

Status Oct3 2021.

CALPERE function (additional comments to the TXT file) :

it calculates the perimeter of an ellipse by the given halfparameter a and b.

HowTo (can be done manually; take only $b > a$):

a) solve t which will verify $((\pi/4)*t**AE) - ((1/2) - (\text{SQRT}(2)/\pi))*\sin(\pi*t) = (\pi/2) - \text{atan}(b/a)$

b) with the t from above, calculate $(\text{SQRT}(a**2+b**2))/(1 - ((1/2) - (\text{SQRT}(2)/\pi))*(\cos(\pi*t)-1))$

c) the result of it is your perimeter

$AE = 1000*ae$ ($ae = 1.15965218091$; see page 3 of https://www.physik.uzh.ch/dam/jcr:3efb63a6-21c8-4481-bbb0-c0e2a4aa4d8d/kt19_protonff.pdf or page 56 of <https://arxiv.org/pdf/1909.12245.pdf> which is called the electron magnetic moment anomaly, ae , is: $ae \approx 1.15965218091 \times 10^{-3}$ see page 351 of ISBN 978-3-030-36418-2).

Why this „ ae “ factor (from quantum mechanic) appear here is not explained for now.

Maximum deviation of the CALPERE calculus: 0.025% on the HP41 with the current SOLVING and serial calculation setups.

See results below of CMPPERE for 100 steps of an isoperimeter of 4.

CALPERE cannot be considered for now as an approximation function:

a) identification of used curve of type „cycloid“ and a point of it must be found (numerically)

b) constant ae from quantum mechanic is used

ELLIPSE CALC
ISOPERIME OF
4.000000000 ***
IN
100.0000000 ***
STEPS

X & Y

0.636619771 ***

0.636619774 ***

CALPERE

4.000000000 ***

in % vs PERIM:

0.000000000 ***

RADIUS & ANGLE

0.900316316 ***

0.785398162 ***

X & Y

0.630253573 ***

0.642954297 ***

CALPERE

4.000003944 ***

in % vs PERIM:

0.000098600 ***

RADIUS & ANGLE

0.900338711 ***

0.775423121 ***

X & Y

0.623887376 ***

0.649226087 ***

CALPERE

4.000015216 ***

in % vs PERIM:

0.000380400 ***

RADIUS & ANGLE

0.900405447 ***

0.765497843 ***

X & Y

0.617521178 ***

0.655436030 ***

CALPERE

4.000033028 ***

in % vs PERIM:

0.000825700 ***
RADIUS & ANGLE
0.900515849 ***
0.755622107 ***

X & Y
0.611154980 ***
0.661584965 ***
CALPERE
4.000056620 ***

in % vs PERIM:
0.001415500 ***
RADIUS & ANGLE
0.900669238 ***
0.745795715 ***

X & Y
0.604788783 ***
0.667673702 ***
CALPERE
4.000085280 ***

in % vs PERIM:
0.002132000 ***
RADIUS & ANGLE
0.900864942 ***
0.736018477 ***

X & Y
0.598422585 ***
0.673703000 ***
CALPERE
4.000118324 ***
in % vs PERIM:
0.002958100 ***

RADIUS & ANGLE

0.901102282 ***

0.726290222 ***

X & Y

0.592056387 ***

0.679673589 ***

CALPERE

4.000155124 ***

in % vs PERIM:

0.003878100 ***

RADIUS & ANGLE

0.901380582 ***

0.716610789 ***

X & Y

0.585690189 ***

0.685586159 ***

CALPERE

4.000195048 ***

in % vs PERIM:

0.004876200 ***

RADIUS & ANGLE

0.901699162 ***

0.706980030 ***

X & Y

0.579323992 ***

0.691441368 ***

CALPERE

4.000237536 ***

in % vs PERIM:

0.005938400 ***

RADIUS & ANGLE

0.902057344 ***
0.697397801 ***

X & Y

0.572957794 ***
0.697239845 ***

CALPERE

4.000282048 ***

in % vs PERIM:

0.007051200 ***

RADIUS & ANGLE

0.902454450 ***
0.687863968 ***

X & Y

0.566591596 ***
0.702982181 ***

CALPERE

4.000328068 ***

in % vs PERIM:

0.008201700 ***

RADIUS & ANGLE

0.902889796 ***
0.678378402 ***

X & Y

0.560225399 ***
0.708668945 ***

CALPERE

4.000375116 ***

in % vs PERIM:

0.009377900 ***

RADIUS & ANGLE

0.903362702 ***

0.668940980 ***

X & Y

0.553859201 ***

0.714300676 ***

CALPERE

4.000422752 ***

in % vs PERIM:

0.010568800 ***

RADIUS & ANGLE

0.903872485 ***

0.659551579 ***

X & Y

0.547493003 ***

0.719877883 ***

CALPERE

4.000470552 ***

in % vs PERIM:

0.011763800 ***

RADIUS & ANGLE

0.904418463 ***

0.650210081 ***

X & Y

0.541126806 ***

0.725401051 ***

CALPERE

4.000518120 ***

in % vs PERIM:

0.012953000 ***

RADIUS & ANGLE

0.904999947 ***

0.640916370 ***

X & Y

0.534760608 ***

0.730870638 ***

CALPERE

4.000565080 ***

in % vs PERIM:

0.014127000 ***

RADIUS & ANGLE

0.905616253 ***

0.631670329 ***

X & Y

0.528394410 ***

0.736287080 ***

CALPERE

4.000611100 ***

in % vs PERIM:

0.015277500 ***

RADIUS & ANGLE

0.906266692 ***

0.622471841 ***

X & Y

0.522028212 ***

0.741650789 ***

CALPERE

4.000655856 ***

in % vs PERIM:

0.016396400 ***

RADIUS & ANGLE

0.906950576 ***

0.613320789 ***

X & Y
0.515662015 ***
0.746962154 ***
CALPERE
4.000699064 ***
in % vs PERIM:
0.017476600 ***
RADIUS & ANGLE
0.907667215 ***
0.604217052 ***

X & Y
0.509295817 ***
0.752221542 ***
CALPERE
4.000740440 ***
in % vs PERIM:
0.018511000 ***
RADIUS & ANGLE
0.908415916 ***
0.595160507 ***

X & Y
0.502929619 ***
0.757429298 ***
CALPERE
4.000779744 ***
in % vs PERIM:
0.019493600 ***
RADIUS & ANGLE
0.909195988 ***
0.586151030 ***

X & Y

0.496563422 ***
0.762585748 ***
CALPERE
4.000816744 ***
in % vs PERIM:
0.020418600 ***
RADIUS & ANGLE
0.910006733 ***
0.577188492 ***

X & Y
0.490197224 ***
0.767691194 ***
CALPERE
4.000851224 ***
in % vs PERIM:
0.021280600 ***
RADIUS & ANGLE
0.910847455 ***
0.568272761 ***

X & Y
0.483831026 ***
0.772745923 ***
CALPERE
4.000883004 ***
in % vs PERIM:
0.022075100 ***
RADIUS & ANGLE
0.911717458 ***
0.559403698 ***

X & Y
0.477464829 ***

0.777750203 ***
CALPERE
4.000911916 ***
in % vs PERIM:
0.022797900 ***
RADIUS & ANGLE
0.912616042 ***
0.550581161 ***

X & Y
0.471098631 ***
0.782704277 ***
CALPERE
4.000937796 ***
in % vs PERIM:
0.023444900 ***
RADIUS & ANGLE
0.913542503 ***
0.541805003 ***

X & Y
0.464732433 ***
0.787608376 ***
CALPERE
4.000960524 ***
in % vs PERIM:
0.024013100 ***
RADIUS & ANGLE
0.914496139 ***
0.533075070 ***

X & Y
0.458366235 ***
0.792462713 ***

CALPERE

4.000979972 ***

in % vs PERIM:

0.024499300 ***

RADIUS & ANGLE

0.915476246 ***

0.524391202 ***

X & Y

0.452000038 ***

0.797267478 ***

CALPERE

4.000996044 ***

in % vs PERIM:

0.024901100 ***

RADIUS & ANGLE

0.916482114 ***

0.515753235 ***

X & Y

0.445633840 ***

0.802022846 ***

CALPERE

4.001008652 ***

in % vs PERIM:

0.025216300 ***

RADIUS & ANGLE

0.917513033 ***

0.507160997 ***

X & Y

0.439267642 ***

0.806728980 ***

CALPERE

4.001017728 ***

in % vs PERIM:

0.025443200 ***

RADIUS & ANGLE

0.918568293 ***

0.498614307 ***

X & Y

0.432901445 ***

0.811386019 ***

CALPERE

4.001023220 ***

in % vs PERIM:

0.025580500 ***

RADIUS & ANGLE

0.919647178 ***

0.490112982 ***

X & Y

0.426535247 ***

0.815994091 ***

CALPERE

4.001025092 ***

in % vs PERIM:

0.025627300 * Worst of all**

RADIUS & ANGLE

0.920748974 ***

0.481656826 ***

X & Y

0.420169049 ***

0.820553300 ***

CALPERE

4.001023308 ***

in % vs PERIM:

0.025582700 ***

RADIUS & ANGLE

0.921872957 ***

0.473245642 ***

X & Y

0.413802852 ***

0.825063741 ***

CALPERE

4.001017860 ***

in % vs PERIM:

0.025446500 ***

RADIUS & ANGLE

0.923018405 ***

0.464879221 ***

X & Y

0.407436654 ***

0.829525492 ***

CALPERE

4.001008760 ***

in % vs PERIM:

0.025219000 ***

RADIUS & ANGLE

0.924184596 ***

0.456557347 ***

X & Y

0.401070456 ***

0.833938609 ***

CALPERE

4.000996016 ***

in % vs PERIM:

0.024900400 ***
RADIUS & ANGLE
0.925370799 ***
0.448279800 ***

X & Y
0.394704258 ***
0.838303140 ***
CALPERE
4.000979660 ***

in % vs PERIM:
0.024491500 ***
RADIUS & ANGLE
0.926576282 ***
0.440046346 ***

X & Y
0.388338061 ***
0.842619108 ***
CALPERE
4.000959732 ***
in % vs PERIM:
0.023993300 ***
RADIUS & ANGLE
0.927800307 ***
0.431856751 ***

X & Y
0.381971863 ***
0.846886528 ***
CALPERE
4.000936296 ***
in % vs PERIM:
0.023407400 ***

RADIUS & ANGLE

0.929042139 ***

0.423710765 ***

X & Y

0.375605665 ***

0.851105393 ***

CALPERE

4.000909408 ***

in % vs PERIM:

0.022735200 ***

RADIUS & ANGLE

0.930301030 ***

0.415608137 ***

X & Y

0.369239468 ***

0.855275685 ***

CALPERE

4.000879168 ***

in % vs PERIM:

0.021979200 ***

RADIUS & ANGLE

0.931576235 ***

0.407548602 ***

X & Y

0.362873270 ***

0.859397363 ***

CALPERE

4.000845660 ***

in % vs PERIM:

0.021141500 ***

RADIUS & ANGLE

0.932866999 ***
0.399531893 ***

X & Y

0.356507072 ***
0.863470377 ***

CALPERE

4.000809004 ***

in % vs PERIM:

0.020225100 ***

RADIUS & ANGLE

0.934172567 ***
0.391557729 ***

X & Y

0.350140875 ***
0.867494652 ***

CALPERE

4.000769304 ***

in % vs PERIM:

0.019232600 ***

RADIUS & ANGLE

0.935492172 ***
0.383625826 ***

X & Y

0.343774677 ***
0.871470107 ***

CALPERE

4.000726716 ***

in % vs PERIM:

