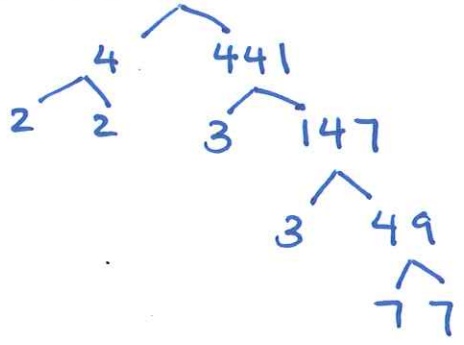
3.2 Perfect Squares, Perfect Cubes, and Their Roots

Example: Use prime factorization to determine the square root of 1764.

$1764 = (2\cdot2)(3\cdot3)\cdot(7\cdot7)$
$= (2\cdot3\cdot7)(2\cdot3\cdot7)$
$= 42\cdot42$

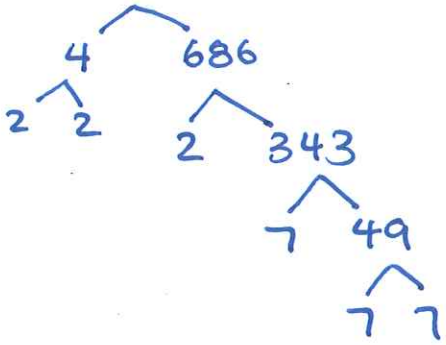
$\sqrt{1764} = 42$



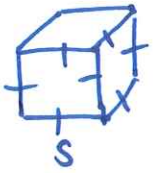
Example: Use prime factorization to determine the cube root of 2744.

$2744 = (2\cdot2\cdot2)(7\cdot7\cdot7)$
$= (2\cdot7)(2\cdot7)(2\cdot7)$
$= 14\cdot14\cdot14$

$\sqrt[3]{2744} = 14$



Example: A cube has volume 12 167 cubic feet. What is the surface area of the cube?



$V = s^3$
$s^3 = 12\,167$
$s = \sqrt[3]{12\,167}$
$= 23$

$S.A. = 6s^2$
$= 6(23)^2$
$= 3174\ ft.^2$

Example: Determine all the perfect square whole numbers and perfect cube whole numbers between 425 and 650.

$20^2 = 400$
$21^2 = 441$
$22^2 = 484$
$23^2 = 529$
$24^2 = 576$
$25^2 = 625$

$7^3 = 343$
$8^3 = 512$