

Pulse ✓

Sys. pressure ✓

Pulse pressure ✓

Dyn. Rt. ✓

" Lt. ✓

Hb. ✓

Pb in faeces ✓

" " " neg. per gram ash ✓

" " urine ✓

" " " " " liter ✓

Height ✓

Wt. ✓

Age ✓

Costal angle ✓

Garage Mechanics Exposure

Costal Angle

Costal angle in degrees	f	x	fx	fx ²
10 - 19	11	0	0	0
20 - 29	24	1	24	24
30 - 39	30	2	60	120
40 - 49	47	3	141	423
50 - 59	40	4	160	640
60 - 69	23	5	115	575
70 - 79	6	6	36	216
80 - 89	1	7	7	49
90 -	2	8	16	128
	<u>184</u>		<u>559</u>	<u>2175</u>

No information 17.

$$Nu_1 = \frac{559}{184} = 3.038043$$

$$Nu_2 = \frac{2175}{184} = 11.820652$$

$$(Nu_1)^2 = 9.229705$$

$$Pi_2 = 2.590947$$

$$Sigma = 1.6096418 \times 10 = 16.096418$$

$$P.E. \text{ sig.} = \frac{.67449 \times 16.096418}{\sqrt{368}}$$

$$= \frac{10.856873}{19.183326}$$

$$= \pm .565950$$

$$\text{mean} = 3.038043 \times 10 + 15$$

$$= 45.380430 \text{ degrees}$$

$$P.E. \text{ m} = \frac{10.856873}{\sqrt{184}}$$

$$= \frac{10.856873}{13.564659}$$

$$= \pm .800379$$

$$\text{mean} = 45.380 \pm .800 \text{ degrees}$$

$$S.D. = 16.096 \pm .566 \text{ degrees}$$

Garage Mechanics Exposure

Age				
Age in years	f	x	fx	fx ²
15 - 20	16	0	0	0
21 - 26	39	1	39	39
27 - 32	30	2	60	120
33 - 38	58	3	174	522
39 - 44	33	4	132	528
45 - 50	13	5	65	325
51 - 56	7	6	42	252
57 - 62	5	7	35	245
	<u>201</u>		<u>547</u>	<u>2031</u>

$$Nu_1 = \frac{547}{201} = 2.721393$$

$$Nu_2 = \frac{2031}{201} = 10.104479$$

$$(Nu_1)^2 = 7.405979$$

$$Pi_2 = 10.104479 - 7.405979$$

$$= 2.698500$$

$$\text{Sigma} = 1.642711 \times 6 = 9.856266 \text{ years}$$

$$\text{P.E. sig.} = \frac{.67449 \times 9.856266}{\sqrt{402}}$$

$$= \frac{6.647953}{20.049937}$$

$$= \pm .3315697$$

$$\text{mean} = 2.721393 \times 6 + 18$$

$$= 34.328358 \text{ years}$$

$$\text{P.E.}_m = \frac{6.647953}{\sqrt{201}}$$

$$= \frac{6.647953}{14.177446}$$

$$= \pm .468910$$

$$\text{mean} = 34.328 \pm .469 \text{ years}$$

$$\text{S.D.} = 9.856 \pm .332 \text{ years}$$

KE 0019042

Garage Mechanics Exposure

Weight in pounds	f	x	fx	fx ²
100 - 114	1	0	0	0
115 - 129	10	1	10	10
130 - 144	41	2	82	164
145 - 159	49	3	147	441
160 - 174	47	4	188	742
175 - 189	23	5	115	575
190 - 204	13	6	78	468
205 - 219	5	7	35	245
220 - 234	0	8	0	0
235 - 249	1	9	9	81
250 - 264	0	10	0	0
265 - 279	1	11	11	121
	<u>191</u>		<u>675</u>	<u>2847</u>

