

Matthie Recalculation Path

Geometry and Measurement II Teacher Guide and Keys

Use the student's response as evidence to investigate. Confirm the likely misconception, reteach the smallest gap, and use a fresh item before moving forward.

GM2-C01-Q1 Route Finder

Chapter 1 Pythagorean Theorem I The Meaning

Student item

1. What is 8^2 ?

Correct response

64

Likely wrong response

16

Misconception to confirm

Squaring is being confused with doubling.

Teaching route and fresh recheck

Expand 8^2 as 8×8 .

GM2-C01-Q2 Tripwire

Chapter 1 Pythagorean Theorem I The Meaning

Student item

A right triangle has legs of 6 cm and 8 cm. Maya writes: $c^2 = 6^2 + 8^2 = 100$, so $c = 100$ cm. Is Maya correct? Identify the error and give the correct hypotenuse.

Correct response

No. $c^2 = 100$, so $c = \sqrt{100} = 10$ cm. Maya stopped at c^2 and reported it as the side length.

Likely wrong response

Yes, $c = 100$ cm.

Misconception to confirm

Reporting c^2 as the hypotenuse instead of taking the square root.

Teaching route and fresh recheck

Return to the Chapter 1 representation, confirm the misconception, then use a fresh check.

GM2-C01-Q3 Confirmation

Chapter 1 Pythagorean Theorem I The Meaning

Student item

A right triangle has legs of 5 cm and 12 cm. Find the hypotenuse.

Correct response

13 cm ($5^2 + 12^2 = 25 + 144 = 169$, and $\sqrt{169} = 13$).

Likely wrong response

17 cm (adds the legs).

Misconception to confirm

Adding the side lengths instead of adding their squares.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C01-Q4 Road Test

Chapter 1 Pythagorean Theorem I The Meaning

Student item

Evaluate 4^2 . Write the multiplication that 4^2 represents.

Correct response

$4 \times 4 = 16$.

Likely wrong response

8 (multiplies 4×2).

Misconception to confirm

Treating the exponent as a multiplier instead of repeated multiplication.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C02-Q1 Route Finder

Chapter 2 Pythagorean Theorem II Applications and the Converse

Student item

1. In a right triangle, is the hypotenuse the longest side?

Correct response

Yes.

Likely wrong response

No.

Misconception to confirm

The hypotenuse property of a right triangle is not secure.

Teaching route and fresh recheck

Mark the right angle and compare the side opposite it with the legs.

GM2-C02-Q2 Tripwire

Chapter 2 Pythagorean Theorem II Applications and the Converse

Student item

A triangle has side lengths 8 cm, 15 cm, and 17 cm. Jordan writes: $8^2 + 15^2 = 17$, so the triangle is not right. Is Jordan correct? Correct the test and decide whether the triangle is right.

Correct response

No. Compare squares: $8^2 + 15^2 = 64 + 225 = 289$ and $17^2 = 289$. The squares match, so the triangle is right. Jordan compared the sum with 17 instead of 17^2 .

Likely wrong response

Yes, the triangle is not right.

Misconception to confirm

Comparing $a^2 + b^2$ with c instead of c^2 when testing the converse.

Teaching route and fresh recheck

Return to the Chapter 2 representation, confirm the misconception, then use a fresh check.

GM2-C02-Q3 Confirmation

Chapter 2 Pythagorean Theorem II Applications and the Converse

Student item

A right triangle has a hypotenuse of 13 m and one leg of 5 m. Find the other leg.

Correct response

12 m ($13^2 - 5^2 = 169 - 25 = 144$, and $\sqrt{144} = 12$).

Likely wrong response

About 13.93 m (adds the squares: $\sqrt{169 + 25} = \sqrt{194}$).

Misconception to confirm

Adding the squares when the hypotenuse is known. For a missing leg, subtract the known leg square from c^2 .

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C02-Q4 Road Test

Chapter 2 Pythagorean Theorem II Applications and the Converse

Student item

A right triangle has legs of 7 cm and 24 cm. Find the length of the hypotenuse.

