IM 9–12 MATH v.1

Unit 2

Polynomials and Rational Functions

ALGEBRA 2

Lesson 26

Using the Sum

Illustrative Mathematics®

Kendall Hunt

Learning Goal

Let’s calculate some totals.

Algebra 2

Some Interesting Sums

Warm-up

Recall that for any geometric sequence starting at a with a common ratio r, the sum s of the first n terms is given by $s = a\frac{1-r^n}{1-r}$. Find the approximate sum of the first 50 terms of each sequence:

1. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$

2. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$

That's a lot of Houses

In 2012, about 71 thousand homes were sold in the United Kingdom. For the next 3 years, the number of homes sold increased by about 18% annually. Assuming the sales trend continues,

1. How many homes were sold in 2013? In 2014?
2. What information does the value of the expression $71\,\dfrac{(1-1.18^{11})}{(1-1.18)}$ tell us?
3. Predict the total number of house sales from 2012 to 2017. Explain your reasoning.
4. Do these predictions seem reasonable? Explain your reasoning.

Back to Funding the Future

Let's say you open a savings account with an interest rate of 5% per year compounded annually and that you plan on contributing the same amount to it at the start of every year.

1. Predict how much you need to put into the account at the start of each year to have over $100,000 in it when you turn 70.
2. Calculate how much the account would have after the deposit at the start of the 50th year if the amount invested each year were:
   a. $100
   b. $500
   c. $1,000
   d. $2,000
3. Say you decide to invest $1,000 into the account at the start of each year at the same interest rate. How many years until the account reaches $100,000? How does the amount you invest into the account compare to the amount of interest earned by the account?

Using the Sum

Lesson Synthesis

If someone asked you to explain how to find the sum of the first n terms of a geometric sequence, how would you explain it to them?

I can use the geometric sum formula to solve problems.

Learning Targets

Algebra 2

That’s a Lot!

Cool-down

Lin wonders how much money she could save over 30 years if she puts \$100 at the start of each year into an account with 3% interest per year compounded annually at the end of the year. She calculates the following, but thinks she must have done something wrong since that seems like a lot of money:

$$total\ amount = 100\,\frac{1-1.3^{30}}{1-1.3} = 872,998.55$$

What did Lin forget in her calculation? How much should her total amount be? Explain or show your reasoning.

identity

An equation which is true for all values of the variables in it.

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