# Value compression

We start with a value range that represents our full paint range from black to white. This can be used to measure the local value of something. The local value is just the real value of an object, and all you have to do is hold your value card up against a colour to see what local value it is.
Here I have divided it into 20 different steps. Many use a system form 0 to 10 however I will be using 0 - 19, 0 representing black paint and 19 representing white paint.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
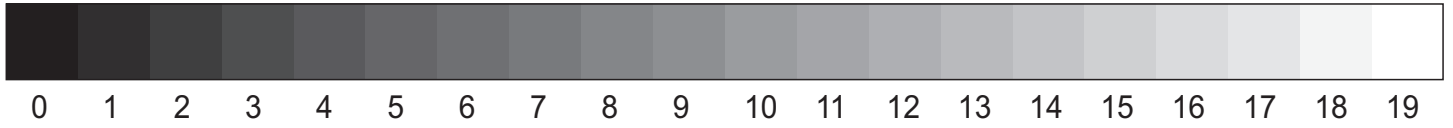
This range can be divided into sub ranges representing light and shadow. A good place to start would be to have the value of white in shadow equal to the value of black in light. That is, if you had a white object, the value of its shaded area would be equal to a black object's lit value.

equal values
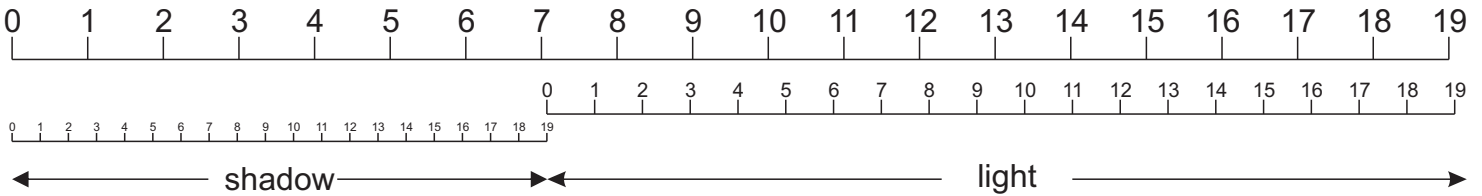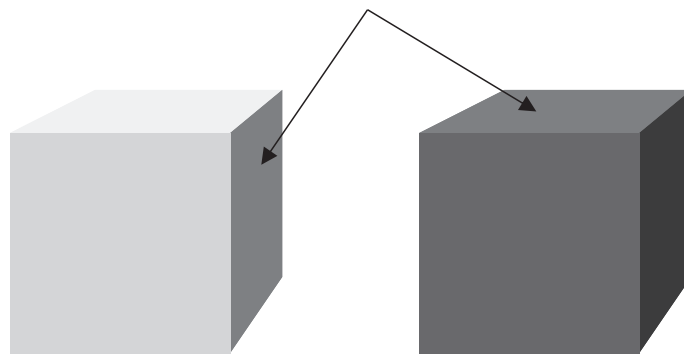
In the above graphic, the lit range has been compressed to a range of 7 to19 and the shadow range between to 0 to 7.
If you wanted to paint a white object, the lit side would be value 19 and the shadow side value 7.
If painting a black object, the lit side would be value 7 and the shadow side would be value 0.
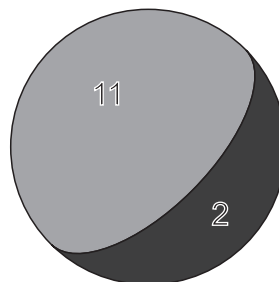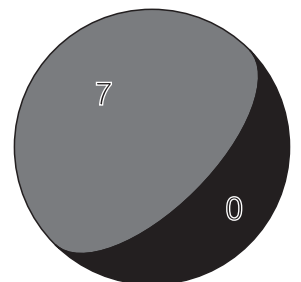
Value 19 sphere

