

AIRBORNE GEOSPATIAL TECHNOLOGIES – IMAGE GEOMETRY

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Supporting the airborne data acquisition and mapping industries



To view in full screen in Adobe Acrobat press the Ctrl + L key on your computer. Press Esc to return to normal view

Georectification and Orthorectification

Need to either orthorectify or georectify the image to a pre-defined projection and datum

These processes gives the image Geography

Georectification

Georectification resamples the image pixel positions to fit a set of pre-defined co-ordinates that may or may not be described in 3-dimensions

This process partially eliminates image distortions associated with elevation changes and scale

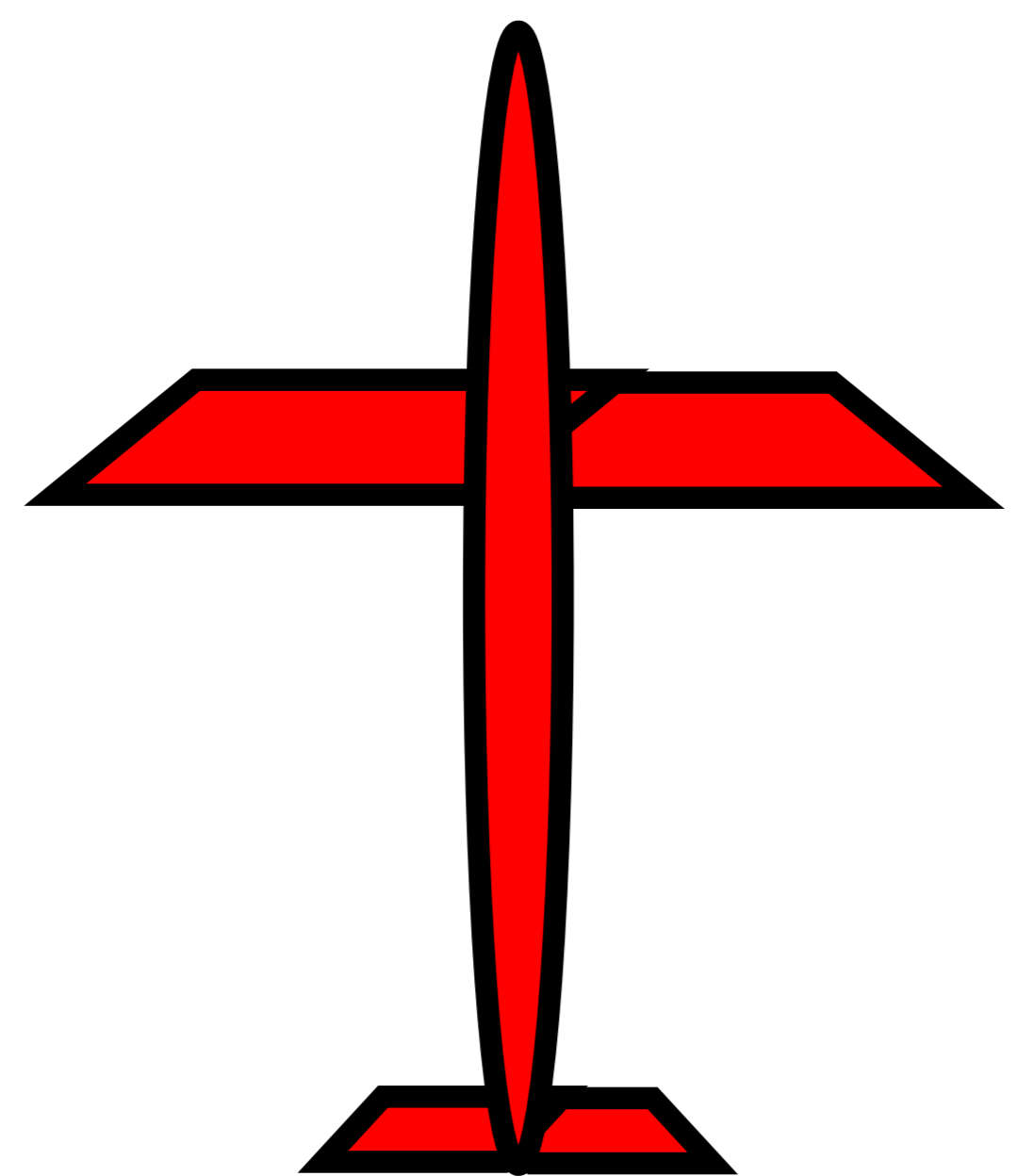
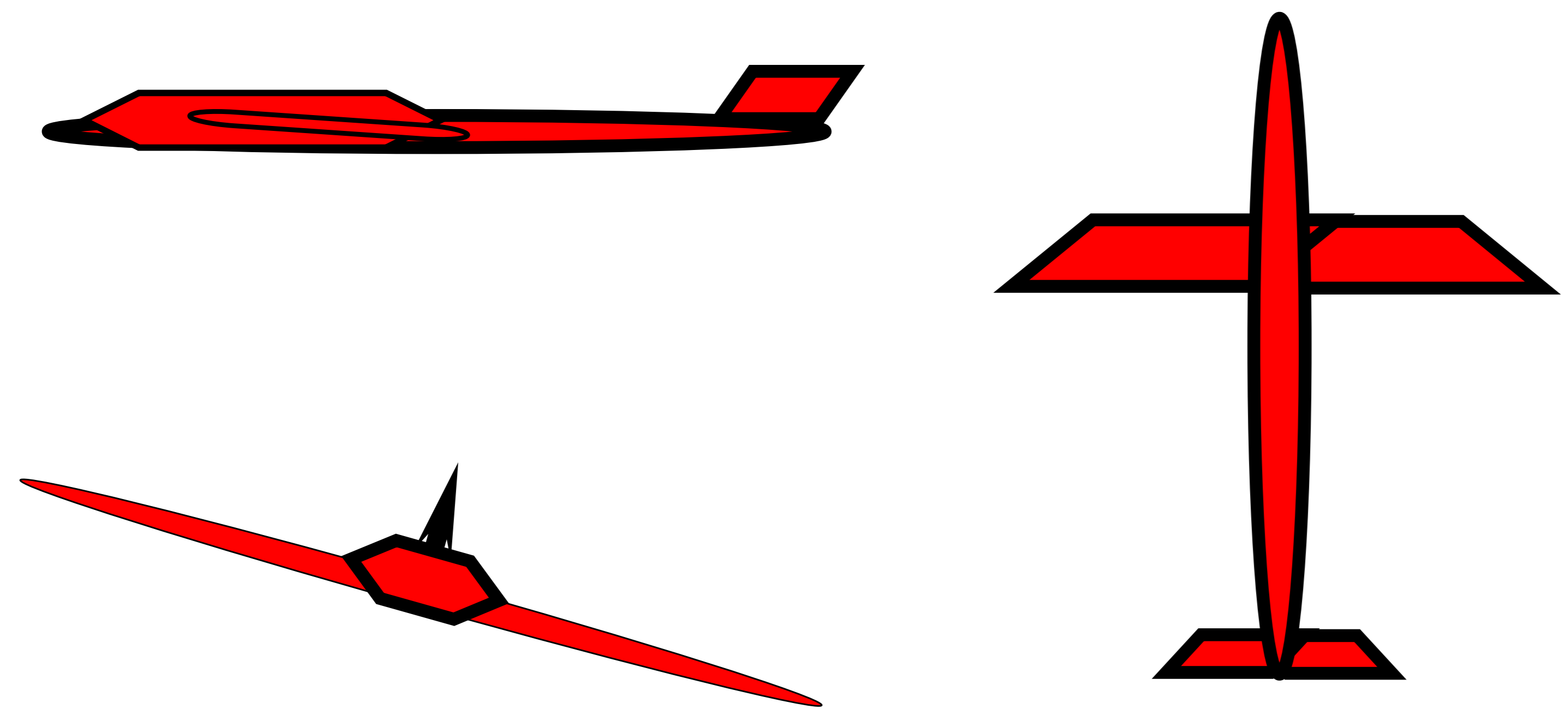
Orthorectification

Orthorectification resamples the image pixel positions to remove distortions associated with the sensor system (Interior Orientation)

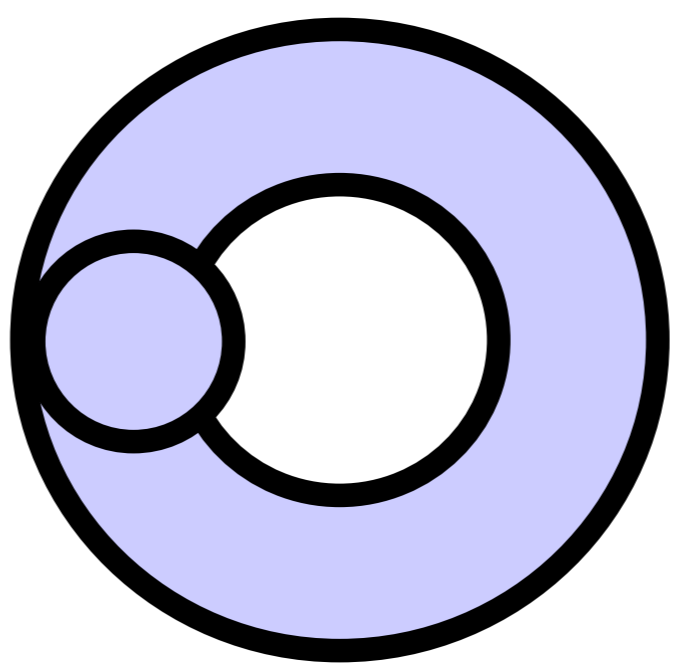
Orthorectification resamples the image pixel positions to fit a 3-dimensional population of co-ordinates, in the form of an elevation model, eliminating the majority of image distortions associated with elevation changes and scale

The larger the population of co-ordinates the better the fit (Relative and Absolute Orientations)

