF page(s) 19-20; original page(s) 32-33

O02: sample PDF page(s) 21-22; original page(s) 34-35

Selected teacher prompts and keys: original page(s) 92, 107-108

Using this sample

Read the preparation and access guidance before using a selected activity.
Keep teacher keys and private preparation pages separate from student copies.
Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

ALIGNMENT

Exact standard and scope

Use transformations to define similarity.

- Verify experimentally the properties of dilations that create similar figures.
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations.
- Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

What students will demonstrate

Use dilation experiments and transformation sequences to justify similarity. Every task names its specific target. Recognition evidence from the M bank complements, but does not replace, construction, experimentation and justification in the O bank.

Similarity uses one common positive scale factor and verified correspondence. Centers are explicitly named. The packet includes both origin-centered and non-origin-centered dilations; scale changes are kept distinct from location and orientation changes.

Source basis: NCDPI Grade 8 Quick Reference Guide (2025), printed pages 31–32. Current adopted-2017 standards apply in 2026–27 and 2027–28; the 2026 revision begins in 2028–29. See source notes for verification limits.

NAVIGATION

Seven sections, two reusable banks

Warm-up: M01-M04 and O01-O04

Construct a dilation experimentally; Compare corresponding dilation lengths; Connect dilation with equal angles; Compose dilation and rotation.

I Do: M05-M08 and O05-O08

Track reflection in a similarity sequence; Track the center in a sequence; Dilate about a specified center; Describe a similarity sequence.

We Do: M09-M13 and O09-O13

Test proportional side lengths; Justify similarity through transformations; Construct a dilation experimentally; Compare corresponding dilation lengths; Connect dilation with equal angles.

Collaborative practice: M14-M18 and O14-O18

Compose dilation and rotation; Track reflection in a similarity sequence; Track the center in a sequence; Dilate about a specified center; Describe a similarity sequence.

Independent practice: M19-M23 and O19-O23

Test proportional side lengths; Justify similarity through transformations; Construct a dilation experimentally; Compare corresponding dilation lengths; Connect dilation with equal angles.

Small-group reteach: M24-M27 and O24-O27

Compose dilation and rotation; Track reflection in a similarity sequence; Track the center in a sequence; Dilate about a specified center.

Exit ticket: M28-M30 and O28-O30

Describe a similarity sequence; Test proportional side lengths; Justify similarity through transformations.

Every student page and worked key carries the item-specific target. Choose one core performance and a few supporting items in a session; retain the remaining items for later practice, reassessment or a different learner.

PREPARATION

Materials, pacing and access

Materials

Pencils, eraser, ruler, protractor, colored pencils and tracing paper or transparencies. Reproduce student pages at a readable scale. Grids use coordinate units, not physical centimeters; no actual-size measurement is inferred. Geometry software is optional, never required.

Prerequisites

Review ordered pairs, signed coordinates, segment length as coordinate distance and the meaning of a vertex, side and angle. For angles, review straight angles and opposite rays. Check these prerequisites separately before interpreting standard-specific performance.

Suggested sequence

Session 1: warm-up and one modeled experiment. Session 2: guided and collaborative construction. Session 3: independent explanations and sequence tests. Session 4, if useful: targeted reteaching and exit evidence. Split or repeat sessions to suit learners; no timing or item-count cutoff defines mastery.

Neutral access supports

Read directions aloud without adding mathematical conclusions. Enlarge grids, offer tactile axes, permit a scribe to record the learner's stated reasoning, and allow a physical or digital construction. Keep the same mathematical decisions and record the support used.

Preserve evidence

Collect the first independent response before discussing a correction. Record answer-supplying hints separately from neutral access. If drawing or communication access prevents interpretable evidence, use N/O rather than a numerical zero.

Stretch and respond

Ask learners to produce a second valid sequence or a counterexample after they can explain a first one. If coordinate signs or angle relationships are insecure, isolate one vertex or one intersection, then return to the full task without disclosing its answer.

WORKED TEACHER MODEL

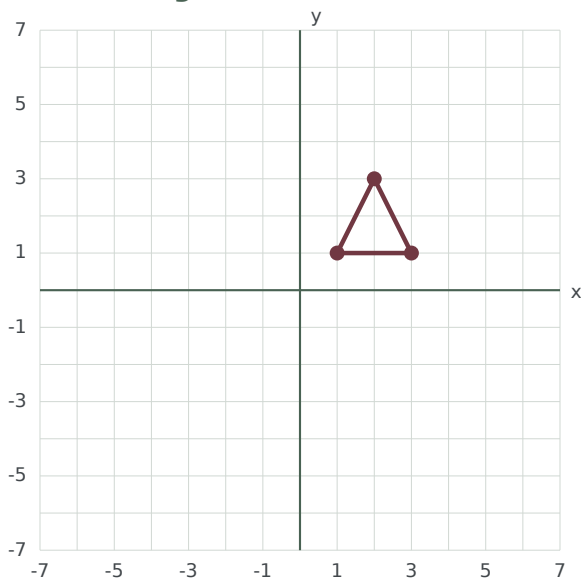
Dilation as a similarity experiment

Say: “I use the same center and factor for every point.” Construct rays from the origin; image distances from the center are doubled. Measure AB and $A'B'$ and two angles. Length ratios are 2 while angles remain equal. Measurement is experimental evidence; the common dilation construction explains the exact relationship.

