2.2 Extra Practice

1. Determine whether each of the following numbers is a perfect square, a perfect cube, both, or neither. Justify your choices mathematically.

a) 196

b) 200

c) 343

d) 625

e) 729

f) 3375

2. Evaluate using prime factorization.

a) $\sqrt{256}$

b) $\sqrt{225}$

c) $\sqrt[3]{1000}$

d) $\sqrt{1681}$

e) $\sqrt[3]{512}$

f) $\sqrt[3]{64}$

3. Evaluate.

a) $\sqrt{289}$

b) $\sqrt{1444}$

c) $\sqrt{3025}$

d) $\sqrt[3]{1728}$

e) $\sqrt[3]{5832}$

f) $\sqrt[3]{8000}$

4. The area of a square city block is 62 500 m^2. Calculate the length of a side.

5. Taylor needs to add a lace edge to a square tablecloth. The area of the cloth is 9 m^2. What length of edging does she need?

6. The surface area of a sphere is given by the formula $SA = 4\pi r^2$. If the surface area of a beach ball is 3600π cm^2, what is the radius of the ball?

7. A cubic aquarium for five sea lions has a volume of 216 m^3. Calculate the dimensions of the aquarium.

8. The volume of a cube is 125 cm^3. Calculate the total length of all the edges.

KEY

1. a) perfect square **b)** neither **c)** perfect cube
d) perfect square **e)** both **f)** perfect cube
2. a) 16 **b)** 15 **c)** 10 **d)** 41 **e)** 8 **f)** 4
3. a) 17 **b)** 38 **c)** 55 **d)** 12 **e)** 18 **f)** 20
4. 250 m **5.** 12 m **6.** 30 cm **7.** 6 m **8.** 60 cm

2.3 Extra Practice

1. Write each expression with positive exponents.

a) c^{-4}

b) mn^{-2}

c) $3x^{-3}$

d) $4m^3n^{-2}$

e) $-2x^{-4}$

f) $-5x^{-3}y^{-2}$

2. Simplify each expression. State the answer using positive exponents.

a) $(2^{-2})(2^3)$

b) $(3^0)(3^{-3})$

c) $\dfrac{5^3}{5^{-4}}$

d) $\dfrac{(3^{-7})(4)}{(3^9)(4^3)}$

e) $(2^4)^3$

f) $(3^2)^{-4}$

g) $[(4)(2^{-3})]^{-2}$

h) $\left(\dfrac{6^2}{5^{-3}}\right)^{-3}$

3. Simplify each expression. State the answer using positive exponents.

a) $\left(2xy^2\right)\left(3x^{-1}y^0\right)$

b) $\left(-3m^2n\right)\left(-4m^4n^{-2}\right)$

c) $\dfrac{m^3n^{-2}}{\left(mn^4\right)\left(m^5n^2\right)}$

d) $(-3xy^4)^2$

e) $(4xy^{-3})^{-2}$

f) $-4x(5x)^3$

g) $\left(\dfrac{6mn^3}{4m^2n}\right)^2$

h) $\left(\dfrac{3x}{-2y^2}\right)^{-2}$

4. Simplify, then evaluate. Give the result as a fraction where necessary.

a) 5^{-2}

b) 7^0

c) $\left(\dfrac{6}{7}\right)^{-2}$

d) $-(-3)^2$

e) $\dfrac{1}{(-3)^{-2}}$

f) $3^{-1} + 4^{-1}$

g) $-5(m^0 + n^0)^2$

h) $\dfrac{5^{-1}+5^{-2}}{5^{-3}}$

i) $\left[\left(\dfrac{3}{4}\right)^{-2}\right]^3$

5. A bacterial culture in a lab has 500 cells. The number of cells doubles every hour. This relationship can be modelled by the equation $N = 500(2)^h$, where N is the estimated number of bacteria cells and h is the time in hours.

a) If the conditions remain ideal, how many cells will there be after 6 h?

b) How many cells were there 2 h ago?

KEY

1. a) $\dfrac{1}{c^4}$ **b)** $\dfrac{m}{n^2}$ **c)** $\dfrac{3}{x^3}$ **d)** $\dfrac{4m^3}{n^2}$ **e)** $\dfrac{-2}{x^4}$ **f)** $\dfrac{-5}{x^3y^2}$

2. a) 2 **b)** $\dfrac{1}{3^3}$ **c)** 5^7 **d)** $\dfrac{1}{(3^{16})(4^2)}$ **e)** 2^{12} **f)** $\dfrac{1}{3^8}$

g) $\dfrac{2^6}{4^2}$ **h)** $\dfrac{1}{(6^6)(5^9)}$

3. a) $6y^2$ **b)** $\dfrac{12m^6}{n}$ **c)** $\dfrac{1}{m^3n^8}$ **d)** $9x^2y^8$

e) $\dfrac{y^6}{16x^2}$ **f)** $-500x^4$ **g)** $\dfrac{9n^4}{4m^2}$ **h)** $\dfrac{4y^4}{9x^2}$

4. a) $\dfrac{1}{25}$ **b)** 1 **c)** $\dfrac{49}{36}$ **d)** -9 **e)** 9 **f)** $\dfrac{7}{12}$

g) -20 **h)** 30 **i)** $\dfrac{4096}{729}$

5. a) 32 000 **b)** 125 **6.** Yes. $\left(\dfrac{2}{1}\right)^3 = 8$