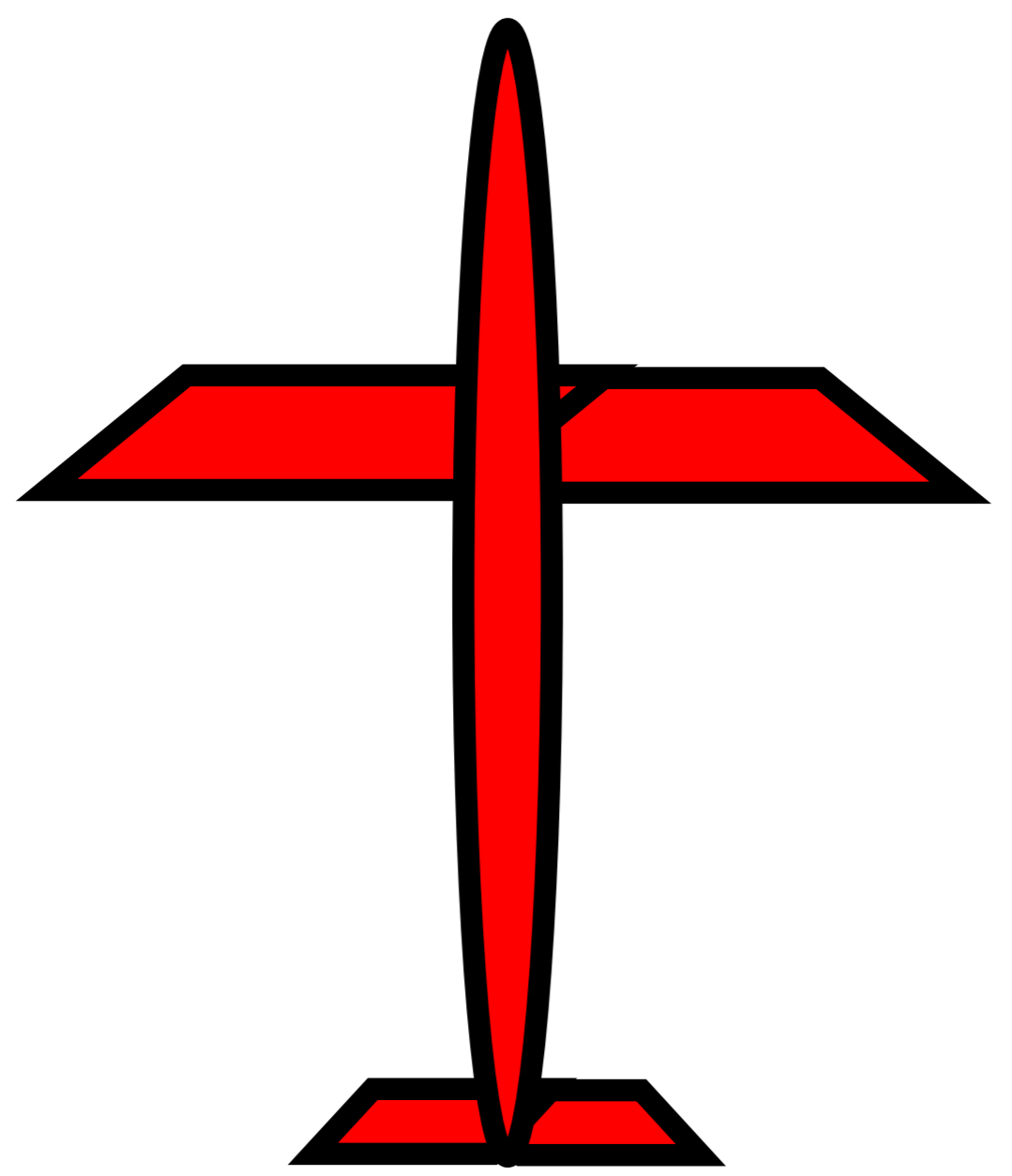
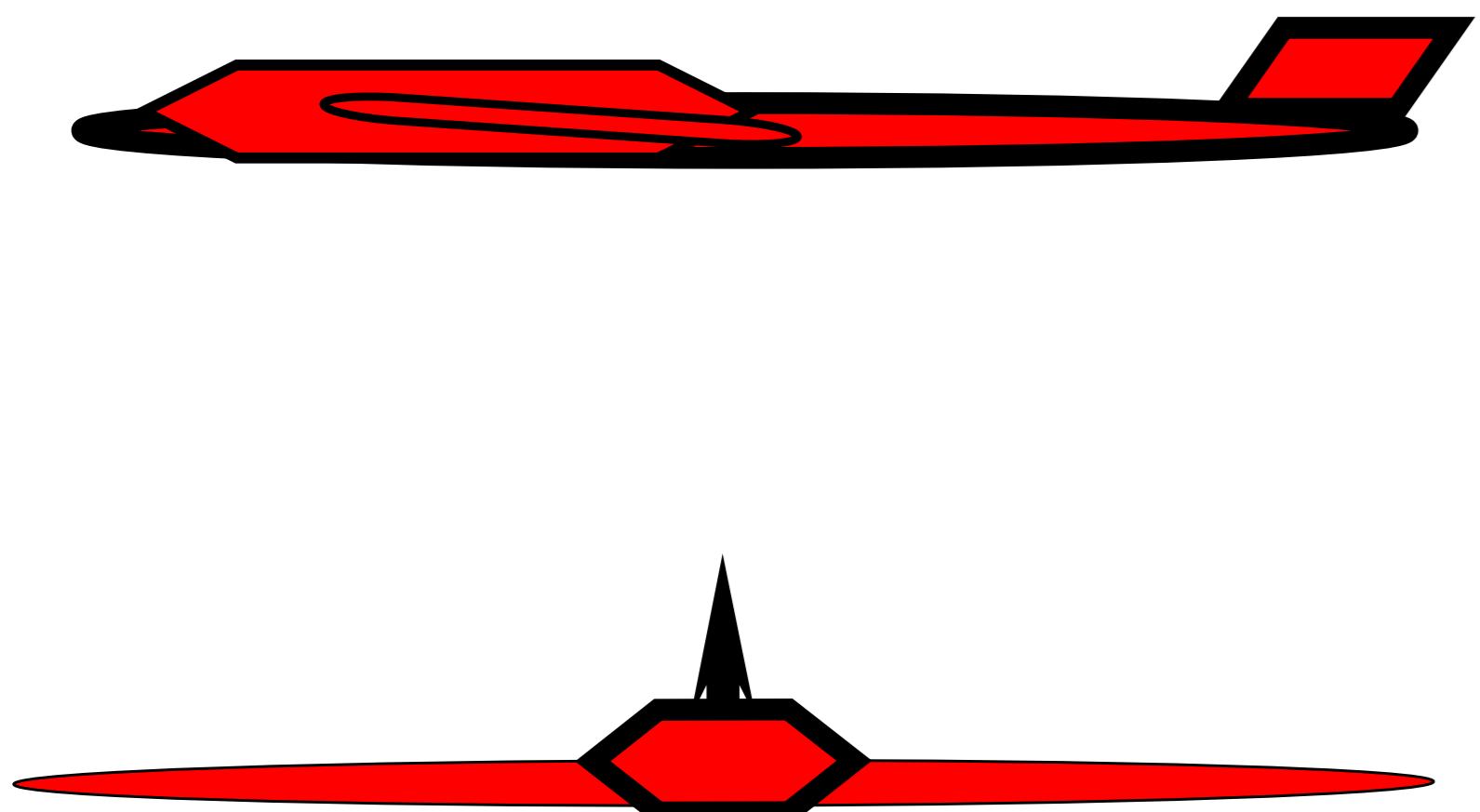
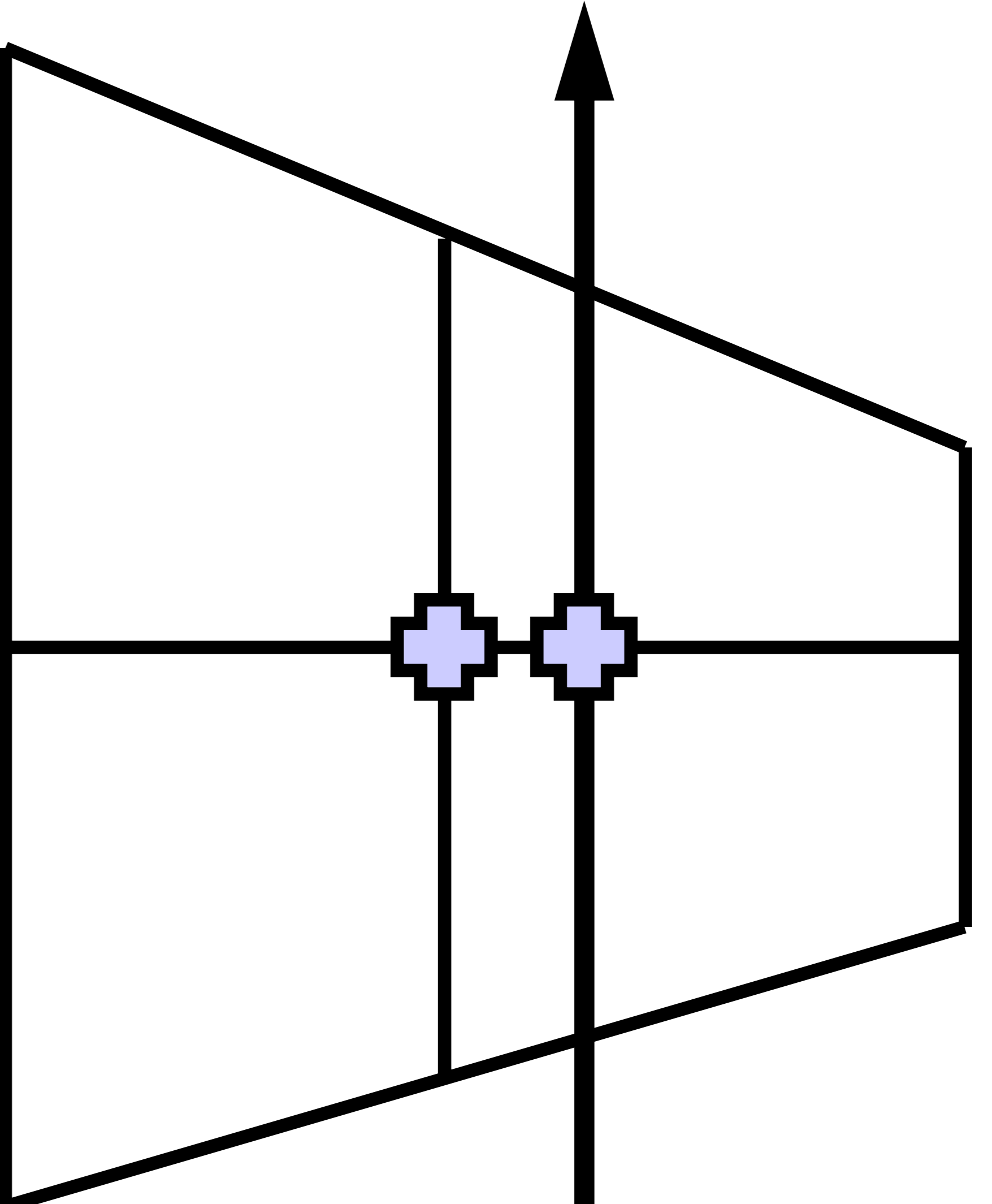
Effects of Roll on Image Scale & Perspective



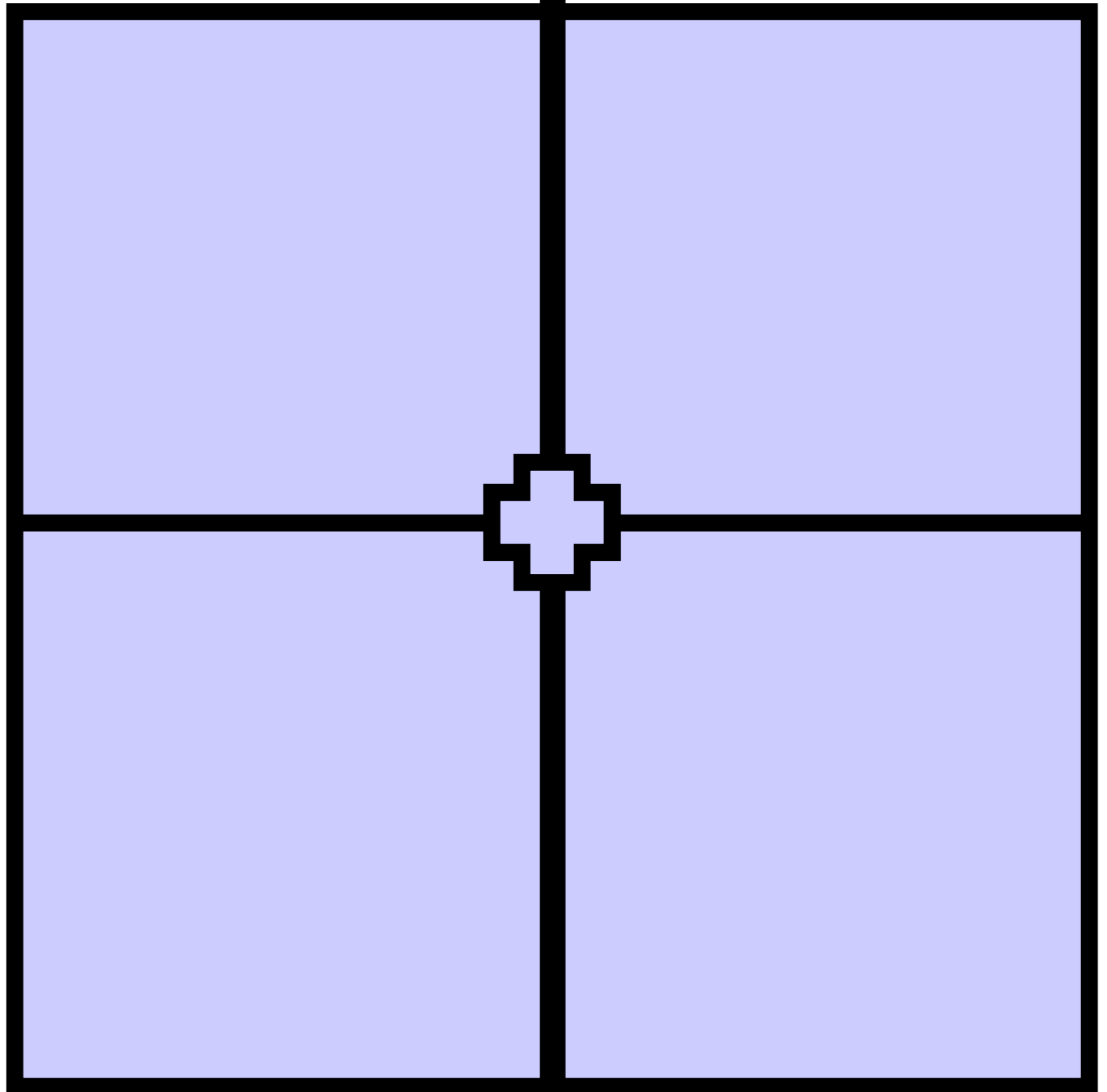
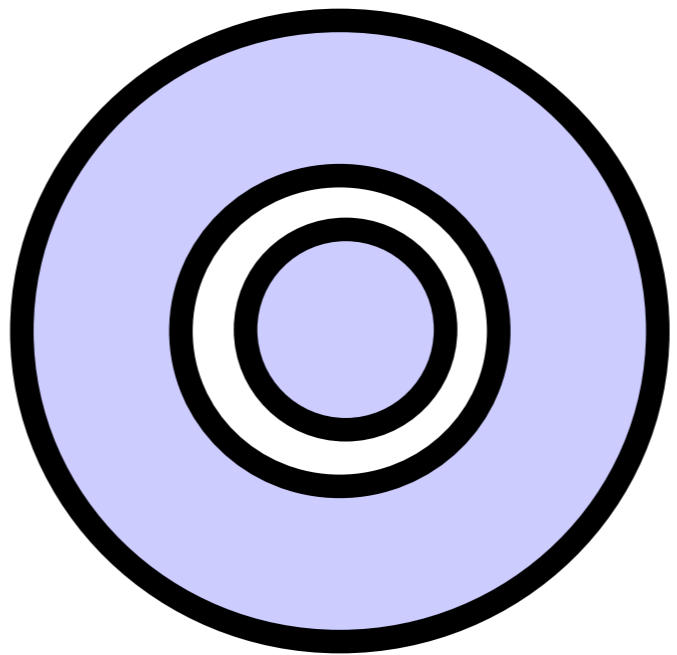
No wind component & roll to starboard



