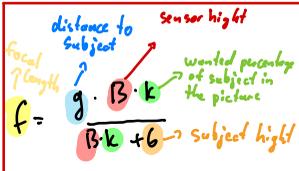


Wildlifephotography Cheat-Sheet

Formeln:



$$g = f + \frac{f}{B \cdot k} \cdot G$$

$$g \sim f$$

(Proportionality: When you double g , f doubles also)

percentage of the whole 2D-Subject around $\frac{1}{25}$
 (depending on "pose" and animal)

realistic distance from bear: $200m$
 Sony APS-C: $0,0156 \cdot \frac{1}{5}$
 $\approx 511mm$
 enough percentage of subject in frame for me in most cases
 (\Rightarrow ok for me, since I can still crop etc.)
 e.g. Bear: $0,0156 \cdot \frac{1}{5} + 1,2 \rightarrow$ should be light brown bear / grizzly (only estimate)

\rightarrow You need around **500mm focal length**, to capture a bear (1,2m hoch) from 200m distance with APS-C so that its height makes **20%** of the frame/picture.

bear: 1,2m / Sony APS-C / 20% / 14%

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	26	65	130	259	389	519	648	778	908	1037

little bird: 0,2m / Sony APS-C / 20% / 14%

big bird: 0,5m / Sony APS-C / 20% / 14%

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	154	384	768	1536						
	62	155	310	620	930	1240	1550			

killer whale: 5m / Sony APS-C / 20% / 100% / 100%

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	6	16	31	62	94	125	156	187	218	249
	31	78	156	311	467	622	778	933	1089	1244

Lion / wolf: 1m / Sony APS-C / 20% / 14%

whale-tail

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	31	78	156	311	467	622	778	933	1089	1244

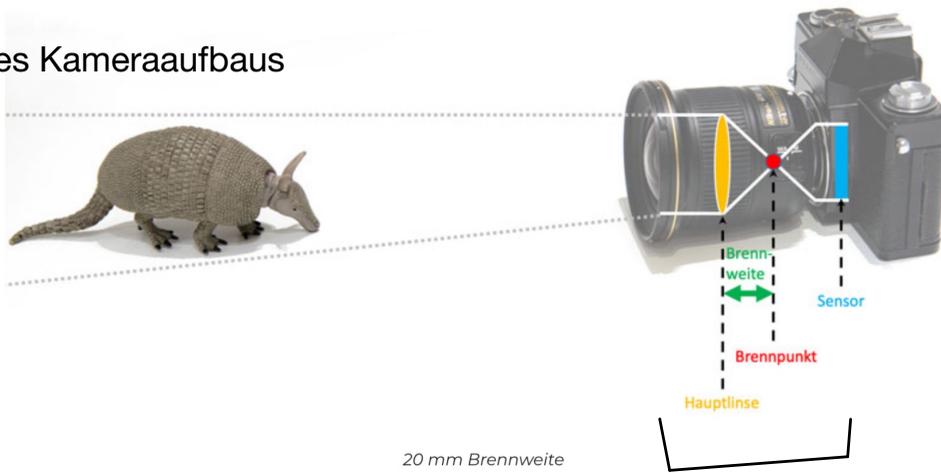
Humphback: 8m / Sony APS-C / 20% / 100% / 100%

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	4	10	19	39	58	78	97	117	136	156
	19	49	97	193	292	389	487	584	681	778

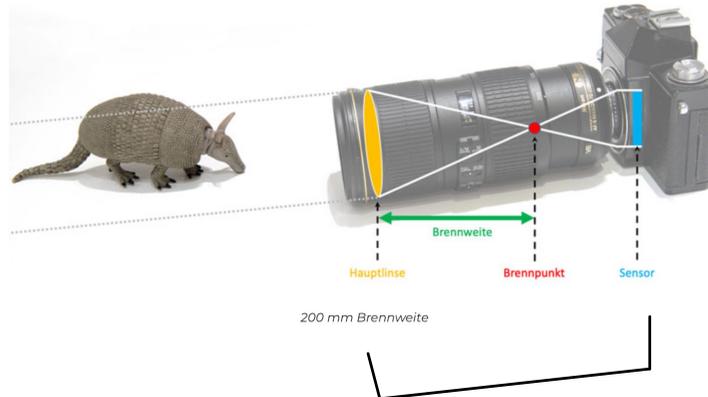
Elefant / rhino: 2,5m / Sony APS-C / 20% / 100% / 100%

