Name _____

1. When using radioactive isotope half-life dating, the amount of a radioactive substance present is usually

given as $R(t) = R_0(\dfrac{1}{2})^{\frac{t}{k}}$ or $R_0(2)^{\frac{-t}{k}}$. For example, using radioactive carbon, we might

have $R(t) = 10^{-12}(2^{\frac{-t}{5700}})$, indicating that after 5700 years when the exponential term has a value of -1,

0.5×10^{-12} or half of the original 10^{-12} carbon isotopes would be present.   Your science teacher
colleague has the following question. He is now experiencing half life functions being written with
base e instead of base 2. He tells you that there is less information when written in this form since with
base 2 you could see the half-life clearly in the function. He is correct! This is less informative but
easier to manipulate with current calculators with *ln x* buttons and no $\log_2$ buttons. How would you
show your colleague how to derive the half-life of the radioactive element used in the function

$R(t) = 0.005\, e^{-0.000277t}$?

2. What is a scoring *rubric*?

3. How many ways are there to place 10 identical balls into 3 distinct urns labeled A, B, and C, if there must
be at least one ball in each urn (ie. no empty urns)?

4. How many ways can 5 people be seated around a circular table?

5. How many digits are there in 32^{40} ?

6. List the ten NCTM-2000 curriculum threads and at least five (5) problem solving strategies.

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1. _____
2. _____
3. _____
4. _____
5. Problem Solving ——————
6. _____
7. _____
8. _____
9. _____
10. _____

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7. To simulate the rolling of a pair of dice we need a random natural number no less than 2 and no greater than 10. You have a random number function RND() on your calculator which gives a random real number in between 0 and 1. Create an expression to generate a random dice roll using you calculator. Assume a function INT(x) that will return the whole number portion of any real number is also present on your calculator.

8. Contrast summative vs formative assessment.

9. What are the motivations (2) behind the "integral" of elementary calculus?

10. Explain the difference between norm-based and criterion-based evaluations.

11. Why is division by zero undefined?

12. Which is larger $0.99\overline{9}$ or 1? (Explain)

13. $\sqrt{2}$ is an algebraic irrational and there are algebraically based approximation algorithms to obtain decimal expansions for its value, but π is a transcendental irrational number. How are we able to obtain approximate values for π?

14. What is the difference between constuctivism and behaviorism as learning theories?

15. Discuss the nature of the function $f(x) = \sin x$?

16. Solve for x: $6^x = 3^{2x} \cdot 2.417^{x-1}$