Performance

Is a function of power available, altitude, temperature and weight.
Performance; Temperature is probably the most important factor time of day has a lot to do with it and your altitude. * Use your OAT gage to determine your temperature.

Power

A normally aspirated engine loses
3.0% every 1000 feet
2.85% for constant speed prop
2.3% for turbocharged airplane

Determine your what your available HP is ???

If you're normally aspirated find your available HP by multiplying your sea level HP at each of these altitudes	Turbocharged? find your available HP by multiplying your sea level HP at each of these altitudes
1000 multiply by .97	1000 multiply by .98
2000 multiply by .94	2000 multiply by .95
3000 multiply by .91	3000 multiply by .93
4000 multiply by .88	4000 multiply by .90
5000 multiply by .85	5000 multiply by .88
6000 multiply by .82	6000 multiply by .86
7000 multiply by .79	7000 multiply by .83

Compute Your HP

Let's say you're flying a 1953 C-180 with a sea level HP of 230 hp @ 2600 RPM you're taking off at smiley creek, elevation 7000 ft after a leisurely late breakfast.
Multiply your SL horsepower 230 by .79 today you are flying a 181 HP airplane.
What if it's warmer than standard temperature day (10 C)?

Density altitude Computations

Density altitude is the altitude the airplane feels when it is hotter than standard temperature.
Is it truly that simple!?

Parlor Trick: Density Altitude

A quick, dirty and pretty close method to compute density altitude.
Take airport elevation and add correction:
Correction: subtract the **standard temperature** in ***Celsius*** from the actual outside temperature.
Every degree is a 100 ft increase in altitude.

Calculating Std. Temp.

You can memorize it:	Parlor Trick:
Standard temperature at Sea level is 59 F or 15 C • Sea lvl is 15 C • 1000 ft is 13 C • 2000 ft is 11 C • 3000 ft is 9 C • 4000 ft is 7 C • 5000 ft is 5 C • 6000 ft is 3 C • 7000 ft is 1 C	Double the first digit of the altitude – for example 3000 is a 6 – 5000 is a 10 – 7000 is a 14 Now subtract that number from 15 to get the standard temperature. Make all these temperatures positive numbers. *This trick is courtesy of an* *airline dispatcher I know*

Example for Smiley Ck

Subtract the standard temperature in Celsius from the actual outside temperature and add it to the altitude. At Smiley Creek, elevation 7000', after a leisurely late breakfast, OAT is 30 C.
This is a 29 C difference between standard and OAT which means you add 2,900' to your airport altitude to get density altitude.
If the OAT is 30 C, what is the DA?
7,000' + 2,900' = 9,900' DA YIKES!

Power Loading

Is the power your engine makes = (HP)
Divided by the weight of your A/C and stuff in it.
P-to-W = P/W
You want better performance? Take weight out of the A/C!

Compute Your HP with Density Altitude

You're flying a with a 1953 C-180 with a sea level HP of 230 hp @ 2600 RPM
You're taking off at smiley creek, elevation 9,900ft DA after a leisurely late breakfast.
Multiply your SL horsepower 230 by .71
Today you are flying a 163hp airplane!

**Power Loading is significant because a 10% increase in power loading increases ground roll by 20%*

Compute Your Power Loading

To compute the power load, divide your gross weight by your power (2,800 lbs).

- Our fully loaded Cessna 180 at sea level has a power loading of 12
- at 7000 feet with 181hp available - the power loading becomes 15.5

This is significant because a 10% increase in power loading increases ground roll by 20%.
In this case, 30% increase in power loading means a 60% increase in ground roll!

Power Loading

Remember our fully loaded C-180 at sea level has a power loading of 12

- at 9,900 feet with 163hp available the power loading becomes 17.

In this case, 50% increase in power loading means a 100% increase in ground roll!

GEE!

I wonder how much extra horse power you have left to clear that TREE?

Excess HP used for climb at Vy

$$\textbf{= } \frac{\textbf{ROC x GW}}{\textbf{33,000}}$$

Excess HP used for climb at Vy:

Cessna 180= $\frac{1000 \text{ X } 2800}{33{,}000}$

That's 85 HP

Example:	Total HP available at sea level	= 230 HP
	Required for climb at Vy	= 85 HP (at sea level)
	Used to maintain level flight at Vy	= 145 HP (at sea level)
	HP used to maintain level flight at Vy	= 145 HP
	DA from Smiley Ck example	= 9,900 Feet
	Horsepower Available	= 163 HP
	LEVEL FLIGHT (subtract HP necessary)	145 HP
Excess HP Available for climb at 9,900 Ft		**= 18 HP Excess**
		Bummer!

Summary

Temperature affects density altitude and turbulence DA affects aircraft performance.
Your safety is directly dependent on Aircraft performance.