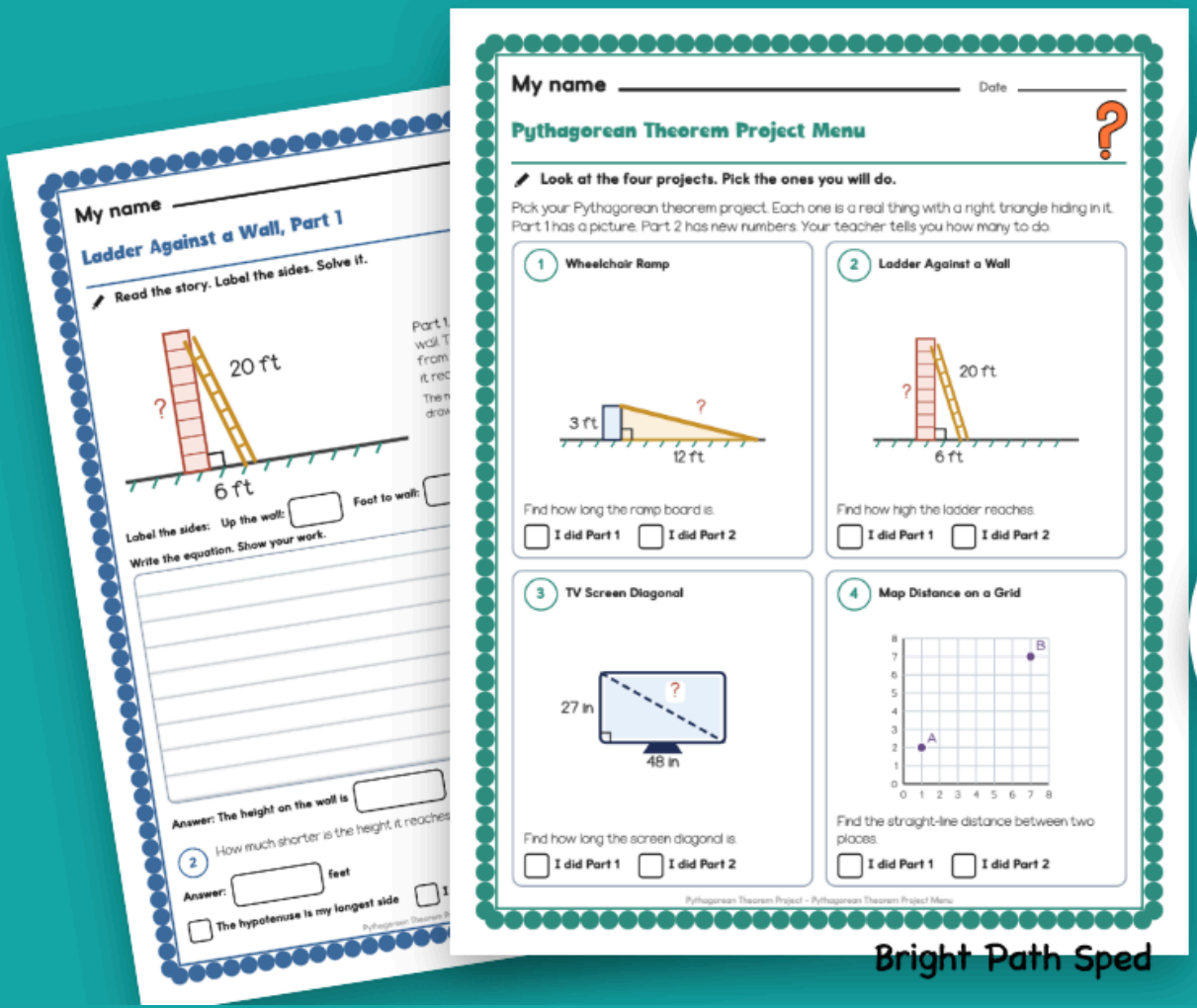
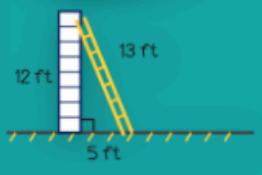
PYTHAGOREAN THEOREM PROJECT

RAMP • LADDER • TV • MAP



25 PAGES

ANSWER KEY



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PREVIEW

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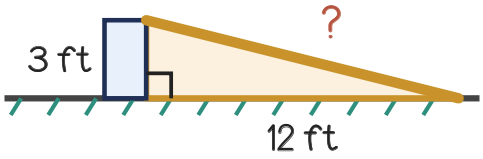
My name _____ Date _____

Pythagorean Theorem Project Menu

Look at the four projects. Pick the ones you will do.