Source: $A(1, 1)$; $B(3, 1)$; $C(2, 3)$.

Sequence: dilate by scale factor 2 about the origin.

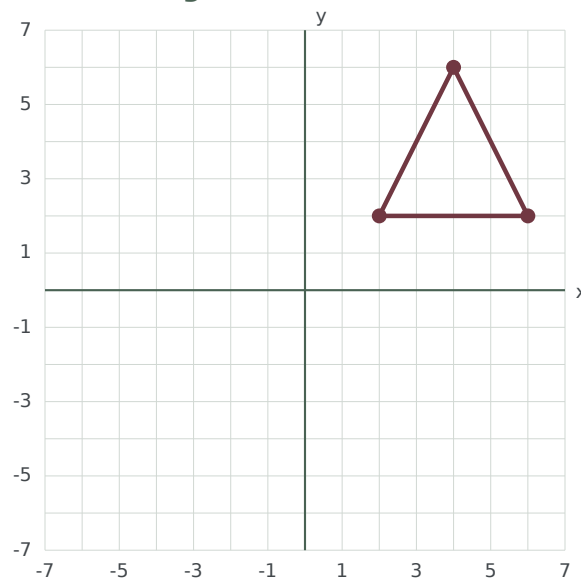
Source figure



Source vertices: $A(1, 1)$; $B(3, 1)$; $C(2, 3)$.

Image vertices: $A'(2, 2)$; $B'(6, 2)$; $C'(4, 6)$.

Final image



Dilate by scale factor 2 about the origin: $A'(2, 2)$; $B'(6, 2)$; $C'(4, 6)$.

Check: Squared side lengths in boundary order are 4, 5, 5 before and 16, 20, 20 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

WORKED TEACHER MODEL

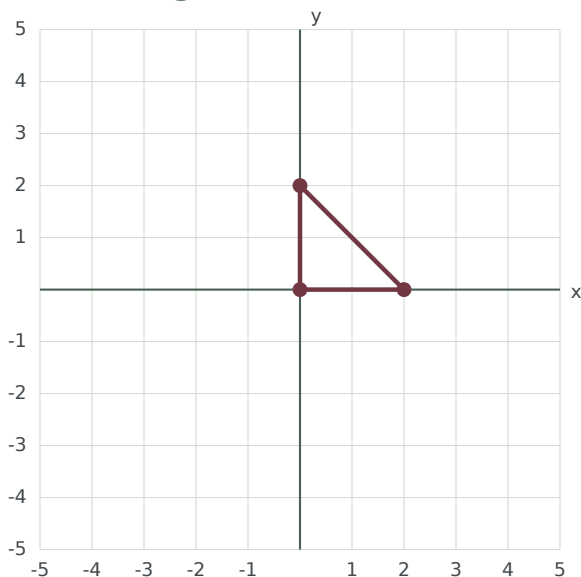
A non-origin center

Say: “Subtract the center, scale the displacement, then add the center back.” The coordinate rule is $(x,y) \rightarrow (1+2(x-1), 1+2(y-1))$. Mark $(1,1)$. Multiplying x and y alone would describe a different center. Rays from $(1,1)$ verify the intended center.

Source: $A(0, 0)$; $B(2, 0)$; $C(0, 2)$.

Sequence: dilate by scale factor 2 about $(1, 1)$.

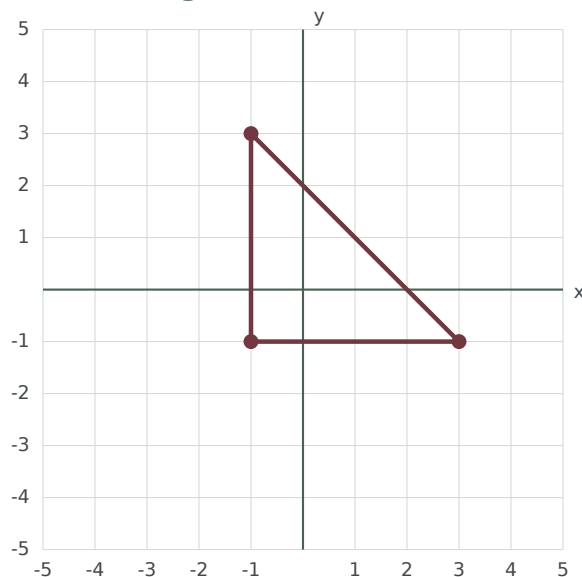
Source figure



Source vertices: $A(0, 0)$; $B(2, 0)$; $C(0, 2)$.

