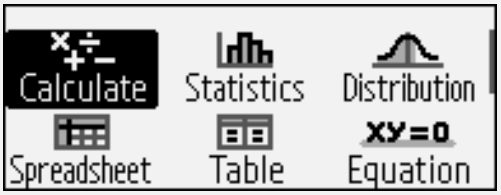
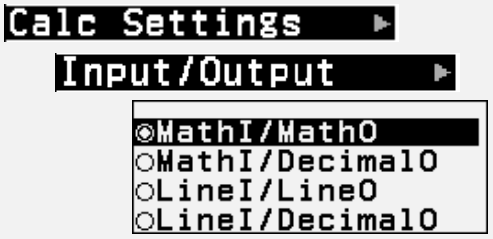
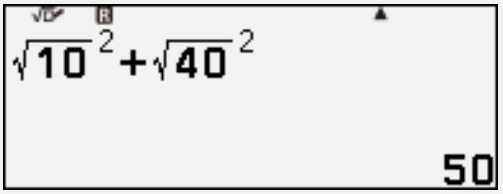
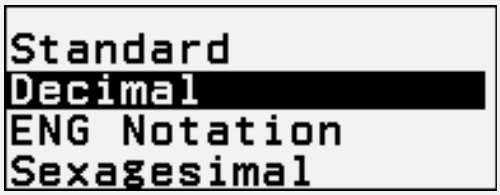
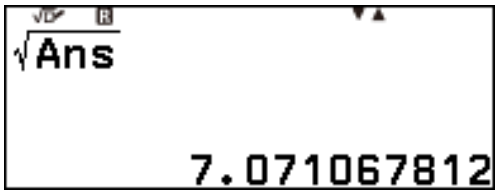
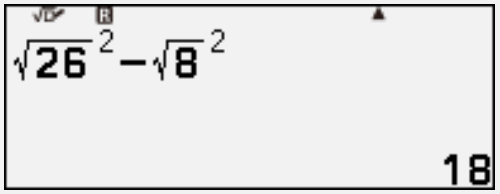
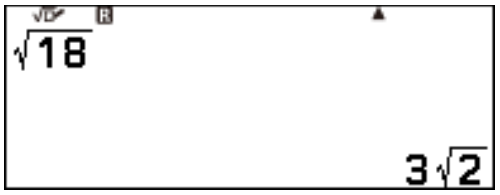
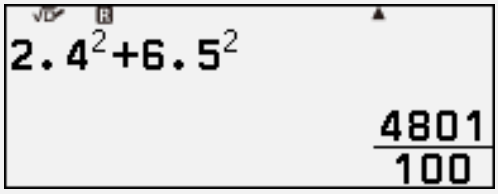
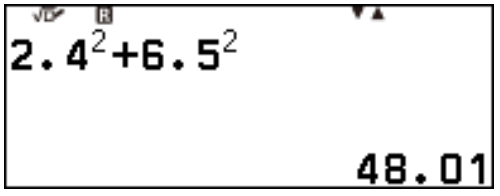
Unit 8: Lesson 9 – Finding Unknown Side Lengths

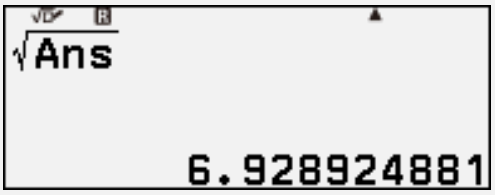
Activity 9.3: Find the Unknown Side Lengths

Skill: Use the Calculate app to determine exact side lengths in simplest radical form.

Activity Summary:
This activity focuses on applying the Pythagorean Theorem to find missing side lengths in right triangles. The Calculate app on the calculator can be used to find the exact length of sides in simplest radical form or convert to a decimal approximation.

1. Turn on the calculator with the ⏻ **- On** button. Press ⌂ **– Home** and then use the arrows to highlight the **Calculate app**.	
2. Press either OK or EXE to open the **Calculate app**.	
3. To have answers in **simplest radical form**, the calculator must be in **MathI/MathO mode**. This is the default setting. To check, press ☰ **– Settings** then press either ▷, OK, or EXE twice. The top option should be selected. Select the second option if you want a **decimal output**.	
4. Press the AC **button** to return to the **Calculate app**.	
5. In the first problem, **Triangle Q** has **legs** of sides $a = \sqrt{10}$ and $b = \sqrt{40}$ and the **hypotenuse**, c, is unknown. Use the **Pythagorean Theorem**, $a^2 + b^2 = c^2$ to solve for c, by finding the value of $a^2 + b^2$ first. Use the **square root key**, √, and **square key**, x^2 as needed. Press either OK or EXE to see that $c^2 = 50$.	

6. To find the **square root** of your answer, **50**, press √ and then the **answer button**, Ans. Press either OK or EXE to find that $c = 5\sqrt{2}$.	
7. To know the decimal approximation of $5\sqrt{2}$, convert to a decimal by pressing the **FORMAT key**, FORMAT, and then **down arrow**, ▼, to highlight **Decimal**.	
8. Press either OK or EXE and $5\sqrt{2}$ will change to its decimal approximation, **7.071067812**.	
9. In the second problem, **Triangle P** has **legs** of sides $\sqrt{8}$ and unknown b with a **hypotenuse** of $\sqrt{26}$. Use the **Pythagorean Theorem**, $a^2 + b^2 = c^2$ to solve for b, by finding the value of $c^2 - a^2$ first. So, $b^2 = 18$.	
10. To find the **square root** of your answer, **18**, press √ and can **manually** enter **18** instead of using the **answer key**. Press either OK or EXE to find that $b = 3\sqrt{2}$.	
11. In the third problem, a right triangle has **legs** of sides **2.4 cm** and **6.5 cm** with an unknown **hypotenuse**. Use the **Pythagorean Theorem**, $a^2 + b^2 = c^2$ to solve for the **hypotenuse**, c, by finding the value of $a^2 + b^2$ first. So, $c^2 = \frac{4801}{100}$.	
12. To convert to an **equivalent decimal**, press the **FORMAT key**, FORMAT, then **down arrow**, ▼, to highlight **Decimal** and press either OK or EXE. So, $c^2 = 48.01$.	

13. To find the **square root** of your answer press √ and then the **answer button**, Ans. Press either OK or EXE to find c. Note that since there is a **decimal** under the **radical**, the answer automatically becomes a **decimal**.	
14. In the fourth problem, a right triangle has a **leg** of length ¼ and a **hypotenuse** of length ⅓. Use the **Pythagorean Theorem**, $a^2 + b^2 = c^2$ to solve for the missing **leg**, b, by finding the value of $c^2 - a^2$ first. Use the **fraction button**, ▭, and **square key**, x^2, as needed. So, $b^2 = \frac{7}{144}$.	
15. By taking the square root of our answer, we find the missing side to be $\frac{\sqrt{7}}{12}$ **cm**. If you need as a decimal, use the format key as described earlier to find a length of approximately **0.2205 cm**.	
16. For the last problem, a **triangle** has an **altitude** drawn which splits the triangle into **two right triangles**. To find the missing side needed, we will first need to find the **height** of the **altitude, h**, using the right triangle on the left. So, $h^2 = 9$.	
17. The right triangle on the right side, the hypotenuse, c, is known and we know the altitude, h, one of its legs. Using the **Pythagorean Theorem**, x^2 must equal $c^2 - h^2$. So, $x^2 = 9$.	
18. Either by taking the **square root**, or knowing **9** is a **perfect square**; the missing side length, x, can be found to be **3**.