

Name: \_\_\_\_\_  
Algebra 1

Date: \_\_\_\_\_  
Band: \_\_\_\_\_

## Unit 6: Exponents and Exponential Functions Performance Tasks

*Instructions:* Choose one performance task. Write all your work on a separate clean piece of paper and attach it to this page.

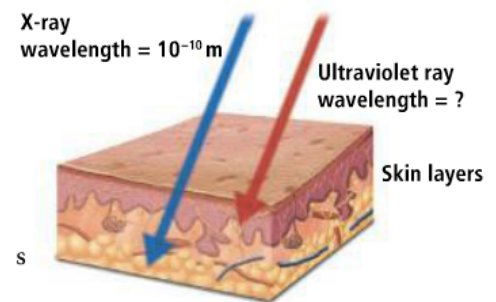
### Big Idea: Properties

Just as there are properties that describe how to rewrite expressions involving addition and multiplication, there are properties that describe how to rewrite and simplify exponential expressions.

### Performance Task 1

*Medical X-rays, with a wavelength of about  $10^{-10}$  m, can penetrate completely through your skin.*

- Ultraviolet rays, which cause sun burn by penetrating only the top level of skin, have a wavelength about 1000 times the wavelength of an X-ray. Find the wavelength of ultraviolet rays. Show your work.
- The wavelengths of visible light are between  $3.8 \times 10^{-7}$  m and  $7.6 \times 10^{-7}$  m. Are these wavelengths longer or shorter than those of ultraviolet rays? Explain.



### Big Idea: Equivalence

One way to represent numbers is in scientific notation. This form uses powers of ten to write very large or very small numbers.

### Performance Task 2

*Write each answer as a power of 2. Show your work and explain your steps.*

- Computer capacity is often measured in bits and bytes. A bit is the smallest unit, which is a 1 or 0, in the computer's memory. A byte is  $2^3$  bits. A megabyte (MB) is  $2^{20}$  bytes. How many bits are in a megabyte?
- A gigabyte (GB) is  $2^{30}$  bytes. How many megabytes are in a gigabyte? How many bits are in a gigabyte?

### Big Idea: Functions

A family of exponential functions has equations of the form  $y = a \cdot b^x$ . They can be used to model exponential growth or decay.

### Performance Task 3

On January 1, 2010, Chessville has a population of 50,000 people. Chessville then enters a period of population growth. Its population increases 7% each year. On the same day, Checkersville has a population of 70,000 people. Checkersville starts to experience a population decline. Its population decreases 4% each year. During what year will the population of Chessville first exceed that of Checkersville? Show all your work and explain your steps.

**Performance Task Assessment: Analytic Holistic Scoring****Developing Autonomy—The student**

3	Persevered to complete the problem without help
2	Completed most of the problem without help
1	Needed key hints to complete the problem
0	Needed extensive guidance to work the problem

**The Solution Process—The student's work showed**

3	A complete and appropriate solution process
2	An appropriate solution process that is almost complete
1	An appropriate process that is partially complete
0	An inappropriate process or no evidence of a process

**The Conclusion/Answer—The student's answer is an**

3	Accurate conclusion, supported by valid evidence and reasons, appropriate to this problem and context
2	Inaccurate but logical conclusion, supported by evidence and reasoning but incorrect due to a minor factual error (in details of problem, in computation, recall a formula, etc.) or minor mistake in reasoning
1	Inaccurate but logical conclusion that overlooks, or gets wrong significant facts (about the problem, the rule, computation, etc.)
0	Inappropriate conclusion: not supported by facts and logic, or there is no conclusion

**Teacher Comments:**