No information 10

$$Nu_1 = \frac{675}{191} = 3.534031$$

$$Nu_2 = \frac{2847}{191} = 14.905759$$

$$(Nu_1)^2 = 12.489375$$

$$Pi_2 = 14.905759 - 12.489375$$

$$= 2.416384$$

$$Sigma = 1.554472 \times 15$$

$$= 23.317080 \text{ pounds}$$

$$P.E. \text{ sig.} = \frac{.67449 \times 23.317080}{\sqrt{382}}$$

$$= \frac{15.727137}{19.544820}$$

$$= \pm .805$$

$$\text{mean} = 3.534031 \times 15 + 107.5$$

$$= 53.010465 + 107.5$$

$$= 160.510465 \text{ pounds}$$

$$P.E. \text{ m} = \frac{.67449 \times 23.317080}{\sqrt{191}}$$

$$= \frac{15.727137}{13.820274}$$

$$= \pm 1.137970 \dots$$

$$\text{mean} = 160.510 \pm 1.138 \text{ pounds}$$

$$S.D. = 23.317 \pm .805 \text{ pounds}$$

KE 0019043 -

Garage Mechanics Exposure

Height				
Height in inches	f	x	fx	fx ²
60 - 60.9	3	0	0	0
61 - 61.9	1	1	1	1
62 - 62.9	0	2	0	0
63 - 63.9	2	3	6	18
64 - 64.9	7	4	28	112
65 - 65.9	8	5	40	200
66 - 66.9	25	6	150	900
67 - 67.9	29	7	203	1421
68 - 68.9	30	8	240	1920
69 - 69.9	18	9	162	1458
70 - 70.9	26	10	260	2600
71 - 71.9	20	11	220	2420
72 - 72.9	14	12	168	2016
73 - 73.9	1	13	13	169
74 - 74.9	4	14	56	784
75 -	1	15	15	225
	<u>189</u>		<u>1562</u>	<u>14244</u>

No information 12

$$Nu_1 = \frac{1562}{189} = 8.264550$$

$$Nu_2 = \frac{14244}{189} = 75.365070$$

$$(Nu_1)^2 = 68.302787$$

$$Pi_2 = 75.365070 - 68.302787$$

$$= 7.062283$$

$$Sigma = 2.657496 \times 1 = 2.657 \text{ inches}$$

$$P.E. \text{ sig.} = \frac{.67449 \times 2.657}{\sqrt{578}} = \frac{.1792112}{19.442222} = \pm .009$$

$$\text{mean} = 8.264550 \times 1 + 60.5 = 68.764550 \text{ inches}$$

$$P.E. \text{ m} = \frac{.67449 \times 2.657}{\sqrt{189}} = \frac{.1792112}{13.747727}$$

$$= \pm .013$$

$$\text{mean} = 68.765 \pm .013 \text{ inches}$$

$$S.D. = 2.657 \pm .009 \text{ inches}$$

KE 0019044

Garage Mechanics Exposure

Pb in Urine mgs./Liter

Mgs. Pb per liter urine	f	x	fx	fx ²
.0 - .039	45	0	0	0
.04 - .079	76	1	76	76
.08 - .119	34	2	68	136
.12 - .159	16	3	48	144
.16 - .199	5	4	20	80
.20 - .239	3	5	15	75
.24 - .279	3	6	18	108
.28 - .319	3	7	21	147
.32 - .359	1	8	8	64
.36 - .399	1	9	9	81
.40 - .439	1	10	10	100
.44 - .479	1	11	11	121
.48 - .519	1	12	12	144
.52 -	3	13	39	507
	193		355	1783

No information 8.

$$Nu_1 = \frac{355}{193} = 1.839378$$

$$Nu_2 = \frac{1783}{193} = 9.238341$$

$$(Nu_1)^2 = 3.383311$$

$$Pi_2 = 9.238341 - 3.383311$$

$$= 5.855030$$

$$\text{Sigma} = \sqrt{5.855030} = 2.419717$$

$$= 2.419717 \times .04 =$$

$$= .097 \text{ mgs.}$$

$$\text{P.E. sig.} = \frac{.67449 \times .097}{\sqrt{386}} = \frac{.065}{19.6}$$

$$= \pm .003$$

$$\text{mean} = 1.839378 \times .04 + .02 = .073575 + .02$$

$$= .093575 \text{ mgs.}$$

$$\text{P.E.}_m = \frac{.67449 \times .097}{\sqrt{193}} = \frac{.065}{13.892}$$

$$= \pm .005$$

$$\text{mean} = .093575 \pm .005 \text{ mgs.}$$

$$\text{S.D.} = .097 \pm .003 \text{ mgs.}$$

Wide variability
indicated by S.D.
being larger than
the mean.