Image vertices: $A'(-1, -1)$; $B'(3, -1)$; $C'(-1, 3)$.

Final image



Dilate by scale factor 2 about $(1, 1)$: $A'(-1, -1)$; $B'(3, -1)$; $C'(-1, 3)$.

Check: Squared side lengths in boundary order are 4, 8, 4 before and 16, 32, 16 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

WORKED TEACHER MODEL

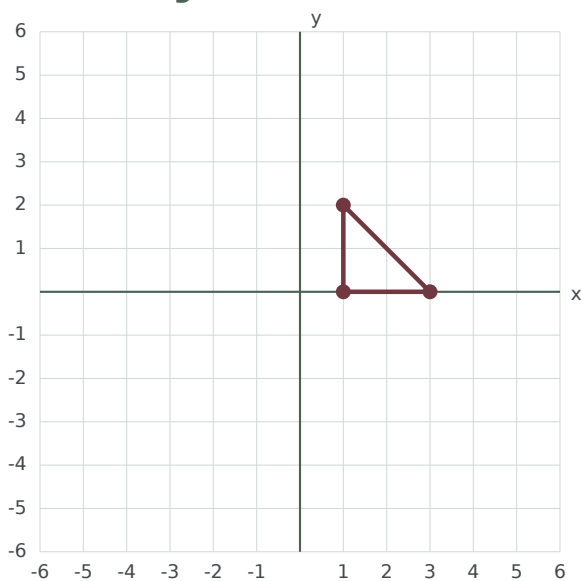
Finding a similarity sequence

Say: “First match size using one common factor. Then move or turn to match location and orientation.” Compute every intermediate vertex. Write the correspondence in order. A matching side ratio is useful, but the complete verified transformation sequence establishes similarity of the whole figure.

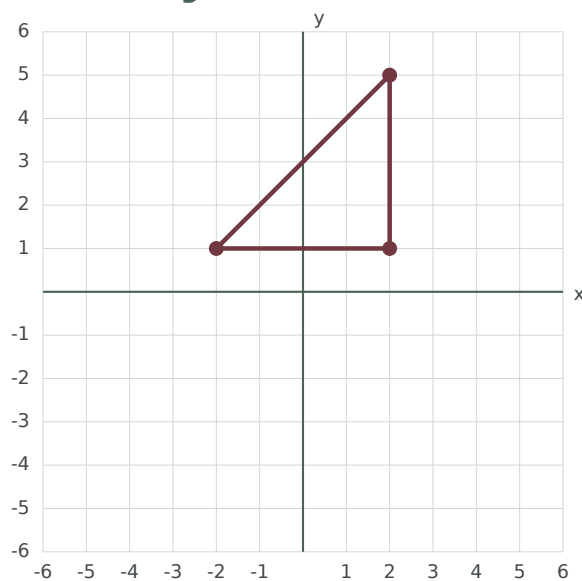
Source: $A(1, 0)$; $B(3, 0)$; $C(1, 2)$.

Sequence: dilate by scale factor 2 about the origin, then rotate 90° counterclockwise about the origin, then translate by $(2, -1)$.

Source figure



Final image



Source vertices: $A(1, 0)$; $B(3, 0)$; $C(1, 2)$.

Image vertices: $A'(2, 1)$; $B'(2, 5)$; $C'(-2, 1)$.

Dilate by scale factor 2 about the origin: $A'(2, 0)$; $B'(6, 0)$; $C'(2, 4)$. Rotate 90° counterclockwise about the origin: $A'(0, 2)$; $B'(0, 6)$; $C'(-4, 2)$. Translate by $(2, -1)$: $A'(2, 1)$; $B'(2, 5)$; $C'(-2, 1)$.

Check: Squared side lengths in boundary order are 4, 8, 4 before and 16, 32, 16 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

REFERENCE AND REASONING

A reusable reasoning anchor

1. Name every point and preserve the intended correspondence.
2. State the transformation, center or axis, direction, and vector or scale factor.
3. Record intermediate images in the order the actions occur.
4. Check every vertex and compare a length or angle property.
5. Distinguish exact coordinate reasoning from measurements of a drawn model.
6. Explain what the verified sequence proves about congruence or similarity.

Useful language: “I know ___ because ___. Therefore ___. I checked ___ by ___. This supports ___, and it does not by itself establish ___.” A complete explanation names the mathematical relationship and applies it to the specific figure.

