Name & Surname: _____ Class: _____ Date: _____

How Long Will Fit?

Right triangles in 2D and 3D

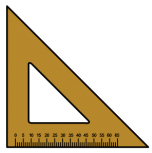
About 50 minutes Level ★★★☆☆



Pythagoras in Steps

In a **right triangle**, the square on the **hypotenuse** equals the sum of the squares on the two **legs**.

- Mark the right angle. The **hypotenuse** c sits opposite it and is longest.
- Write $a^2 + b^2 = c^2$ with c as the **hypotenuse**.
- If c is missing, add: $c = \sqrt{(a^2 + b^2)}$. If a **leg** is missing, subtract.
- For a box, use it twice: base diagonal first, then height to **space diagonal**.



TASK A

/12

Complete the table. Square each leg, add, then take the square root.

a (in.)	b (in.)	$c^2 = a^2 + b^2$	c (in.)
3	4		
6	8		
5	12		
9	12		
8	15		
7	24		

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Find Missing Sides

Practice 2D hypotenuse and leg calculations.

Key words

hypotenuse: longest side, opposite the right angle

right triangle: triangle with one 90-degree angle

Pythagorean Theorem: $a^2 + b^2 = c^2$ for a right triangle

leg: one of the two sides that form the right angle

square root: number that times itself makes the starting number

TASK B

/12

Show $a^2 + b^2 = c^2$. Circle the hypotenuse first, then add or subtract.

WARM UP

1. Legs 3 in. and 4 in. Find the **hypotenuse** c.

   Answer: _____

2. Legs 6 in. and 8 in. Find the **hypotenuse** c.

   Answer: _____

3. Legs 5 in. and 12 in. Find the **hypotenuse** c.

   Answer: _____

4. Legs 9 in. and 12 in. Find the **hypotenuse** c.

   Answer: _____

PRACTICE

5. Hypotenuse 10 in., leg 6 in. Find the missing **leg** b.

   Answer: _____

6. Hypotenuse 13 in., leg 5 in. Find the missing **leg** b.

   Answer: _____

7. Hypotenuse 15 in., leg 9 in. Find the missing **leg** b.

   Answer: _____

8. Hypotenuse 25 in., leg 7 in. Find the missing **leg** b.

   Answer: _____

PROBLEM SOLVING

9. A rectangular field is 60 ft by 80 ft. Find the **diagonal** across it.

   Answer: _____

10. A 10-ft ladder stands with its foot 6 ft from a wall. How high up the **wall** does it reach?

    Answer: _____

11. A screen is 9 in. by 12 in. What is its **diagonal** length?

    Answer: _____

12. A student says $5^2 + 12^2 = 17^2$. Explain the **mistake**.

    Answer: _____

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Tackle Tricky Lengths

Round decimals and find space diagonals in boxes.

TASK C

/12

Show both steps for boxes. Round to the nearest tenth and include units.

WARM UP

1. Legs 8 in. and 15 in. Find the **hypotenuse** c.

Answer: _____

2. Legs 7 in. and 24 in. Find the **hypotenuse** c.

Answer: _____

3. Legs 20 in. and 21 in. Find the **hypotenuse** c.

Answer: _____

4. Legs 2 in. and 3 in. Find c to the nearest **tenth**.

Answer: _____

PRACTICE

5. Hypotenuse 17 in., leg 8 in. Find the missing **leg**.

Answer: _____

6. Hypotenuse 29 in., leg 20 in. Find the missing **leg**.

Answer: _____

7. Hypotenuse 10 in., leg 4 in. Find the leg to the nearest **tenth**.

Answer: _____

8. Hypotenuse 9 in., leg 5 in. Find the leg to the nearest **tenth**.

Answer: _____

PROBLEM SOLVING

9. A box is 6 in. by 8 in. with height 5 in. What is the longest **rod** inside to the nearest tenth?

Answer: _____

10. A box is 5 in. by 12 in. with height 8 in. What is the **space diagonal** to the nearest tenth?

Answer: _____

11. Points (2, 3) and (7, 10) make legs 5 and 7. Find the **distance** between them to the nearest tenth.

Answer: _____

12. A student says the space diagonal is shorter than the box height. Explain why this is **wrong**.

Answer: _____

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Squares Add Up

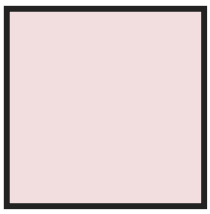
See why areas add, then decode an exam question.

TASK D

/4

Find the area of each square and the triangle.