KE 0019045

Garage Mechanics Exposure

Pb in Urine (Total)

Pb in urine mgrs.	f	x	fx	fx ²
.0 - .039	17	0	0	0
.04 - .079	39	1	39	39
.08 - .119	46	2	92	184
.12 - .159	33	3	99	297
.16 - .199	24	4	96	384
.20 - .239	10	5	50	250
.24 - .279	7	6	42	252
.28 - .319	5	7	35	245
.32 - .359	2	8	16	128
.36 - .399	3	9	27	243
.40 - .439	0	10	0	0
.44 - .479	2	11	22	242
.48 - .519	0	12	0	0
.52 -	5	13	65	845
	<u>193</u>		<u>583</u>	<u>3109</u>

No information 8.

$$Nu_1 = \frac{583}{193} = 3.020725$$

$$Nu_2 = \frac{3109}{193} = 16.108808$$

$$(Nu_1)^2 = 9.124780$$

$$Pi_2 = 16.108808 - 9.124780 = 6.984028$$

$$\text{Sigma} = 2.642731 \times .04 = .105709 \text{ mgrs.}$$

$$\begin{aligned} \text{P.E. sig.} &= \frac{.67449 \times .105709}{\sqrt{586}} \\ &= \frac{.071300}{19.646883} \end{aligned}$$

$$= \pm .003629$$

$$\text{mean} = 3.020725 \times .04 + .02$$

$$= .140829$$

$$\begin{aligned} \text{P.E.}_m &= \frac{.67449 \times .105709}{\sqrt{193}} \\ &= \frac{.071300}{13.892443} \end{aligned}$$

$$= \pm .005132$$

$$\text{mean} = .141 \pm .005 \text{ mgrs. Pb}$$

$$\text{S.D.} = .106 \pm .004 \text{ mgrs.}$$

KE 0019046

Garage Mechanics Exposure

Pb in Faeces mg./grm. Ash

Mgs. Pb per grm. ash	f	x	fx	fx ²
.0 - .039	5	0	0	0
.04 - .079	51	1	51	51
.08 - .119	54	2	108	216
.12 - .159	36	3	108	324
.16 - .199	18	4	72	288
.20 - .239	8	5	40	200
.24 - .279	4	6	24	144
.28 - .319	4	7	28	196
.32 - .359	1	8	8	64
.36 - .399	0	9	0	0
.40 - .439	0	10	0	0
.44 - .479	3	11	33	363
.48 - .519	0	12	0	0
.52 -	4	13	52	676
	188		524	2522

No information 13.

$$Nu_1 = \frac{524}{188} = 2.787234$$

$$Nu_2 = \frac{2522}{188} = 13.414893$$

$$(Nu_1)^2 = 7.768673$$

$$Pi_2 = 13.414893 - 7.768673 = 5.646220$$

$$Pi_2 = \text{Sigma} = 2.376178 \times .04 = .095 \text{ mgs.}$$

$$\begin{aligned} \text{P.E. sig.} &= \frac{.67449 \times .095}{\sqrt{376}} \\ &= \frac{.064}{19.39} = \pm .003 \end{aligned}$$

$$\begin{aligned} \text{mean} &= Nu_1 \times .04 + .02 \\ &= 2.787234 \times .04 + .02 \\ &= .111489 + .02 = .131489 \text{ mgs.} \end{aligned}$$

$$\begin{aligned} \text{P.E.m} &= \frac{.67449 \times .095}{\sqrt{188}} = \frac{.064077}{13.711309} \\ &= \pm .005 \end{aligned}$$

$$\text{mean} = .131489 \pm .005 \text{ mgs.}$$

$$\text{S.D.} = .095 \pm .003 \text{ mgs.}$$

KE 0019047

Garage Mechanics Exposure

Pb in Faeces (total)

