SANTA's PHYSICS:

check book for conversions

Assumptions:

Population of Earth

Percentage that is children
OR
Number of children on earth

Percentage of children that believe in Santa
OR
Percentage of "Christian"s of population

CALCULATE: Number of children to deliver to

Number of children per household

CALCULATE: Number of Households

Mass of Santa's sleigh

Mass of Santa

Number of reindeer

Mass of a reindeer

Dimensions of Santa's sleigh

Volume of sleigh

Area of sleigh from below

Area of sleigh from front

Average present mass

Average present height

Average present bottom area

CALCULATE:
total mass of presents

total mass of sleigh, Santa, reindeer

total mass of sleigh, Santa, reindeer, presents

total height of presents (assuming they are not crushed)

what the density of the presents would need to be crushed to to fit in the sleigh and only be 2 meters tall

Assumption: Surface Area of earth:
196,940,400 square miles (509,917,870 square kilometers).

CALCULATE:
Assuming households evenly spread,
Average area between households,

Average distance between households (square root of area)

ASSUMPTIONS:
average hours of nightfall on Dec. 21,
if mostly Northern Hemisphere

Rotation in hours of the earth:

CALCULATE: Total time for Santa to make the journey

Assumptions: Time spent in each household:

The escape velocity (11 km/sec)
Sound = 334 m/s

CALCULATE:
Average time between each household:

Average speed between each household: (Average distance/average time)

maximum speed reached between each household
(average speed times two)
Santa accelerates to max speed for half the distance, half the time, then deaccelerates the rest of the way

the acceleration/deacceleration for each half of the trip between each household

the total force required by the reindeer
F=mA

the work required by the reindeer
W= Fd (half the distance)
the work required by Each reindeer

the power required by the reindeer
P =W/T

the power required by EACH reindeer
(in horsepower??)
in watts?

The work converted to thermal, electrical, or chemical energy units

** Given the thermal energy absorbed by each reindeer over the time of each trip, and its mass, you can calculate the new temperature of the reindeer (assuming it started at zero)...

You can then compare to the cooking/vaporizing temperature of reindeer meat!

The theoretical terminal velocity of the sleigh