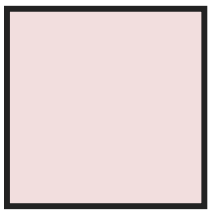
1



3 in

Area: _____ **in²**

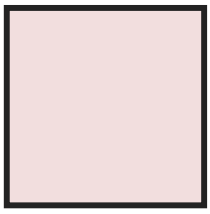
2



4 in

Area: _____ **in²**

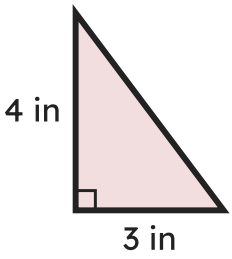
3



5 in

Area: _____ **in²**

4



Area: _____ **in²**

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How Long Will Fit?

TASK E

/3

Box the command word. Underline the topic and plan points.

1. Box the command word **2. Underline** the topic **3. Count** the marks: how many points?
4. Plan, then write

Explain whether a triangle with sides 6 in., 8 in. and 10 in. is a right triangle. Show your working. (3)

Command word	**Topic**	**Points I need**

Write $a^2 + b^2 = c^2$ with 10 as c, the longest side → Calculate $6^2 + 8^2 = 36 + 64 = 100$ and $10^2 = 100$ → State 100 = 100, so it is a right triangle

My answer

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Don't Mix Up

Clear up common confusions and study worked methods.

TASK F

/6

Explain the difference in each pair in your own words.

Finding the hypotenuse VS **Finding a leg**

The difference is...

$c^2 = 169$ in^2 VS **$c = 13$ in.**

The difference is...

$5^2 + 12^2$ VS **$(5 + 12)^2$**

The difference is...

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How Long Will Fit?

TASK G

/2

Study each example, then try the matching question.

WORKED EXAMPLE

Legs 9 in. and 12 in. Find c.

1. Label c as the hypotenuse opposite the right angle
2. Write $9^2 + 12^2 = c^2$
3. Add: 81 + 144 = 225
4. Take the square root: c = sqrt(225) = 15 in.

Answer: 15 in.

YOUR TURN

Legs 8 in. and 15 in. Find c.

Answer: _____

WORKED EXAMPLE

Box 6 in. by 8 in., height 5 in. Find the space diagonal to the nearest tenth.

1. Step 1 base: $6^2 + 8^2 = 36 + 64 = 100$, base = 10 in.
2. Step 2 space: $10^2 + 5^2 = 100 + 25 = 125$
3. Space = sqrt(125) ≈ 11.2 in., longer than any edge

Answer: 11.2 in.

YOUR TURN

Box 5 in. by 12 in., height 8 in. Find the space diagonal to the nearest tenth.

Answer: _____

How did I do?

Circle a face for each line.

I can find a missing side with $a^2 + b^2 = c^2$	☹	😐	☺
I can choose when to add or subtract	☹	😐	☺
I can use two steps to find a space diagonal	☹	😐	☺

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Answer sheet: How Long Will Fit?

Task A

3 | 4 | 25 | 5
6 | 8 | 100 | 10
5 | 12 | 169 | 13
9 | 12 | 225 | 15
8 | 15 | 289 | 17
7 | 24 | 625 | 25

Task B

1. 5 in.
2. 10 in.
3. 13 in.
4. 15 in.
5. 8 in.
6. 12 in.
7. 12 in.
8. 24 in.
9. 100 ft
10. 8 ft
11. 15 in.
12. Wrong because 25 + 144 = 169, not 289, so c = 13, not 17.

Task C

1. 17 in.
2. 25 in.
3. 29 in.
4. 3.6 in.
5. 15 in.
6. 21 in.
7. 9.2 in.
8. 7.5 in.
9. 11.2 in.
10. 15.3 in.
11. 8.6 units
12. Wrong because the space diagonal is the hypotenuse of the second triangle, so it is longer than the height.

Task D

1. area = 9 in^2
2. area = 16 in^2
3. area = 25 in^2
4. area = 6 in^2

Task E

Command word: Explain

Topic: Pythagorean Theorem

Points: Write $a^2 + b^2 = c^2$ with 10 as c, the longest side; Calculate $6^2 + 8^2 = 36 + 64 = 100$ and $10^2 = 100$; State 100 = 100, so it is a right triangle

---

Task F

1. The hypotenuse is longest and opposite the right angle, so add: $c = \sqrt{a^2 + b^2}$. A leg is shorter, so subtract: $leg = \sqrt{c^2 - other^2}$.
2. c^2 is the area of the square on the side. You must take the square root to get the side length, so $\sqrt{169} = 13$.
3. Square first then add: $25 + 144 = 169$. Squaring after adding gives $17^2 = 289$, which is too big.

Task G

1. 17 in.
2. 15.3 in.

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