Pick your Pythagorean theorem project. Each one is a real thing with a right triangle hiding in it. Part 1 has a picture. Part 2 has new numbers. Your teacher tells you how many to do.

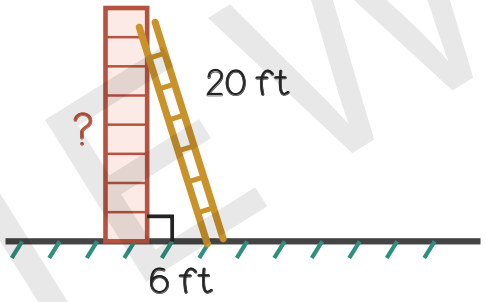
1 Wheelchair Ramp



Find how long the ramp board is.

☐ **I did Part 1** ☐ **I did Part 2**

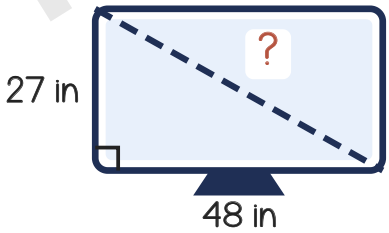
2 Ladder Against a Wall



Find how high the ladder reaches.

☐ **I did Part 1** ☐ **I did Part 2**

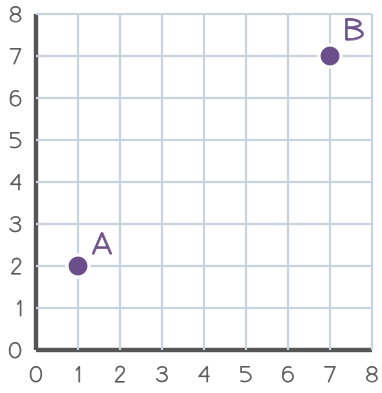
3 TV Screen Diagonal



Find how long the screen diagonal is.

☐ **I did Part 1** ☐ **I did Part 2**

4 Map Distance on a Grid



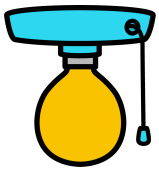
Find the straight-line distance between two places.

☐ **I did Part 1** ☐ **I did Part 2**

PREVIEW

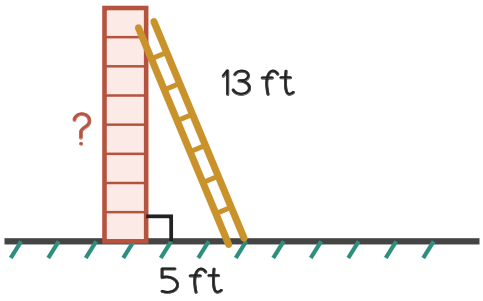
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Project Plan: Four Steps

Read the four steps. Keep this page next to you.



Every Pythagorean theorem project uses the same four steps. Here they are on one story.

Story: A 13-foot ladder leans on a wall. Its foot is 5 feet from the wall. How high does it reach?

$$a^2 + b^2 = c^2$$

1 Draw it

Sketch the story. The wall and the ground make a right angle: mark it with a little square.

Example: the ladder, the wall and the ground make a right triangle.

2 Label it

Write each number on its side. The hypotenuse is across from the right angle. Put a ? on the side you need.

Example: the ladder is the hypotenuse, 13. The ground side is 5. The wall side is ?.

3 Solve it

Hypotenuse unknown: add the squares. A leg unknown: subtract.

Example: $5^2 + b^2 = 13^2$, so $b^2 = 169 - 25 = 144$, $b = 12$

4 Check it

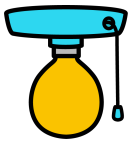
Is the hypotenuse the longest side? Does the answer make sense? Write the units.