Correct response

25 cm ($7^2 + 24^2 = 49 + 576 = 625$, and $\sqrt{625} = 25$).

Likely wrong response

31 cm (adds the legs).

Misconception to confirm

Adding the side lengths instead of adding their squares.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C03-Q1 Route Finder

Chapter 3 Three Dimensional Objects and Nets

Student item

1. Is a rectangle 2-D or 3-D?

Correct response

2-D

Likely wrong response

3-D

Misconception to confirm

Flat shapes and solids are being confused.

Teaching route and fresh recheck

Compare a paper rectangle with a rectangular box.

GM2-C03-Q2 Tripwire

Chapter 3 Three Dimensional Objects and Nets

Student item

A student says, “A cylinder is a prism because it has two congruent, parallel bases.” Is the student correct? Use the shapes of the bases and the surfaces in your explanation.

Correct response

No. A prism has polygon bases and flat side faces. A cylinder has circular bases and one curved surface, so it is not a prism.

Likely wrong response

Yes, because it has two congruent, parallel bases.

Misconception to confirm

Classifying a solid by its parallel bases alone without checking the base shape and the side surfaces.

Teaching route and fresh recheck

Return to the Chapter 3 representation, confirm the misconception, then use a fresh check.

GM2-C03-Q3 Confirmation

Chapter 3 Three Dimensional Objects and Nets

Student item

Name the solid that has two circular bases and one curved surface.

Correct response

Cylinder.

Likely wrong response

Circular prism, or cone.

Misconception to confirm

Classifying a solid by its bases without checking whether the side surface is flat or curved.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C03-Q4 Road Test

Chapter 3 Three Dimensional Objects and Nets

Student item

A solid has 6 congruent square faces. Name the solid.

Correct response

Cube.

Likely wrong response

Square (names the face instead of the solid).

Misconception to confirm

Naming the shape of a face instead of the solid.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C04-Q1 Route Finder

Chapter 4 Surface Area of Prisms

Student item

1. What does area measure?

Correct response

Flat space / area.

Likely wrong response

Space inside / volume.

Misconception to confirm

Area and volume are not being separated.

Teaching route and fresh recheck

Cover one face with square units before discussing the whole solid.

GM2-C04-Q2 Tripwire

Chapter 4 Surface Area of Prisms

Student item

A cube has side length 5 cm. A student writes: surface area = $5^2 = 25 \text{ cm}^2$. Is the student correct? Correct the calculation and explain what was missed.

Correct response

No. A cube has 6 congruent square faces: $SA = 6 \times 5^2 = 6 \times 25 = 150 \text{ cm}^2$. The student found the area of one face only.

Likely wrong response

Yes, 25 cm^2 .

Misconception to confirm

Finding the area of one face instead of adding all six faces.

Teaching route and fresh recheck

Return to the Chapter 4 representation, confirm the misconception, then use a fresh check.

GM2-C04-Q3 Confirmation

Chapter 4 Surface Area of Prisms

Student item

Find the surface area of a cube with side length 4 cm.

Correct response

96 cm^2 ($6 \times 4^2 = 6 \times 16$).

Likely wrong response

16 cm^2 (one face only).

Misconception to confirm

Finding the area of one face instead of all six.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C04-Q4 Road Test

Chapter 4 Surface Area of Prisms

Student item

Find the surface area of a cube with side length 3 cm.

Correct response

54 cm^2 ($6 \times 3^2 = 6 \times 9$).

Likely wrong response

9 cm^2 (one face only).

Misconception to confirm

Finding the area of one face instead of all six.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C05-Q1 Route Finder

Chapter 5 Surface Area of Cylinders and Composite Solids

Student item

1. What does circumference measure?

Correct response

Distance around the circle.

Likely wrong response

Space inside.

Misconception to confirm

Circumference and area are being confused.

Teaching route and fresh recheck

Trace the rim and name it distance around.

