

?

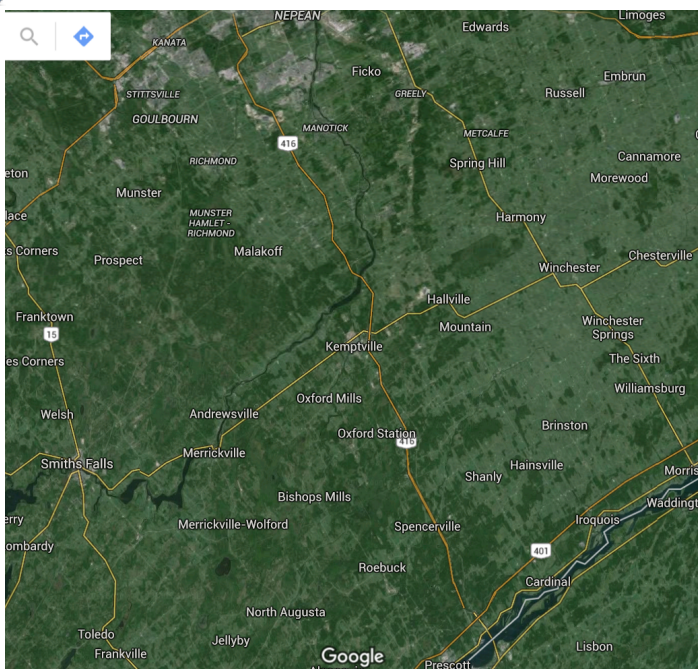
(You'll come back to title this lesson at the end)

How did I go about finding ...?

Today's Problem

<https://geoguessr.com/world/play>

<https://www.google.ca/maps/@45.0088584,-75.6498823,73196m/data=!3m1!1e3>



What communities are closest to the perimeter of a 30 km search area?

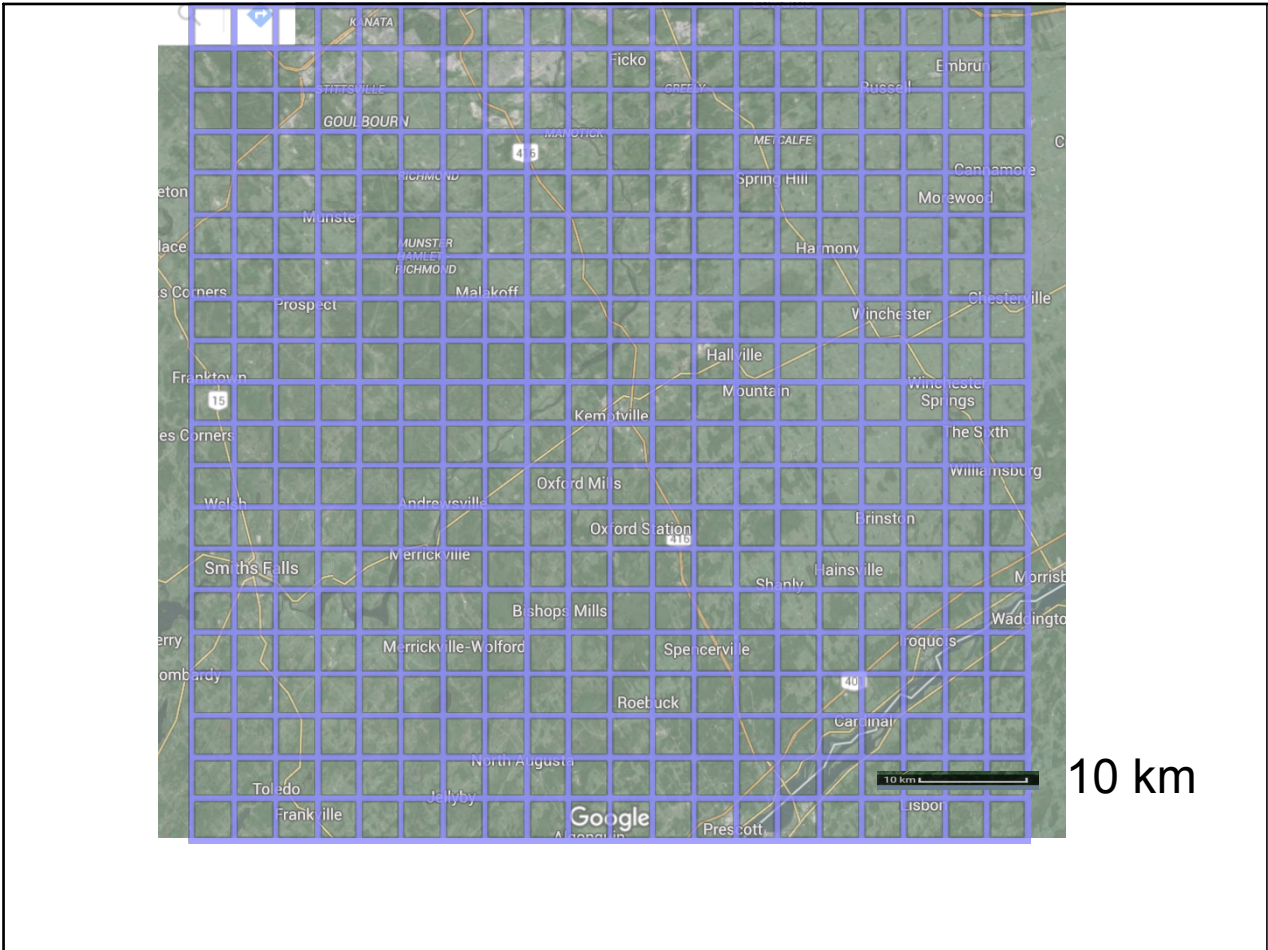
-Kemptville is the centre of the search area