Example: 12 feet is shorter than 13 feet, so it makes sense. The ladder reaches 12 feet up.

PREVIEW

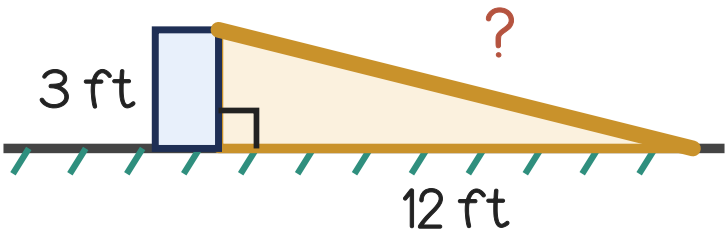
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Wheelchair Ramp, Part 1

Read the story. Label the sides. Solve it.



Part 1. A ramp for a school stage rises 3 feet. It runs 12 feet along the ground. How long is the ramp board? Round to the tenth.

The numbers are made up for practice. Not drawn exactly to scale.

Label the sides: **Rise (up):** ☐ **Run (along the ground):** ☐ **Ramp board:** ☐

Write the equation. Show your work.

Answer: The ramp board is ☐ **feet**

2 How much longer is the ramp board than the ground it covers?

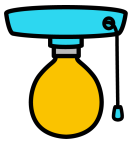
Answer: ☐ **feet**

☐ **The hypotenuse is my longest side** ☐ **I wrote my units**

PREVIEW

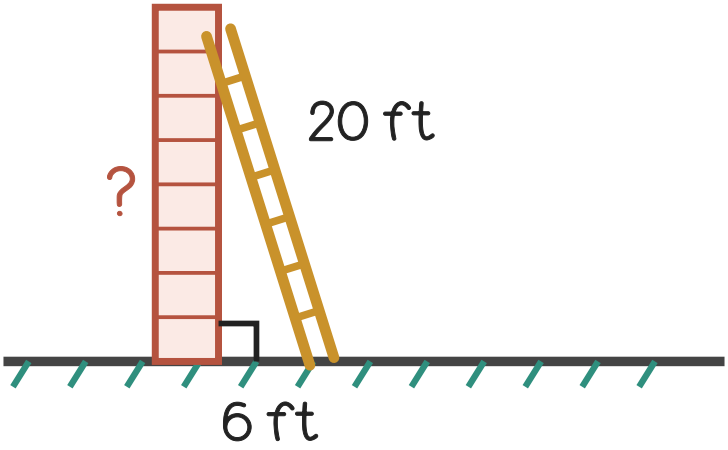
Preview - Bright Path Shed

My name _____ Date _____



Ladder Against a Wall, Part 1

Read the story. Label the sides. Solve it.



Part 1. A 20-foot ladder leans against a wall. The foot of the ladder is 6 feet from the wall. How high up the wall does it reach? Round to the tenth.

The numbers are made up for practice. Not drawn exactly to scale.

Label the sides: **Up the wall:** ☐ **Foot to wall:** ☐ **Ladder:** ☐

Write the equation. Show your work.

Answer: The height on the wall is ☐ **feet**

2 How much shorter is the height it reaches than the ladder?

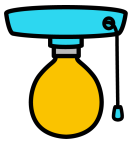
Answer: ☐ **feet**

☐ **The hypotenuse is my longest side** ☐ **I wrote my units**

PREVIEW

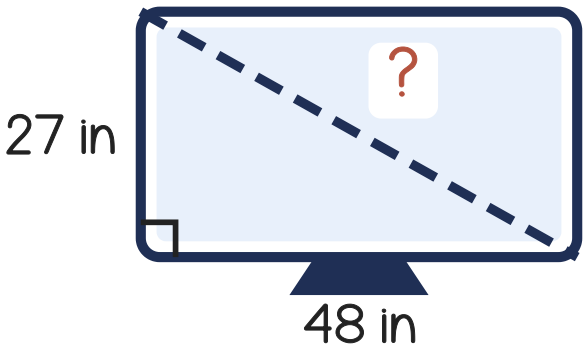
Preview - Bright Path Shed

My name _____ Date _____



TV Screen Diagonal, Part 1

Read the story. Label the sides. Solve it.



