

## Binary Mystery Pictures

*Convert from base 10 to base 2 to reveal the image!*



**Virtually Montessori**

## Binary Mystery Pictures

This is an extension activity used after the students have had several lessons on place value for base 2. They should have also had practice converting base 10 numbers using 0 and 1 to write numbers in base 2 (binary). The picture activity takes conversion one step further, having the student filling in each box as a 0 or 1, with a 1 represented by a shaded box. Converting the given numbers from base 10 to base 2 will reveal a pixelated image, as a computer would draw it on the screen.

The grid is divided into 2 main sections (A and B), each with 8 smaller columns across. Notice the two columns of numbers along the grid to the left. The column of numbers on the left correspond to section A and the numbers on the right correspond to section B.

### Directions:

1. For each row, convert each base 10 number to base 2. Show your answer by shading in the appropriate boxes in the corresponding column. A shaded box represents that place value as a "1."

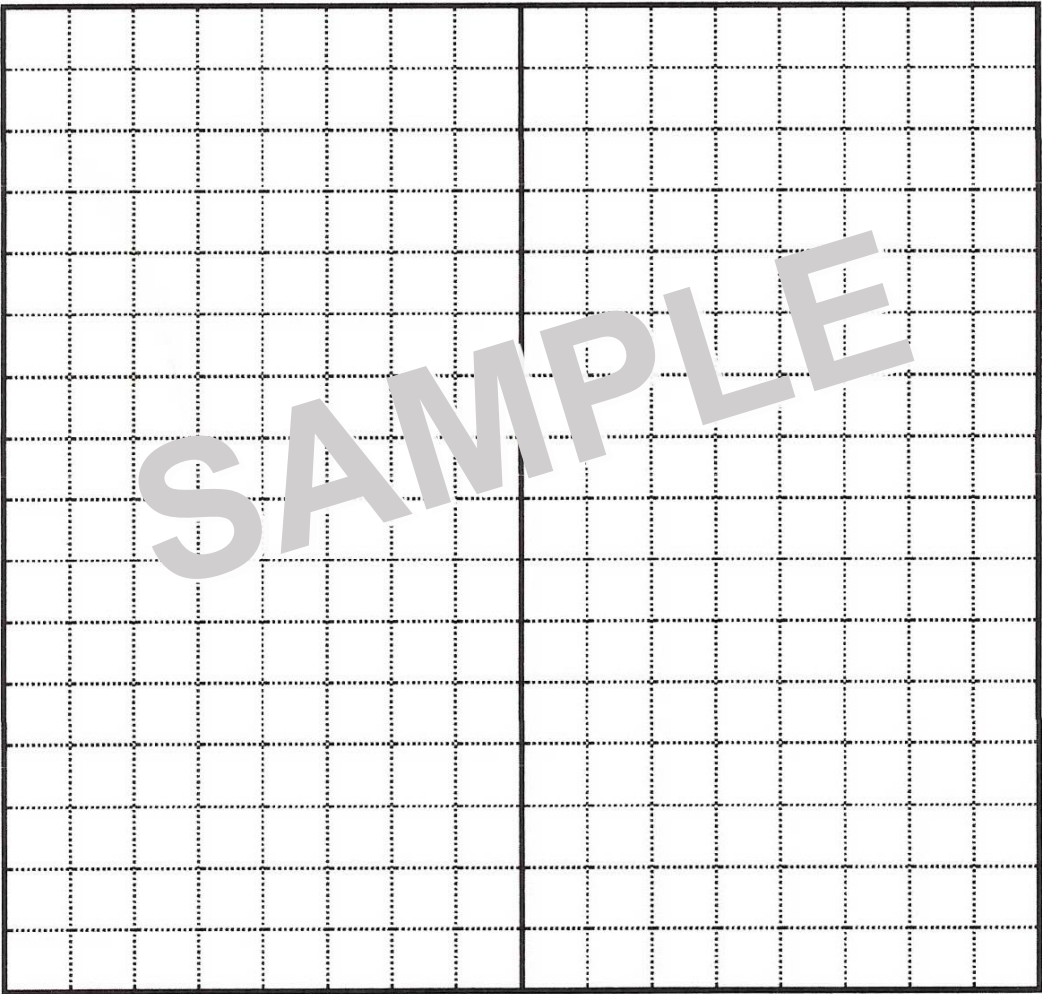
**Example:** In the grid below, the first row lists 0 and 0, so therefore, no boxes are shaded. In the second row in section A, 0 is listed so again no boxes in that section's row are shaded. In the second row, section B, 15 is shown. To represent 15 as an 8-digit binary number, you would shade the first four boxes from the right to represent "00001111" in the place values filled.

