

Estimating Sea Ice Area

Workplace Mathematics 10

Big Idea

- 3D objects can be examined mathematically by **measuring** directly and indirectly length, surface area, and volume.
- Representing and analyzing data allows us to notice and wonder about relationships.

Curricular Competency

Reasoning and modelling

- Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number.
- Model with mathematics in situational contexts

Understanding and solving

- Visualize to explore and illustrate mathematical concepts and relationships.

Communicating and representing

- Represent mathematical ideas in concrete, pictorial, and symbolic forms.

Connecting and reflecting

- Connect mathematical concepts with each other, other areas, and personal interests

Content

- Create, interpret, and critique graphs.
- Surface area.

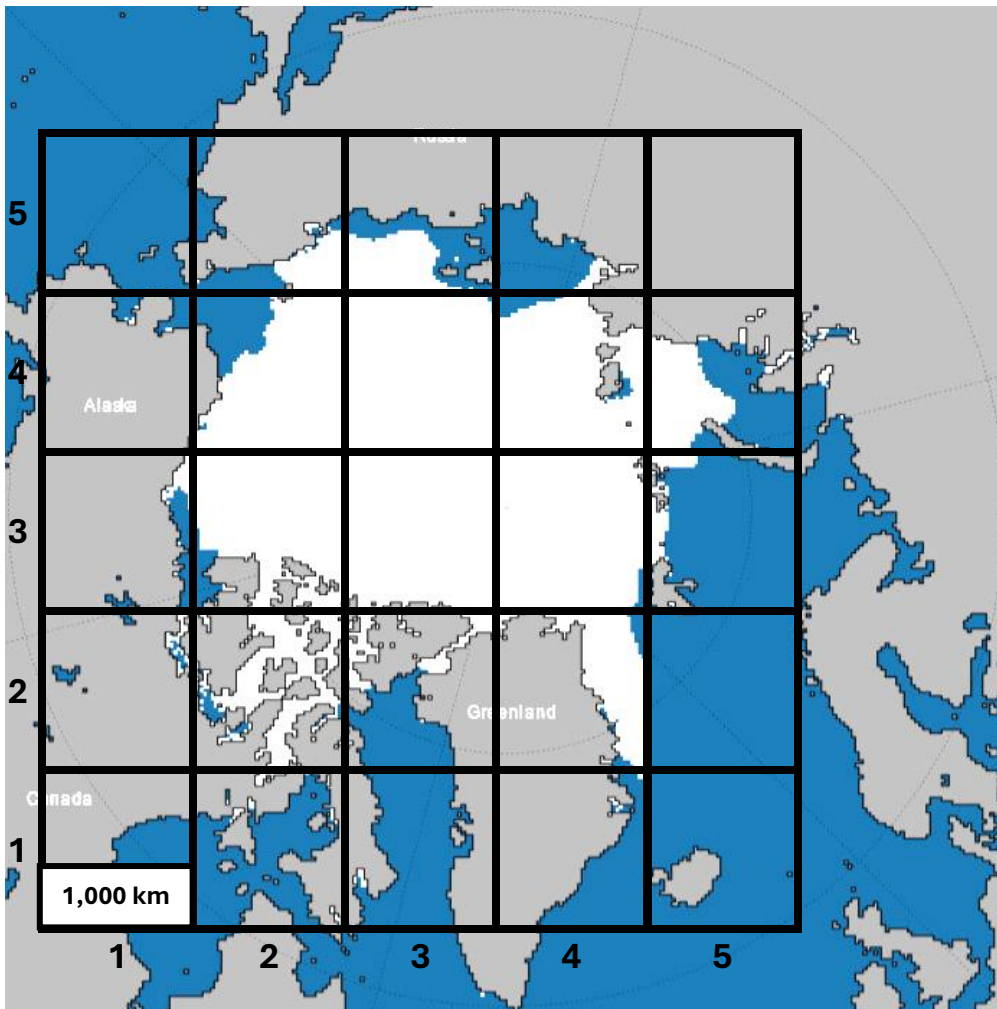
Sea Ice Extent Map

September 1980

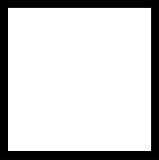
Location: North Pole

Side Length: 1,000 km

Area of a \square : _____ km^2

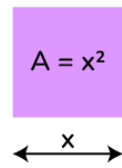


1980 Area of Coordinate Square (x , y)

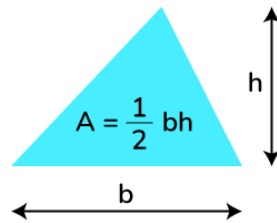
(2,2) 	(3,2)	(4,2)
(2,3)	(3,3)	(4,3)
(2,4)	(3,4)	(4,4)
(2,5)	(3,5)	(4,5)
(5,3)	(5,4)	

Area Formulas

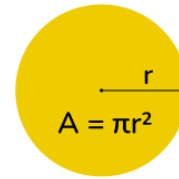
Square



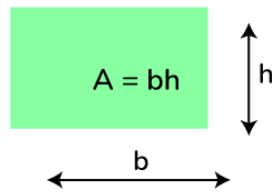
Triangle



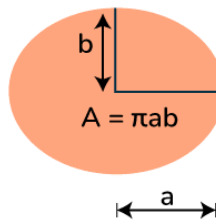
Circle



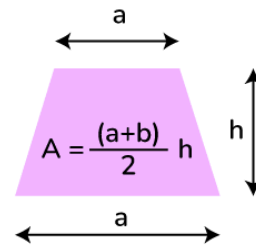
Rectangle



Eclipse



Trapezoid



Example 1)

What is the Area of the of sea ice in Semtember, 1980?