$g / E(k)$	10	25	50	100	150	200	250	300	350	400
$f(k)$	12	31	62	125	187	249	312	374	436	499
	62	155	310	620	930	1240	1550			

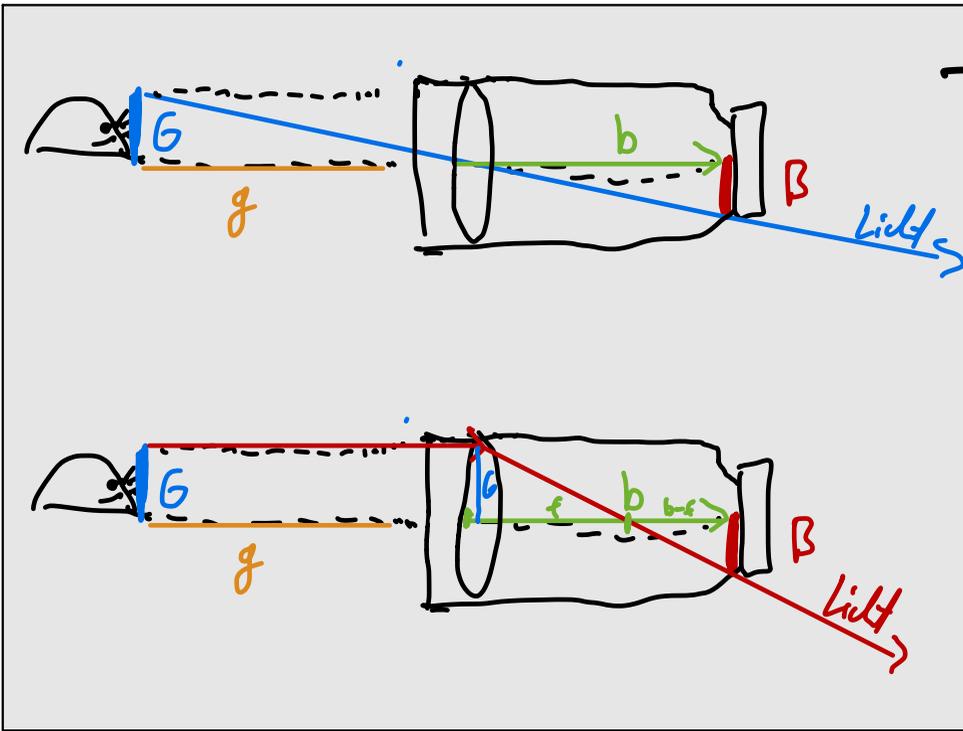
Vereinfachung des Kameraaufbaus



<https://www.blogografie.de/brennweite-objektiv/>



Lichteinfall, der für die Bilddarstellung auf Sensor bzw. Kamera verantwortlich und für die Berechnung von Interesse ist.
 (How a Camera-Lens captures the light - simple put)

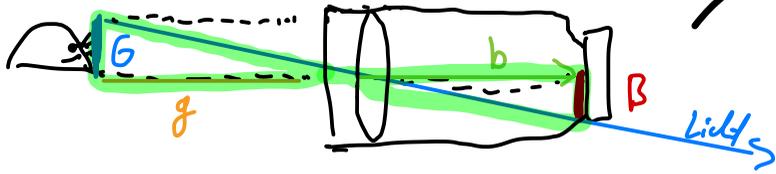


Formel für die Brennweite, die man mithilfe der Strahlensätze herleiten kann
 (How to calculate focal length)

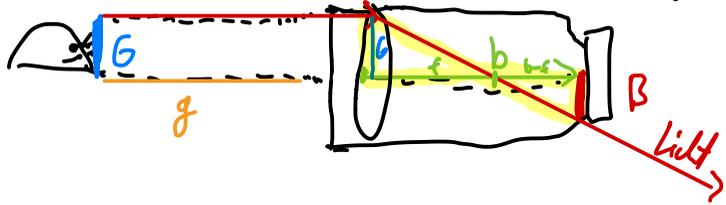
$$f = \frac{g \cdot B \cdot k}{B \cdot k + G}$$

(distance to subject) Entfernung \rightarrow g
 (sensor-height) Sensorgröße (höhe) \rightarrow B
 gewünschte Bildanteil (percentage of subject-height in the picture) \rightarrow k
 Gegenstandsgröße (subject height) \rightarrow G

