

Figure it out you can do it

We do not have glaciers today, but over the last 1.8 million years, Michigan has been covered by at least 4 separate glacial advances. These glacial advances have sculpted the landforms we see today – the most remarkable landforms are the Great Lakes.

Imagine a mass of ice big enough to cover from Wyoming to Maine and from Canada to the Ohio River. The question comes up, “**How thick was the ice over Michigan during the last ice age?**” Estimates vary from as little as one mile to two miles or more. I guess depends on where you were and when. Irrespective of the exact depth, can you imagine how much a mile thick slab of ice is? I have seen scale drawings (at the State Museum in Lansing) and under the right circumstance I can see things a mile (or more) away from me. But I still cannot get that to relate to a mile or more of ice.

Can you convert, lets say a mile and a quarter of ice, to something a little easier to relate to? Give it a try and, oh yeah, show your work. What information do you need – where did you get your references and/or data.

An example:

Assumptions

- thickness of the ice sheet = 1.25 miles (a conservative estimate)
 - The average height of a person = 5.5 feet (65 inches)
 - If the glacier was scaled down to 5.5 feet, then the average person would be about as thick as a dime
 - So stand up is your head higher or lower than 5.5 feet? Lets say it is 5.5 feet – drop a dime on the floor and you have an idea of how thick the glacier (you) was and how big tall a person would be at that same size scale.
 - See the attached spreadsheet for more details – with a spread sheet you can change the numbers and see what happens.
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How much would the ice weigh/how many gallons of ice would there be?

In a square foot of a glacier (top to bottom)?

A square mile of a glacier (top to bottom)?

The whole state covered by a glacier?

Is ice more dense or less dense than water? (ice is less dense than water – it floats)

Is the ice mass the same thickness all over? – Explain you conclusions.

It would be kinda like a big thick pancake – the center would be the thickest the edges would taper off rather quickly but over all the thickness would not vary greatly.

If an ice maker can make 12 cubes of ice, one inch on a side, every 10 minutes how long will it take to make a mile of ice? ($5280/6 = \#$ hours to “make a mile” = 880 hours / 36.6 days / just over a month)

What landforms did we get as a result of glaciation? “everything in the state except for man made objects”

What have we gotten from the glaciers in the way of non-renewable natural resources?

Clay – sand – gravel – peat – marl – some pigment materials and – oh yeah - WATER

How much is a billion?

Our planet is 4.55 billion (4,550,000,000) years old!

Compared with other animals, humans have long lives. Relative to the 4.55 billion-year history of our planet, however, our 80-year life spans pass in an instant of time. Because we tend to think in terms of months and years, time periods that affect our daily lives, it's sometimes difficult to comprehend the immense amount of time that geologists refer to as 'geologic time'.

So, how much is a billion? The answer depends on who you ask! Americans do not agree with the British on names for numbers over a million! The American system is shown here.

1 thousand	1,000	10^3
1 million	1,000,000	10^6
1 billion	1,000,000,000	10^9
1 trillion	1,000,000,000,000	10^{12}
1 quadrillion	1,000,000,000,000,000	10^{15}
1 quintillion	1,000,000,000,000,000,000	10^{18}

Still can't imagine numbers this big? How about this:

How long would it take to count to one billion?

Try it! Start counting one number a second without stopping until you reach a billion. You will be able to stop in 31 years, 259 days, 1 hours, 46 minutes, and 40 seconds!

How **thick** How **big** How **much**

Thickness of ice	=	1.25 miles	2.01 km
Thickness of ice	=	6,600 feet	2.01 km
Height of a person	=	5.50 feet	1.68 m
Glacier was	=	1,200.0 people tall	
if a person was	=	0.0531 inches	1.35 mm
Glacier was	=	5.31 feet tall	1.62 m
1 cubic foot H ₂ O	=	7.48 gallons	
1 cubic foot H ₂ O	=	62.40 pounds	
density of ice	=	0.917 that of water	
1 'foot' glacier	=	45,270.5 gallons of ice	
1 'foot' glacier	=	377,657.3 pounds of ice	
1 sq. mile	=	27,878,400 sq. feet	
1 sq. mile glacier	=	1,262,067,880,550 gallons of ice	
1 sq. mile glacier	=	10,528,480,714,752 pounds of ice	
Michigan	=	56,804.0 sq. mile	
Michigan had	=	71,690,503,886,784,900 gallons of water/ice	
Michigan had	=	598,059,818,520,773,000 pounds of water/ice	
Male height	=	5' 9" 69 inches	
Female height	=	5' 2" 62 inches	
aveage average	=	5' 5.5" 65.5 inches	
1 Penny	=	0.0610 inches	1.55 mm
1 Nickel	=	0.0768 inches	1.95 mm
1 Dime	=	0.0531 inches	1.35 mm
1 Quarter	=	0.0689 inches	1.75 mm
1 kilometer	=	0.621371 miles	
1 mile	=	1.609344 kilometers	
1 foot	=	0.000305 kilometers	
1 mile	=	1,760.0 yards	
1 mile	=	5,280.0 feet	
1 mile	=	63,360.0 Inches	
1 millimeter	=	0.039370 Inches	
1 centameter	=	0.393700 inches	
1 meter	=	39.370079 inches	
1 thousand	=	1,000 10 ^ 3	
1 million	=	1,000,000 10 ^ 6	
1 billion	=	1,000,000,000 10 ^ 9	
1 trillion	=	1,000,000,000,000 10 ^ 12	
1 quadrillion	=	1,000,000,000,000,000 10 ^ 15	
1 quintillion	=	1,000,000,000,000,000,000 10 ^ 18	