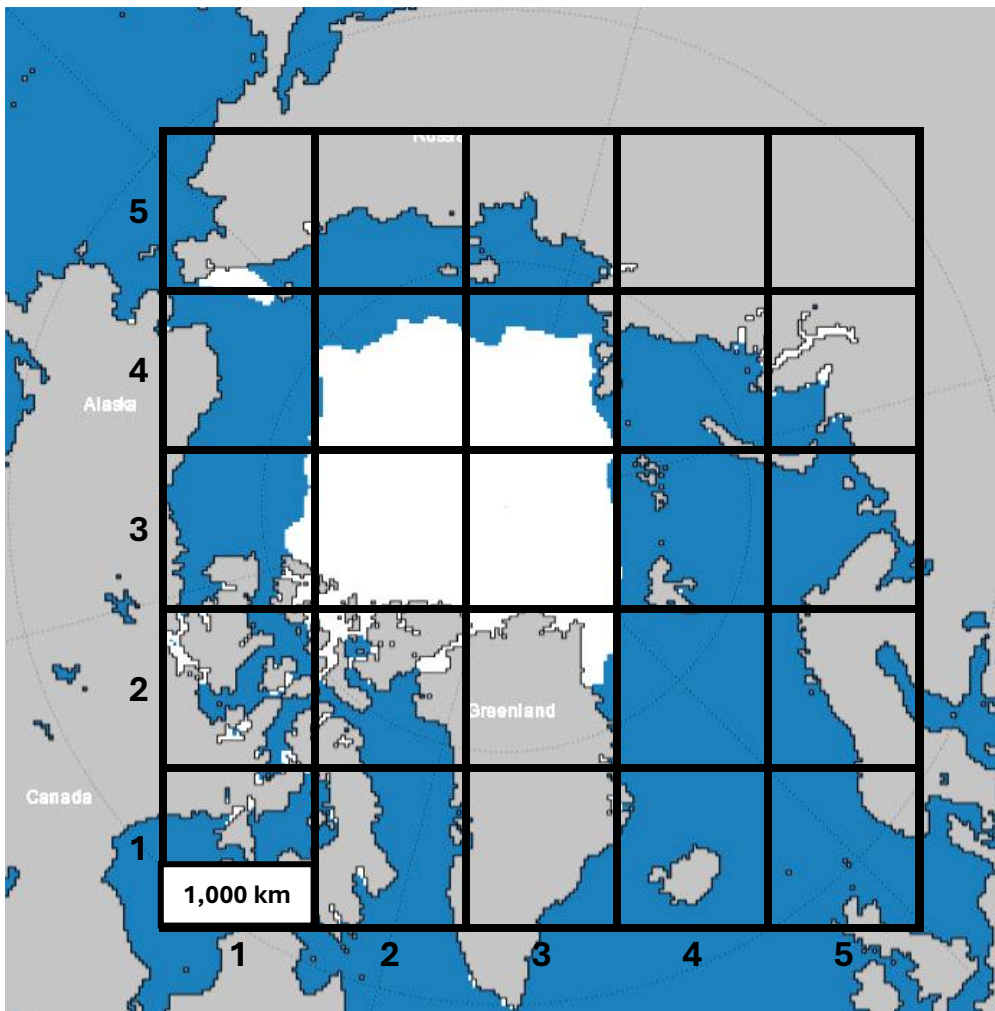
Sea Ice Extent Map

September 2024

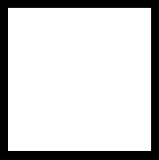
Location: North Pole

Side Length: 1,000 km

Area of a \square : _____ km^2

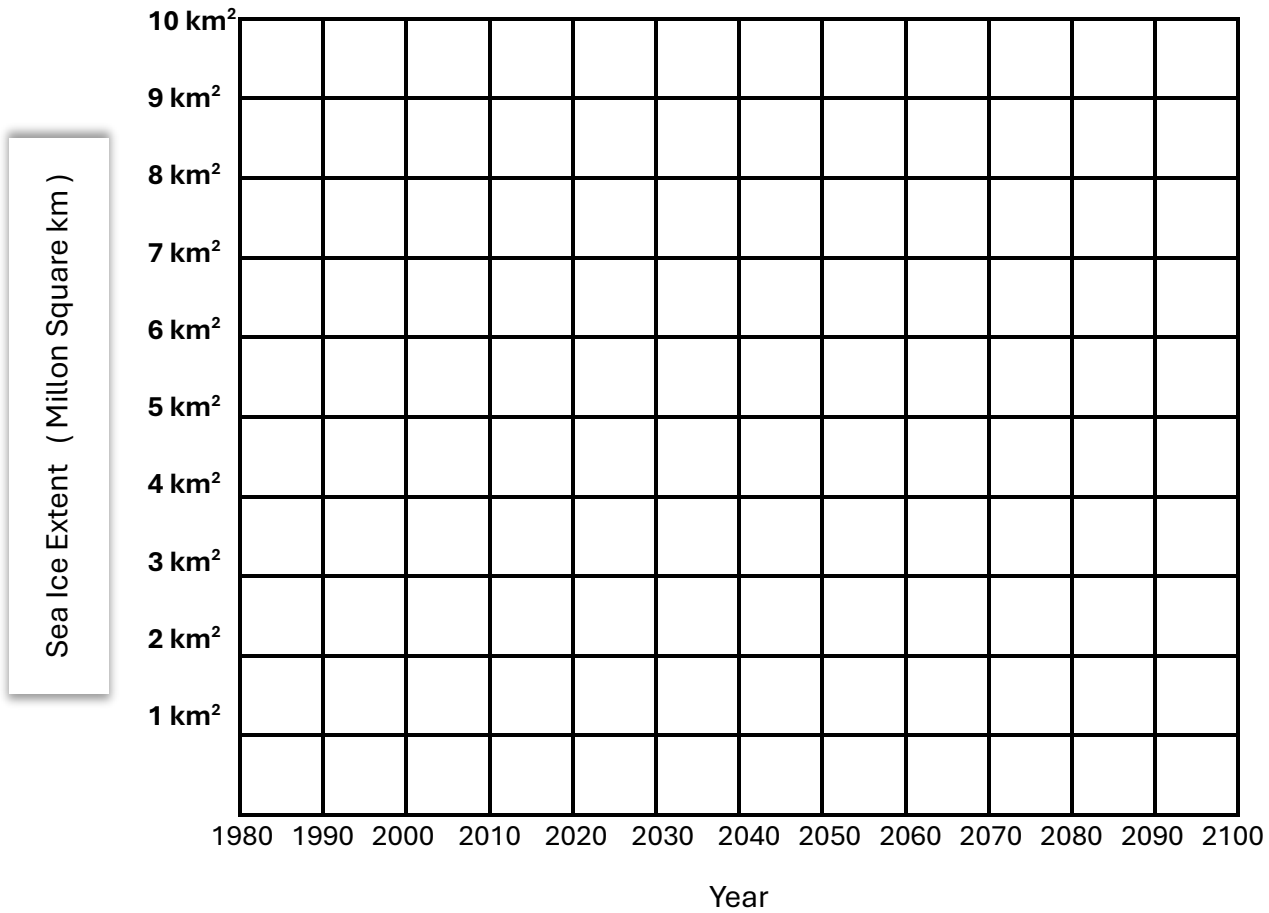


2024 September Area of coordinate square (x , y)

(1,2) 	(2,2)	(3,2)
(1,3)	(2,3)	(3,3)
(1,4)	(2,4)	(3,4)
(1,5)		

Graphing Sea Ice Area

Title:



1. What is the difference in sea ice area between 1980 and 2024?