PLAN VIEW

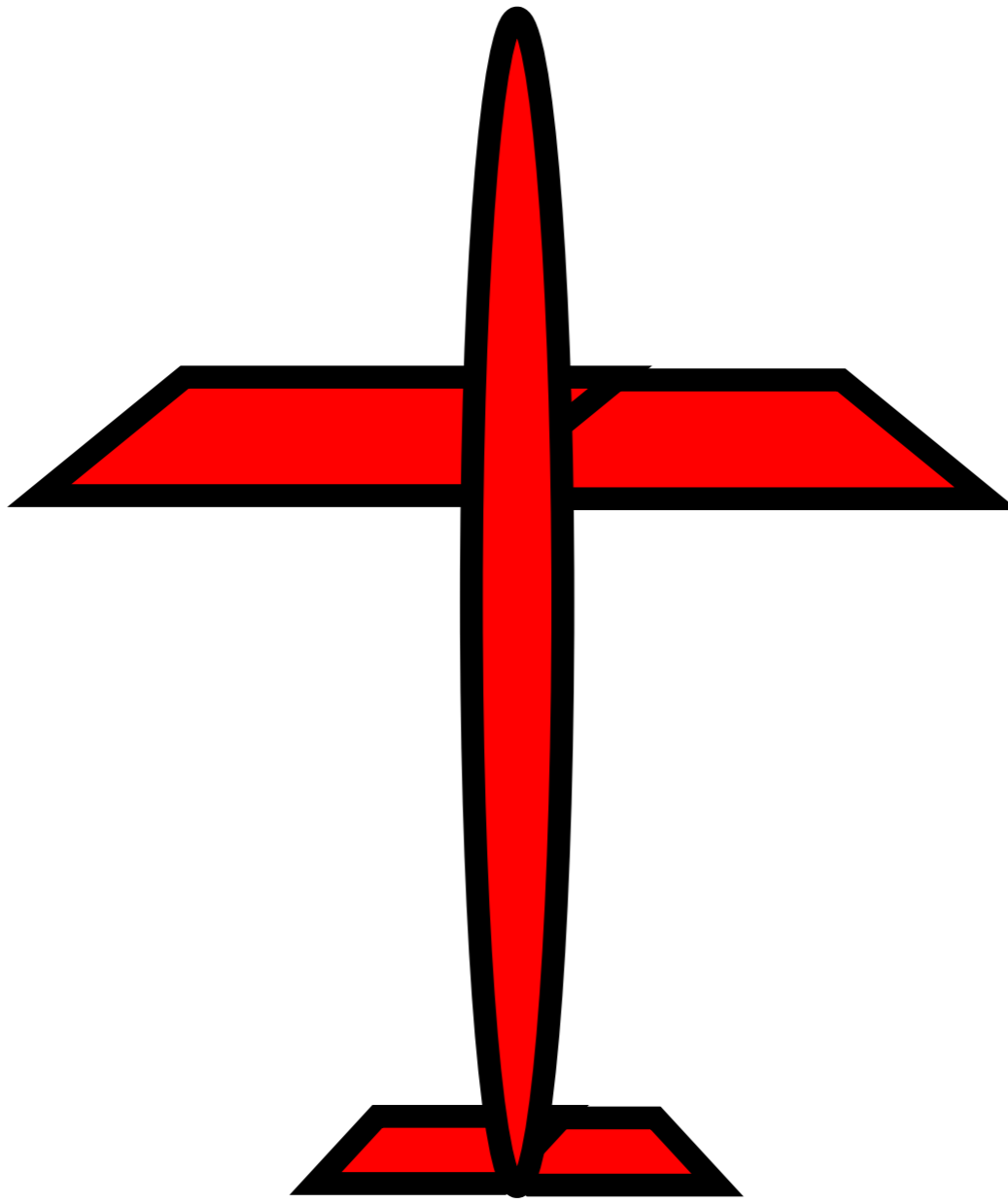
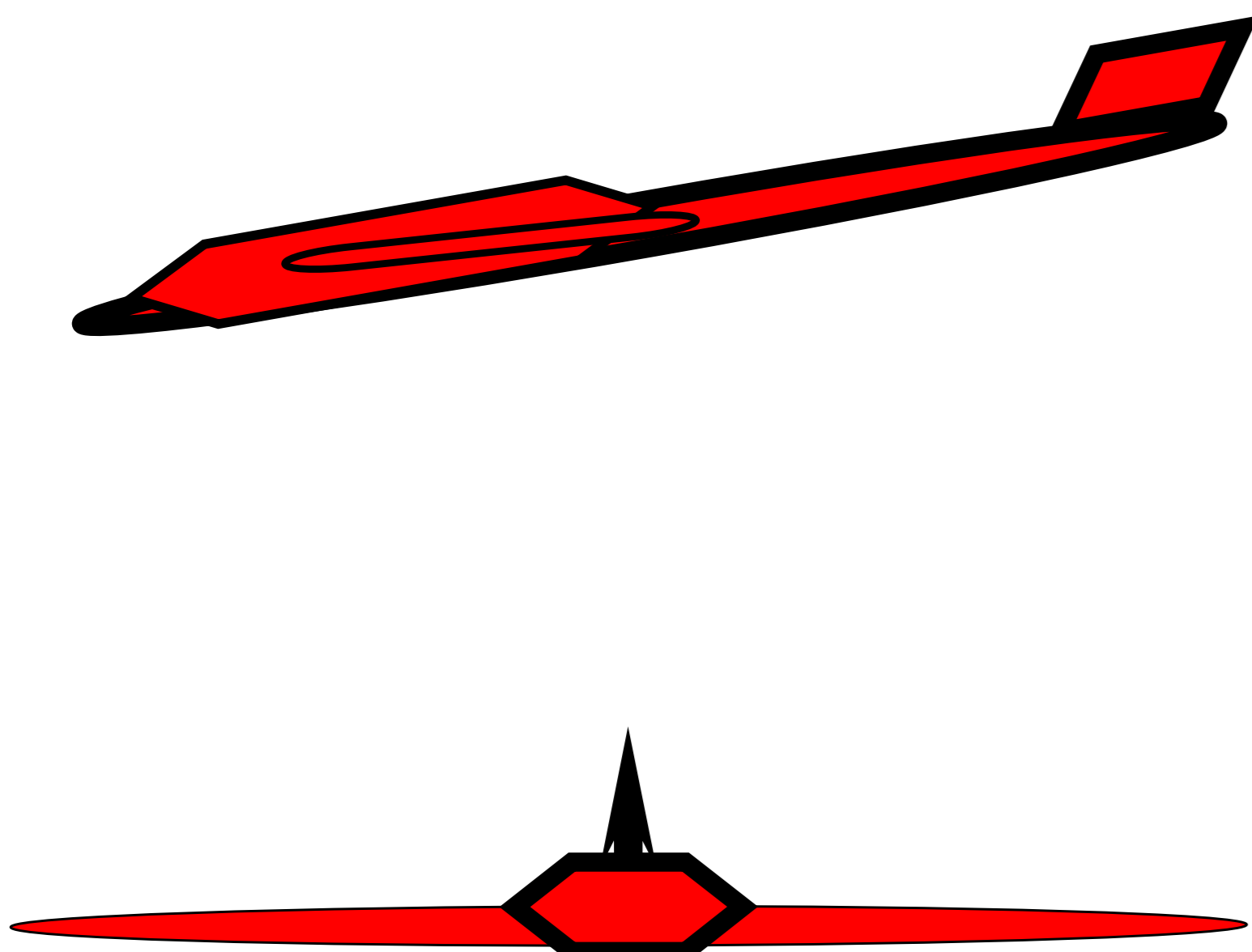


No wind component & level flight

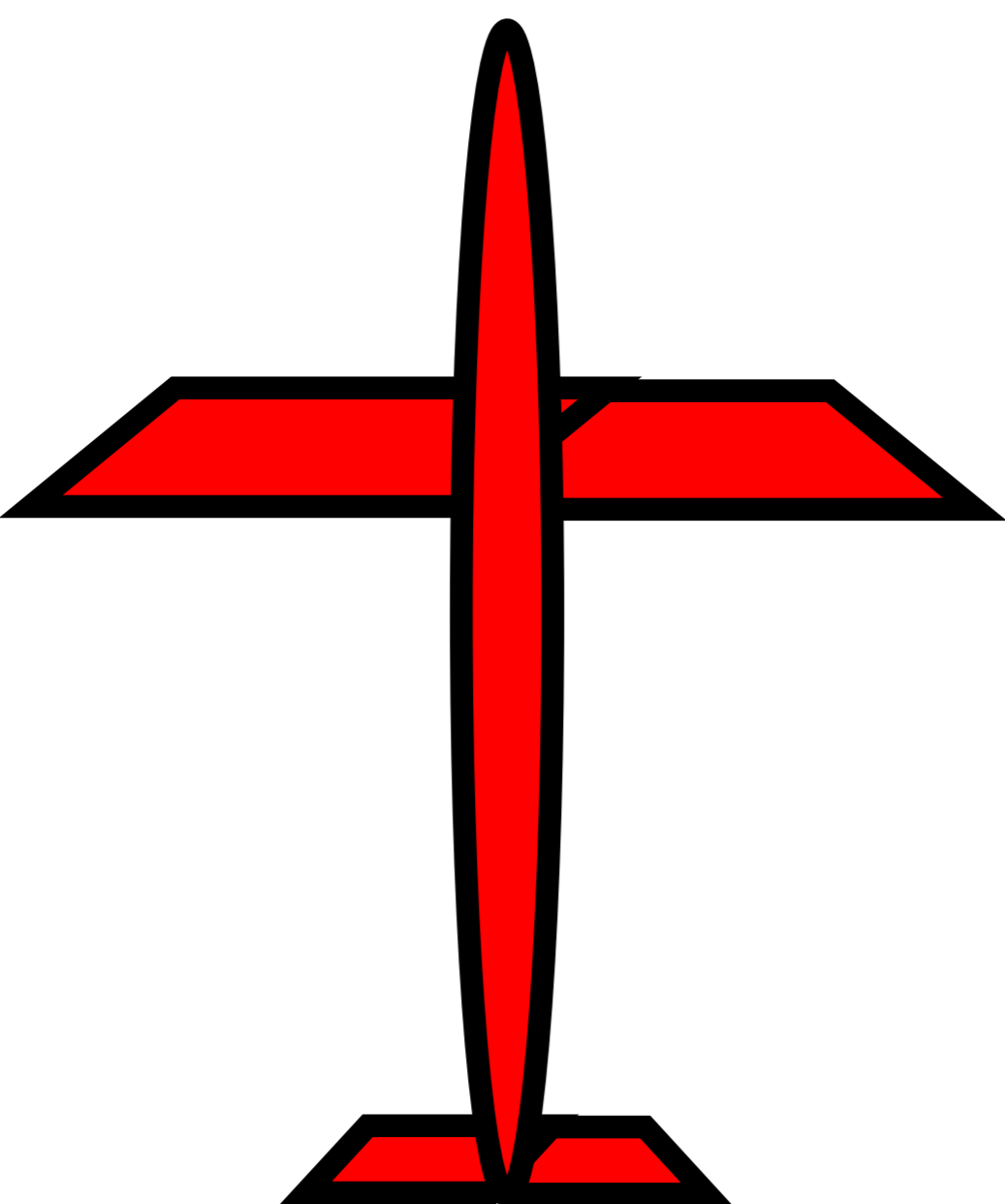
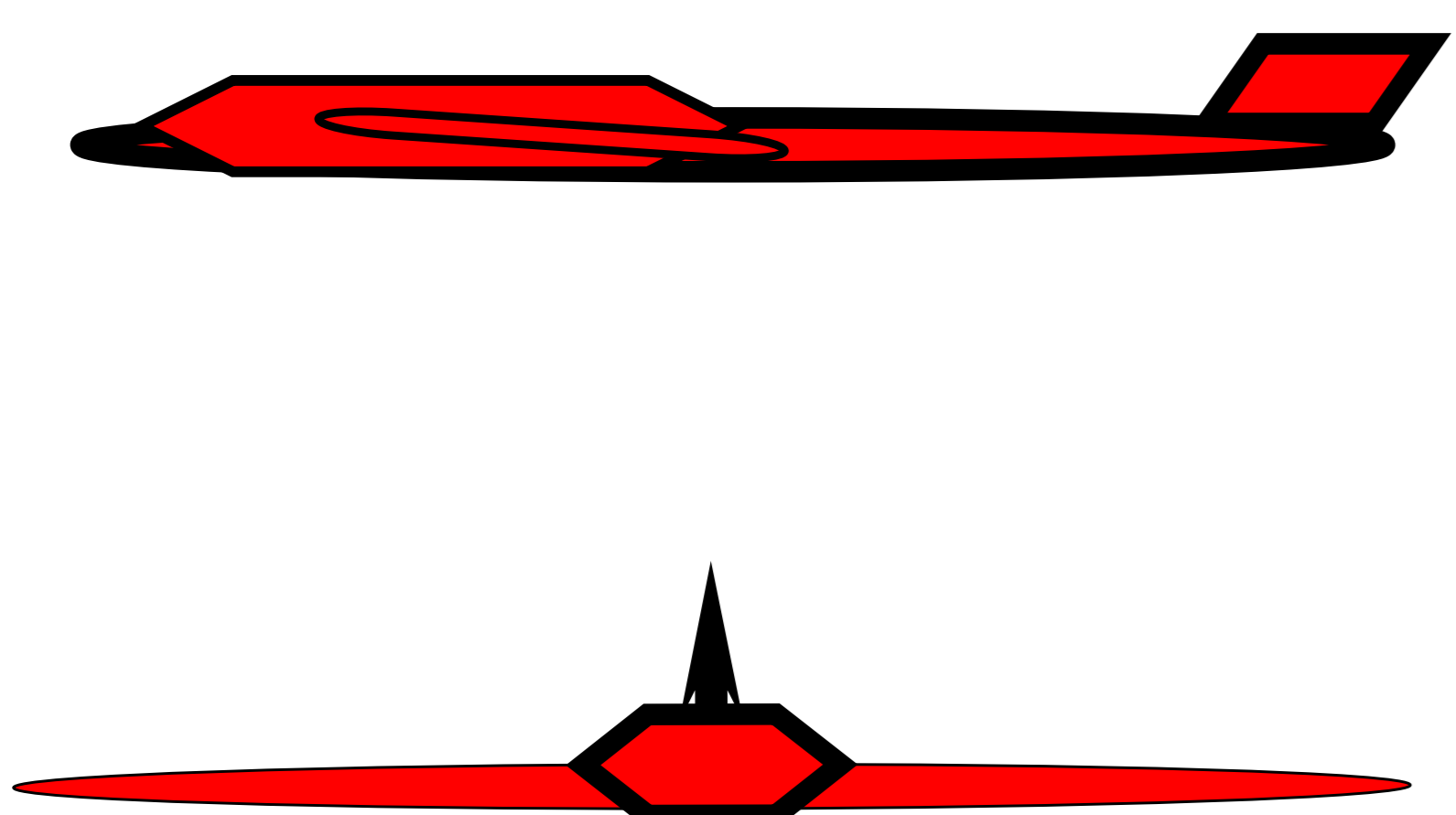
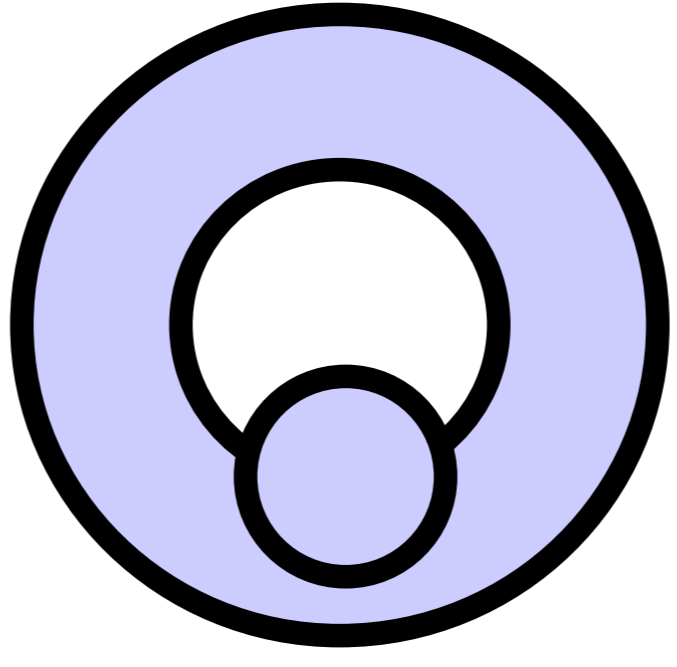