Pb in faeces (total) mgrs.	f	x	fx	fx ²
.0 - .079	5	0	0	0
.08 - .159	26	1	26	26
.16 - .239	33	2	66	132
.24 - .319	25	3	75	225
.32 - .399	28	4	112	448
.40 - .479	17	5	85	425
.48 - .559	13	6	78	468
.56 - .639	8	7	56	392
.64 - .719	7	8	56	448
.72 - .799	7	9	63	567
.80 - .879	3	10	30	300
.88 - .959	1	11	11	121
.96 - 1.039	2	12	24	288
1.04 - 1.119	3	13	39	507
1.12 -	10	14	140	1960
	188		861	6307

No information 13

$$Nu_1 = \frac{861}{188} = 4.579789$$

$$Nu_2 = \frac{6307}{188} = 33.547872$$

$$(Nu_1)^2 = 20.974449$$

$$Pi_2 = 33.547872 - 20.974449 = 12.573423$$

$$\text{Sigma} = 3.545902 \times .08 = .283672 \text{ mgrs.}$$

$$\text{P.E. sig.} = \frac{.67449 \times .283672}{\sqrt{376}} = \frac{.191334}{19.390719}$$

$$= \pm .0098672$$

High frequency in last group increases mean value considerably.

$$\text{mean} = 4.579789 \times .08 + .04 = .406383 \text{ mgrs.}$$

$$\text{P.E.}_m = \frac{.67449 \times .283672}{\sqrt{188}} = \frac{.191334}{13.711309}$$

$$= \pm .013954$$

$$\text{mean} = .406 \pm .014 \text{ mgrs. Pb}$$

$$\text{S.D.} = .284 \pm .010 \text{ mgrs.}$$

Garage Mechanics Exposure

Haemoglobin

DARE haemoglobin
reading

	f	x	fx	fx ²
70 - 71.9	2	0	0	0
72 - 73.9	3	1	3	3
74 - 75.9	8	2	16	32
76 - 77.9	4	3	12	36
78 - 79.9	12	4	48	192
80 - 81.9	41	5	205	1025
82 - 83.9	20	6	120	720
84 - 85.9	40	7	280	1960
86 - 87.9	13	8	104	832
88 - 89.9	15	9	135	1215
90 - 91.9	24	10	240	2400
92 -	15	11	165	1815
	197		1328	10230

No information 4.

$$Nu_1 = \frac{1328}{197} = 6.741117$$

$$Nu_2 = \frac{10230}{197} = 51.928934$$

$$(Nu_1)^2 = 45.442658$$

$$Pi_2 = 6.486276$$

$$\text{Sigma} = 2.546817 \times 2 = 5.093634\% \text{ DARE}$$

$$\text{P.E. sig.} = \frac{.67449 \times 5.093634}{\sqrt{394}} = \frac{3.435605}{198.4943500} = \pm .001730$$

$$\text{mean} = 6.741117 \times 2 + 71.5$$

$$= 76.593634\% \text{ DARE}$$

$$\text{P.E.}_m = \frac{3.435605}{\sqrt{197}}$$

$$= \frac{3.435605}{14.035668}$$

$$= \pm .244776$$

$$\text{mean} = 76.594 \pm .245\% \text{ DARE}$$

$$\text{S.D.} = 5.094 \pm .002\% \text{ DARE}$$

Note tendency of
readings to be grouped
at 80, 85 and 90.

KE 0019049

Garage Mechanics Exposure

Dynamometer Left

Dynamometer reading	f	x	fx	fx ²
50 - 59	4	0	0	0
60 - 69	3	1	3	3
70 - 79	8	2	16	32
80 - 89	30	3	90	270
90 - 99	47	4	188	752
100 - 109	42	5	210	1050
110 - 119	20	6	120	720
120 - 129	25	7	175	1225
130 - 139	5	8	40	320
140 - 149	5	9	45	405
150 - 159	1	10	10	100
160 -	2	11	22	242
	<u>192</u>		<u>919</u>	<u>5119</u>