2. What is the rate of change in sea ice area between 1980 and 2024?

3. What size do you think the sea ice will be in 2040? What about 2050?

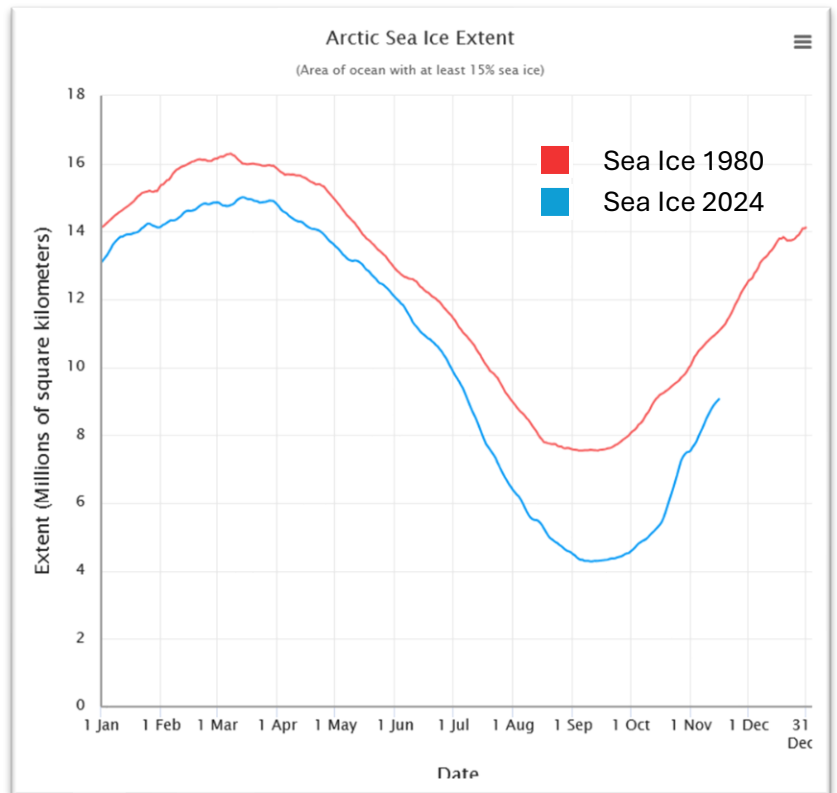
Actual Sea Ice Data

Actual Sea Ice Extent Area:

1980 September: 7,500,000 km²

2024 September 4,300,000 km²

1. Did your calculated sea ice area match the actual data?



2. Why do you think these values are different?
-

3. What are potential sources of error?
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References

akhilvasabhaktula03. (2024, September 25). *Area Formulas in Maths*. Retrieved from Geeks for Geeks:
<https://www.geeksforgeeks.org/area-formulas/>

Center, N. S. (2024). *Sea Ice Analysis Tool*. Retrieved from National Snow and Ice Data Center:
<https://nsidc.org/sea-ice-today/sea-ice-tools/sea-ice-analysis-tool>