REPRODUCIBLE ORGANIZER

Represent, reason and check

Name: _____ Date: _____

Givens and correspondence**Representation or calculation****Justification and check****Conclusion in the problem's context**

TEACHING SCRIPT

Warm-up

Core: O01 | Optional bank: M01-M04, O01-O04

Specific target: Construct a dilation experimentally. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Elicit a first attempt before giving a model. Ask learners to name the given information and what they need to establish.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

One verified sequence: dilate by scale factor 2 about the origin. Dilate by scale factor 2 about the origin: $A'(2, 0)$; $B'(8, 0)$; $C'(4, 4)$. Squared side lengths in boundary order are 9, 8, 5 before and 36, 32, 20 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar. Accept measured values consistent with the drawn scale and modest instrument error; the coordinate construction supplies exact verification. Corresponding angles match, while corresponding lengths all have the stated ratio.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

I Do

Core: O05 | Optional bank: M05-M08, O05-O08

Specific target: Track reflection in a similarity sequence. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Model the core task aloud, stopping before each decision. Use a different-color pen for givens and deductions. Learners annotate the reasoning, then try another item.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

One verified sequence: dilate by scale factor 2 about the origin, then reflect across the x-axis. Dilate by scale factor 2 about the origin: $A'(0, 0)$; $B'(6, 0)$; $C'(6, 4)$; $D'(2, 6)$. Reflect across the x-axis: $A'(0, 0)$; $B'(6, 0)$; $C'(6, -4)$; $D'(2, -6)$. Squared side lengths in boundary order are 9, 4, 5, 10 before and 36, 16, 20, 40 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

We Do

Core: O09 | Optional bank: M09-M13, O09-O13

Specific target: Test proportional side lengths. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Have learners supply the next step and its reason. Write a proposed step only after they explain its effect on the whole figure.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

The actual dilation should give $A'(0, -10)$; $B'(4, -8)$; $C'(2, -2)$. B' in the proposal is shifted 1 unit horizontally from its required position; the other vertices match. The source AB squared length is 5; a true dilation requires 20, but the proposal gives 29. Thus the proposed factor/center/correspondence does not map all vertices. Check every named vertex rather than a single match.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

Collaborative practice

Core: O14 | Optional bank: M14-M18, O14-O18

Specific target: Compose dilation and rotation. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Assign constructor, checker and explainer roles; rotate roles after one task. Each learner records a personal conclusion before the group compares.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

One verified sequence: dilate by scale factor $\frac{1}{2}$ about the origin, then rotate 180° counterclockwise about the origin. Dilate by scale factor $\frac{1}{2}$ about the origin: $A'(-\frac{3}{2}, -1)$; $B'(0, -1)$; $C'(-\frac{1}{2}, \frac{1}{2})$. Rotate 180° counterclockwise about the origin: $A'(\frac{3}{2}, 1)$; $B'(0, 1)$; $C'(\frac{1}{2}, -\frac{1}{2})$. Squared side lengths in boundary order are 9, 10, 13 before and $\frac{9}{4}$, $\frac{5}{2}$, $\frac{13}{4}$ after. Each image side is $\frac{1}{2}$ times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

Independent practice

Core: O19 | Optional bank: M19-M23, O19-O23

Specific target: Test proportional side lengths. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Provide only neutral access supports. Preserve the first drawing and explanation before any conference or correction.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

The actual dilation should give $A'(0, -2)$; $B'(1, -3/2)$; $C'(1/2, 0)$. B' in the proposal is shifted 1 unit horizontally from its required position; the other vertices match. The source AB squared length is 5; a true dilation requires $5/4$, but the proposal gives $17/4$. Thus the proposed factor/center/correspondence does not map all vertices. Check every named vertex rather than a single match.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

Small-group reteach

Core: O24 | Optional bank: M24-M27, O24-O27

Specific target: Compose dilation and rotation. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Inspect the first response for one specific gap. Model that prerequisite with a separate example, then return to the core task for fresh evidence.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

One verified sequence: dilate by scale factor $\frac{3}{2}$ about the origin, then rotate 270° counterclockwise about the origin. Dilate by scale factor $\frac{3}{2}$ about the origin: $A'(-\frac{9}{2}, -\frac{3}{2})$; $B'(0, -\frac{3}{2})$; $C'(-\frac{3}{2}, 3)$. Rotate 270° counterclockwise about the origin: $A'(-\frac{3}{2}, \frac{9}{2})$; $B'(-\frac{3}{2}, 0)$; $C'(3, \frac{3}{2})$. Squared side lengths in boundary order are 9, 10, 13 before and $\frac{81}{4}$, $\frac{45}{2}$, $\frac{117}{4}$ after. Each image side is $\frac{3}{2}$ times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

TEACHING SCRIPT

Exit ticket

Core: O28 | Optional bank: M28-M30, O28-O30

Specific target: Describe a similarity sequence. Select 10–25 minutes for a core task and discussion, with additional construction time as needed. Timing is a planning estimate, not a proficiency rule.

Launch and organization

Ask for an individual response and one stated check. Use the evidence to choose the next lesson; do not require the whole remaining bank.

Teacher language and modeling

“Which point corresponds to which? What is the center or axis, and what happens first?” Have the learner point to every vertex in order. Keep a coordinate column for each step.

