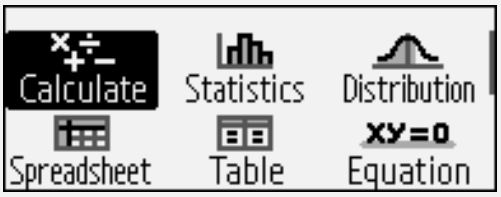
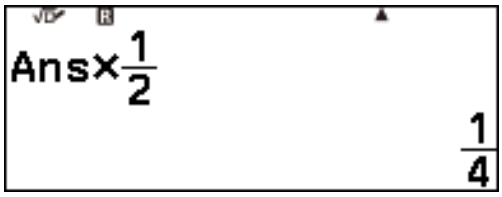
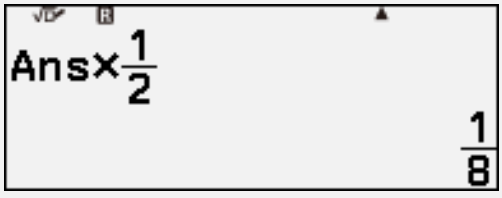
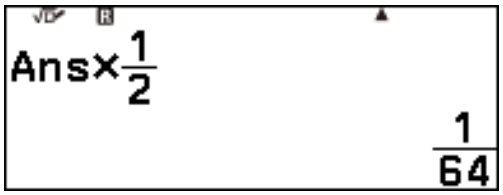
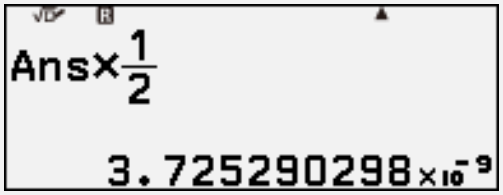
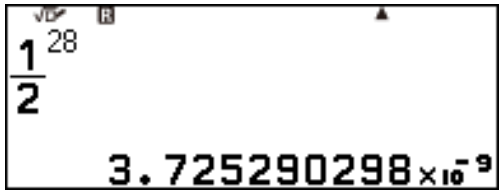
Unit 7: Lesson 1 – Exponent Review

Activity 1.3: Shrink Tower

Skill: Use the Calculate app to repeat an operation to a prior answer using the Ans Key.

Activity Summary:
This activity encourages students to recognize repeated division by 2 as being equivalent to repeated multiplication by the fraction ½, preparing them to better understand negative exponents. In the Calculate app of the calculator, the Ans Key can be used to repeat an operation utilizing the prior answer.

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**. Each day the tower in this activity is "½" as tall as the day before. So, **Day 1** would be ½ of 1; 100% of the original height. Enter the expression **½ times 1** and press either OK or EXE. On **Day 1**, the tower is ½ of its original height.	
3. Now, press the **multiplication key**, ⊗, and the calculator will **automatically** insert **Ans** as the **first factor**.	
4. For **Day 2**, the tower will again be ½ the height of **Day 1**. Enter ½ as the second factor and press either OK or EXE. On **Day 2**, the tower is ¼ of its original height.	
5. To find the **fractional** height of **Day 3** compared to the original height, press either OK or EXE again. On **Day 3**, the tower is ⅛ of its original height.	

6. To find the height on **Day 6**, press either [OK] or [EXE] **three more times**. On **Day 6**, the tower is $1/64$ of its original height.	
7. To determine what fraction of the original height of the tower after **28 days**, you could press either [OK] or [EXE] **twenty-two more times**. The results were written as a **fraction** until the 27th day! On **Day 26** the tower was $1/67,108,864$ of its original height.	
8. However, writing this expression using **exponents** will be easier. On **Day 28**, the tower will be $\left(\frac{1}{2}\right)^{28} = \frac{1}{(2)^{28}}$ of its original height. Let's verify that each representation has the result of $3.725290298 \times 10^{-9}$. 9. To enter $\left(\frac{1}{2}\right)^{28}$, type [Shift] [1] [▼] [2] [▶] [x^□] [2] [8].	
10. To enter $\frac{1}{2^{28}}$, type [Shift] [1] [▼] [2] [x^□] [2] [8]. Since both expressions yield the same result, they are **equivalent expressions**.	
11. Later in **Lesson 6** of this unit, students will investigate writing **equivalent expressions** using **negative exponents**. To enter the equivalent expression of 2^{-28}, type [2] [x^□] [Shift] [(-)] [2] [8].