		A								B							
0	0																
0	15																
7	255																
7	255																
7	225																
4	1																
4	1																
4	1																
4	1																
4	1																
4	1																
4	31																
124	63																
252	63																
252	30																
120	0																

2. Continue converting numbers for each row until the picture is revealed.

Name \_\_\_\_\_

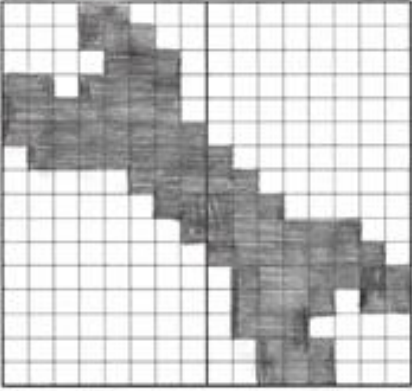
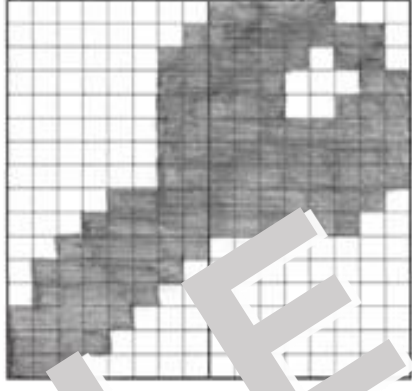
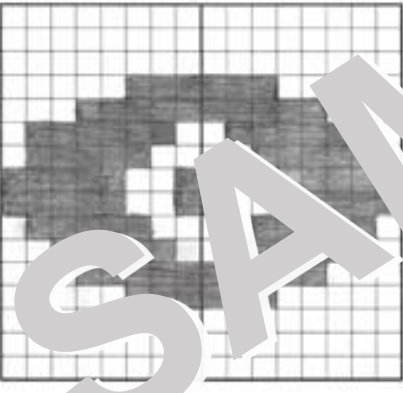
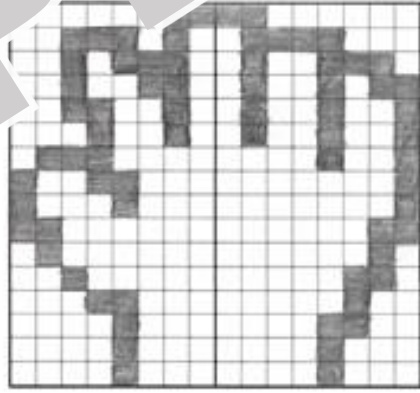
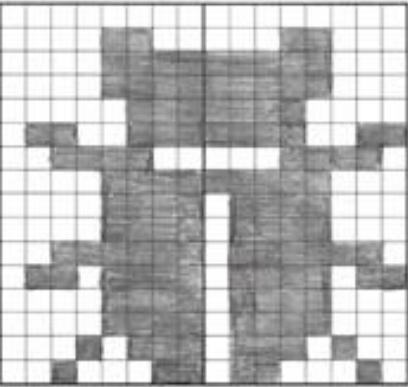
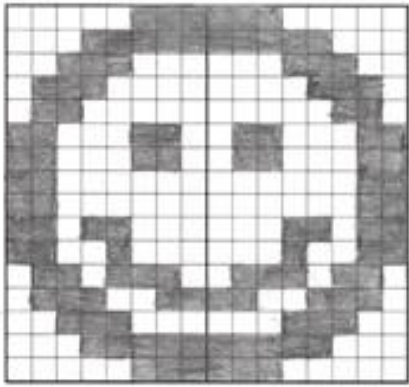
24	0
28	0
14	0
222	0
254	0
255	0
127	128
7	192
3	224
1	252
0	254
0	127
0	123
0	112
0	56
0	56