19

7

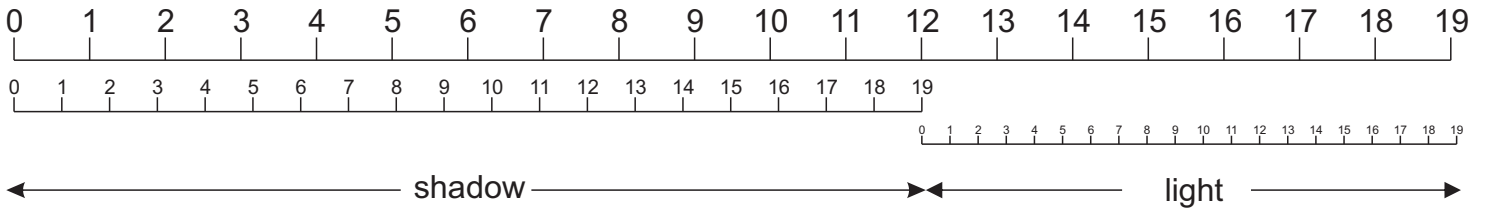Value 11 sphere

14

4

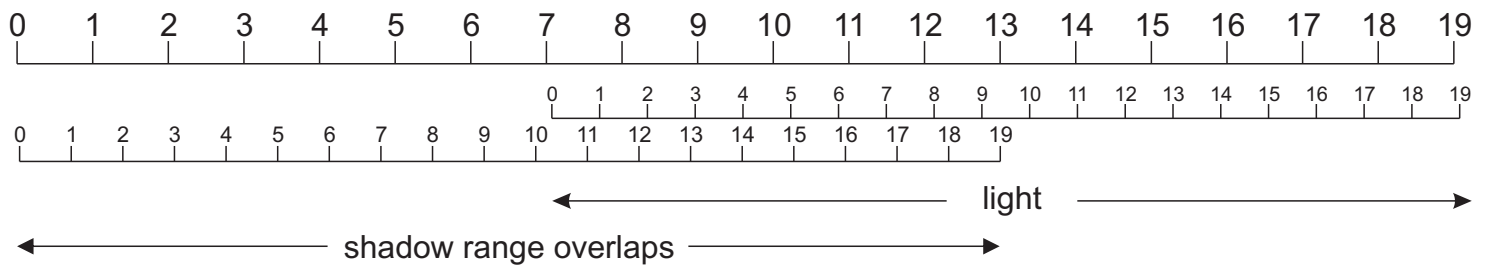Value 6 sphere

11

2

Value 0 sphere

7

0
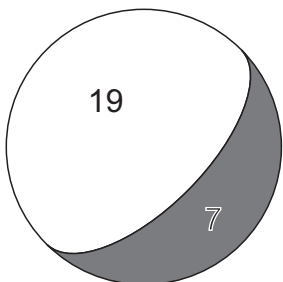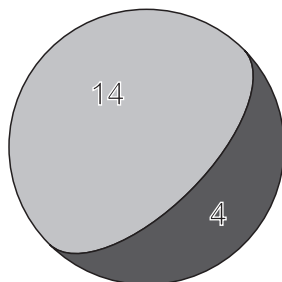
Bleached Lights and Larger Shadow Range

The proportions of divisions are arbitrary and below is an example of a setup that could be used to simulate bleached light in a similar way to a photograph. Possibly a backlit scene where you want to see into the shadows so they have a larger range.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

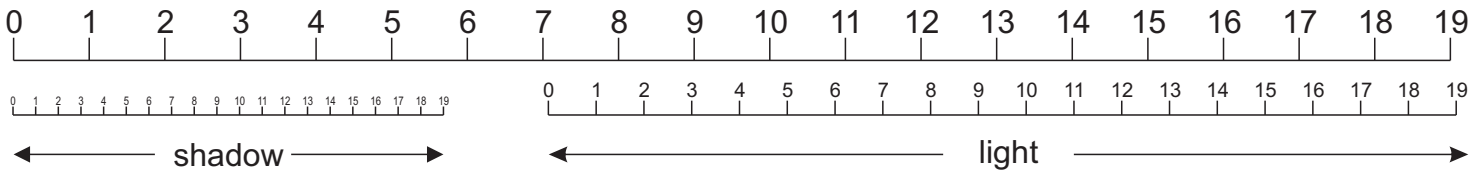←——————————————— shadow ———————————————→←——————— light ———————→