Verified core solution

One verified sequence: reflect across the y-axis, then dilate by scale factor $\frac{3}{2}$ about the origin, then translate by $(1, 1)$. Reflect across the y-axis: $A'(4, 1)$; $B'(1, 1)$; $C'(2, 4)$. Dilate by scale factor $\frac{3}{2}$ about the origin: $A'(6, \frac{3}{2})$; $B'(\frac{3}{2}, \frac{3}{2})$; $C'(3, 6)$. Translate by $(1, 1)$: $A'(7, \frac{5}{2})$; $B'(\frac{5}{2}, \frac{5}{2})$; $C'(4, 7)$. Squared side lengths in boundary order are 9, 10, 13 before and $\frac{81}{4}$, $\frac{45}{2}$, $\frac{117}{4}$ after. Each image side is $\frac{3}{2}$ times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar.

Evidence and response to a gap

If a learner changes only one vertex or uses inconsistent scale factors, ask them to compare the rule applied to each row of the coordinate table. If signs are the issue, rebuild one axis move with a physical tracing. Do not supply the remaining image coordinates.

Close: ask “What did your check establish, and what evidence would be insufficient?” Record the first explanation, representation and accuracy separately. Select the next item to test the unresolved target; note any answer-supplying cues apart from access supports.

MULTIPLE-CHOICE BANK

M01-M02 • Choose and justify**M01 | Warm-up | Construct a dilation experimentally**

Figure ABC has $A(1, 0)$; $B(4, 0)$; $C(2, 2)$. Apply this sequence: dilate by scale factor 2 about the origin. Which ordered image is correct?

- A. $A'(5, -1)$; $B'(11, -1)$; $C'(7, 3)$
- B. $A'(0, -2)$; $B'(6, -2)$; $C'(2, 2)$
- C. $A'(-1, 3)$; $B'(5, 3)$; $C'(1, 7)$
- D. $A'(2, 0)$; $B'(8, 0)$; $C'(4, 4)$

Reasoning / check: _____

M02 | Warm-up | Compare corresponding dilation lengths

A dilation maps a side of length 6 units to a corresponding side of length 12 units. What is the image-to-original scale factor?

