

Chapter 6 Practice Test

For questions 1 to 4, select the best answer.

1. Simplify $\frac{2^3 \times 2^4}{(2^3)^4}$.

- A 2^5 B 2^{-5} C 2^0 D $2^{\frac{7}{12}}$

2. Evaluate $\left(\frac{3}{2}\right)^{-4}$.

- A $-\frac{81}{16}$ B -6 C $\frac{81}{2}$ D $\frac{16}{81}$

3. Consider the exponential function $y = 0.9^x$. What value of x results in a y -value that is greater than 1?

- A -2 B 0 C 2 D There is none.

4. Suppose that in a bacterial culture, the number of bacteria double every day. On Day 10 of the experiment, the bacteria numbered 16 000. On which day did the bacteria number 1 000?

- A Day 9 B Day 1 C Day 6 D Day 4

5. Recall that Kepler's third law relates the period of orbit of a planet to its distance from the sun according to the relation $T = r^{\frac{3}{2}}$, if T is measured in years and r is measured in astronomical units (AU). The radius of orbit for the planet Venus is approximately $\frac{36}{49}$ AU. Using a calculator, determine its period in years. Express your answer in fraction form.

6. The table shows the total number of houses built in a subdivision over a period of 8 years. Does the growth pattern appear to be exponential? Explain.

Time (years)	Number of Houses
1	60
2	87
3	123
4	168
5	222
6	285
7	357
8	438

7. Recall that water absorbs light. When Wyatt went diving with a light meter, he noticed that the light intensity decreased by 20% for every 10 m that he descended.

- What fraction of the surface light intensity is left at a depth of 10 m? at 20 m?
- Assume that the meter read 1 unit at the surface. Write an exponential function to model the decrease in light intensity in 10-m intervals.
- At what depth will the light intensity drop to less than 20% of the intensity at the surface?

8. The input and output for a function machine is shown.

Input	Output
-1	0.625
0	1.000
3	4.096

Find the equation of an exponential function that matches the input to the output.

Name: _____

Date: _____

9. Karin purchased shares in Woodchuck Reforestation for \$18.60 per share. She kept track of the share value each week for 8 weeks, as shown. Is the growth best modelled by a linear, a quadratic, or an exponential function? Justify your answer.

Time (weeks)	Share Value (\$)
0	18.60
1	18.97
2	19.35
3	19.74
4	20.13
5	20.54
6	20.95
7	21.37
8	21.79

10. Suppose that a new drug persists in the human body following the model

$M = M_0(0.63)^{\frac{h}{4}}$, where M is the mass of drug remaining in the body, in milligrams; M_0 is the mass of the dose taken, also in milligrams; and h is the time in hours since the dose was taken.

- a) A standard dose is 150 mg. Sketch a graph showing the mass remaining in the body up to 24 h.
- b) Use your graph to estimate the half-life of the drug in the body.
- c) Check your estimate in part b) using the equation.
- d) How long will it take before the mass of the drug remaining is less than 40 mg?