Unit 6, Lesson 20

Annually, Quarterly, or Monthly?

Let's use different time intervals to solve problems.

20.1 Finding Equal Expressions

1. Find pairs of expressions that are equal. Be prepared to explain how you know.

$(3^5)^2$	$(3 \cdot 3 \cdot 3 \cdot 3 \cdot 3) \cdot (3 \cdot 3)$
$3 \cdot 3 \cdot 9 \cdot 9 \cdot 9$	3^6
$(3^2)^4$	3^7
3^{10}	$3 \cdot 9 \cdot 27$

2. Write an expression that is equal to $(2^{30})^7$ using a single exponent.
3. Without evaluating the expressions, explain why 2^{15} is equal to 8^5.

20.2 How Many Times per Year?

1. Complete the table.

If something happens _____,	it happens _____ times a year.	it happens every _____ months.
annually		
semiannually		
quarterly		
monthly		

CC BY NC 2024 Illustrative Mathematics®

2. A gym membership has an annual fee, billed monthly. Find the amount of each bill if the annual fee in dollars is:

   a. 360

   b. 540

   c. g

3. An educational foundation gives an annual scholarship, distributed semiannually. Find the amount of each distribution if the annual scholarship amount in dollars is:

   a. 1,800

   b. 5,000

   c. s

4. A magazine subscription has an annual price, billed quarterly. Find the amount of each bill if the annual price in dollars is:

   a. 48

   b. 80

   c. m

20.3 Your Problems Are Compounded

Match each item in the first column to a representation in the second column. Be prepared to explain your reasoning.

1. A worker sets aside $6,000 per year for their retirement fund by saving the same amount monthly.
2. A business's revenue increases by 20% per quarter. This happens for 2 years. Initially, their quarterly revenue was $6,000.
3. $6{,}000 \cdot ((1.05)^4)^x$
4. A man borrows $6,000 from his sister. He will reduce the amount he owes in 1 year by paying her back quarterly.
5. A business's revenue decreases by 20% semiannually. This happens for 3 years. Initially, their quarterly revenue was $6,000.
6. The number of subscribers to a website triples quarterly for 2 years. Initially there were 6 subscribers.
7. $6{,}000 \cdot ((1.1)^2)^3$
8. The number of likes on a post was 6, and then for the next 2 years, the number of likes doubled monthly.

A. $6{,}000 \cdot 1.21^3$

B.

x	0	1	2	3	4	5
y	6,000	7,200	8,640	10,368	12,442	14,930

C. $6 \cdot (3^4)^2$

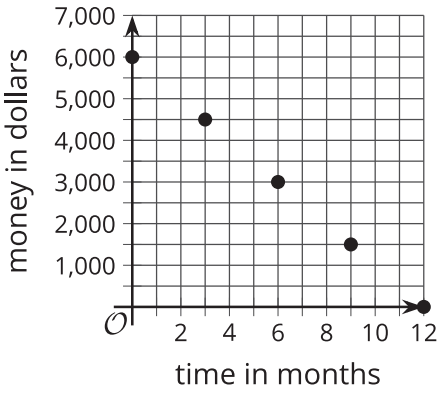
D.

x	0	1	2	3	4	5
y	6,000	4,800	3,840	3,072	2,457.6	1,966.1

E. $6{,}000 \cdot 1.2155^x$

F. $6 \cdot 4{,}096^2$

G.



H.