A



## Answer Key

<p><b>A: wrench</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>24</td><td>0</td></tr> <tr><td>28</td><td>0</td></tr> <tr><td>14</td><td>0</td></tr> <tr><td>222</td><td>0</td></tr> <tr><td>254</td><td>0</td></tr> <tr><td>255</td><td>0</td></tr> <tr><td>127</td><td>128</td></tr> <tr><td>7</td><td>192</td></tr> <tr><td>3</td><td>224</td></tr> <tr><td>1</td><td>252</td></tr> <tr><td>0</td><td>254</td></tr> <tr><td>0</td><td>127</td></tr> <tr><td>0</td><td>123</td></tr> <tr><td>0</td><td>112</td></tr> <tr><td>0</td><td>56</td></tr> <tr><td>0</td><td>56</td></tr> </table> 	24	0	28	0	14	0	222	0	254	0	255	0	127	128	7	192	3	224	1	252	0	254	0	127	0	123	0	112	0	56	0	56	<p><b>B: key</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>0</td><td>248</td></tr> <tr><td>1</td><td>254</td></tr> <tr><td>3</td><td>246</td></tr> <tr><td>3</td><td>227</td></tr> <tr><td>3</td><td>231</td></tr> <tr><td>3</td><td>255</td></tr> <tr><td>3</td><td>255</td></tr> <tr><td>7</td><td>255</td></tr> <tr><td>15</td><td>254</td></tr> <tr><td>31</td><td>252</td></tr> <tr><td>63</td><td>0</td></tr> <tr><td>126</td><td>0</td></tr> <tr><td>124</td><td>0</td></tr> <tr><td>248</td><td>0</td></tr> <tr><td>240</td><td>0</td></tr> <tr><td>224</td><td>0</td></tr> </table> 	0	248	1	254	3	246	3	227	3	231	3	255	3	255	7	255	15	254	31	252	63	0	126	0	124	0	248	0	240	0	224	0
24	0																																																																
28	0																																																																
14	0																																																																
222	0																																																																
254	0																																																																
255	0																																																																
127	128																																																																
7	192																																																																
3	224																																																																
1	252																																																																
0	254																																																																
0	127																																																																
0	123																																																																
0	112																																																																
0	56																																																																
0	56																																																																
0	248																																																																
1	254																																																																
3	246																																																																
3	227																																																																
3	231																																																																
3	255																																																																
3	255																																																																
7	255																																																																
15	254																																																																
31	252																																																																
63	0																																																																
126	0																																																																
124	0																																																																
248	0																																																																
240	0																																																																
224	0																																																																
<p><b>C: eye</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>7</td><td>224</td></tr> <tr><td>31</td><td>248</td></tr> <tr><td>126</td><td>126</td></tr> <tr><td>124</td><td>62</td></tr> <tr><td>249</td><td>159</td></tr> <tr><td>249</td><td>159</td></tr> <tr><td>124</td><td>62</td></tr> <tr><td>62</td><td>124</td></tr> <tr><td>31</td><td>248</td></tr> <tr><td>7</td><td>224</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td></tr> </table> 	0	0	0	0	0	0	7	224	31	248	126	126	124	62	249	159	249	159	124	62	62	124	31	248	7	224	0	0	0	0	0	0	<p><b>D: and</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>58</td><td>7</td></tr> <tr><td>46</td><td>7</td></tr> <tr><td>7</td><td>73</td></tr> <tr><td>73</td><td>73</td></tr> <tr><td>112</td><td>9</td></tr> <tr><td>152</td><td>1</td></tr> <tr><td>136</td><td>1</td></tr> <tr><td>192</td><td>3</td></tr> <tr><td>64</td><td>2</td></tr> <tr><td>32</td><td>6</td></tr> <tr><td>24</td><td>4</td></tr> <tr><td>8</td><td>12</td></tr> <tr><td>4</td><td>8</td></tr> <tr><td>4</td><td>8</td></tr> </table> 	58	7	46	7	7	73	73	73	112	9	152	1	136	1	192	3	64	2	32	6	24	4	8	12	4	8	4	8				
0	0																																																																
0	0																																																																
0	0																																																																
7	224																																																																
31	248																																																																
126	126																																																																
124	62																																																																
249	159																																																																