Part 1. A TV screen is 48 inches wide and 27 inches tall. How long is the diagonal of the screen? Round to the tenth.

The numbers are made up for practice. Not drawn exactly to scale.

Label the sides: **Height:** ☐ **Width:** ☐ **Diagonal:** ☐

Write the equation. Show your work.

Answer: The diagonal is ☐ **inches**

2 How much longer is the diagonal than the width of the screen?

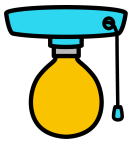
Answer: ☐ **inches**

☐ **The hypotenuse is my longest side** ☐ **I wrote my units**

PREVIEW

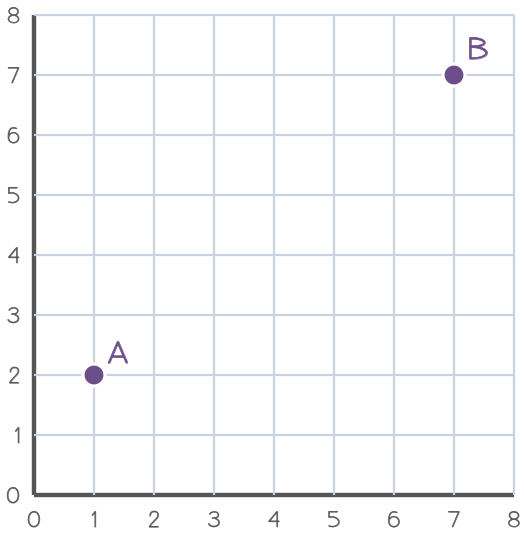
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My name _____ Date _____



Map Distance on a Grid, Part 1

Read the story. Label the sides. Solve it.



Part 1. On a town map, each square is 1 mile. The library is at A (1, 2) and the park is at B (7, 7). How far is it in a straight line from A to B? Round to the tenth.

The numbers are made up for practice. Not drawn exactly to scale.

Label the sides: **Up:** ☐ **Across:** ☐ **Straight line:** ☐

Write the equation. Show your work.

Answer: The straight-line distance is ☐ **miles**

2 Walking the streets, across and then up, is 6 + 5 miles. How many more miles is that than the straight line?

Answer: ☐ **miles**

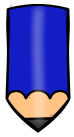
☐ **The hypotenuse is my longest side** ☐ **I wrote my units**

PREVIEW

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My name _____ Date _____

My Project Write-Up



Copy your answers. Tell what you learned.

Copy your answers from each page. Skip any project you did not do.

Scenario	Part 1 answer	Part 2 answer
Wheelchair Ramp		
Ladder Against a Wall		
TV Screen Diagonal		
Map Distance on a Grid		

I chose ____ because ____. The hypotenuse is ____. My answer makes sense because ____.

My favorite project and why

One thing I would tell a friend about the hypotenuse

PREVIEW

My name _____ Date _____

Find the Mistake

Find the mistake. Then fix it.

Sam is made up for practice. Each problem has one mistake.

1 **Sam: a 20-foot ladder, foot 6 feet from the wall: how high?**

1 $6^2 + 20^2 = h^2$
2 $36 + 400 = 436$
3 $h = 20.9$ feet

The mistake is on line

☐ 1 ☐ 2 ☐ 3

Fix it. Write the right answer.

2 **Sam: a TV is 48 inches wide and 27 inches tall: diagonal?**

1 $48^2 + 27^2 = d^2$
2 $2304 + 729 = 3033$
3 $d = 3033$ inches

The mistake is on line

☐ 1 ☐ 2 ☐ 3

Fix it. Write the right answer.

3 **Sam: a ramp rises 3 feet and runs 12 feet: how long is the board?**

1 $3^2 + 12^2 = c^2$
2 $6 + 24 = 30$
3 $c = 5.5$ feet

The mistake is on line

☐ 1 ☐ 2 ☐ 3

Fix it. Write the right answer.

4 **Sam: a map trip goes 6 miles across and 8 miles up: straight line?**

1 $6^2 + 8^2 = c^2$
2 $36 + 64 = 100$
3 $c = 6 + 8 = 14$ miles

The mistake is on line

☐ 1 ☐ 2 ☐ 3

Fix it. Write the right answer.