Bildliche Darstellung



Strahlensatz: $\frac{b}{B} = \frac{g}{G}$



Strahlensatz: $\frac{f}{G} = \frac{b-f}{B}$

Nachweis der Formel

$$\Leftrightarrow \frac{f}{G} = \frac{b}{B} - \frac{f}{B}$$

Einsetzen von oben $\Leftrightarrow \frac{f}{G} = \frac{g}{G} - \frac{f}{B} \quad | + \frac{f}{B}$

$$\Leftrightarrow \frac{f}{G} + \frac{f}{B} = \frac{g}{G}$$

$$\Leftrightarrow \left(\frac{1}{G} + \frac{1}{B}\right) \cdot f = \frac{g}{G} \quad | : \left(\frac{1}{G} + \frac{1}{B}\right)$$

$$\Leftrightarrow f = \frac{g}{\frac{1}{G} + \frac{1}{B}}$$

$$\Leftrightarrow f = \frac{g}{1 + \frac{G}{B}}$$

$$\Leftrightarrow f = \frac{g \cdot B}{B + G}$$

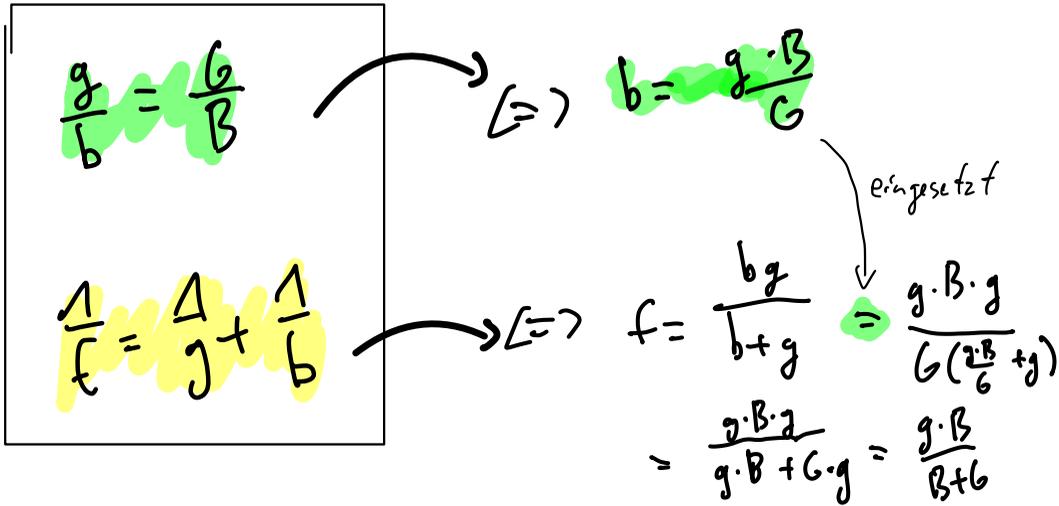
umgeformte Formel

$$\left(f + \frac{f}{B} \cdot G = g \right)$$

Formel mit Legende

$$f = \frac{\overset{\text{Entfernung}}{g} \cdot \overset{\text{Seitenlänge (Bild)} \rightarrow}{B} \cdot \overset{\text{gegenüberliegendes Bild anfallt}}{k}}{\overset{\text{Abstand}}{B} \cdot k + \overset{\text{Abstand}}{G}}$$

„bekannte“ Formeln, die im Internet kursieren, die ebenfalls die aufgestellten Formeln bestätigen
(Information in the internet, that also confirms my calculations)


$$\frac{g}{b} = \frac{G}{B} \quad \Leftrightarrow \quad b = \frac{g \cdot B}{G}$$
$$\frac{1}{f} = \frac{1}{g} + \frac{1}{b}$$

eingesetzt

$$f = \frac{bg}{b+g} = \frac{g \cdot B \cdot g}{G \left(\frac{g \cdot B}{G} + g \right)}$$
$$= \frac{g \cdot B \cdot g}{g \cdot B + G \cdot g} = \frac{g \cdot B}{B + G}$$

Information and background about the Wildlife photography Cheat-Sheet

The Intention behind this work is to help others figure out as I, what kind of focal length they would need.

I chose some variables already, because they fit my personal need. That is why I tried to make it as transparent as possible how and why the formula works and how to adjust it for other needs.

Explanation of the chosen examples:

I like to shoot wildlife a lot and the example animal heights are of animals that I expect to see or wanna see where I live and in vacations im planning. I want to go as cheap and as light as possible. That is why I chose APSC, to get that extra reach for cheap money (I know that this has other disadvantages like lowlight performance).

