MATH BATH

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1. ROUND PEG IN A SQUARE HOLE.

A. PROVE THAT THE CIRCLE OF RADIUS r THAT FITS
EXACTLY INSIDE A SQUARE ACTUALLY TAKES
UP LESS AREA.

B. OF THE DIFFERENCE IN AREA, BY HOW MUCH
IS THAT RELATIVE TO RADIUS r.

2. YOU'RE IN HOT WATER.

A. IF THE COPPER PIPE IN YOUR HOUSE IS
1 INCH IN DIAMETER AND YOUR HOT WATER HEATER IS
32 FEET FROM THE BATHROOM TAP, WITH REGARDS AS TO HOW THE SNAKING PIPE GOES, IF NORMALLY THE

WATER IS AT ROOM TEMPERATURE, SAY AT 70 DEGREES, AND YOU FLIP THE HOT SPICKET ON THE SINK TO

PULL WATER FROM THE HEATER AT 120 DEGREES, HOW MUCH COLD WATER WILL YOU WASTE WHILE YOU LET

IT RUN UNTIL YOU FEEL THE HOT WATER FROM THE SPICKET. DISTANCE FROM PIPE TO SPICKET IS

NEGLIGIBLE.

B. IF THE WATER TRAVELS AT A FOOT A SECOND, HOW LONG WILL YOU HAVE TO WAIT TO FEEL THE HOT

WATER.

C. IF THAT IS THE RATE, WHAT PRESSURE IS THE WATER UNDER IN POUNDS PER SQUARE INCH.

D. HOW MUCH ENERGY IN WATTS DID THE HOT WATER HEATER HAVE TO EXPEND TO HEAT THE FIRST 32

FEET OF HOT WATER IN THE PIPE FROM ROOM TEMPERATURE TO 120 DEGREES.

E. HOW LONG DID IT TAKE THE WATER HEATER TO HEAT THAT AMOUNT OF WATER.

F. HOW MUCH DID IT COST TO HEAT THAT MUCH WATER IF THE PRICE PER KILAWAT HOUR IS $0.00 (

FILL IN THE PRICE FROM YOUR ELECTRIC BILL)