Name_____

Discrete Exponential Growth and Decay

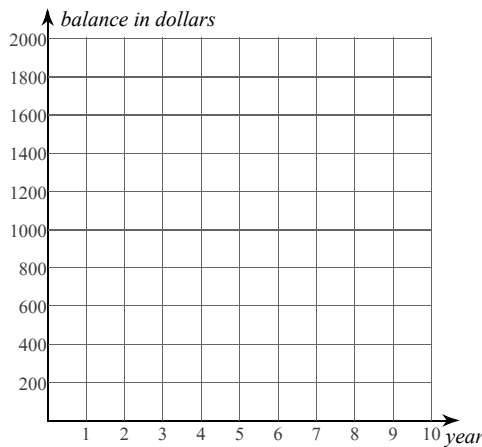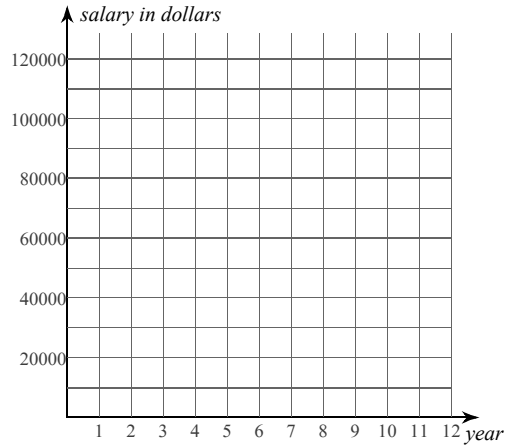Date_____ Period_____

Solve each discrete exponential growth/decay problem. You may use the provided graph to plot points or sketch the exponential function.
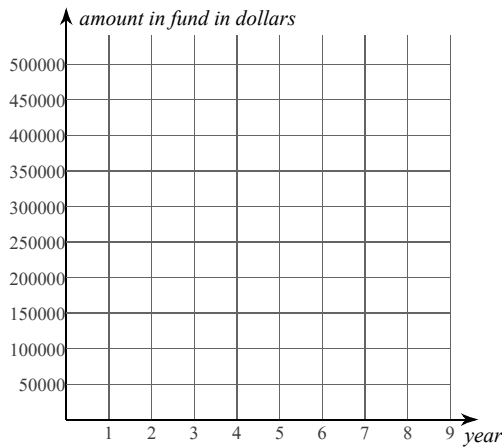
1) A savings account balance is compounded annually. If the interest rate is 2% per year and the current balance is $1,430.00, what will the balance be 8 years from now?
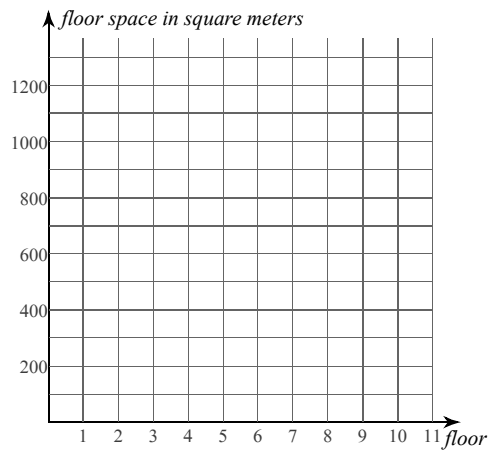
balance in dollars

2000
1800
1600
1400
1200
1000
800
600
400
200

1   2   3   4   5   6   7   8   9   10 *year*

2) An employee receives a 4% raise once per year. If the employee's initial salary is $72,300.00, what will the employee's salary be after 10 years?

salary in dollars

120000
100000
80000
60000
40000
20000

1   2   3   4   5   6   7   8   9   10 11 12 *year*

3) A philanthropist pledges to donate 17% of a fund each year. If the fund initially has $450,000.00, how much will the fund have after 7 years?

amount in fund in dollars

500000
450000
400000
350000
300000
250000
200000
150000
100000
50000

1   2   3   4   5   6   7   8   9 *year*

4) An architect is designing a tapered office tower where the ground floor (floor 0) is the largest and the floor space is reduced by 5% per floor. If the ground floor has an area of 1,140.0 m², what is the area of the 9th floor?

floor space in square meters

1200
1000
800
600
400
200

1   2   3   4   5   6   7   8   9   10 11 *floor*

Solve each discrete exponential growth/decay problem.

5) Rentals in a high rise apartment building get more expensive higher up, since the views get better. The ground floor (floor 0) rent is $1,680.00. The rent increases 4.7% per floor. On what floor is the rent $4,209.62?

6) For tax purposes, a car rental company assumes each car in their fleet depreciates by 5.5% per year. If the initial value of a car is $21,300.00, in how many years will the value depreciate to $8,615.66?
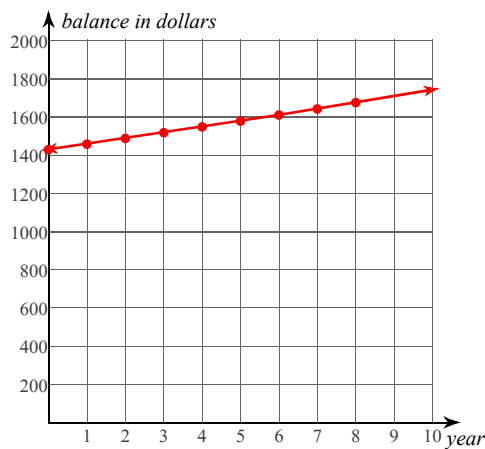
Solve each discrete exponential growth/decay problem. Round your answer to the nearest percent.

