

Key to Population Fun Part 2.

Author .

Reviewer .

Answers on the Author's Work ...

How to do it

- 1) County _____
- 2) Population in 2003 _____
- 3) Births – Deaths _____
- 4) Net Migration _____
- 5) Total Change _____

- From Data Book
- Ditto
- Ditto
- Ditto
- Ditto

6) Population in 2000 = _____

Line (2) – (5) gets _____

7) a rate of change = _____ per year
or
b _____ % per year

First divide Line (2) by Line (6);
answer is _____
Next take the cube root of this
number using your calculator, then subtract
1 from it;
A7) answer is _____ per yr
Multiply this by 100 & round
To 1 decimal place
A8) Answer is _____ % per yr

- 8) Year 2003 _____
- Year 2005 _____
- Year 2020 _____
- Year 2050 _____

First find the no. of years between 2003
and the future dates of interest. For
2005, $t = 2$; for 2020, $t = 17$; for 2050, $t = 47$.
For year 2003, enter the number in line (2)
above. For other years, use the e^x key on
calculator, like so;
For 2005 answer is (Line 2) $\times e^{(A7)*2}$
= _____
2020, answer is (2) $\times e^{(A7)*17} =$ _____
2050, answer is (2) $\times e^{(A7)*47} =$ _____

9) Size of county is _____ sq. miles

From Data Book

10) Amt. Land needed to feed one person
is _____

From Week 1 calculation -- if you didn't
remember it, enter 0.1 ha here.

11a) Time when population's need will
exceed county size is _____ years from
now

See below for calculation

11b) Population will be _____ at that

time

12) To find the time at which the growing population will need the whole county for raising food, proceed like so ...

- a) convert county area to hectares; Line (9) x 259 ha/mile² = _____ ha
- b) Find the number of people supportable by that many hectares like so ...
 $N = (\text{No. of hectares in county, line 12a}) / (\text{no. ha/person, line 10}) = \text{_____ people.}$
- c) By brute force, keep putting bigger and bigger values of “t” into the exponential growth equation until you get a number bigger than line 12b. By a more elegant solution, proceed like so ...

Line(12b) = Line (2)* e^{(A7)*t}, solve for t. Rearranging algebraically,
Line(12b)/Line(2) = e^{(A7)*t} Take natural log [ln key on your calculator] of each side gives you ln[Line(12b)/Line(2)] = A7 * t. Solve for t to get $t = (1/A7) * \ln[\text{Line}(12b)/\text{Line}(2)] = \text{_____ years after 2003.}$

How did you do?

Line (6) ok er, error ... author should have _____

Line (7a) ok er, error ... author should have _____

Line (7b) ok er, error ... author should have _____

Line (8) Year 2003 ok er, error ... author should have _____

Year 2005 ok er, error ... author should have _____

Year 2020 ok er, error ... author should have _____

Year 2050 ok er, error ... author should have _____

Line (11a) ok er, error ... author should have _____

Line (11b) ok er, error ... author should have _____

Reviewer’s notes All A-OK? What need’s work (if anything)?