Flight Line

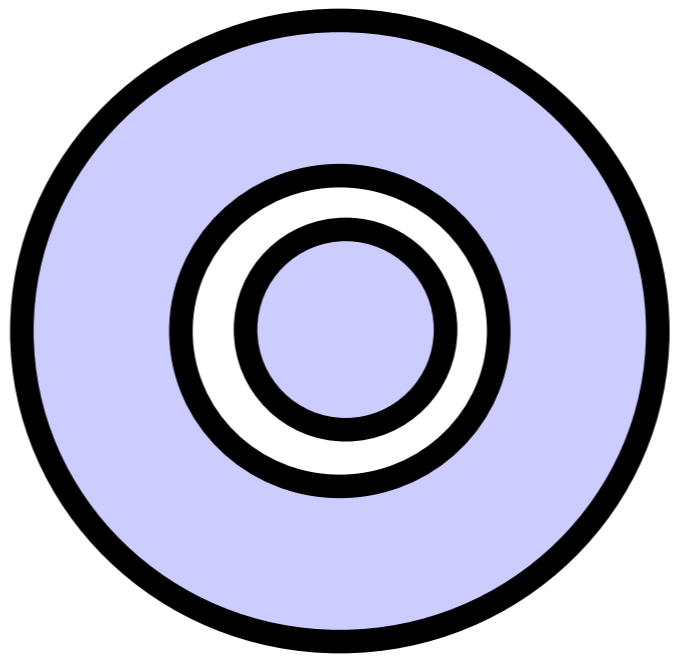
Effects of Pitch on Image Scale & Perspective



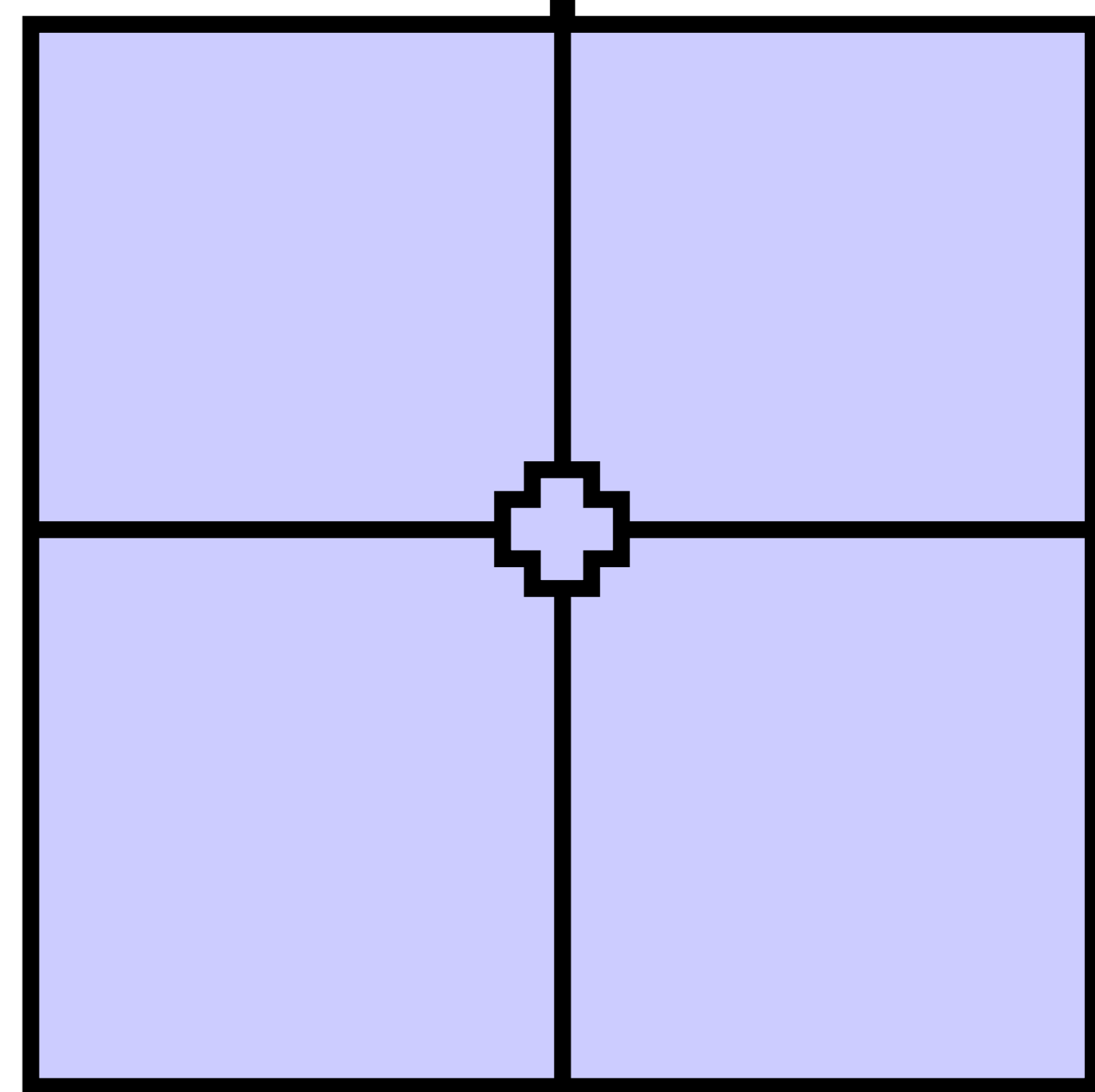
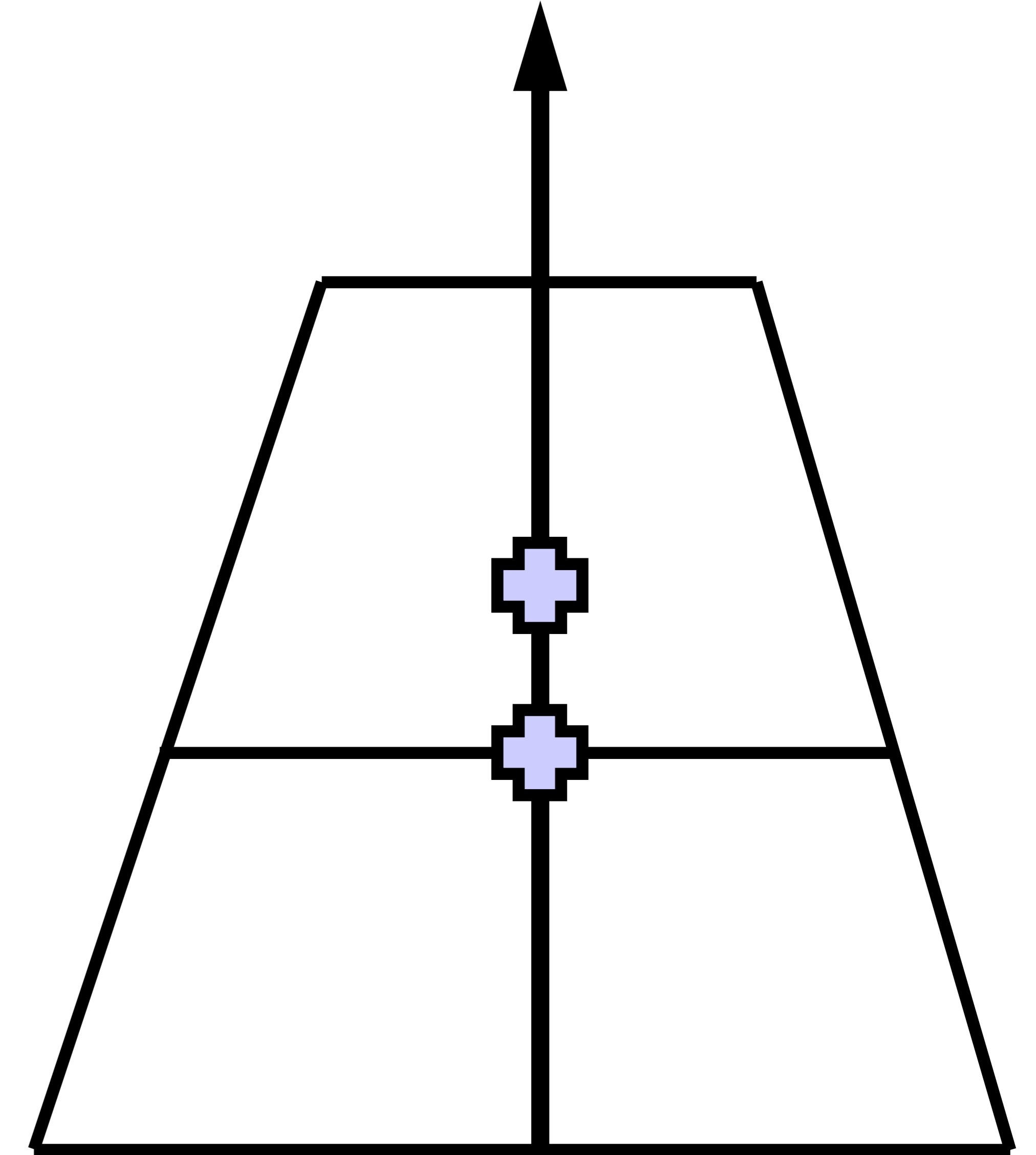
No wind component & pitch down