No information 9

$$Nu_1 = \frac{919}{192} = 4.786458$$

$$Nu_2 = \frac{5119}{192} = 26.661458$$

$$(Nu_1)^2 = 22.910180$$

$$Pi_2 = 3.751278$$

$$\text{Sigma} = 1.936822 \times 10 = 19.368220 \text{ degrees}$$

$$\text{P.E. sig.} = \frac{.67449 \times 19.368220}{19.595915} = \frac{13.063671}{19.595915}$$

$$= \pm .666653$$

$$\text{mean} = 4.786458 \times 10 + 55$$

$$= 102.864580 \text{ degrees}$$

$$\text{P.E.}_m = \frac{.67449 \times 19.368220}{13.856407}$$

$$= \frac{13.063671}{13.856407}$$

$$= \pm .942789$$

$$\text{mean} = 102.865 \pm .943 \text{ degrees}$$

$$\text{S.D.} = 19.368 \pm .667 \text{ degrees}$$

KE 0019050

Garage Mechanics Exposure

Dynamometer Right

Dynamometer reading	f	x	fx	fx ²
60 - 69	1	0	0	0
70 - 79	3	1	3	3
80 - 89	9	2	18	36
90 - 99	29	3	87	261
100 - 109	40	4	160	640
110 - 119	28	5	140	700
120 - 129	33	6	198	1188
130 - 139	22	7	154	1078
140 - 149	19	8	152	1216
150 - 159	7	9	63	567
160 -	<u>1</u>	10	<u>10</u>	<u>100</u>
	192		985	5789

No information 9

$$Nu_1 = \frac{985}{192} = 5.130208$$

$$Nu_2 = \frac{5789}{192} = 30.151041$$

$$(Nu_1)^2 = 26.319034$$

$$Pi_2 = 3.832007$$

$$Sigma = 1.957550 \times 10 = 19.575500$$

$$P.E. sig. = \frac{.67449 \times 19.575500}{384}$$

$$= \frac{13.203479}{19.595915}$$

$$= \pm .673787$$

$$mean = 5.130208 \times 10 + 65$$

$$= 116.30208 \text{ degrees on dyn.}$$

$$P.E._m = \frac{13.203479}{192}$$

$$= \frac{13.203479}{13.856407}$$

$$= \pm .952879$$

$$mean = 116.302 \pm .953 \text{ degrees on dyn.}$$

$$S.D. = 19.576 \pm .674 \text{ degrees on dyn.}$$

KE 0019051

Garage Mechanics Exposure

Pulse Pressure

Pulse pressure

mm. Hg	f	x	fx	fx ²
20 - 24	4	0	0	0
25 - 29	2	1	2	2
30 - 34	14	2	28	56
35 - 39	22	3	66	198
40 - 44	42	4	168	672
45 - 49	28	5	140	700
50 - 54	30	6	180	1080
55 - 59	18	7	126	882
60 - 64	18	8	144	1152
65 - 69	7	9	63	567
70 - 74	6	10	60	600
75 - 79	6	11	66	726
80 -	2	12	24	288
	<u>199</u>		<u>1067</u>	<u>6923</u>

No information 2.

$$Nu_1 = \frac{1067}{199} = 5.361809$$

$$Nu_2 = \frac{6923}{199} = 34.788944$$

$$(Nu_1)^2 = 28.748996$$

$$Pi_2 = 6.039948$$

$$\text{Sigma} = 2.457631 \times 5 = 12.288155 \text{ mms.}$$

$$\begin{aligned} \text{P.E. sig.} &= \frac{.67449 \times 12.288155}{\sqrt{398}} \\ &= \frac{8.288238}{19.949937} \\ &= \pm .415452 \end{aligned}$$

$$\text{mean} = 5.361809 \times 5 + 22.5$$

$$= 49.309045 \text{ mms. Hg}$$

$$\begin{aligned} \text{P.E.}_m &= \frac{8.288238}{\sqrt{199}} \\ &= \frac{8.288238}{14.106735} \\ &= \pm .587538 \end{aligned}$$

$$\text{mean} = 49.309 \pm .588 \text{ mms. Hg}$$

$$\text{S.D.} = 12.288 \pm .415 \text{ mms. Hg}$$

KE 0019052

Garage Mechanics Exposure

Systolic Pressure

Systolic pressure

mm Hg.	f	x	fx	fx ²
80 - 89	1	0	0	0
90 - 99	4	1	4	4
100 - 109	16	2	32	64
110 - 119	52	3	156	468
120 - 129	62	4	248	992
130 - 139	36	5	180	900
140 - 149	18	6	108	648
150 - 159	5	7	35	245
160 - 169	4	8	32	256
170 - 179	0	9	0	0
180 -	2	10	20	200
	<u>200</u>		<u>815</u>	<u>3777</u>

