

## 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.

- a) What fraction of the surface light intensity is left at a depth of 10 m? at 20 m?
- b) 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.
- c) 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: \_\_\_\_\_

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