Squares, Cubes, and Their Roots

Many students confuse the functions of squares, cubes, and their roots, and it can be difficult to recognize these numbers without memorizing them. This handout serves as a reference tool and provides a brief explanation of squares, square roots, cubes, and cube roots.

Squares

A square is a number multiplied by itself. For example, $4 \times 4$ is four squared. In math notation, with “n” representing any number, a number squared is written as $n^2$, so four squared would be written as $4^2$. The following is a list of common perfect squares:

<table>
<thead>
<tr>
<th>Number</th>
<th>Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0^2 = 0$</td>
</tr>
<tr>
<td>1</td>
<td>$1^2 = 1$</td>
</tr>
<tr>
<td>2</td>
<td>$2^2 = 4$</td>
</tr>
<tr>
<td>3</td>
<td>$3^2 = 9$</td>
</tr>
<tr>
<td>4</td>
<td>$4^2 = 16$</td>
</tr>
<tr>
<td>5</td>
<td>$5^2 = 25$</td>
</tr>
<tr>
<td>6</td>
<td>$6^2 = 36$</td>
</tr>
<tr>
<td>7</td>
<td>$7^2 = 49$</td>
</tr>
<tr>
<td>8</td>
<td>$8^2 = 64$</td>
</tr>
<tr>
<td>9</td>
<td>$9^2 = 81$</td>
</tr>
<tr>
<td>10</td>
<td>$10^2 = 100$</td>
</tr>
<tr>
<td>11</td>
<td>$11^2 = 121$</td>
</tr>
<tr>
<td>12</td>
<td>$12^2 = 144$</td>
</tr>
<tr>
<td>13</td>
<td>$13^2 = 169$</td>
</tr>
<tr>
<td>14</td>
<td>$14^2 = 196$</td>
</tr>
<tr>
<td>15</td>
<td>$15^2 = 225$</td>
</tr>
<tr>
<td>16</td>
<td>$16^2 = 256$</td>
</tr>
<tr>
<td>17</td>
<td>$17^2 = 289$</td>
</tr>
<tr>
<td>18</td>
<td>$18^2 = 324$</td>
</tr>
<tr>
<td>19</td>
<td>$19^2 = 361$</td>
</tr>
<tr>
<td>20</td>
<td>$20^2 = 400$</td>
</tr>
</tbody>
</table>

Square Roots

The opposite operation of squaring a number is finding its square root, and square roots are written with the radical symbol “$\sqrt{}$” over them. Because squaring and finding a number’s square root are opposite operations, they cancel each other out. For example, $\sqrt{25} = 5$ because $5^2 = 25$. The following is a list of common perfect square roots:

<table>
<thead>
<tr>
<th>Square Root</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sqrt{0}$</td>
<td>$0$</td>
</tr>
<tr>
<td>$\sqrt{1}$</td>
<td>$1$</td>
</tr>
<tr>
<td>$\sqrt{4}$</td>
<td>$2$</td>
</tr>
<tr>
<td>$\sqrt{9}$</td>
<td>$3$</td>
</tr>
<tr>
<td>$\sqrt{16}$</td>
<td>$4$</td>
</tr>
<tr>
<td>$\sqrt{25}$</td>
<td>$5$</td>
</tr>
<tr>
<td>$\sqrt{36}$</td>
<td>$6$</td>
</tr>
<tr>
<td>$\sqrt{49}$</td>
<td>$7$</td>
</tr>
<tr>
<td>$\sqrt{64}$</td>
<td>$8$</td>
</tr>
<tr>
<td>$\sqrt{81}$</td>
<td>$9$</td>
</tr>
<tr>
<td>$\sqrt{100}$</td>
<td>$10$</td>
</tr>
<tr>
<td>$\sqrt{121}$</td>
<td>$11$</td>
</tr>
<tr>
<td>$\sqrt{144}$</td>
<td>$12$</td>
</tr>
<tr>
<td>$\sqrt{169}$</td>
<td>$13$</td>
</tr>
<tr>
<td>$\sqrt{196}$</td>
<td>$14$</td>
</tr>
<tr>
<td>$\sqrt{225}$</td>
<td>$15$</td>
</tr>
<tr>
<td>$\sqrt{256}$</td>
<td>$16$</td>
</tr>
<tr>
<td>$\sqrt{289}$</td>
<td>$17$</td>
</tr>
<tr>
<td>$\sqrt{324}$</td>
<td>$18$</td>
</tr>
<tr>
<td>$\sqrt{361}$</td>
<td>$19$</td>
</tr>
<tr>
<td>$\sqrt{400}$</td>
<td>$20$</td>
</tr>
</tbody>
</table>
Cubes

