



# 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                     |                                |                                |

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

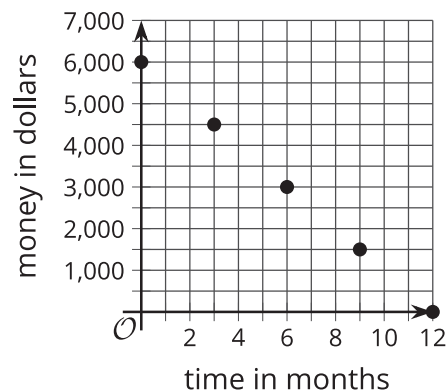
D.

| 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.