GM2-C05-Q2 Tripwire

Chapter 5 Surface Area of Cylinders and Composite Solids

Student item

A closed cylinder has radius 3 cm and height 4 cm. A student uses $2\pi rh$ and reports $24\pi \text{ cm}^2$ as the total surface area. Is the student correct? Correct the work and explain what is missing.

Correct response

No. $2\pi rh$ gives only the curved surface. $SA = 2\pi r^2 + 2\pi rh = 2\pi(3^2) + 2\pi(3)(4) = 18\pi + 24\pi = 42\pi \text{ cm}^2 \approx 131.88 \text{ cm}^2$.

Likely wrong response

Yes, $24\pi \text{ cm}^2$ (about 75.36 cm^2).

Misconception to confirm

Leaving out the two circular bases of a closed cylinder.

Teaching route and fresh recheck

Return to the Chapter 5 representation, confirm the misconception, then use a fresh check.

GM2-C05-Q3 Confirmation

Chapter 5 Surface Area of Cylinders and Composite Solids

Student item

Find the surface area of a closed cylinder with radius 2 cm and height 5 cm. Use $\pi \approx 3.14$.

Correct response

$$SA = 2\pi(2^2) + 2\pi(2)(5) \approx 25.12 + 62.80 = 87.92 \text{ cm}^2.$$

Likely wrong response

62.8 cm² (curved surface only).

Misconception to confirm

Leaving out the two circular bases.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C05-Q4 Road Test

Chapter 5 Surface Area of Cylinders and Composite Solids

Student item

Find the surface area of a closed cylinder with radius 2 cm and height 7 cm. Use $\pi \approx 3.14$.

Correct response

$$113.04 \text{ cm}^2 (2(3.14)(2^2) + 2(3.14)(2)(7) = 25.12 + 87.92).$$

Likely wrong response

87.92 cm² (curved surface only).

Misconception to confirm

Leaving out the two circular bases.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C06-Q1 Route Finder

Chapter 6 Volume of Prisms and Cylinders

Student item

1. What does volume measure?

Correct response

Space inside a solid.

Likely wrong response

Outside covering.

Misconception to confirm

Volume and surface area are being confused.

Teaching route and fresh recheck

Use a fill-versus-wrap comparison.

GM2-C06-Q2 Tripwire

Chapter 6 Volume of Prisms and Cylinders

Student item

A rectangular prism measures 4 cm by 3 cm by 2 cm. A student adds $4 + 3 + 2$ and reports a volume of 9 cm^3 . Is the student correct? Correct the calculation and explain the error.

Correct response

No. Volume multiplies the dimensions: $V = 4 \times 3 \times 2 = 24 \text{ cm}^3$.

Likely wrong response

Yes, 9 cm^3 .

Misconception to confirm

Adding the dimensions instead of multiplying them.

Teaching route and fresh recheck

Return to the Chapter 6 representation, confirm the misconception, then use a fresh check.

GM2-C06-Q3 Confirmation

Chapter 6 Volume of Prisms and Cylinders

Student item

Find the volume of a rectangular prism measuring 6 cm by 4 cm by 5 cm.

Correct response

120 cm^3 ($6 \times 4 \times 5$).

Likely wrong response

15 cm^3 (adds the dimensions).

Misconception to confirm

Adding the dimensions instead of multiplying them.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C06-Q4 Road Test

Chapter 6 Volume of Prisms and Cylinders

Student item

Find the volume of a rectangular prism measuring 4 cm by 3 cm by 2 cm.

Correct response

24 cm^3 ($4 \times 3 \times 2$).

Likely wrong response

9 cm^3 (adds the dimensions).

Misconception to confirm

Adding the dimensions instead of multiplying them.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C07-Q1 Route Finder

Chapter 7 Volume of Pyramids Cones Spheres and Capacity

Student item

1. What is the difference between vertical height and slant height?

Correct response

Vertical height is perpendicular to the base; slant height runs along the outside.

Likely wrong response

They are the same.