249	159																																																																
124	62																																																																
62	124																																																																
31	248																																																																
7	224																																																																
0	0																																																																
0	0																																																																
0	0																																																																
58	7																																																																
46	7																																																																
7	73																																																																
73	73																																																																
112	9																																																																
152	1																																																																
136	1																																																																
192	3																																																																
64	2																																																																
32	6																																																																
24	4																																																																
8	12																																																																
4	8																																																																
4	8																																																																
<p><b>E: insect</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>0</td><td>0</td></tr> <tr><td>12</td><td>24</td></tr> <tr><td>15</td><td>248</td></tr> <tr><td>15</td><td>248</td></tr> <tr><td>7</td><td>240</td></tr> <tr><td>103</td><td>243</td></tr> <tr><td>60</td><td>30</td></tr> <tr><td>15</td><td>248</td></tr> <tr><td>15</td><td>120</td></tr> <tr><td>15</td><td>120</td></tr> <tr><td>63</td><td>126</td></tr> <tr><td>111</td><td>123</td></tr> <tr><td>15</td><td>120</td></tr> <tr><td>15</td><td>120</td></tr> <tr><td>23</td><td>116</td></tr> <tr><td>35</td><td>98</td></tr> </table> 	0	0	12	24	15	248	15	248	7	240	103	243	60	30	15	248	15	120	15	120	63	126	111	123	15	120	15	120	23	116	35	98	<p><b>F: smiley face</b></p> <table style="display: inline-table; vertical-align: top;"> <tr><td>7</td><td>224</td></tr> <tr><td>31</td><td>248</td></tr> <tr><td>56</td><td>28</td></tr> <tr><td>112</td><td>14</td></tr> <tr><td>96</td><td>6</td></tr> <tr><td>198</td><td>99</td></tr> <tr><td>198</td><td>99</td></tr> <tr><td>192</td><td>3</td></tr> <tr><td>192</td><td>3</td></tr> <tr><td>216</td><td>27</td></tr> <tr><td>200</td><td>19</td></tr> <tr><td>110</td><td>118</td></tr> <tr><td>115</td><td>206</td></tr> <tr><td>56</td><td>28</td></tr> <tr><td>31</td><td>248</td></tr> <tr><td>7</td><td>224</td></tr> </table> 	7	224	31	248	56	28	112	14	96	6	198	99	198	99	192	3	192	3	216	27	200	19	110	118	115	206	56	28	31	248	7	224
0	0																																																																
12	24																																																																
15	248																																																																
15	248																																																																
7	240																																																																
103	243																																																																
60	30																																																																
15	248																																																																
15	120																																																																
15	120																																																																
63	126																																																																
111	123																																																																
15	120																																																																
15	120																																																																
23	116																																																																
35	98																																																																
7	224																																																																
31	248																																																																
56	28																																																																
112	14																																																																
96	6																																																																
198	99																																																																
198	99																																																																
192	3																																																																
192	3																																																																
216	27																																																																
200	19																																																																
110	118																																																																
115	206																																																																
56	28																																																																
31	248																																																																
7	224																																																																



Thank you for viewing this item! If you have any questions,  
feel free to email [info@virtuallymontessori.com](mailto:info@virtuallymontessori.com).