No wind component & level flight

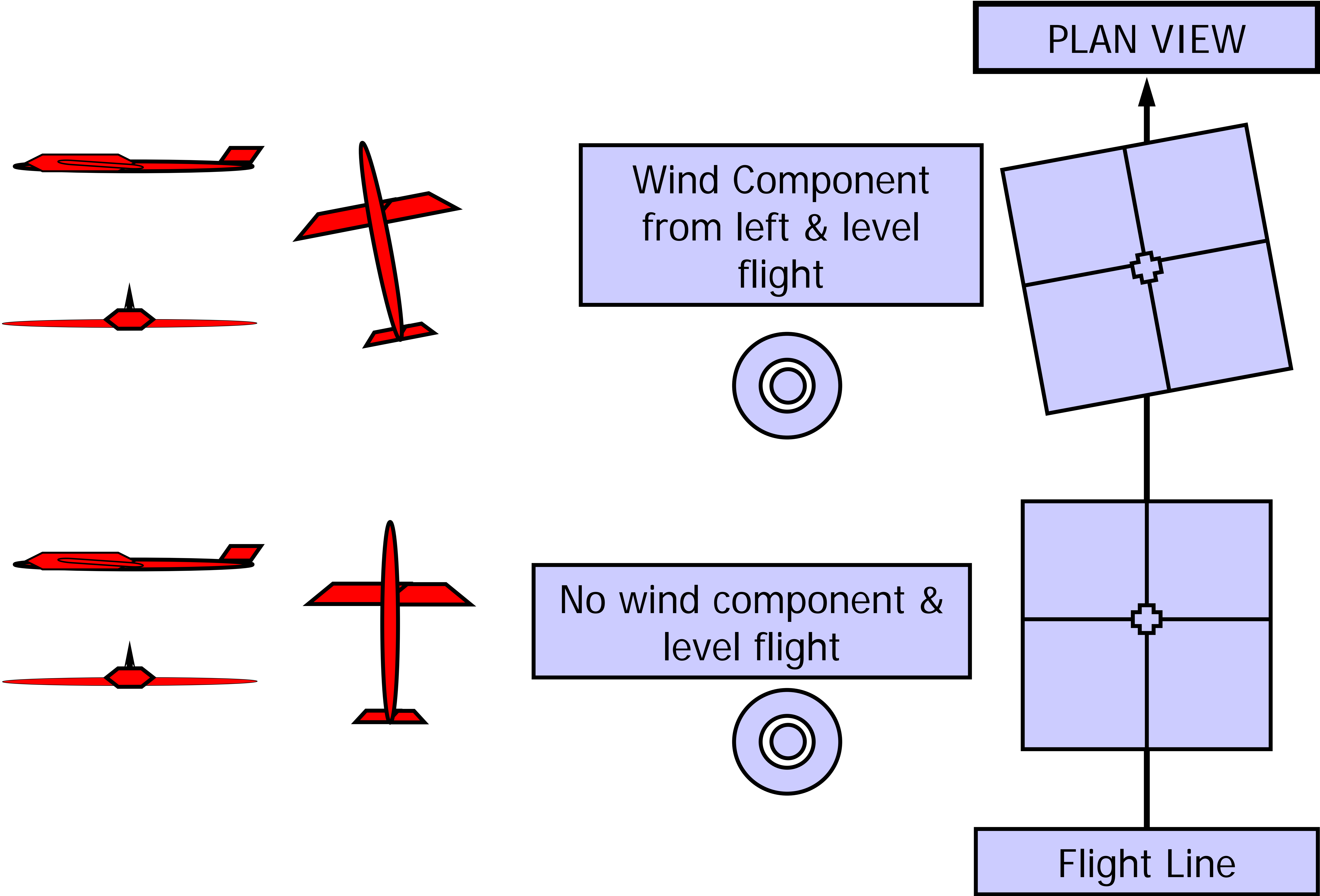


PLAN VIEW

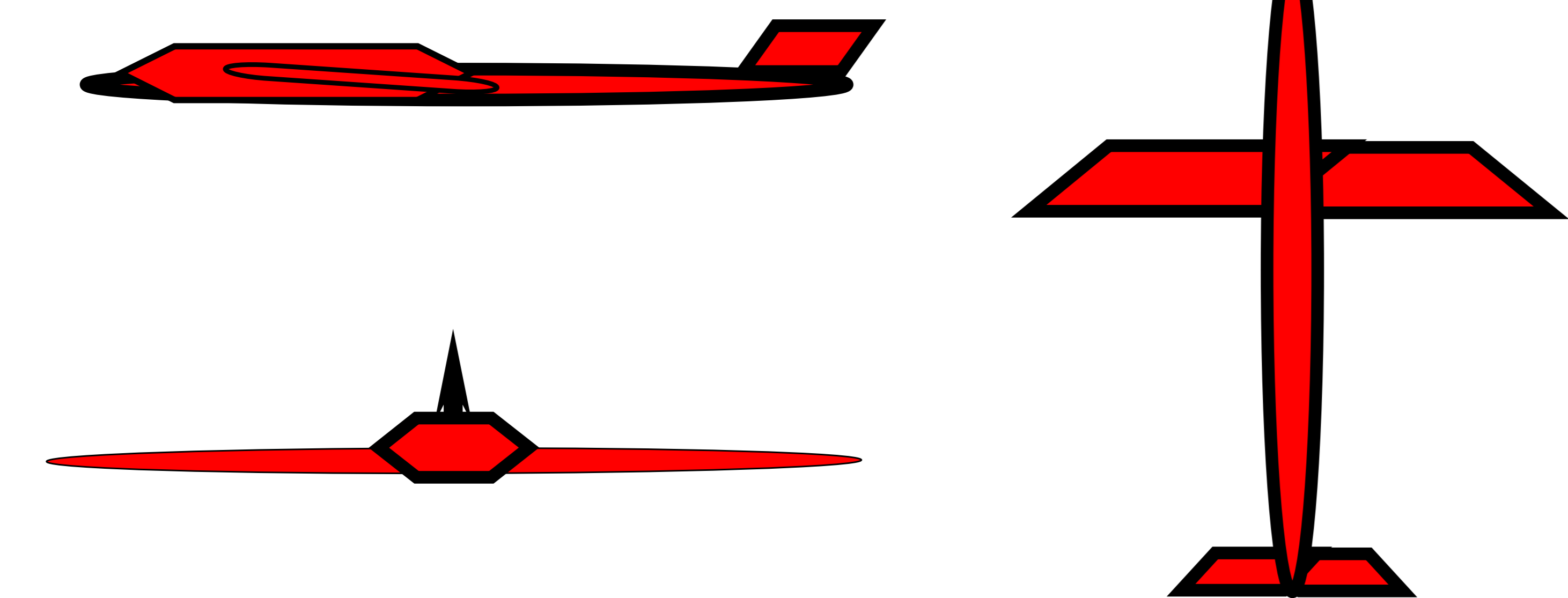
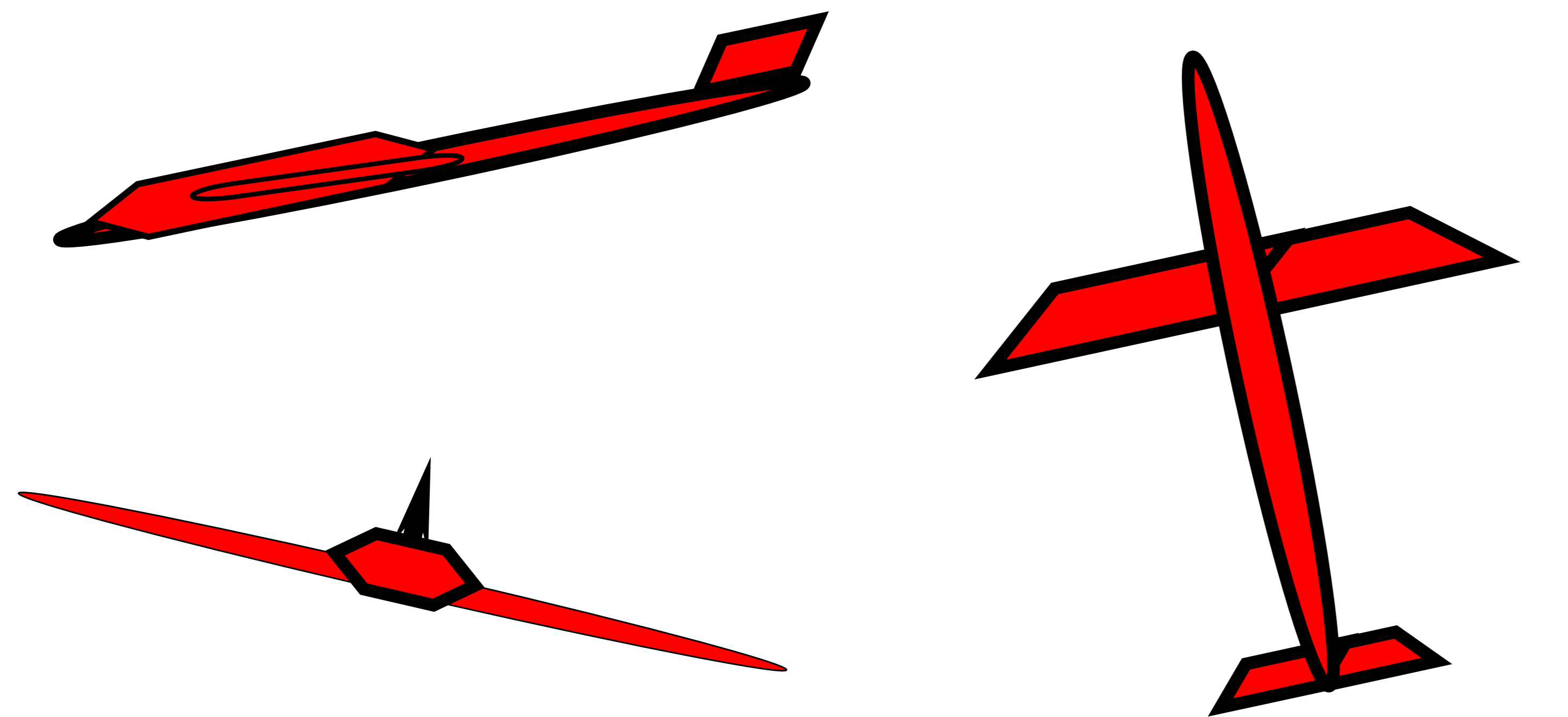


Flight Line

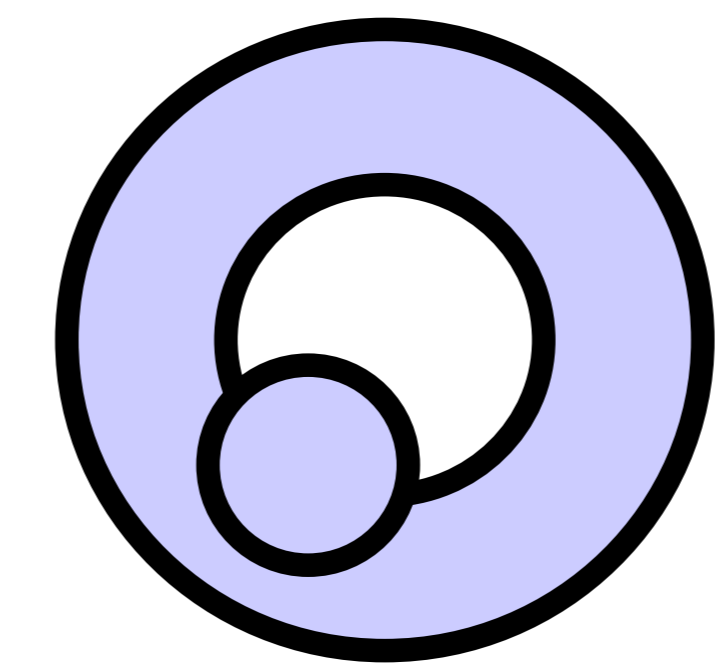
Effects of Roll on Image Scale & Perspective



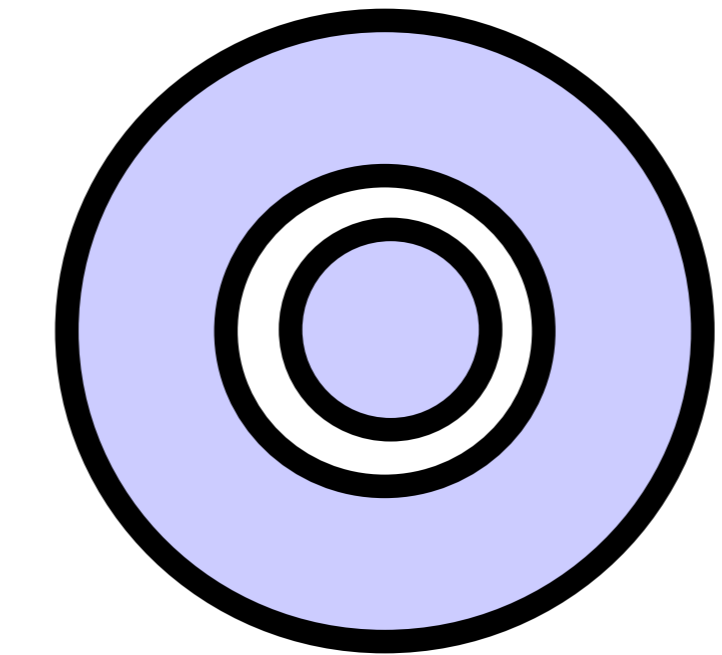
Effects of Roll, Pitch & Yaw on Image Scale and Perspective



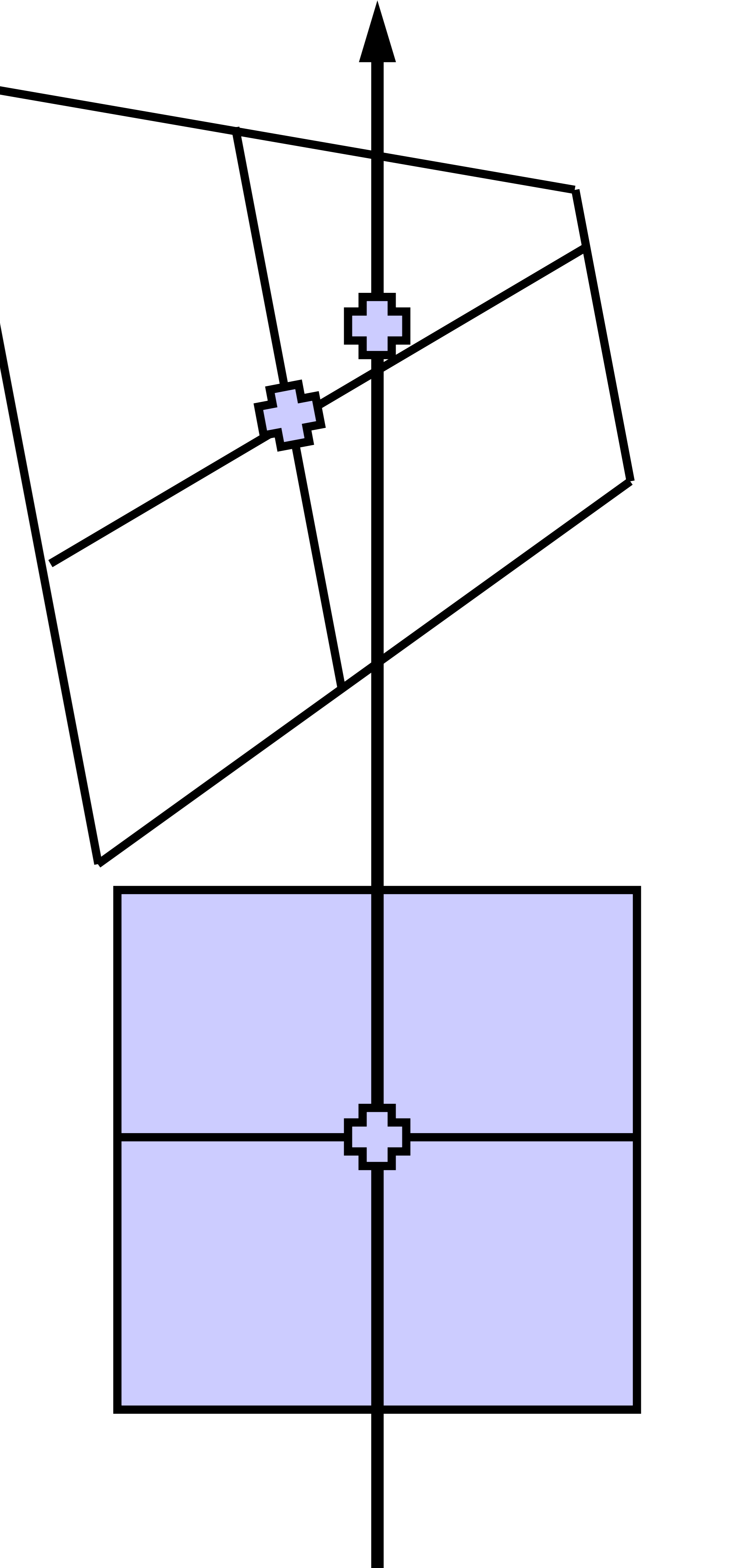
Wind component from left & pitch down & roll to starboard



