MPH FROM RACECAR HORSEPOWER & WEIGHT

This is our forth feature on math relationships to predict drag race vehicle performance. Recall the relationships presented in '05 DRM Issue #18: *Horsepower from Racecar Weight & Elapse Time.*

HP = (vehicle weight x 200) / (ET x ET x ET)

Going in the other direction, ELAPSE TIME is derived from vehicle weight and HORSEPOWER. That was presented in '07 DRM Issue #2: *ET from Racecar Weight & Horsepower.*

ET = (vehicle weight x 200) to the 1/3 power

In a similar manner, '06 DRM Issue #20 presented *Horsepower from Racecar Weight & Speed.*

HP = vehicle weight x (MPH / 234) x (MPH / 234) x (MPH / 234)

Likewise, going in the other direction, engine HORSEPOWER and vehicle weight can be used to predict racecar SPEED. That relationship is featured next:

MPH = [(horsepower / weight) to the one third power] x 234

Again based on math relationships determined in the '60s (from Chrysler Racing), all of these equations provide a good method to predict or to analyze vehicle performance. That pesky expression for one third power appears again as it did in the '07 DRM Issue #2. A method to handle that solution with a scientific calculator was presented in that issue. Another method is presented in the next example.

TOP ALCOHOL EXAMPLE: A dynomometer power level from Les Davenport is reported to be around 2,500 horsepower. Top Alcohol Funnycar weight is approximately 2,400 pounds. With those values, note the following:

MPH = [(2,500 / 2,400) to the one third power] x 234

MPH = [(1.042) to the one third power] x 234

MPH = [1.014] x 234 = 237 MPH

WITH NO SCIENTIFIC CALCULATOR, you can still determine the one-third power. Simply determine what number in the square brackets [ ] times itself three times equals 1.042 as the solution in the parentheses ( ). Use trial and error for several values. For example:

- Try [1.01] x [1.01] x [1.01] = (1.030) as the solution. That is not enough.
- So try [1.02] x [1.02] x [1.02] = (1.061) as the solution. That is too much.
- Try in between. [1.015] x [1.015] x [1.015] = (1.045) as the solution. That is closer.
- Try [1.014] x [1.014] x [1.014] = (1.0425) as the solution. That is really close.

OTHER IHRA CLASSES: This relationship will now be examined for several classes of quarter mile racing, for various vehicle weights and horsepower levels. Some of the class records were examined in DRM for several vehicles. Without access to specific values, estimates of weights and power levels were made from vehicles that were recognized. Those values were used in the math relation to produce speeds in the ballpark of those for the various classes.

IHRA class	Est. weight	Est. horse-power	MPH
Pro Mod blown	2,800	2,200	216
Pro Mod NOS	2,450	1,920	216
Pro Stock	2,450	1,800	211
Top Dragster	2,000	1,600	217
Top Dragster	2,000	1,300	203
Pro Sportsman	2,500	1,600	202
SS/PCA	3,000	800	151
SS/PGA	3,100	600	135
SS/AM	2,900	1,000	164
SS/GTDA	3,200	600	134
B/SA	3,500	500	122
IT/SA	3,100	170	89
H/CM	3,100	400	118
J/CM	3,100	330	111
S/GTD	2,900	300	110
H/PS	3,800	280	98

*Racecar weights and power levels were estimates based on the vehicles used by several class record holders.

Horsepower can be derived from engine dynomometer tests or from previous runs. Then that value can be used with racecar weight to check your speed in subsequent runs. Keep in mind that your power level can vary with air density ('06 DRM Issue #8: Air Density Effect: Pressure & Temperature and '06 DRM Issue #9: Air density and Humidity).

THE EIGHTH MILE: As we did in previous math articles, the MPH in the eighth mile can be likewise determined. From '06 DRM #20, recall the following:

HP = vehicle weight x (MPH* / 187) x (MPH / 187) x (MPH / 187)

With that in mind going in the other direction, note the following:

MPH* = [(horsepower / vehicle weight) to the one third power] x 187

MPH in the 1/8th mile

Examining a few of the classes from the previous table for the EIGHTH MILE SPEED:

IHRA class	Est. weight	Est. horse-power	MPH 1/8th
SS/PGA	3,100	600	108
B/SA	3,500	500	98
H/CM	3,100	400	95

ANALYSIS: Most quarter mile time slips also provide eighth mile values. Look at that incremental value from your quarter mile runs. Of course, if you are making an assault on the eighth mile, you can do the eighth mile math for those time slips also. If your racecar values do not quite add up from these relationships, change the multipliers for a better fit. Then with your custom (and even proprietary) analysis methods, you can better determine if overall performance is up or down on subsequent runs. You can determine if your performance is up or down in the early part of the race or later in the race with these relations.

REFERENCE: Les Davenport, Acceleration Enterprises, Box 38, Site 6 RR 1, Dewinton, Alberta, Canada, T0L0X0 (403) 938 6200

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Bob Szabo is an owner / driver of a blown alcohol drag racecar and one of the few technical racing book authors. His new manual, "5,000 Horsepower on Methanol with Nitro, Racing Gas, Nitrous, & Ethanol Technology"; covering fuel injection, carburetor, normally aspirated, supercharged, & turbocharged setups. His current manual, "Fuel Injection Racing Secrets" provides technical information for mechanical fuel injection. Both are popular gifts for birthday, Mother's or Father's Day, & anniversaries. Check the DRM Yellow Pages for Szabo Publishing or the Internet at http://www.racecarbook.com or call (707) 446 2917.