Chapter 6 Review

6.1 The Exponent Rules, pages 280–287

1. Simplify each of the following. Leave in exponential form.

a) $\dfrac{3^3 \times 3^6}{3^5}$ **b)** $\dfrac{z^4}{z \times z}$

c) $[(-3)^4]^3$ **d)** $\dfrac{\left(p^2\right)^2 \times p}{p^2}$

2. Use the exponent rules to simplify each algebraic expression.
a) $(k^5)^2$ **b)** $(xy^4)(2x^2y)$

6.2 Evaluate Powers with Integer Exponents, pages 288–295

3. Evaluate each of the following. When appropriate, express answers as fractions.

a) 2^{-5} **b)** $\left(\dfrac{1}{5}\right)^{-3}$

c) $4^{-1} + 4^{-2}$ **d)** $\left(\dfrac{3}{2}\right)^{-2}$

6.3 Investigate Rational Exponents, pages 296–304

4. Evaluate, without using a calculator.

a) $81^{\frac{1}{4}}$ **b)** $(-27)^{\frac{2}{3}}$ **c)** $0.0001^{\frac{1}{4}}$

5. Use a calculator to evaluate each of the following. Round answers to 3 decimal places.

a) $16^{\frac{2}{3}}$ **b)** $0.0016^{\frac{3}{4}}$ **c)** $35^{-\frac{5}{8}}$

6.4 Model Data with Exponential Functions, pages 305–311

6. a) Classify each of the following situations as linear, quadratic, or exponential. Explain your choices.
  i) Stefan ran 60 m the first day and increased the distance he ran by the square of the day number each day, starting with 2.
  ii) Leah ran 25 m the first day and increased the distance she ran by 15 m each day.
  iii) Kiyoe ran 20 m the first day and increased the distance she ran by 40% each day.
b) Who ran the farthest on the fifth day?

6.5 Exponential Functions and Their Properties, pages 312–318

7. Consider the function $y = 0.1^x$
a) Complete the table of values and sketch a graph of the function.

x	y
−3	
−2	
−1	
0	
1	
2	
3	

b) Find the domain, range, intercepts, intervals of increase and decrease, and any asymptotes.

6.6 Compare Linear, Quadratic, and Exponential Functions, pages 319–325

8. Use first differences, second differences, and/or ratios to classify each relation as linear, quadratic, exponential, or none of these.

a)

x	y
−3	13.0
−2	9.5
−1	6.0
0	2.5
1	−1.0
2	−2.5
3	−6.0

b)

x	y
−3	64.000
−2	16.000
−1	4.000
0	1.000
1	0.200
2	0.040
3	0.008

c)

x	y
−3	−0.5
−2	−4.0
−1	−6.5
0	−8.0
1	−8.5
2	−8.0
3	−6.5

6.7 Exponential Growth and Decay, pages 326–333

9. A petri dish is filled with agar, a gel made from seaweed, so that its surface area of 300 cm^2 is completely covered. The centre of the agar is infected with bacteria, which grow outward, creating a growth ring. Erhan measured the growth ring for two weeks. He constructed an exponential growth model using the function $A(t) = 3(1.8)^{\frac{t}{3}}$, where $A(t)$ represents the area of the growth ring, in square centimetres, and t represents the time, in days.

a) Calculate the area of the growth ring at the start of the experiment.

b) Sketch a graph of the area of growth ring, $A(t)$, versus time, t, for 21 days.

c) What was the area of the growth ring after 2 days? 6 days? 10 days?

d) After how many days was the entire surface area of the agar infected with bacteria?