PREVIEW

Answer Key: Mistakes, Write-Up, Plan

Sam in each Find the Mistake problem is invented. Line numbers count the first line as line 1.

Item	Problem	Mistake	What went wrong	Right answer
Sam 1	a 20-foot ladder, foot 6 feet from the wall: how high?	Line 1	The ladder is the hypotenuse, so it goes alone on the right: $6^2 + h^2 = 20^2$. 400 - 36 = 364, h = 19.1.	19.1 feet
Sam 2	a TV is 48 inches wide and 27 inches tall: diagonal?	Line 3	3033 is d squared, not d. Take the square root: d = 55.1.	55.1 inches
Sam 3	a ramp rises 3 feet and runs 12 feet: how long is the board?	Line 2	Squaring is times itself, not times 2: 9 + 144 = 153, and c = 12.4.	12.4 feet
Sam 4	a map trip goes 6 miles across and 8 miles up: straight line?	Line 3	14 is the way along the streets. The straight line is the square root of 100, which is 10.	10 miles

Write-up table page 15

Scenario	Part 1	Part 2
Wheelchair Ramp	12.4 feet	8 feet
Ladder Against a Wall	19.1 feet	25 feet
TV Screen Diagonal	55.1 inches	24 inches
Map Distance on a Grid	7.8 miles	10 miles

Common slips to watch for

- Using the ladder, ramp board or diagonal as a leg: it is always the hypotenuse.
- Stopping at c squared and forgetting the square root.
- Adding when a leg has to be found: it is a subtraction.
- Leaving the units off the answer.

Sample plan: the ramp, Part 1

- Sketch: a right triangle with the ramp board slanted, the porch edge up, the ground along the bottom.
- Know: rise 3 feet, run 12 feet. Need: the ramp board, which is the hypotenuse.
- Equation: $3^2 + 12^2 = c^2$, so $c^2 = 153$ and c = 12.4.
- Guess: more than 12, because the hypotenuse is the longest side.

The checklist (page 16)

- It is the student's own self-check. There is no score and no rubric: nine boxes, and a badge to color when every box is checked.
- Use it for a quick conference: ask the student to show you one box and the part of the page that proves it.

PREVIEW

Class Progress Grid

Every student on one grid: items right by page type.

Class or group _____ Month _____

Student	Ramp (of 4)	Ladder (of 4)	TV screen (of 4)	Map (of 4)	Mistakes (of 4)

PREVIEW

How to fill this in

For each column, add up how many items that student has right with no prompt (the tracker rows). One glance across a row shows which skill is easiest and which is next.

Grouping for small-group time

Students low on a scenario need the four steps (page 5) and the planning page (page 6) again. Students near full marks can move on to Find the Mistake (page 17).

Marcus's Tracker (Invented Student)

Marcus T. is invented; nothing on this page describes a real student. The blank tracker is on page 20.

Student	Teacher	Month
Marcus T. (an invented student)	Ms. Reyes (invented)	November

Page	Page type and set	Items	Right	Date	Notes
7	Wheelchair Ramp, Part 1	2	2	11/3	-
8	Wheelchair Ramp, Part 2	2	1	11/5	Added the squares instead of subtracting
9	Ladder Against a Wall, Part 1	2	2	11/10	-
10	Ladder Against a Wall, Part 2	2	2	11/12	-
11	TV Screen Diagonal, Part 1	2	1	11/17	Stopped at 3033, no square root
12	TV Screen Diagonal, Part 2	2	-	-	-
13	Map Distance on a Grid, Part 1	2	-	-	-
14	Map Distance on a Grid, Part 2	2	-	-	-
17	Find the Mistake	4	-	-	-

How to read it

Marcus T. has done **5 of 9** scored pages and got **8 of 10** items right with no prompt. **3** pages were all right and **2** carry a note. Every number comes from the table.

What the table points to

The lowest page is Wheelchair Ramp, Part 2 (1 of 2) and TV Screen Diagonal, Part 1 (1 of 2). That is where the next practice goes. The 4 pages left blank are not tried yet, never wrong.

PREVIEW