No wind component & level flight

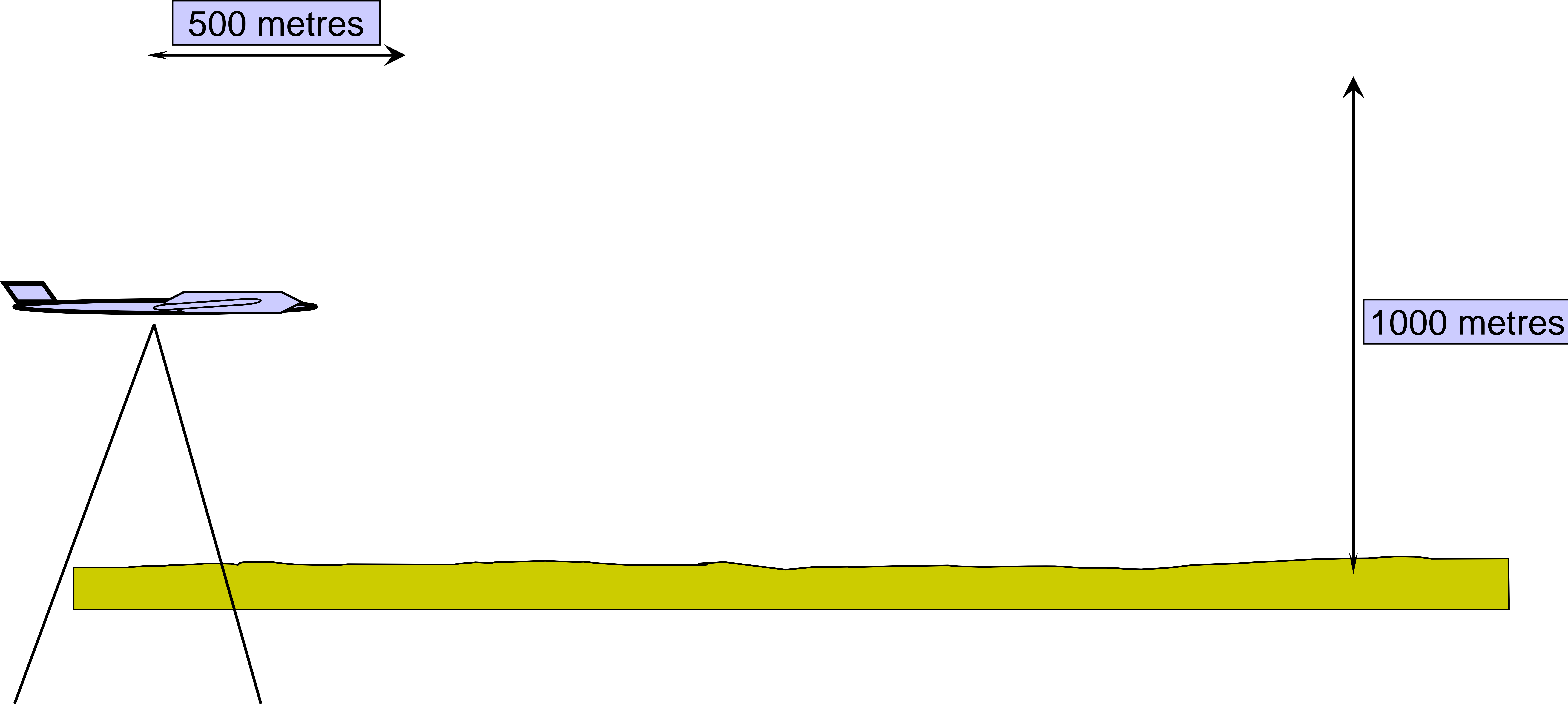


PLAN VIEW

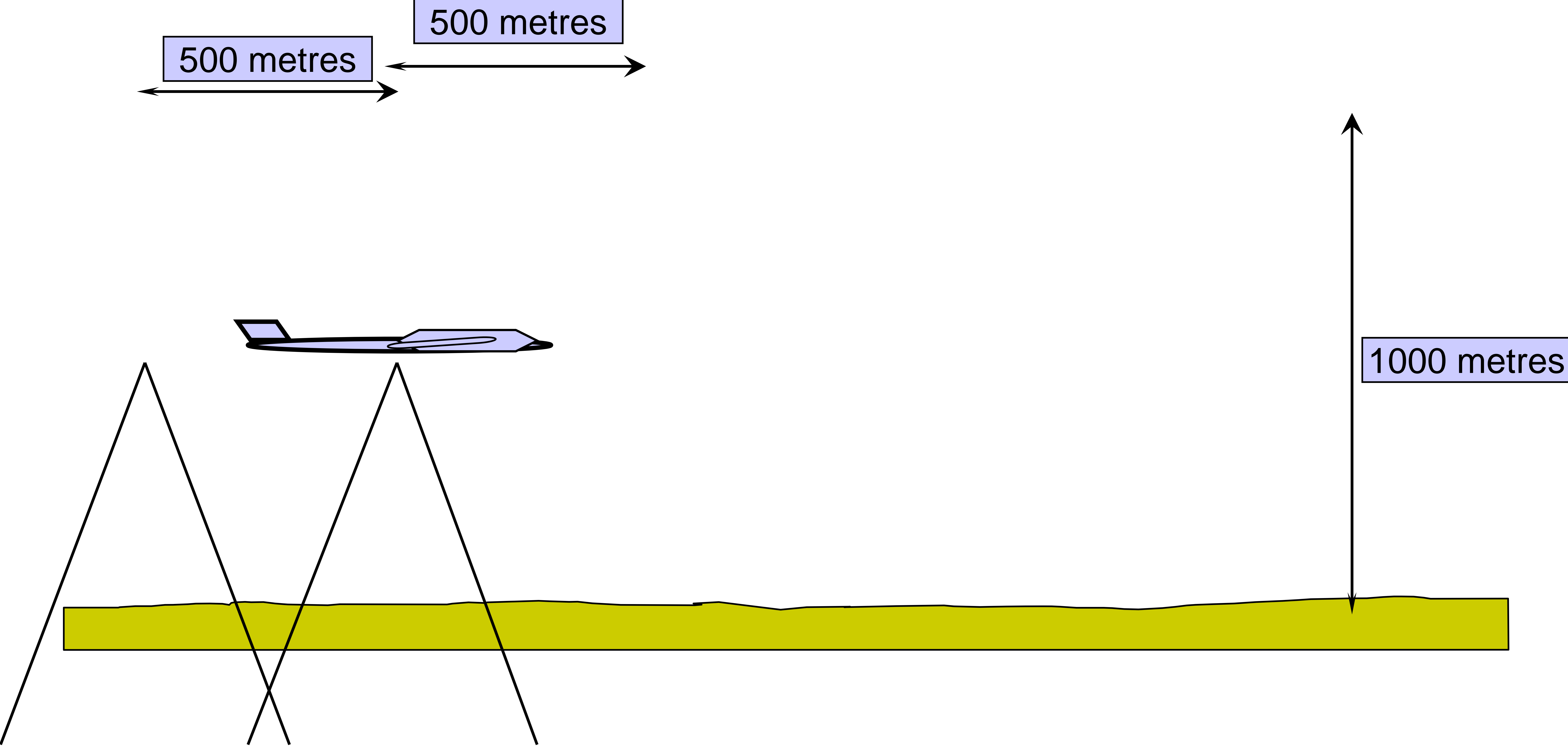


Flight Line

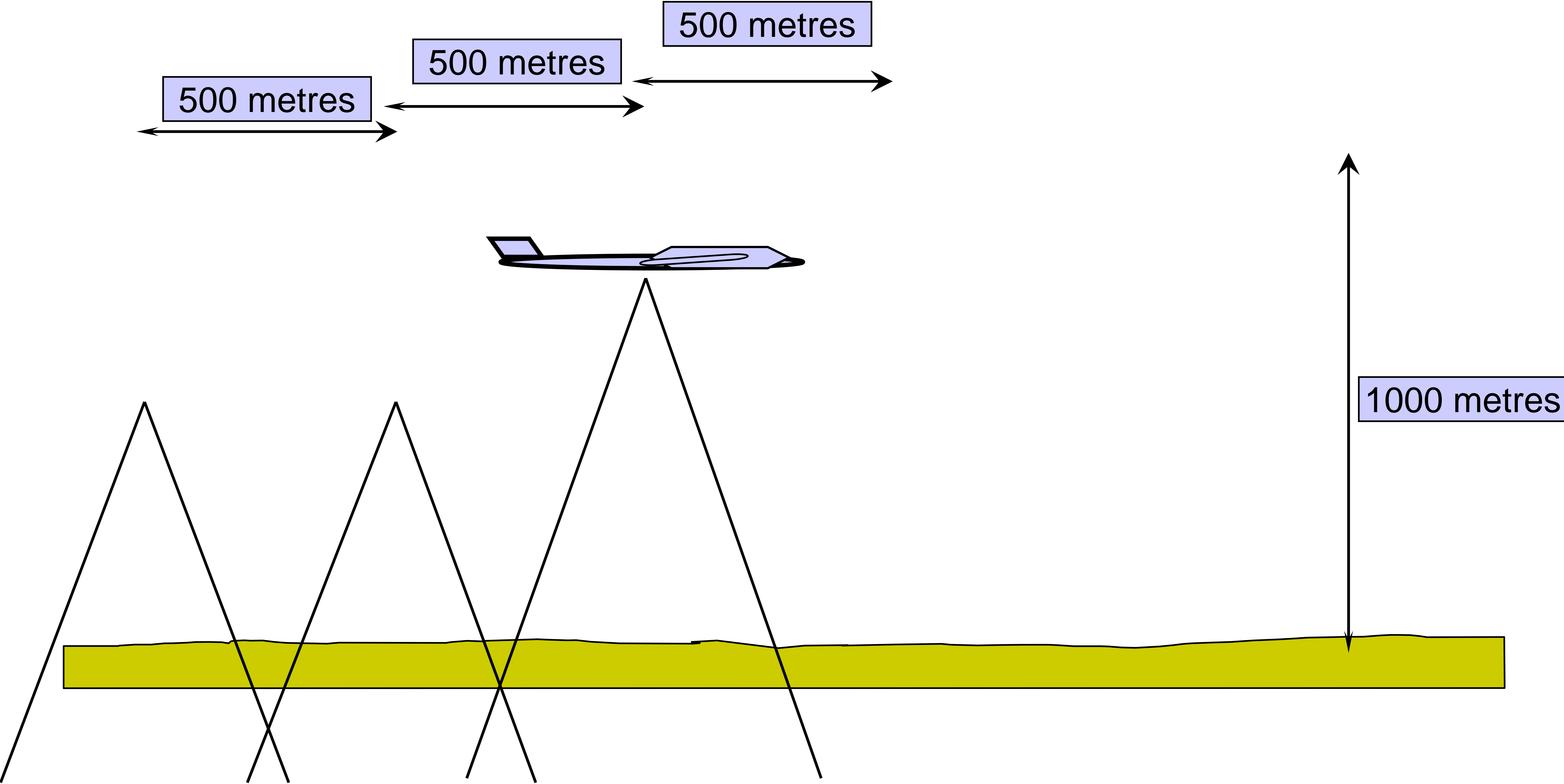
Effects of Altitude on Image Scale & Resolution



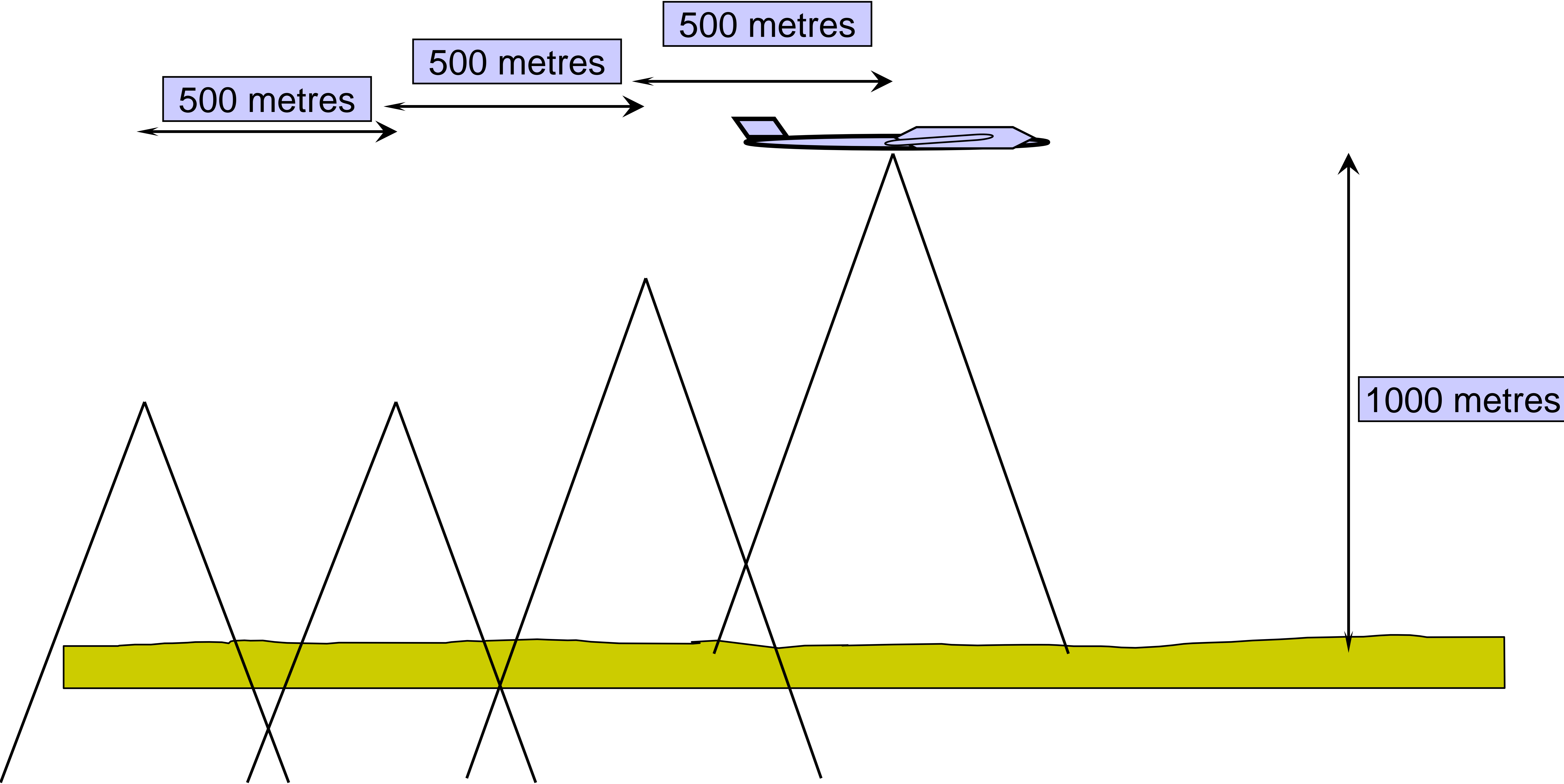
Effects of Altitude on Image Scale & Resolution