A cube is a number multiplied by itself and then multiplied by itself again. For example, $4 \times 4 \times 4$ is four cubed. In math notation, with “$n$” representing any number, a number cubed is written as $n^3$, so four cubed is written as $4^3$. The following is a list of common perfect cubes:

<table>
<thead>
<tr>
<th>Number</th>
<th>Cube</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0^3 = 0$</td>
</tr>
<tr>
<td>1</td>
<td>$1^3 = 1$</td>
</tr>
<tr>
<td>2</td>
<td>$2^3 = 8$</td>
</tr>
<tr>
<td>3</td>
<td>$3^3 = 27$</td>
</tr>
<tr>
<td>4</td>
<td>$4^3 = 64$</td>
</tr>
<tr>
<td>5</td>
<td>$5^3 = 125$</td>
</tr>
<tr>
<td>6</td>
<td>$6^3 = 216$</td>
</tr>
<tr>
<td>7</td>
<td>$7^3 = 343$</td>
</tr>
<tr>
<td>8</td>
<td>$8^3 = 512$</td>
</tr>
<tr>
<td>9</td>
<td>$9^3 = 729$</td>
</tr>
<tr>
<td>10</td>
<td>$10^3 = 1000$</td>
</tr>
<tr>
<td>11</td>
<td>$11^3 = 1331$</td>
</tr>
<tr>
<td>12</td>
<td>$12^3 = 1728$</td>
</tr>
<tr>
<td>13</td>
<td>$13^3 = 2197$</td>
</tr>
<tr>
<td>14</td>
<td>$14^3 = 2744$</td>
</tr>
<tr>
<td>15</td>
<td>$15^3 = 3375$</td>
</tr>
<tr>
<td>16</td>
<td>$16^3 = 4096$</td>
</tr>
<tr>
<td>17</td>
<td>$17^3 = 4913$</td>
</tr>
<tr>
<td>18</td>
<td>$18^3 = 5832$</td>
</tr>
<tr>
<td>19</td>
<td>$19^3 = 6859$</td>
</tr>
<tr>
<td>20</td>
<td>$20^3 = 8000$</td>
</tr>
</tbody>
</table>

Cube Roots

The opposite operation of cubing a number is finding the cube root, and cube roots are written with the radical symbol “$\sqrt[3]{\phantom{0}}$” over them. Because cubing and finding a number’s cube root are opposite operations, they cancel each other out. For example, $\sqrt[3]{125} = 5$ because $5^3 = 125$. The following is a list of common perfect cube roots:

<table>
<thead>
<tr>
<th>Cube Root</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sqrt[3]{0}$</td>
<td>$0$</td>
</tr>
<tr>
<td>$\sqrt[3]{1}$</td>
<td>$1$</td>
</tr>
<tr>
<td>$\sqrt[3]{2}$</td>
<td>$2$</td>
</tr>
<tr>
<td>$\sqrt[3]{3}$</td>
<td>$3$</td>
</tr>
<tr>
<td>$\sqrt[3]{4}$</td>
<td>$4$</td>
</tr>
<tr>
<td>$\sqrt[3]{5}$</td>
<td>$5$</td>
</tr>
<tr>
<td>$\sqrt[3]{6}$</td>
<td>$6$</td>
</tr>
<tr>
<td>$\sqrt[3]{7}$</td>
<td>$7$</td>
</tr>
<tr>
<td>$\sqrt[3]{8}$</td>
<td>$8$</td>
</tr>
<tr>
<td>$\sqrt[3]{9}$</td>
<td>$9$</td>
</tr>
<tr>
<td>$\sqrt[3]{10}$</td>
<td>$10$</td>
</tr>
<tr>
<td>$\sqrt[3]{11}$</td>
<td>$11$</td>
</tr>
<tr>
<td>$\sqrt[3]{12}$</td>
<td>$12$</td>
</tr>
<tr>
<td>$\sqrt[3]{13}$</td>
<td>$13$</td>
</tr>
<tr>
<td>$\sqrt[3]{14}$</td>
<td>$14$</td>
</tr>
<tr>
<td>$\sqrt[3]{15}$</td>
<td>$15$</td>
</tr>
<tr>
<td>$\sqrt[3]{16}$</td>
<td>$16$</td>
</tr>
<tr>
<td>$\sqrt[3]{17}$</td>
<td>$17$</td>
</tr>
<tr>
<td>$\sqrt[3]{18}$</td>
<td>$18$</td>
</tr>
<tr>
<td>$\sqrt[3]{19}$</td>
<td>$19$</td>
</tr>
<tr>
<td>$\sqrt[3]{20}$</td>
<td>$20$</td>
</tr>
</tbody>
</table>