- A. 2
- B. $\frac{1}{2}$
- C. 3
- D. $\frac{9}{4}$

Reasoning / check: _____

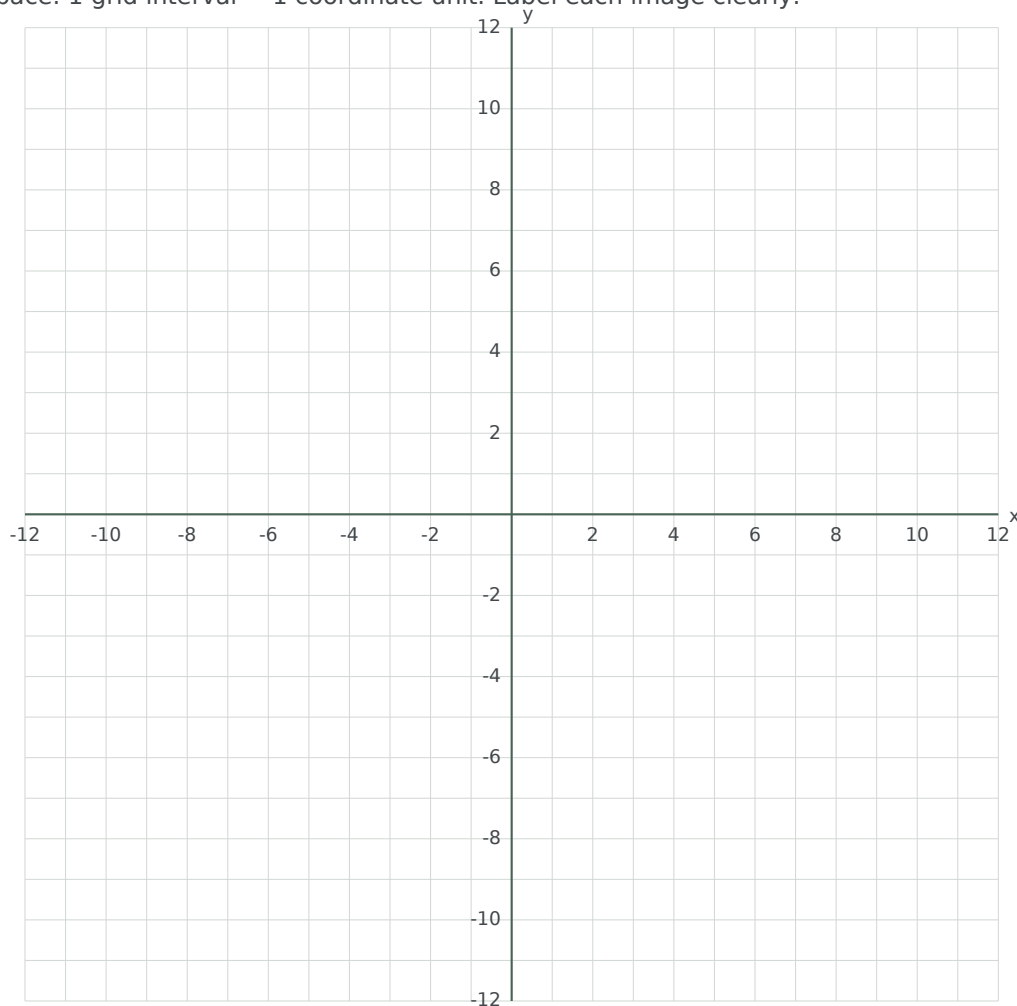
WARM-UP • OPEN / PERFORMANCE BANK

001 • Construct and explain

Target: Construct a dilation experimentally

Figure ABC has $A(1, 0)$; $B(4, 0)$; $C(2, 2)$. Plot and trace the figure. Construct its dilation by factor 2 about the origin, using rays from the origin through every vertex. Record the image coordinates. Measure two corresponding sides and two corresponding angles. Compare ratios and angle measures; explain how drawing error affects the evidence.

Plotting workspace: 1 grid interval = 1 coordinate unit. Label each image clearly.



Construction notes (use the response page for tables and justification)

WARM-UP • RESPONSE WORKSPACE

001 • Record and justify

Target: Construct a dilation experimentally**Coordinate / angle table and calculations (name each point, side or angle)****Measured comparisons or additional intermediate representation****Explanation, justification and independent check**

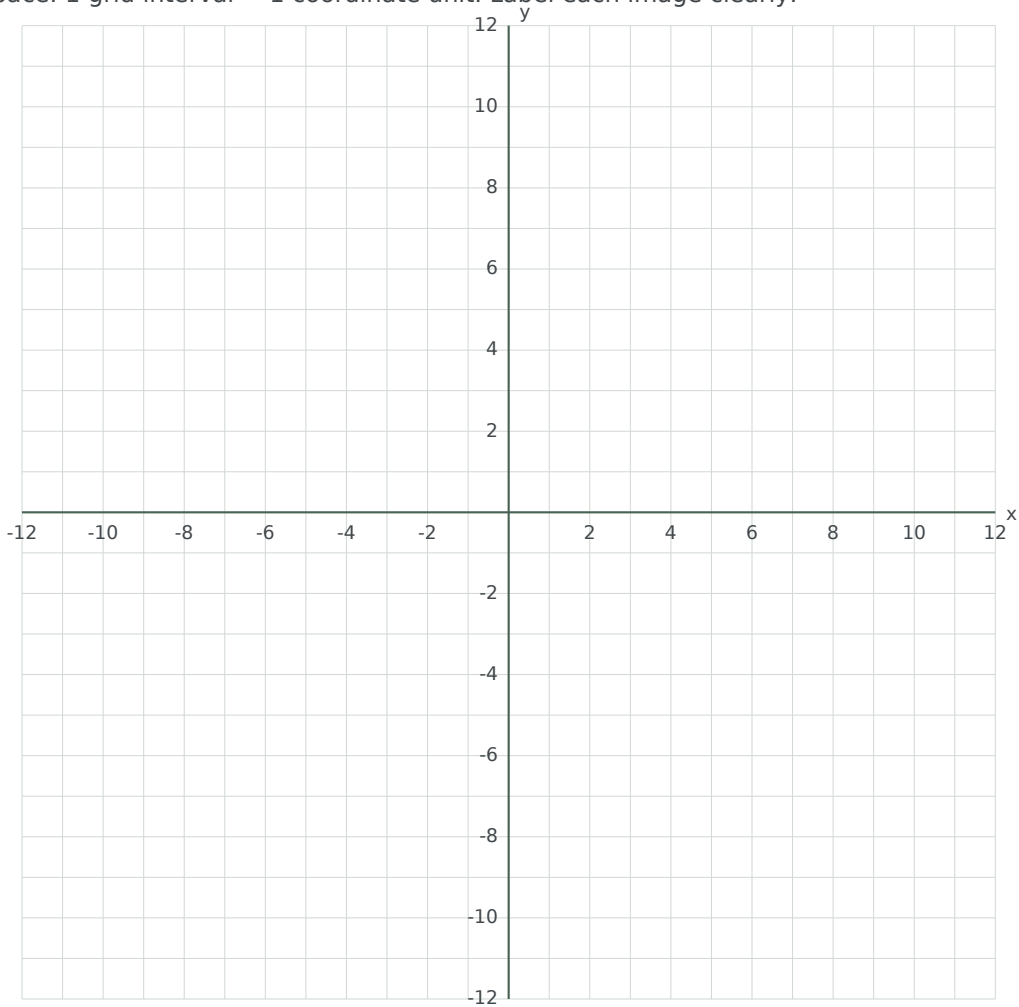
WARM-UP • OPEN / PERFORMANCE BANK

002 • Construct and explain

Target: Compare corresponding dilation lengths

Figure ABC has A(-3, 0); B(0, 0); C(-2, 3). Construct dilate by scale factor 2 about the origin. Draw all corresponding vertices. Measure every source side and image side in the same units. Organize the image/source ratios in a table; then verify those ratios exactly using squared coordinate distances. Explain what the ratios establish.