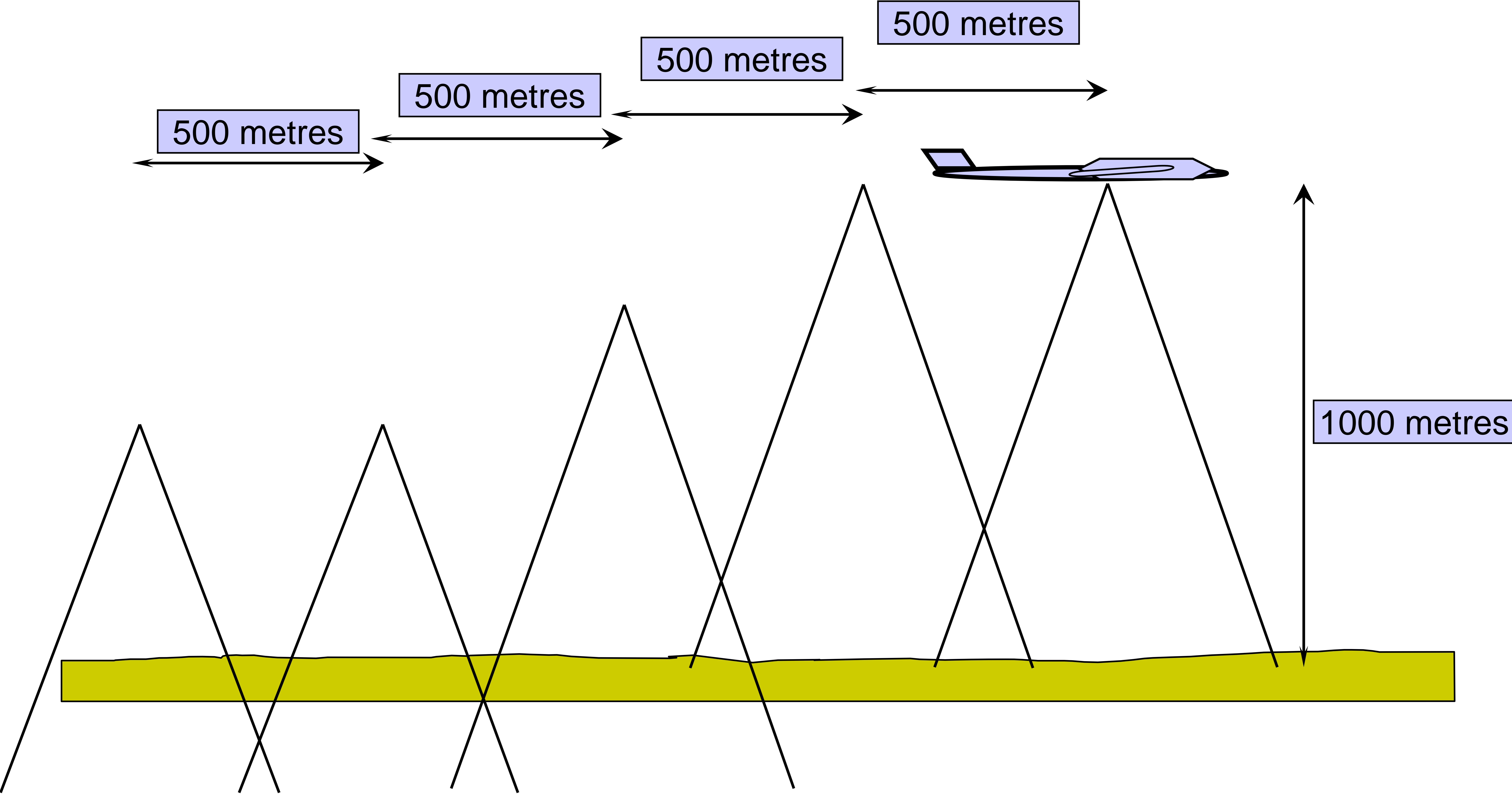
Effects of Altitude on Image Scale & Resolution



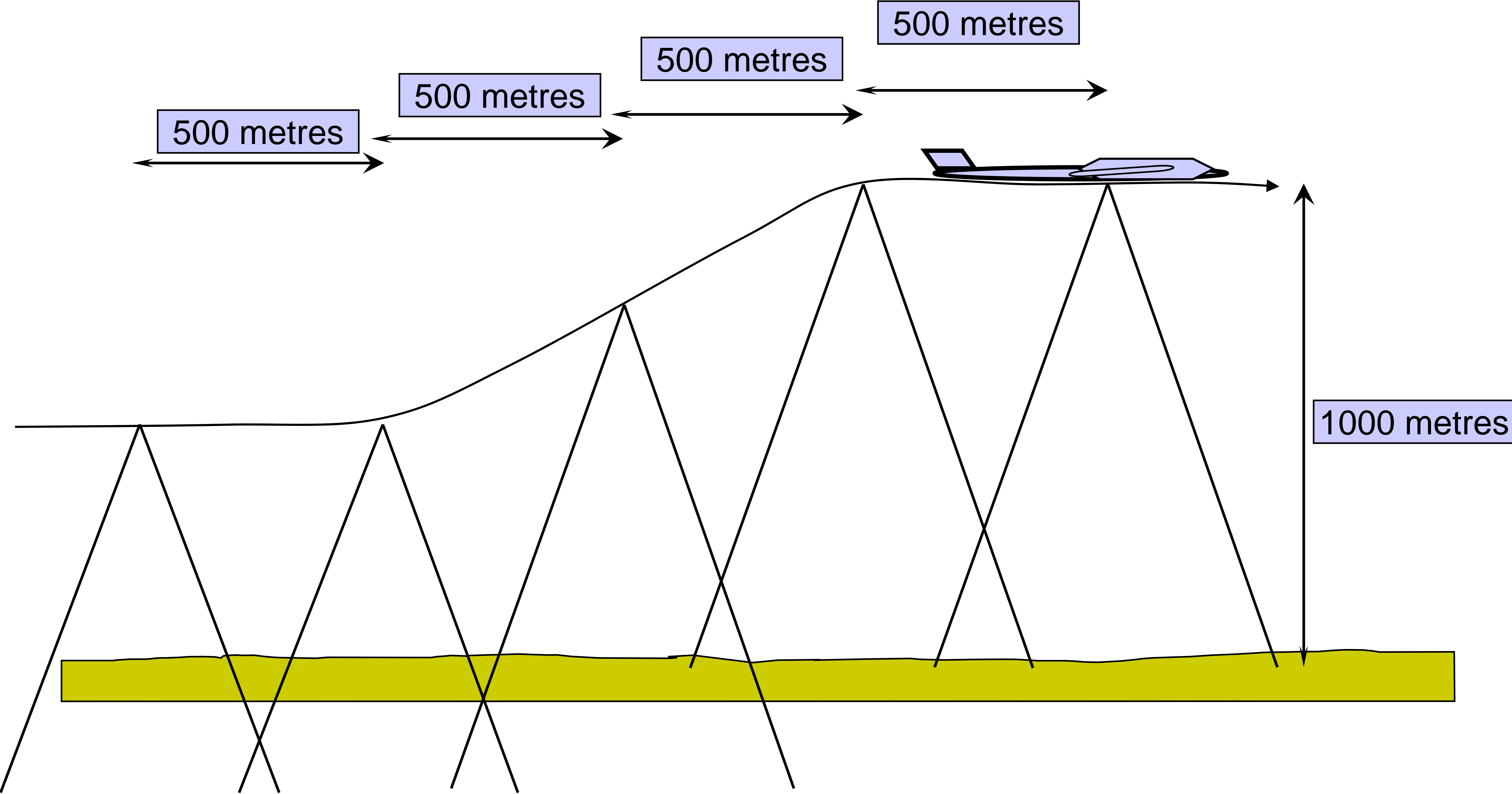
Effects of Altitude on Image Scale & Resolution



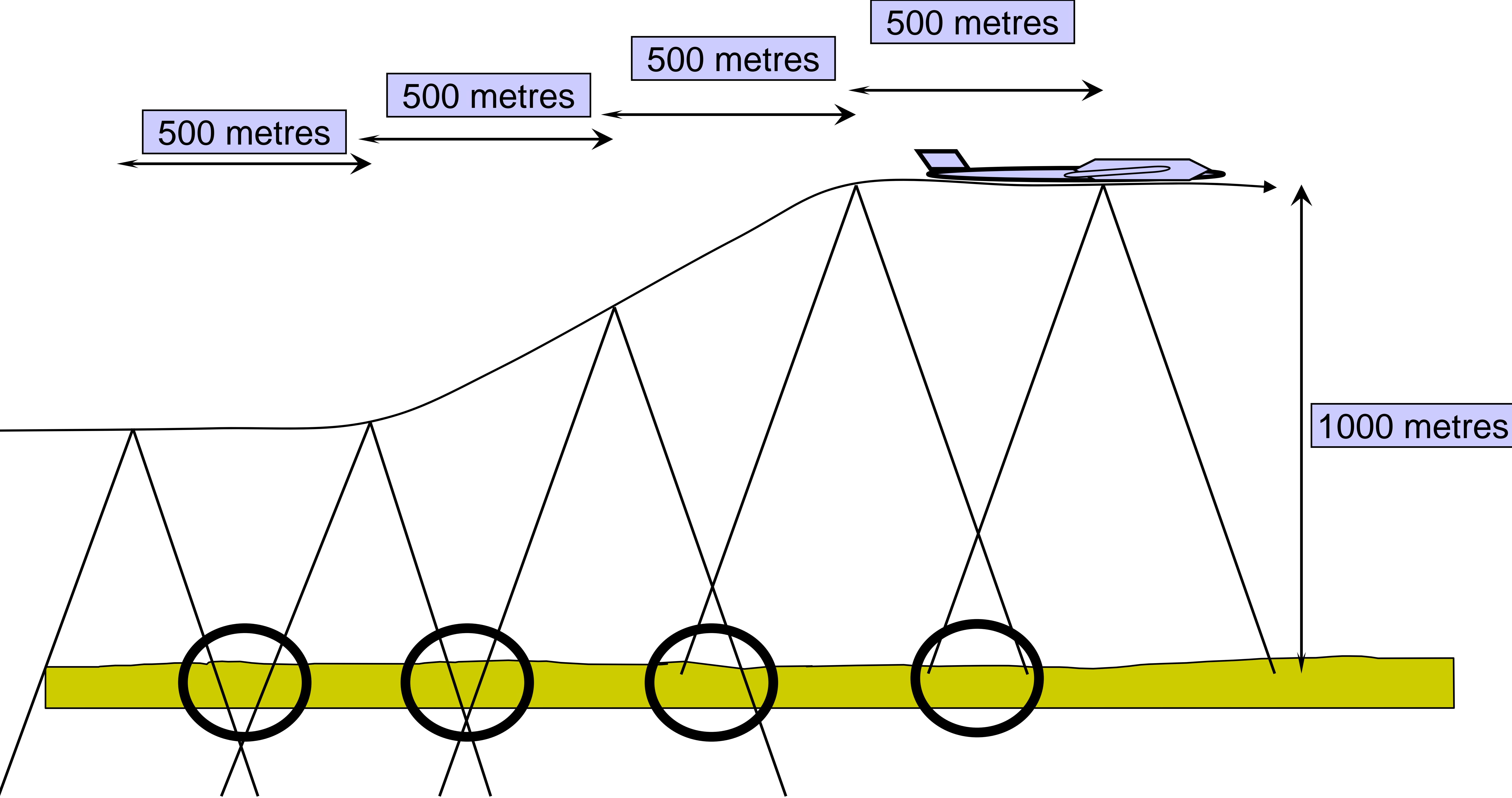
Effects of Altitude on Image Scale & Resolution



