Lesson Plan 3: Magnetic Field Strength

For Elementary Students

The Compass Needle Trick

Imagine you have a tiny compass. If you broke the compass open and carefully pulled out the little needle, you could hold it between your thumb and forefinger.

- Magnetic Field Strength is how hard you have to pinch your fingers to stop the compass needle from flying away.

  → The harder you have to squeeze, the STRONGER the magnetic field is at that point.
  → If the needle barely wiggles, the field is WEAK.

What is a Magnetic Vector Arrow?

A Magnetic Vector Arrow is an arrow that shows you the direction the compass needle would fly if you let go of it.

→ The arrow points the same way the needle would fly off.

What are Isoline Circles?

Scientists draw circles called isolines to show places where the magnetic strength is the same.

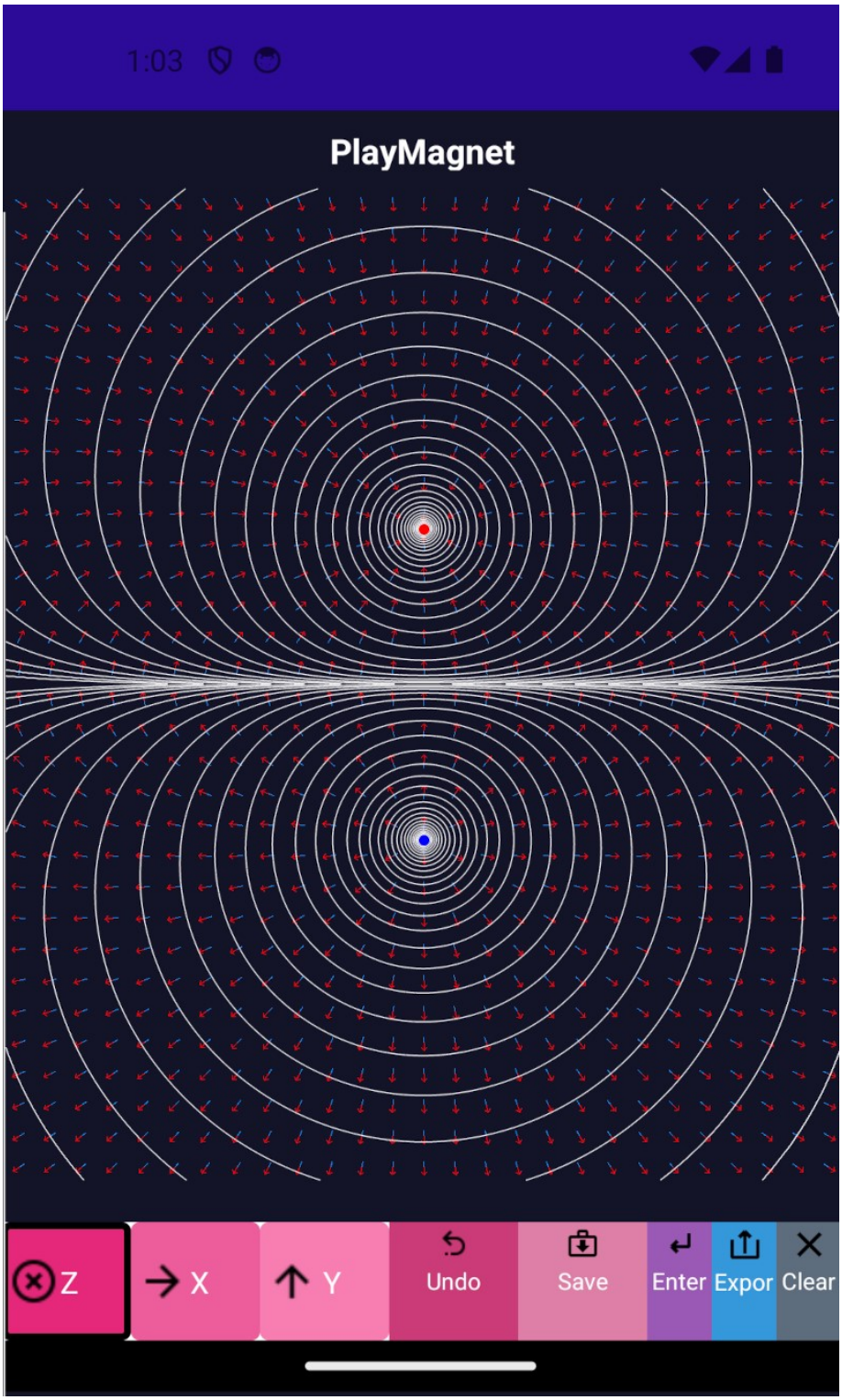
→ Think of isolines like rings on a tree stump — each ring marks a spot that is the same distance from the center.

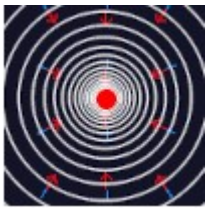
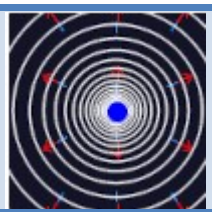
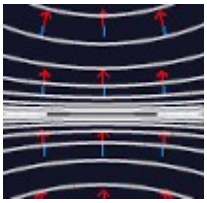
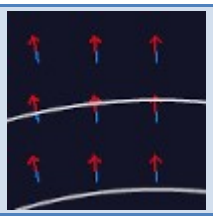
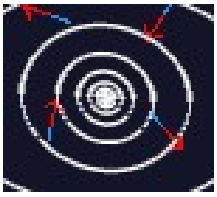
→ Circles that are close together mean the field changes quickly (strong pull).

→ Circles that are far apart mean the field changes slowly (gentle pull).

Reading the PlayMagnet Picture

Look at the picture below. It shows a magnetic dipole — just two poles (North and South) shown in the PlayMagnet app. Here is what each label means:



North Pole **(Maximum Positive)**	The strongest positive pull. If you put a compass needle here, it would fly toward this pole very fast. You would have to pinch your fingers HARDEST to hold it still.	
South Pole **(Maximum Negative)**	The strongest negative pull — just as strong as the North pole, but pulling the needle in the opposite direction.	
Neutral Point **(Minimum / Weakest)**	Right in the middle between the two poles, the pulls cancel out. This is where the field is weakest. A compass needle here would barely wiggle — you could hold it with the lightest pinch.	
Vector Arrow **(Field Direction)**	These little arrows show which way a free compass needle would fly. Follow the arrows like a trail of breadcrumbs to see the path a needle would take.	
Isoline Circle **(Area of Same Strength)**	Each white circle is a ring where the magnetic strength is exactly the same. If you walked around one of these circles, the pinch of your fingers would never change.	

Quick Activity

1. Open PlayMagnet and tap canvas once to place a North Pole (red disc).
2. Look at the Isoline Circles around it. Are they close together or far apart?
3. Now tap the Z Axis Button to select an South Pole Disk (Button Toggles the Field)
4. Now tap the screen to place a South Pole (blue disc) nearby. Watch how the circles change shape!
5. Find the Neutral Point between the two discs. That is where the field is weakest.