Lighter Shadows

Below is an example of a setup where there is more reflection making a shadow lighter. Imagine a sphere lit by a lamp in a room with white walls. The light bouncing off the wall will illuminate the shadow.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

←——————————————— light ———————————————→
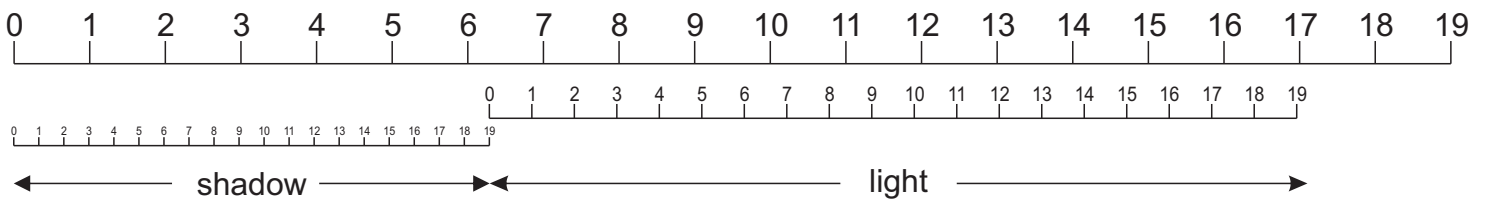
←——————————— shadow range overlaps ———————————→

Darker shadows

And if you have dark coloured walls there will be less light in the shadows. Note the gap between the light range and the shadow range.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

←——— shadow ———→   ←——————————— light ———————————→

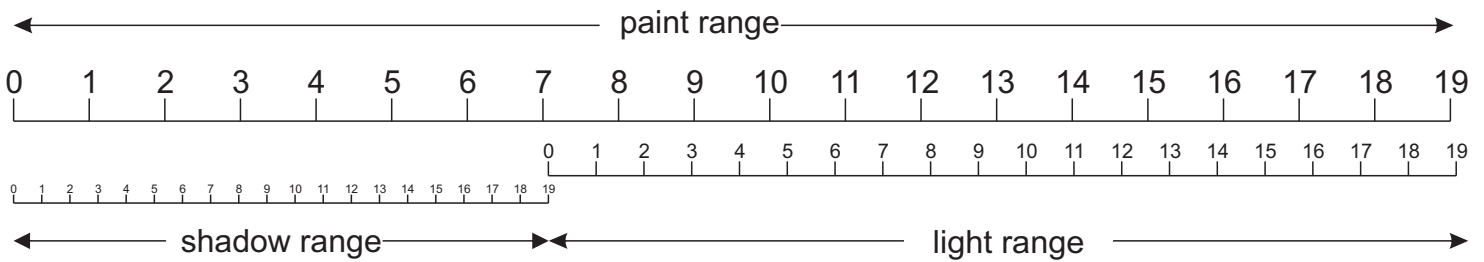# Allowing for Specular Highlights (Shiny Reflections)

Lastly, what if you painted someone with a white shirt and used white for it, only to discover that the person was wearing a ring that was a higher value than the shirt? Using white would leave you nowhere to go. If there are any shiny objects in the scene, the ranges have to be adjusted to allow for them.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

←——— shadow ———→←——————————— light ———————————→

In this setup, both ranges have been shortened proportionately to allow for shiny reflections. White is darker on both the light and shadows.
Realistically, black should be reserved for the very darkest crevices in the same way as white for shiny reflections.

Using the Value Scales in Practice

paint range

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

shadow range   light range

There are several ways you can use this graph while painting.

Working from a Local Value

Lets say you wanted to paint skin for example.

Step 1: First you need to find out what the skin's local value is. Hold up your value card against some skin to find what value is closest to it. Mine is close to value 10 so I'll use that.

Step 2: Look up 10 in the light range and see where it corresponds to the paint range. Here it is close to 13 ½, so that is the value to mix for skin in full light.

Step 3: Likewise, lookup value 10 in the shadow range and find the corresponding paint range value. It is close to 3 3/4 , so this is the value to mix for skin in shadow.

Working from a Painted Value:

Imagine you have already painted or mixed a colour that is supposed to be in the light and you want to find out what value you need to mix to use for its shadow. All we have to do is work out the object's local value, and we can use the same method as above.