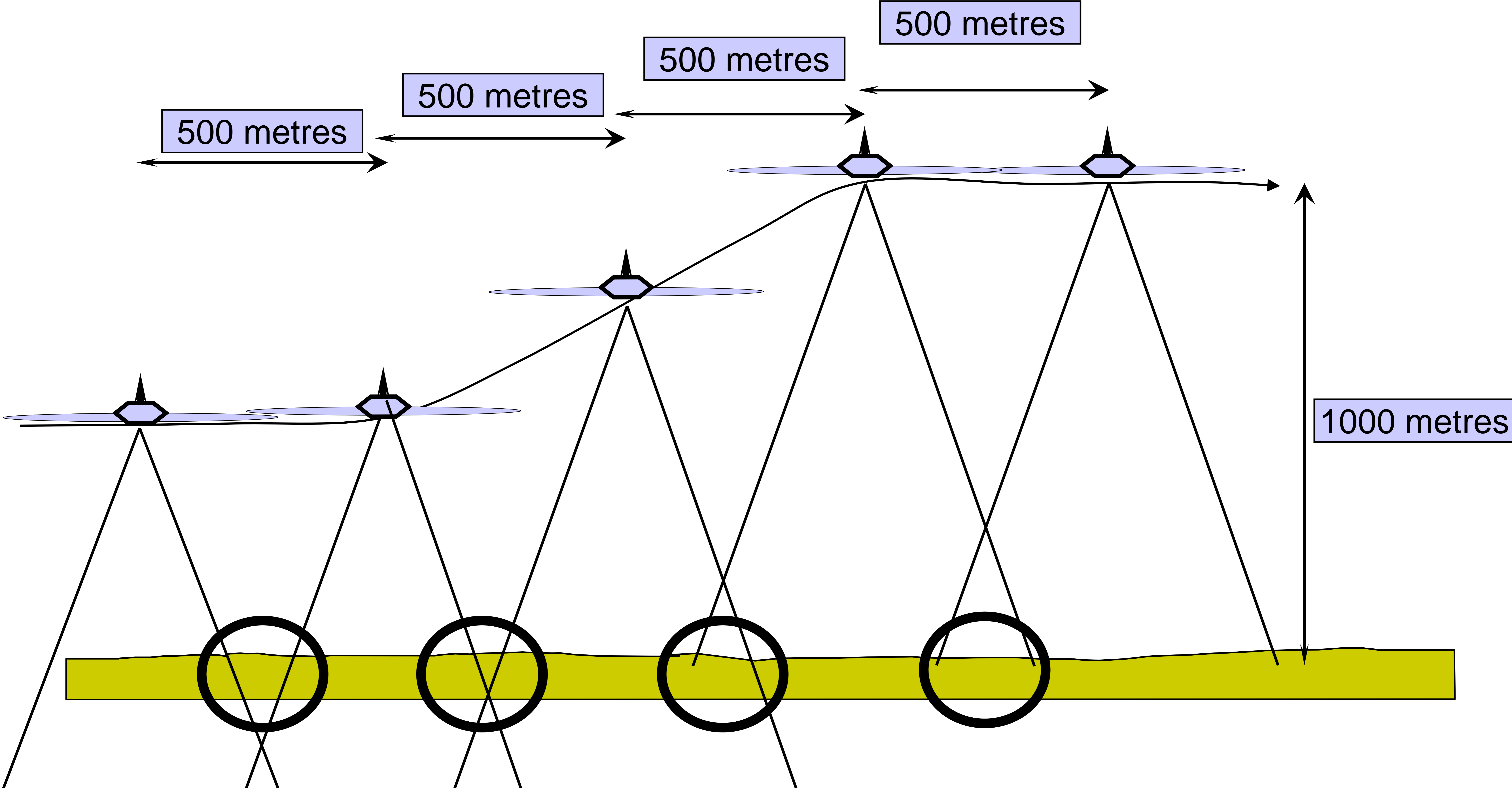
Effects of Altitude on Image Scale & Resolution



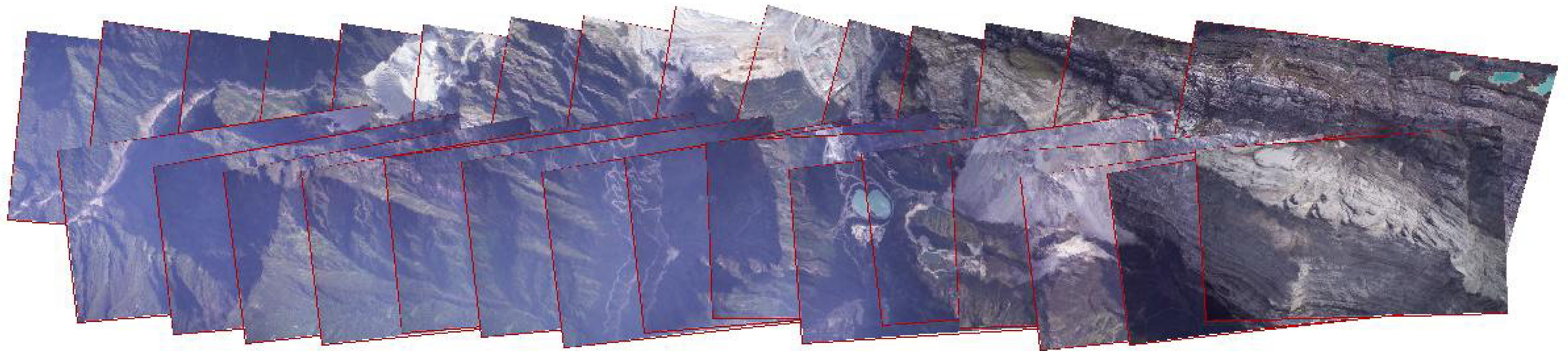
Effects of Altitude on Image Scale & Resolution



Effects of Altitude on Image Scale & Resolution



Survey Flight Without Drift & Height Control



Images are rotated with respect to planned flight lines

Images have variable scales

Camera Lens Calibration Parameters

- Radial lens distortions will displace objects from true, to a lesser or greater extent, depending on the quality and focal length of the lens
- Geographic positions of objects described on an aerial image will not correspond to absolute geographic positions unless lens distortions are taken into account
- Short focal length lenses have greater radial lens distortions than long focal length lenses
- Camera calibration certificates must accompany all image data used for photogrammetric mapping purposes

DCS Proback Camera Calibration Certificate

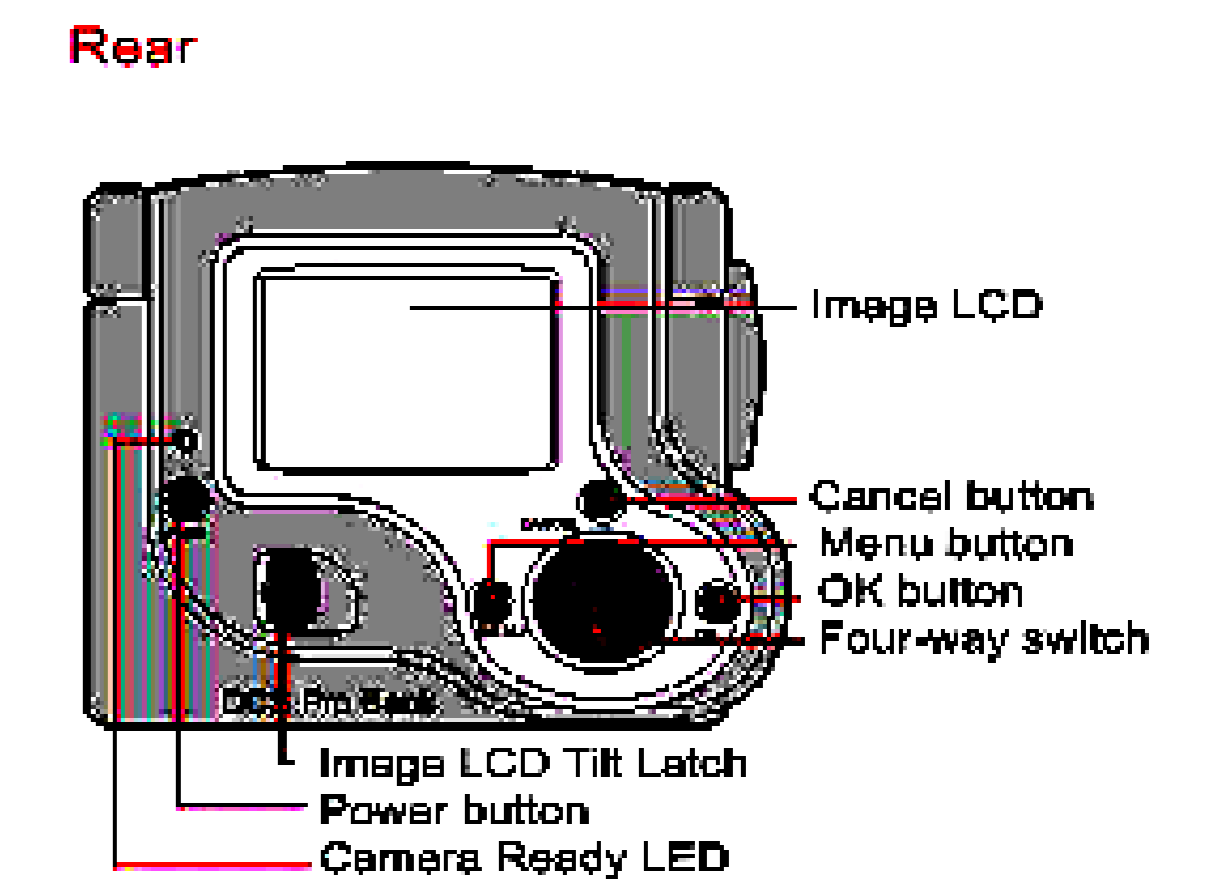
Camera calibration certificate

s/n lens 8888791
 s/n camera DCSPB-00310
 f-stop 5.6
 dimension AT [mm] 36.6480
 dimension XT [mm] 36.6480
 PPx ref TLHC [mm] 18.9110
 PPy ref TLHC [mm] 18.4841
 K1 3.642E-05
 K2 -2.262E-08

Lens type Carl Zeiss Distagon 4/40 T*
 CCD pixel size [mm] 0.009
 CCD array size AT [pixels] 4072
 CCDD array size [pixels] 4072

< < < < < < < < along flight track (x-axis)

starboard-side
 across
 flight
 track
 (y-axis)
 port-side

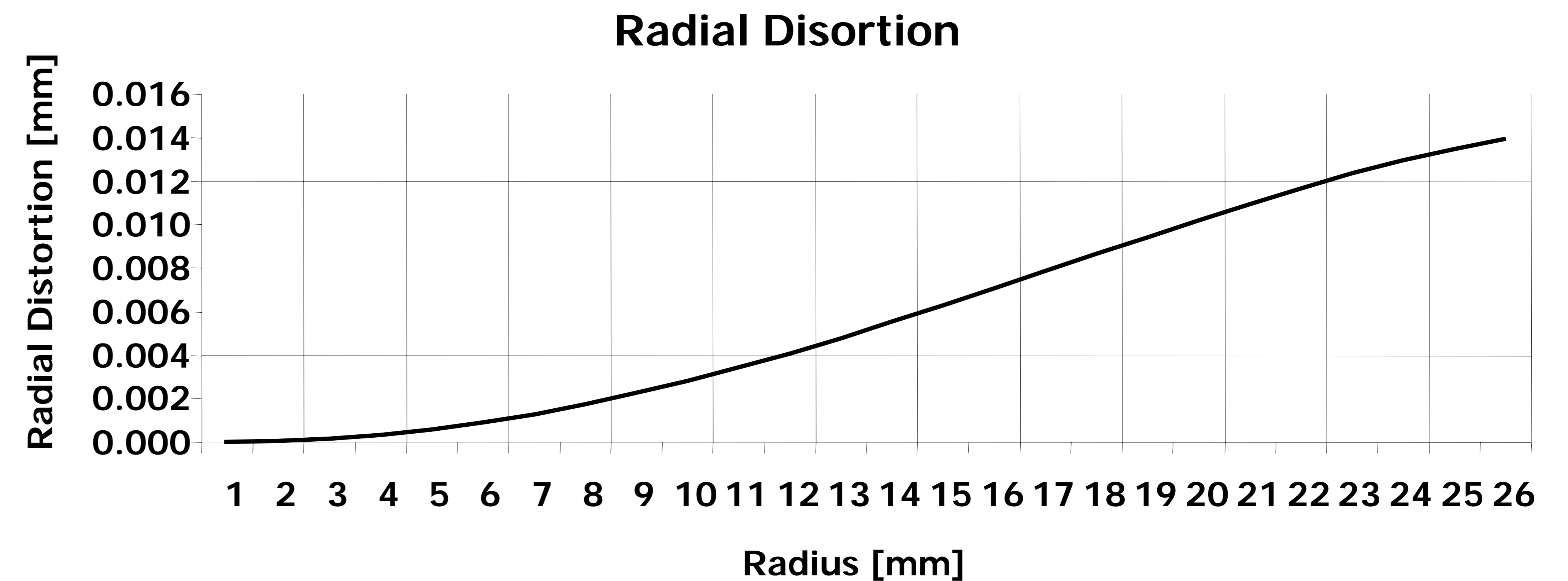


NOTES:

1. Distortion is positive if away from coordinate centre line
2. Calibrated at a temperature of 20 Celsius
3. No filter fitted

angle [deg]	angle [rads]	radius [mm]	dr [mm]
0.000	0.000000	0.0	0.000000
13.846	0.241661	1.0	0.000036
27.692	0.483322	2.0	0.000145
41.538	0.724983	3.0	0.000326
55.385	0.966644	4.0	0.000577
69.231	1.208305	5.0	0.000896
83.077	1.449966	6.0	0.001282
96.923	1.691627	7.0	0.001730
110.769	1.933288	8.0	0.002238
124.615	2.174949	9.0	0.002802
138.462	2.416610	10.0	0.003416
152.308	2.658271	11.0	0.004076
166.154	2.899932	12.0	0.004775
180.000	3.141593	13.0	0.005509
193.846	3.383254	14.0	0.006269
207.692	3.624915	15.0	0.007049
221.538	3.866576	16.0	0.007841
235.385	4.108237	17.0	0.008636
249.231	4.349898	18.0	0.009426
263.077	4.591558	19.0	0.010200
276.923	4.833219	20.0	0.010949
290.769	5.074880	21.0	0.011662
304.615	5.316541	22.0	0.012328
318.462	5.558202	23.0	0.012936
332.308	5.799863	24.0	0.013473
346.154	6.041524	25.0	0.013927

Measurements		
Calibrated Princinal Distance [mm]	41.1785	
Coordinates Centre Line [mm]	0.0000	0.0000
Principal Point ref Centre Line (x,y) [mm]	0.5870	-0.1601
Fiducial BLHC pixel centre (x,y) [mm]	-18.3195	-18.3195
Fiducial TLHC pixel centre (x,y) [mm]	-18.3195	18.3195
Fiducial TRHC pixel centre (x,y) [mm]	18.3195	18.3195
Fiducial BRHC pixel centre (x,y) [mm]	18.3195	-18.3195
Date of calibration [dd/mm/yyyy]	03/04/2007	
s/n lens & camera	8888791	DCSPB-00310



2-D / 3-D Ground Control & Acquisition