No information 1

$$Nu_1 = \frac{815}{200} = 4.075000$$

$$Nu_2 = \frac{3777}{200} = 18.885000$$

$$(Nu_1)^2 = 16.605625$$

$$Pi_2 = 18.885000 - 16.605625 = 2.279375$$

$$Sigma = 1.509760 \times 10 = 15.097600 \text{ mm}$$

$$P.E. \text{ sig.} = \frac{.67449 \times 15.0976}{\sqrt{400}} = \frac{10.183180}{20}$$

$$= \pm .509159$$

$$\text{mean} = 4.075000 \times 10 + 85$$

$$= 125.750 \text{ mm Hg.}$$

$$P.E.m = \frac{.67449 \times 15.0976}{\sqrt{200}}$$

$$= \frac{10.183180}{14.142135}$$

$$= \pm .720059$$

$$\text{mean} = 125.750 \pm .720 \text{ mm Hg}$$

$$S.D. = 15.098 \pm .509 \text{ mm Hg}$$

KE 0019053

Garage Mechanics Exposure

Pulse

Pulse in beats per minute	f	x	fx	fx ²
40 - 49	1	0	0	0
50 - 59	3	1	3	3
60 - 69	33	2	66	132
70 - 79	65	3	195	585
80 - 89	62	4	248	992
90 - 99	24	5	120	600
100 - 109	9	6	54	324
110 - 119	1	7	7	49
120 - 129	2	8	16	128
	<u>200</u>		<u>709</u>	<u>2813</u>

No information 1

$$Nu_1 = \frac{709}{200} = 3.045000$$

$$Nu_2 = \frac{2813}{200} = 14.065000$$

$$(Nu_1)^2 = 9.272025$$

$$Pi_2 = 14.065000 - 9.272025$$

$$= 4.792975$$

$$Sigma = 2.189286 \times 10$$

$$= 21.892860 \text{ beats}$$

$$P.E. \text{ sigma} = \frac{.67449 \times 21.892860}{20}$$

$$= \frac{14.766515}{20}$$

$$= \pm .7383257$$

$$\text{mean} = 3.045000 \times 10 + 45$$

$$= 75.450000$$

$$P.E. \text{ m} = \frac{.67449 \times 21.892860}{200}$$

$$= \frac{14.766515}{14.142135}$$

$$= \pm 1.044150$$

$$\text{mean} = 75.450 \pm 1.044 \text{ beats per minute}$$

$$S.D. = 21.893 \pm .738 \text{ beats}$$

KE 0019054

Garage Mechanics Exposure

Temperature

Temperature in °F.	f	x	fx	fx ²
96 - 96.49	2	0	0	0
96.5 - 96.99	2	1	2	2
97 - 97.49	10	2	20	40
97.5 - 97.99	16	3	48	144
98 - 98.49	67	4	268	1072
98.5 - 98.99	62	5	310	1550
99 - 99.49	32	6	192	1152
99.5 - 99.99	6	7	42	294
100 -	1	8	8	64
	<u>198</u>		<u>890</u>	<u>4318</u>

No information 3

$$Nu_1 = \frac{890}{198} = 4.494949$$

$$Nu_2 = \frac{4318}{198} = 21.808080$$

$$(Nu_1)^2 = 20.204567$$

$$Pi_2 = 21.808080 - 20.204567$$

$$= 1.603513$$

$$Sigma = 1.268298 \times .5$$

$$= .634149^\circ \text{ F.}$$

$$P.E. \text{ sig.} = \frac{.67449 \times .634149}{\sqrt{396}}$$

$$= \frac{.427727}{19.899748}$$

$$= \pm .021$$

$$\text{mean} = 4.494949 \times .5 + 96.25$$

$$= 2.247474 + 96.25$$

$$= 98.497494^\circ \text{ F.}$$

$$P.E. \text{ m} = \frac{.67449 \times .634149}{\sqrt{198}}$$

$$= \frac{.427727}{14.071247}$$

$$= \pm .030$$

$$\text{mean} = 98.497 \pm .030 \text{ degrees F.}$$

$$S.D. = .634 \pm .021 \text{ degrees F.}$$

KE 0019055