Misconception to confirm

Height types are being confused.

Teaching route and fresh recheck

Draw the right-angle marker from apex to base and contrast it with the slanted edge.

GM2-C07-Q2 Tripwire

Chapter 7 Volume of Pyramids Cones Spheres and Capacity

Student item

A square pyramid has base area 36 cm^2 and vertical height 9 cm. A student uses $V = Bh$ and reports 324 cm^3 . Is the student correct? Correct the calculation and explain the error.

Correct response

No. A pyramid holds one-third of the prism with the same base and height: $V = \frac{1}{3}Bh = \frac{1}{3}(36)(9) = 108 \text{ cm}^3$.

Likely wrong response

Yes, 324 cm³.

Misconception to confirm

Using the prism formula $V = Bh$ without the one-third factor.

Teaching route and fresh recheck

Return to the Chapter 7 representation, confirm the misconception, then use a fresh check.

GM2-C07-Q3 Confirmation

Chapter 7 Volume of Pyramids Cones Spheres and Capacity

Student item

Find the volume of a square pyramid with base area 30 cm² and vertical height 9 cm.

Correct response

$$90 \text{ cm}^3 \left(V = \frac{1}{3}Bh = \frac{1}{3}(30)(9) \right).$$

Likely wrong response

270 cm³ (uses $V = Bh$).

Misconception to confirm

Leaving out the one-third factor for a pyramid.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C07-Q4 Road Test

Chapter 7 Volume of Pyramids Cones Spheres and Capacity

Student item

A square pyramid has a base side length of 6 cm and a vertical height of 9 cm. Find its volume.

Correct response

$$108 \text{ cm}^3 \left(B = 6 \times 6 = 36, \text{ then } V = \frac{1}{3}(36)(9) \right).$$

Likely wrong response

324 cm³ (uses $V = Bh$).

Misconception to confirm

Leaving out the one-third factor for a pyramid.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.

GM2-C08-Q1 Route Finder

Chapter 8 Mixed Geometry and Measurement Problem Solving

Student item

1. A fence goes around a garden. Is that perimeter or area?

Correct response

Perimeter.

Likely wrong response

Area.

Misconception to confirm

The context word “around” is not being translated into a measurement.

Teaching route and fresh recheck

Underline fence/around, then name perimeter before calculating.

GM2-C08-Q2 Tripwire

Chapter 8 Mixed Geometry and Measurement Problem Solving

Student item

A rectangular yard is 8 m long and 5 m wide. A student multiplies 8×5 and says 40 m² of fencing is needed. Is the student correct? Correct the work and explain the measurement and unit needed.

Correct response

No. Fencing goes around the yard, so find the perimeter: $P = 2(8 + 5) = 26$ m. 40 m² is the area.

Likely wrong response

Yes, 40 m².

Misconception to confirm

Finding area when the job needs the distance around, and using square units for a length.

Teaching route and fresh recheck

Return to the Chapter 8 representation, confirm the misconception, then use a fresh check.

GM2-C08-Q3 Confirmation

Chapter 8 Mixed Geometry and Measurement Problem Solving

Student item

A garden needs fencing. Name the measurement needed and state whether the answer uses linear, square, or cubic units.

Correct response

Perimeter, which uses linear units (such as m).

Likely wrong response

Area, in square units.

Misconception to confirm

Choosing area when the task describes the distance around.

Teaching route and fresh recheck

Ask the student to name the required measurement or relationship before recalculating, then recheck with new values.

GM2-C08-Q4 Road Test

Chapter 8 Mixed Geometry and Measurement Problem Solving

Student item

A fence will be placed around a rectangular yard. Which measurement is needed, perimeter or area? State the type of unit the answer should use.

Correct response

Perimeter, in linear units (such as m).

Likely wrong response

Area, in square units.

Misconception to confirm

Choosing area when the task describes the distance around.

Teaching route and fresh recheck

Have the student explain why the method fits, solve a fresh item, and verify units or geometric meaning.