Use your value card to measure the value of the painted area. (Note that in the above ranges, it should fall between 7 - 19 or it is out of bounds.) Find the corresponding value in the light range and this will be the objects local value. Now use the above method.

As an example, we'll pretend that we've measured the paint value at 16.
Value16 on the paint range corresponds to a little higher than value 14 on the light range.
Look up 14 on the shadow range and see what paint value it corresponds to. In this case, it is close to 5 1/4. So if the lit side is 16, the shadow needs to be 5 1/4.

Likewise, If you have painted something that is supposed to be in shadow, and you want to want to calculate its lit value, the same method applies.
Again, if it's painted value is not between 0 - 7, it is out of bounds and can't be in shadow.
Say you have painted a shadow that you have measured to be value 5.
5 on the paint range corresponds to 13 ½ on the shadow range which is the object's local value.
Look up 13 ½ on the light range and then find the corresponding paint value. In this case it is 15 ½.
So if a shadow is value 5, the lit side had to be 15 1/2.

How to divide a line into as many segments as needed

Say we have decided on the length of a range and need to divide it into 19 equal parts.
Here is one way of doing it

First draw a line from one end of the range at any convenient angle and make it a length that you
cand divide easily. For example one segment every 1/4". Mark as many equal segments as you need.
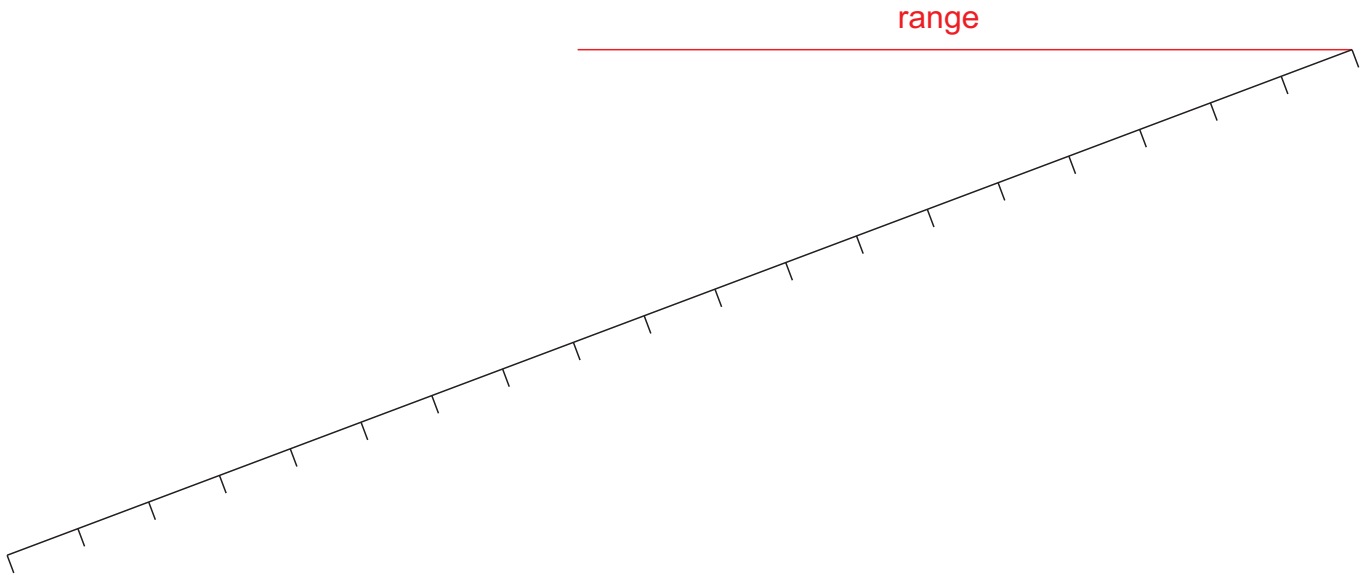
range

Draw a line from the end of that line to the other end of the range line (red) as below.
Then draw lines parallel to it (blue lines) from your marks. This will divide your range line into the same
amount of equal divisions

range