

Chapter 6 Test

For questions 1 to 4, select the best answer.

- Evaluate $32^{\frac{4}{5}}$.
 A 26 B 40 C 8 D 16
- Evaluate $4^0 - 4^{-2}$.
 A $-\frac{1}{16}$ B $\frac{15}{16}$ C $1\frac{1}{16}$ D 8
- Simplify $\frac{(0.5)^5 \times (0.5)^{-2}}{[(0.5)^3]^2}$.
 A $(0.5)^{-3}$ B $(0.25)^{-2}$ C $(0.5)^{-6}$ D $(0.5)^{-16}$
- Express 16^2 as a power with base 2.
 A 2^{16} B 2^8 C 2^6 D 2^4
- Recall that the relation between gravitational acceleration and period for a 1.0-m long pendulum is $T = 2\pi g^{-\frac{1}{2}}$, where T is the period, in seconds, and g represents the gravitational acceleration, in metres per second squared (m/s^2).
 - The gravitational acceleration at the surface of Mars is about 3.7 m/s^2 . Find the period of a pendulum 1.0 m long.
 - The period of a 1.0 m long pendulum on the surface of Venus is approximately 2.1 s. Determine the gravitational acceleration, g , on the surface of Venus.

- Samuel made a New Years resolution to exercise every day. He plans to exercise two seconds the first day and triple the amount of time he spends exercising each day.

a) Complete the table to show the amount of time Samuel plans to spend exercising for the first 5 days.

Day	Planned Exercise Time (s)
1	
2	
3	
4	
5	

- Is this an exponential relation? Explain why or why not.
 - Use a calculator to determine which day Samuel's plan will become impractical. Note that 1 day is 86 400 s.
- Consider the exponential functions $f(x) = (0.05)^x$, $g(x) = (0.5)^x$, and $h(x) = 5^x$.
 - Which is greatest when $x = 10$?
 - Which is greatest when $x = -10$?
 - For what value of x do all three functions have the same value?
 - The Krumbein phi scale is used to classify sediments such as silt and sand. The scale is modelled by the function $D = 2^{-\phi}$, where D is the diameter of the particle in millimetres, and ϕ is the Krumbein scale value. Coarse sand has a Krumbein scale value of about 1. Cobblestones have a Krumbein scale value of about -7 . How does the diameter of coarse sand compare with the diameter of cobblestone?

Name: _____

Date: _____

9. Frida bought a cup of coffee at a temperature of 50°C for an experiment. She placed the cup in a room that was at 20°C . Before the coffee began to cool, Frida predicted the coffee's temperature over time and displayed her predictions in a table.

Time (min)	Temperature of Coffee ($^{\circ}\text{C}$)
0	50.0
10	46.7
20	42.9
30	38.4
40	33.2
50	27.1
60	20.0

Is Frida's predicted temperature change linear, exponential, or neither? Justify your answer.

10. A ball is dropped off of a 40-m tall building and allowed to bounce. The relation between the height of the ball's bounce in metres, $H(n)$, and the bounce number, n , is given by $H(n) = 40(0.25)^n$.
- a) What is the height of the ball's bounce on the second bounce?
 - b) On which bounce will the height of the ball's bounce be less than 1.0 m?
 - c) Using the relation given, can you determine the number of bounces required for the ball to have a height of 0 m? Explain.