0.018167900 ***

RADIUS & ANGLE

0.936825051 ***

0.375735887 ***

X & Y

0.337408479 ***

0.875396629 ***

CALPERE

4.000681364 ***

in % vs PERIM:

0.017034100 ***

RADIUS & ANGLE

0.938170422 ***

0.367887612 ***

X & Y

0.331042281 ***

0.879274103 ***

CALPERE

4.000633432 ***

in % vs PERIM:

0.015835800 ***

RADIUS & ANGLE

0.939527509 ***

0.360080689 ***

X & Y

0.324676084 ***

0.883102388 ***

CALPERE

4.000583084 ***

in % vs PERIM:

0.014577100 ***

RADIUS & ANGLE

0.940895524 ***

0.352314798 ***

X & Y

0.318309886 ***

0.886881326 ***

CALPERE

4.000530516 ***

in % vs PERIM:

0.013262900 ***

RADIUS & ANGLE

0.942273670 ***

0.344589613 ***

X & Y

0.311943688 ***

0.890610741 ***

CALPERE

4.000475928 ***

in % vs PERIM:

0.011898200 ***

RADIUS & ANGLE

0.943661145 ***

0.336904797 ***

X & Y

0.305577491 ***

0.894290437 ***

CALPERE

4.000419524 ***

in % vs PERIM:

0.010488100 ***

RADIUS & ANGLE

0.945057135 ***

0.329260007 ***

X & Y

0.299211293 ***

0.897920203 ***

CALPERE

4.000361552 ***

in % vs PERIM:

0.009038800 ***

RADIUS & ANGLE

0.946460822 ***

0.321654889 ***

X & Y

0.292845095 ***

0.901499803 ***

CALPERE

4.000302252 ***

in % vs PERIM:

0.007556300 ***

RADIUS & ANGLE

0.947871375 ***

0.314089084 ***

X & Y

0.286478898 ***

0.905028982 ***

CALPERE

4.000241880 ***

in % vs PERIM:

0.006047000 ***

RADIUS & ANGLE

0.949287953 ***

0.306562221 ***

X & Y

0.280112700 ***
0.908507468 ***
CALPERE
4.000180708 ***
in % vs PERIM:
0.004517700 ***
RADIUS & ANGLE
0.950709705 ***
0.299073922 ***

X & Y
0.273746502 ***
0.911934959 ***
CALPERE
4.000119024 ***
in % vs PERIM:
0.002975600 ***
RADIUS & ANGLE
0.952135766 ***
0.291623801 ***

X & Y
0.267380304 ***
0.915311139 ***
CALPERE
4.000057124 ***
in % vs PERIM:
0.001428100 ***
RADIUS & ANGLE
0.953565262 ***
0.284211462 ***

X & Y
0.261014107 ***

0.918635664 ***
CALPERE
3.999995335 ***
in % vs PERIM:
-0.000116625 ***
RADIUS & ANGLE
0.954997302 ***
0.276836501 ***

X & Y
0.254647909 ***
0.921908166 ***
CALPERE
3.999933972 ***
in % vs PERIM:
-0.001650700 ***
RADIUS & ANGLE
0.956430982 ***
0.269498504 ***

X & Y
0.248281711 ***
0.925128252 ***
CALPERE
3.999873384 ***
in % vs PERIM:
-0.003165400 ***
RADIUS & ANGLE
0.957865383 ***
0.262197050 ***

X & Y
0.241915514 ***
0.928295503 ***

CALPERE

3.999813918 ***

in % vs PERIM:

-0.004652050 ***

RADIUS & ANGLE

0.959299566 ***

0.254931705 ***

X & Y

0.235549316 ***

0.931409473 ***

CALPERE

3.999755950 ***

in % vs PERIM:

-0.006101250 ***

RADIUS & ANGLE

0.960732579 ***

0.247702030 ***

X & Y

0.229183118 ***

0.934469686 ***

CALPERE

3.999699847 ***

in % vs PERIM:

-0.007503825 ***

RADIUS & ANGLE

0.962163446 ***

0.240507572 ***

X & Y

0.222816921 ***

0.937475635 ***

CALPERE

3.999646000 ***
in % vs PERIM:
-0.008850000 ***
RADIUS & ANGLE
0.963591172 ***
0.233347872 ***

X & Y
0.216450723 ***
0.940426783 ***
CALPERE
3.999594809 ***
in % vs PERIM:
-0.010129775 ***
RADIUS & ANGLE
0.965014741 ***
0.226222459 ***

X & Y
0.210084525 ***
0.943322557 ***
CALPERE
3.999546680 ***
in % vs PERIM:
-0.011333000 ***
RADIUS & ANGLE
0.966433109 ***
0.219130852 ***

X & Y
0.203718327 ***
0.946162350 ***
CALPERE
3.999502011 ***

in % vs PERIM:
-0.012449725 ***
RADIUS & ANGLE
0.967845210 ***
0.212072558 ***

X & Y
0.197352130 ***
0.948945516 ***
CALPERE
3.999461221 ***

in % vs PERIM:
-0.013469475 ***
RADIUS & ANGLE
0.969249945 ***
0.205047075 ***

X & Y
0.190985932 ***
0.951671371 ***
CALPERE
3.999424731 ***

in % vs PERIM:
-0.014381725 ***
RADIUS & ANGLE
0.970646189 ***
0.198053888 ***

X & Y
0.184619734 ***
0.954339186 ***
CALPERE
3.999392940 ***

in % vs PERIM:

-0.015176500 ***
RADIUS & ANGLE
0.972032781 ***
0.191092471 ***

X & Y
0.178253537 ***
0.956948186 ***
CALPERE
3.999366256 ***

in % vs PERIM:
-0.015843600 ***
RADIUS & ANGLE
0.973408524 ***
0.184162285 ***

X & Y
0.171887339 ***
0.959497552 ***
CALPERE
3.999345088 ***

in % vs PERIM:
-0.016372800 ***
RADIUS & ANGLE
0.974772184 ***
0.177262780 ***

X & Y
0.165521141 ***
0.961986408 ***
CALPERE
3.999329799 ***

in % vs PERIM:
-0.016755025 ***

RADIUS & ANGLE

0.976122481 ***

0.170393388 ***

X & Y

0.159154944 ***

0.964413822 ***

CALPERE

3.999320753 ***

in % vs PERIM:

-0.016981175 ***

RADIUS & ANGLE

0.977458090 ***

0.163553533 ***

X & Y

0.152788746 ***

0.966778805 ***

CALPERE

3.999318288 ***

in % vs PERIM:

-0.017042800 ***

RADIUS & ANGLE

0.978777635 ***

0.156742618 ***

X & Y

0.146422548 ***

0.969080299 ***

CALPERE

3.999322698 ***

in % vs PERIM:

-0.016932550 ***

RADIUS & ANGLE

0.980079684 ***
0.149960035 ***

X & Y

0.140056350 ***
0.971317175 ***

CALPERE

3.999334230 ***

in % vs PERIM:

-0.016644250 ***

RADIUS & ANGLE

0.981362744 ***
0.143205156 ***

X & Y

0.133690153 ***
0.973488228 ***

CALPERE

3.999353086 ***

in % vs PERIM:

-0.016172850 ***

RADIUS & ANGLE

0.982625253 ***
0.136477336 ***

X & Y

0.127323955 ***
0.975592168 ***

CALPERE

3.999379398 ***

in % vs PERIM:

-0.015515050 ***

RADIUS & ANGLE

0.983865574 ***

0.129775912 ***

X & Y

0.120957757 ***

0.977627608 ***

CALPERE

3.999413205 ***

in % vs PERIM:

-0.014669875 ***

RADIUS & ANGLE

0.985081986 ***

0.123100201 ***

X & Y

0.114591560 ***

0.979593062 ***

CALPERE

3.999454466 ***

in % vs PERIM:

-0.013638350 ***

RADIUS & ANGLE

0.986272676 ***

0.116449496 ***

X & Y

0.108225362 ***

0.981486927 ***

CALPERE

3.999503012 ***

in % vs PERIM:

-0.012424700 ***

RADIUS & ANGLE

0.987435728 ***

0.109823069 ***

X & Y

0.101859164 ***

0.983307473 ***

CALPERE

3.999558548 ***

in % vs PERIM:

-0.011036300 ***

RADIUS & ANGLE

0.988569105 ***

0.103220163 ***

X & Y

0.095492966 ***

0.985052825 ***

CALPERE

3.999620591 ***

in % vs PERIM:

-0.009485225 ***

RADIUS & ANGLE

0.989670639 ***

0.096639998 ***

X & Y

0.089126769 ***

0.986720945 ***

CALPERE

3.999688487 ***

in % vs PERIM:

-0.007787825 ***

RADIUS & ANGLE

0.990738010 ***

0.090081759 ***

X & Y
0.082760571 ***
0.988309615 ***
CALPERE
3.999761346 ***
in % vs PERIM:
-0.005966350 ***
RADIUS & ANGLE
0.991768726 ***
0.083544602 ***

X & Y
0.076394373 ***
0.989816396 ***
CALPERE
3.999837994 ***
in % vs PERIM:
-0.004050150 ***
RADIUS & ANGLE
0.992760091 ***
0.077027644 ***

X & Y
0.070028176 ***
0.991238607 ***
CALPERE
3.999916953 ***
in % vs PERIM:
-0.002076175 ***
RADIUS & ANGLE
0.993709173 ***
0.070529960 ***

X & Y

0.063661978 ***
0.992573274 ***
CALPERE
3.999996368 ***
in % vs PERIM:
-0.000090800 ***
RADIUS & ANGLE
0.994612765 ***
0.064050583 ***

X & Y
0.057295780 ***
0.993817076 ***
CALPERE
4.000073920 ***
in % vs PERIM:
0.001848000 ***
RADIUS & ANGLE
0.995467321 ***
0.057588492 ***

X & Y
0.050929583 ***
0.994966273 ***
CALPERE
4.000146776 ***
in % vs PERIM:
0.003669400 ***
RADIUS & ANGLE
0.996268893 ***
0.051142610 ***

X & Y
0.044563385 ***

0.996016603 ***

CALPERE

4.000211464 ***

in % vs PERIM:

0.005286600 ***

RADIUS & ANGLE

0.997013023 ***

0.044711790 ***

X & Y

0.038197187 ***

0.996963147 ***

CALPERE

4.000263788 ***

in % vs PERIM:

0.006594700 ***

RADIUS & ANGLE

0.997694613 ***

0.038294809 ***

X & Y

0.031830989 ***

0.997800119 ***

CALPERE

4.000298660 ***

in % vs PERIM:

0.007466500 ***

RADIUS & ANGLE

0.998307713 ***

0.031890353 ***

X & Y

0.025464792 ***

0.998520551 ***

CALPERE

4.000309992 ***

in % vs PERIM:

0.007749800 ***

RADIUS & ANGLE

0.998845207 ***

0.025496995 ***

X & Y

0.019098594 ***

0.999115754 ***

CALPERE

4.000290628 ***

in % vs PERIM:

0.007265700 ***

RADIUS & ANGLE

0.999298277 ***

0.019113169 ***

X & Y

0.012732396 ***

0.999574289 ***

CALPERE

4.000232616 ***

in % vs PERIM:

0.005815400 ***

RADIUS & ANGLE

0.999655377 ***

0.012737130 ***

X & Y

0.006366199 ***

0.999879555 ***

CALPERE

4.000129276 ***
in % vs PERIM:
0.003231900 ***
RADIUS & ANGLE
0.999899821 ***
0.006366880 ***

X & Y
0.000000001 ***
1.000000000 ***
CALPERE
4.000000000 ***
in % vs PERIM:
0.000000000 ***
RADIUS & ANGLE
1.000000000 ***
0.000000001 ***