Plotting workspace: 1 grid interval = 1 coordinate unit. Label each image clearly.



Construction notes (use the response page for tables and justification)

WARM-UP • RESPONSE WORKSPACE

002 • Record and justify

Target: Compare corresponding dilation lengths

Coordinate / angle table and calculations (name each point, side or angle)

Measured comparisons or additional intermediate representation

Explanation, justification and independent check

WORKED MULTIPLE-CHOICE KEYS

M01-M02**M01 • Construct a dilation experimentally**

D. Dilate by scale factor 2 about the origin: $A'(2, 0)$; $B'(8, 0)$; $C'(4, 4)$. A: every listed vertex is offset by $(3, -1)$ from the required image, so this option fails the stated mapping. B: every listed vertex is offset by $(-2, -2)$ from the required image, so this option fails the stated mapping. C: every listed vertex is offset by $(-3, 3)$ from the required image, so this option fails the stated mapping. D: matches every corresponding vertex.

Evidence to examine: the chosen letter alone does not establish the student's reasoning or a specific misconception. Ask for the vertex calculation or angle relationship that supports the choice.

M02 • Compare corresponding dilation lengths

A. $\text{Image/original} = 12/6 = 2$. Use corresponding lengths in the stated order. A: 2 agrees with the calculation. B: $1/2$ does not satisfy the stated relationships. C: 3 does not satisfy the stated relationships. D: $9/4$ does not satisfy the stated relationships.

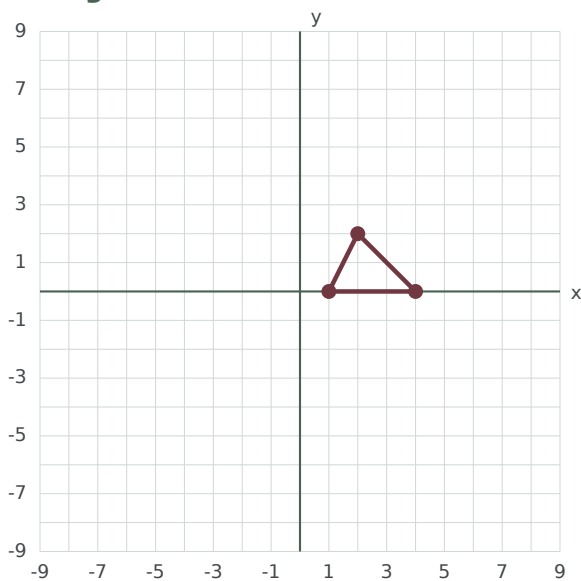
Evidence to examine: the chosen letter alone does not establish the student's reasoning or a specific misconception. Ask for the vertex calculation or angle relationship that supports the choice.

WORKED OPEN / PERFORMANCE KEY

001 • Construct a dilation experimentally

One verified sequence: dilate by scale factor 2 about the origin. Dilate by scale factor 2 about the origin: $A'(2, 0)$; $B'(8, 0)$; $C'(4, 4)$. Squared side lengths in boundary order are 9, 8, 5 before and 36, 32, 20 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar. Accept measured values consistent with the drawn scale and modest instrument error; the coordinate construction supplies exact verification. Corresponding angles match, while corresponding lengths all have the stated ratio.

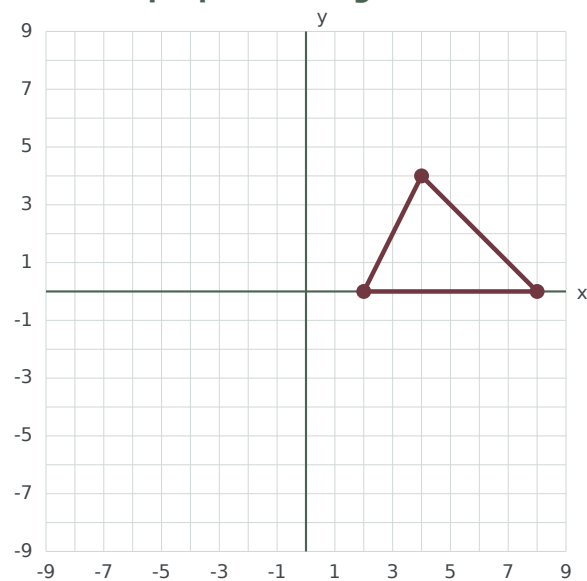
Original



Original: $A(1, 0)$; $B(4, 0)$; $C(2, 2)$.

Final / proposed: $A'(2, 0)$; $B'(8, 0)$; $C'(4, 4)$.