7) A new social media site is increasing its user base by a constant percentage per month. If the user base grows from 29,130 users to 52,167 users over 10 months, at what monthly rate is the user base increasing?

8) A rubber bouncy ball is dropped from a height of 115.00 inches onto a hard flat floor. After each bounce, the ball returns to a height that is a constant percentage less than the previous maximum height. After the 19th bounce, the ball reaches a maximum height of 3.34 inches. At what percentage does the maximum ball height reduce per bounce?

Name_____

# Discrete Exponential Growth and Decay

Date_____ Period_____

Solve each discrete exponential growth/decay problem. You may use the provided graph to plot points or sketch the exponential function.

1) A savings account balance is compounded annually. If the interest rate is 2% per year and the current balance is $1,430.00, what will the balance be 8 years from now?


balance in dollars

year

$1430 \cdot 1.02^8 \approx \$1,675.47$

2) An employee receives a 4% raise once per year. If the employee's initial salary is $72,300.00, what will the employee's salary be after 10 years?


salary in dollars
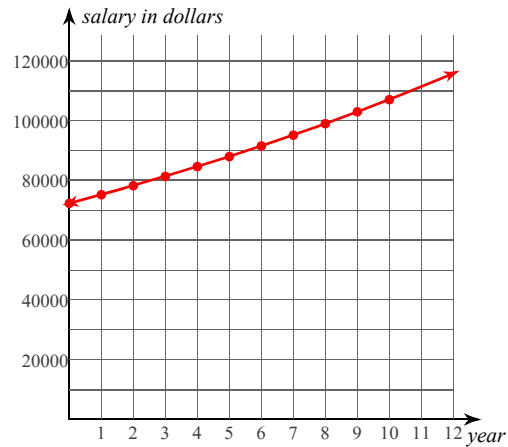
year

$72300 \cdot 1.04^{10} \approx \$107,021.66$

3) A philanthropist pledges to donate 17% of a fund each year. If the fund initially has $450,000.00, how much will the fund have after 7 years?

amount in fund in dollars

year
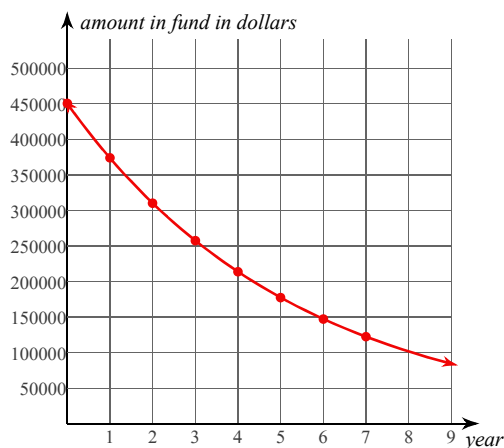
$450000 \cdot 0.83^7 \approx \$122,112.23$

4) An architect is designing a tapered office tower where the ground floor (floor 0) is the largest and the floor space is reduced by 5% per floor. If the ground floor has an area of 1,140.0 m², what is the area of the 9th floor?

floor space in square meters
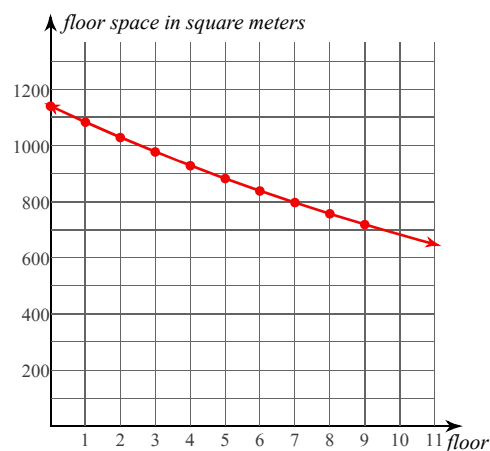
floor

$1140 \cdot 0.95^9 \approx 718.5$ m²

Solve each discrete exponential growth/decay problem.

5) Rentals in a high rise apartment building get more expensive higher up, since the views get better. The ground floor (floor 0) rent is $1,680.00. The rent increases 4.7% per floor. On what floor is the rent $4,209.62?

$$\frac{\ln \dfrac{4209.62}{1680}}{\ln 1.047} \approx 20\text{th floor}$$

6) For tax purposes, a car rental company assumes each car in their fleet depreciates by 5.5% per year. If the initial value of a car is $21,300.00, in how many years will the value depreciate to $8,615.66?

$$\frac{\ln \dfrac{8615.66}{21300}}{\ln 0.945} \approx 16 \text{ years}$$

Solve each discrete exponential growth/decay problem. Round your answer to the nearest percent.

7) A new social media site is increasing its user base by a constant percentage per month. If the user base grows from 29,130 users to 52,167 users over 10 months, at what monthly rate is the user base increasing?

$$\left(\frac{52167}{29130}\right)^{\frac{1}{10}} - 1 \approx 6\% \text{ per month}$$

8) A rubber bouncy ball is dropped from a height of 115.00 inches onto a hard flat floor. After each bounce, the ball returns to a height that is a constant percentage less than the previous maximum height. After the 19th bounce, the ball reaches a maximum height of 3.34 inches. At what percentage does the maximum ball height reduce per bounce?

$$\left| \left(\frac{3.34}{115}\right)^{\frac{1}{19}} - 1 \right| \approx 17\% \text{ per bounce}$$