I at least want to get a good picture. That means for me, to have the (rough estimate of the) height in 20% of the picture height. That way I should have a clear enough image, when I zoom in and also have enough environment for environmental shots. Portraits are obviously another thing, which is why more focal length basically is always better in my opinion.

But considering weight, price and minimum aperture might reduce your options.

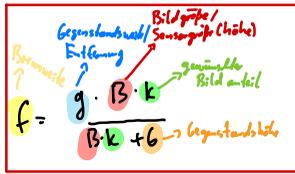
My personal decision process:

I was planning on going with sony and not canon or nikon, because sony had at the time I wanted to go into photography cheaper and better options. I liked the 200-600 because of Aperture 6.3 instead of Aperture 8 on the canon 200-800 for example (not mentioning the weight difference). Also the APSC options seemed to be better at Sony. Then I basically had to decide between the 70-350, the 200-600 and the 400-800. By far the cheapest and lightest is obviously the 70-350, which is enough for anything above 1m height (considering you can get as close as around 120m to 1m-animals - so this might not be enough for wolves for example). You cannot use TCs with it though. The 400-800 is too heavy for me. I would have to carry a tripod always and that's not what I want. Note: If you decide, that 800 is the perfect focal length for you, choosing canon 200-800 would be cheaper and lighter, but older, darker and harder to handle. In the end, I chose the 70-350 because I thought I might get close enough for bigger birds to also get them. Turns out I can rarely, and also I do wanna get closer sometimes. I'm shooting for 9 months now and in Germany there are a lot of cool birds and owls to shoot, not so much land based animals. That's why I upgraded pretty fast to the 200-600. I didn't choose the 400-800 because I was still convinced 200-600 would be enough, having in mind I would be able to use a 1.4 TC if I wanted. Right now I couldn't be more happy with my decisions. I mainly go out with the 200-600+TC14 and that gets me a lot of very close shots with 50% subject in picture. But im still convinced that 20% in picture is enough for most people, which is why I leave the Cheat-Sheet as it is. Also it wasn't too expensive and is very comfortable to shoot handheld. I rarely use the 70-350 but it is fun, because its so light. It also blends in more and you dont get attention because of its length - I use it a lot when im with friends or my girlfriend, who are not as much into photography.

Further notes for you:

- the proportionality helps you to estimate the gaps in the tables.
- rent lenses, especially if calculating the weight and balance is important to you

Formeln:



$$g = f + \frac{f}{B \cdot k} \cdot G$$

(Proportionality: When you double g , f doubles also)

$$g \sim f$$

Wildtierfotografie Cheat-Sheet

Anteil der Fläche dann groß $\frac{f}{g}$
 (je mehr dem in welche "Pose" man welches Tier fotografiert)

realistische Entfernung vom Bär
 z.B. Bär: $200 \cdot 0,0156 \cdot \frac{1}{5} \approx 511 \text{ mm}$
 $0,0156 \cdot \frac{1}{5} + 1,2 \rightarrow$ siehe Höhe Braunbär
 → Man braucht ca. 500mm Brennweite, um eine Bär (1,2m hoch) aus 200m Entfernung so mit APSC zu fotografieren, dass seine Höhe 20% des Bildes ausfüllt (4%)

Bär: 1,2m / Sony APSC / 20% / 4%

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	26	65	130	259	389	519	648	778	908	1037

Kleine Vogel: 0,2m / Sony APSC / 20% / 4%
 große Vogel: 0,5m / Sony APSC / 20% / 4%

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	154	384	768	1536						
	62	155	310	620	930	1240	1550			

Killer whale: 5m / Sony APSC / 20% / 4%
 100% 100%

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	6	16	31	62	94	125	156	187	218	249
	31	78	156	311	467	622	778	933	1089	1244

Löwe / Wolf: 1m / Sony APSC / 20% / 4%
 whale-tail

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	31	78	156	311	467	622	778	933	1089	1244

Kumpback: 8m / Sony APSC / 20% / 4%
 100% 100%

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	4	10	19	39	58	78	97	117	136	156
	19	49	97	193	292	389	487	584	681	778

Fleuret / Nashorn: 2,5m / Sony APSC / 20% / 4%
 100% 100%

g / E(k)	10	25	50	100	150	200	250	300	350	400
f(k)	12	31	62	125	187	249	312	374	436	499
	62	155	310	620	930	1240	1550			