Final / proposed image



Source side lengths in boundary order (coordinate units), approximately: 3.00, 2.83, 2.24. Source interior angles at A, B, C, approximately: 63.4° , 45.0° , 71.6° . Image interior angles, same named order: 63.4° , 45.0° , 71.6° .

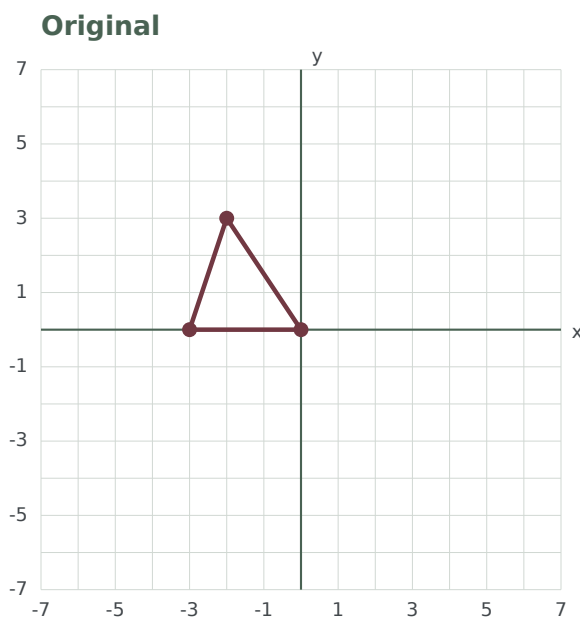
Drawing check: vertices must be at the listed coordinates, joined in order and labeled by the learner. Dots in these teacher diagrams locate the vertices; the coordinate lists fix their correspondence. For multi-step tasks, also check the intermediate coordinates in the worked solution.

Assess separately: accuracy of values; faithful construction or representation; explanation of the applicable property; and the stated check or interpretation. A correct final value with no requested performance is incomplete evidence. Accept mathematically equivalent sequences or arguments when every required correspondence and condition is verified.

WORKED OPEN / PERFORMANCE KEY

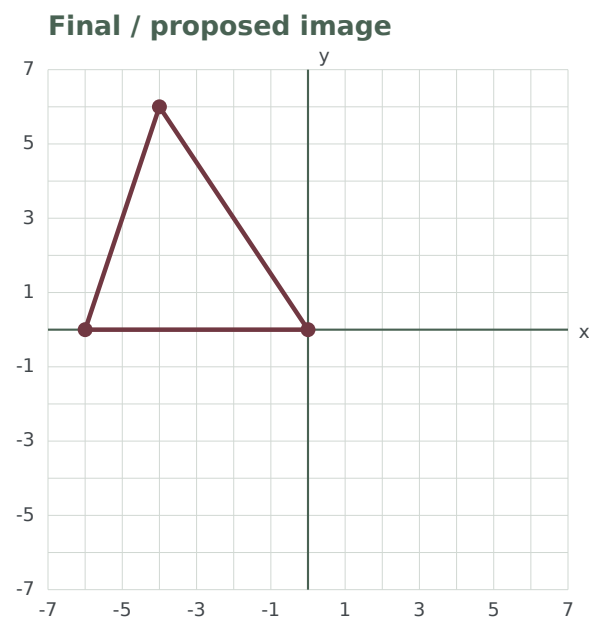
002 • Compare corresponding dilation lengths

One verified sequence: dilate by scale factor 2 about the origin. Dilate by scale factor 2 about the origin: $A'(-6, 0)$; $B'(0, 0)$; $C'(-4, 6)$. Squared side lengths in boundary order are 9, 13, 10 before and 36, 52, 40 after. Each image side is 2 times its corresponding original side. A dilation preserves angle measures and multiplies all corresponding lengths by the same positive factor; hence the figures are similar. Accept measured values consistent with the drawn scale and modest instrument error; the coordinate construction supplies exact verification. Corresponding angles match, while corresponding lengths all have the stated ratio.



Original: $A(-3, 0)$; $B(0, 0)$; $C(-2, 3)$.

Final / proposed: $A'(-6, 0)$; $B'(0, 0)$; $C'(-4, 6)$.



Source side lengths in boundary order (coordinate units), approximately: 3.00, 3.61, 3.16. Source interior angles at A, B, C, approximately: 71.6° , 56.3° , 52.1° . Image interior angles, same named order: 71.6° , 56.3° , 52.1° .

Drawing check: vertices must be at the listed coordinates, joined in order and labeled by the learner. Dots in these teacher diagrams locate the vertices; the coordinate lists fix their correspondence. For multi-step tasks, also check the intermediate coordinates in the worked solution.

Assess separately: accuracy of values; faithful construction or representation; explanation of the applicable property; and the stated check or interpretation. A correct final value with no requested performance is incomplete evidence. Accept mathematically equivalent sequences or arguments when every required correspondence and condition is verified.