Name: _____

Date: _____   / 36
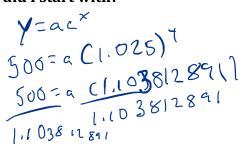
1. I have $ 500 in a bank account after 4 years of investing at a rate of return of 2.5%
   How much money did I start with?

$$500 + 2.5 = 102.5 \Rightarrow \frac{102.5}{100} = 1.025$$

$$y = ac^x$$
$$500 = a\,(1.025)^4$$
$$500 = a\,\frac{(1.0381289\,1)}{1.10381289\,1}$$
$$\frac{500}{1.1038\,12\,891} = a$$

$$452.98 = a$$

/ 4

Answer: _____452.98_____ $.

2. In 2000, Florida's population was **16** million people.
   Since 2000, the state's population has grown by **2 %** each year.
   What would you predict Florida's population to be in 2016?

$x =$ year
$y =$ population
$a = 16\,000\,000$
$c = 2 \cdot \frac{100 + 2 = 102}{100} = 1.02$

$$\begin{array}{c} 2016 \\ -2000 \\ \hline 16 \end{array}$$

$$y = ac^x$$
$$y = 16\,000\,000\,(1.02)^{16}$$

$$y = 21\,964\,571$$

/ 4

Answer: __21 964 571__ people .

3. Since 2002, the cost of patient care in Quebec hospitals has increased by about **4%** per year.
   In 2002, such hospital costs were an average of **$ 968** per day.
   What is the approximate cost per day for a patient to stay in a hospital in 2016?

$x =$ years
$y =$ patients
$a = 968$
$c = 4 - \frac{100 + 4 = 104}{100} = 1.04$

$$y = ac^x$$
$$y = 968\,(1.04)^{14}$$
$$y = 1676.26$$

$$\begin{array}{c} 2016 \\ -2002 \\ \hline 14 \end{array}$$

/ 4

Answer: __1676.26__ $.

4. Macdonald High School purchased a new printer for **$ 35 000** in the year **2011.**
   Each year, the printer loses 5 % of its value.
   What will the printer's approximate value be at the end of this year (2017)?

   $\dfrac{2017}{-2011}$
   6

   $x = \text{years}$

   $y = \text{value}$

   $a = 35\ 000$

   $c = 100 - 5 = \dfrac{95}{100} = 0.95$

   $y = ac^x$

   $y = 35\ 000(0.95)^6$

   $y = 25\ 728.21$

   / 4

   Answer: $\underline{\quad 25\ 728.21 \quad}$ $.

5. A bacteria culture **triples** in size **every 4 hours.**
   If the culture starts off with **200** bacteria, **how many** would be present at the end of 2 full days?
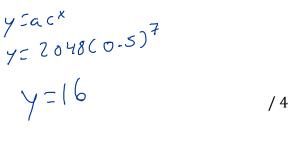
   $x = \text{hours}$ $\qquad \dfrac{48}{3} = 16$

   $y = \text{bacteria}$

   $a = 200$

   $c = \text{triples } (3)$

   $y = ac^x$

   $y = 200(3)^{16}$

   $y = 8\ 609\ 344\ 200$

   / 4

   Answer: $\underline{\quad 8\ 609\ 344\ 200 \quad}$ bacteria

6. Your uncle deposited $1500 into an account paying 6.5% annual interest when you turned 2
   years old. **What should the account balance be when you reach your 18th birthday?**
   (Round your answer to the nearest cent).

   $x = \text{years}$ $\qquad 18 - 2 = 16$

   $y = \text{money}$

   $a = 1500$

   $c = 100 + 6.5 = \dfrac{106.5}{100} = 1.065$

   $y = ac^x$

   $y = 1500(1.065)^{16}$

   $y = 4108.52$

   / 4

   Answer: $\underline{\quad 4108.52 \quad}$ $.

7. An international chess tournament brings out the best players in the world.
   This year, there are 2048 competitors playing head-to-head matches.
   After each round, the field of competitors is cut in half.
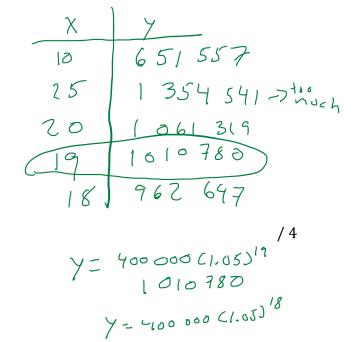   **How many players should be left after the seventh round?**

$X =$ years (7)

$y =$ chess players

$a = 2048$

$c = 100 - 50 = \dfrac{50}{100} = 0.5$

$y = ac^x$

$y = 2048(0.5)^7$

$y = 16$

/4

Answer: ____16____ players

8. The population of a city grows at a rate of 5% per year.
   The population in 1990 was 400 000.
   How many years should it take for the population to reach over 1 000 000 people?
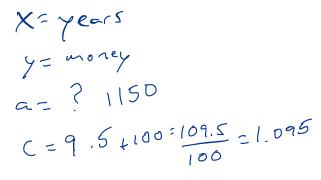   **What year would that be?**

$X =$ years

$y =$ people

$a = 400\ 000$

$c = 100 + 5 = \dfrac{105}{100} = 1.05$

X	Y
10	651 557
25	1 354 541 → too much
20	1 061 319
19	1 010 780
18	962 647

$y = 400\ 000 (1.05)^{10}$
  651 557

$y = 400\ 000 (1.05)^{25}$
  1 354 541

$y = 400\ 000 (1.05)^{20}$
  1 061 319

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$y = 400\ 000 (1.05)^{19}$
  1 010 780

$y = 400\ 000 (1.05)^{18}$

$1990 + 19 = 2009$

The pop would reach 1 000 000 in the year ____2009____

9. In **2016**, Joel has **$ 3120.71** in a bank account **after 11 years** of investing
   The average annual rate of return during that time **was 9.5%**
   How much money did Joel start investing with?
   How much money would Joel have had in his account in 2013?

$X = $ years

$y = $ money

$a = $? 1150

$C = 9.5 + 100 = \dfrac{109.5}{100} = 1.095$

$3120.71 = a(1.095)^{11}$

$3120.71 = a(2.71365923)$

$\dfrac{3120.71}{2.71365923} \quad \dfrac{}{2.71365923}$

$\boxed{1150 = a}$

Start with

/ 4

Ⓧ

$2016 - 11 = 2005$

$2013 - 2005 = 8$

$y = ac^x$

$y = 1150(1.095)^8$

$y = 2376.90$

Answer: Joel would have started with $ __1150__

Answer: Joel would have had $ __2376.9__ in 2013.