-Constraint: Solve without direct measurement

-Make your thinking fully visible

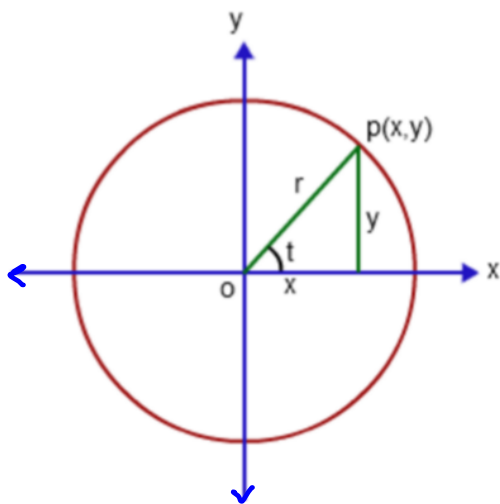
10 km

Equation of a Circle_Standard Position



Consolidating Your Understanding

The Equation of a Circle



For a circle in *standard position* (i.e., centre, the origin) and radius, r , ...

Example 1:



Finding the Radius Given a Point

A town, located at $(-24, 18)$, is on the circumference of a circular search area with what radius? (Note: The centre of the search area is at the origin).

Solution:

a) Apply the equation of a circle where

$$\begin{aligned} r &= \sqrt{x^2 + y^2} \\ &= \sqrt{(-24)^2 + 18^2} \\ &= \sqrt{576 + 324} \\ &= \sqrt{900} \\ &= 30 \end{aligned}$$

b) Equation of this circle?

$$\begin{aligned} x^2 + y^2 &= r^2 \\ \text{With } r &= 30, \\ x^2 + y^2 &= 30^2 \\ x^2 + y^2 &= 900 \end{aligned}$$

Example 2:



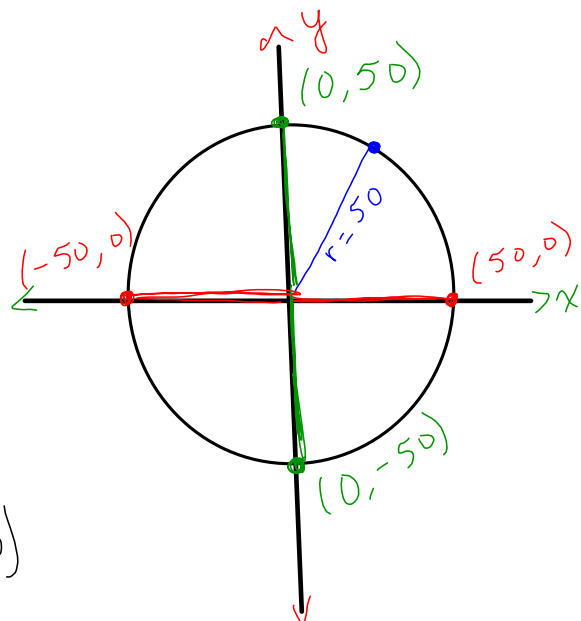
Focusing on x- and y-intercepts

a) The search area in Example 1 is enlarged by 20 km. Determine four sets of coordinates that lie on the circumference of the circle.

Solution:

$$\begin{aligned} r &= 30 + 20 \\ &= 50 \text{ km} \end{aligned}$$

The four coordinates could be represented by the x- and y-intercepts:
 $(50, 0), (0, 50), (-50, 0), (0, -50)$



Equation of a Circle_Standard Position

b) Use $x^2 + y^2 = 50^2$ to determine the x- and y- intercepts.

For x-int.

Set $y = 0$:

$$x^2 + 0^2 = 50^2$$

$$x^2 = 50^2$$

$$\sqrt{x^2} = \sqrt{50^2}$$

$$x = \pm 50$$

\therefore x-int. are $(50, 0)$ and $(-50, 0)$

In like manner, repeat the process for the y-int with $x = 0$.

Example 3:



If the point (a, b) is on the circumference of a circle with radius r , and in standard position, then which of the following points also lie on the circumference?

- i) $(-a, b)$ ii) $(-a, -b)$ iii) $(a, -b)$

Practice

p91 #1, 2ace, 3ac, 4cd, 5ab, 6, 10, 11