D.1

Mapping Force Fields

IB PHYSICS | FORCE FIELDS

What is a Force Field?

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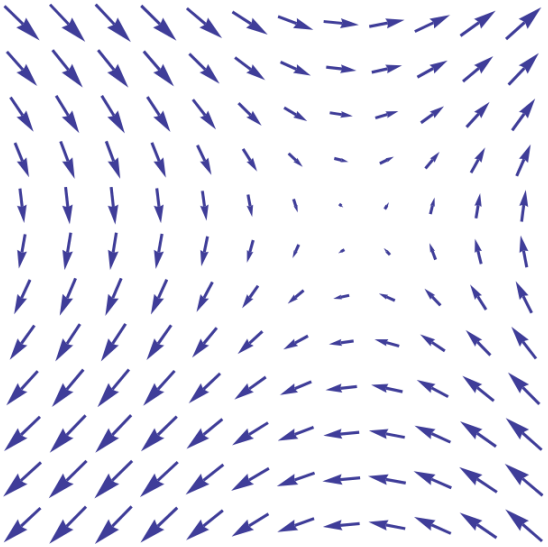
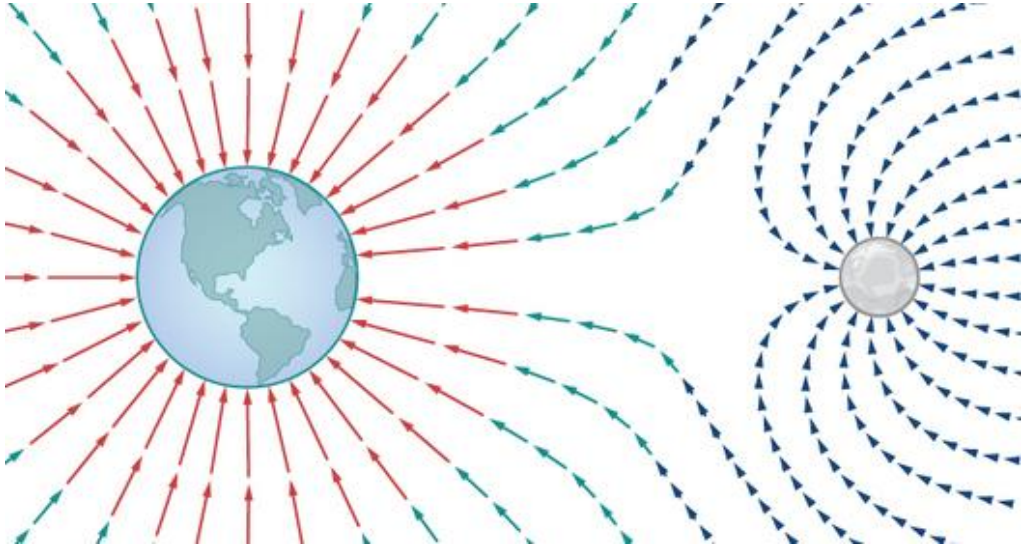
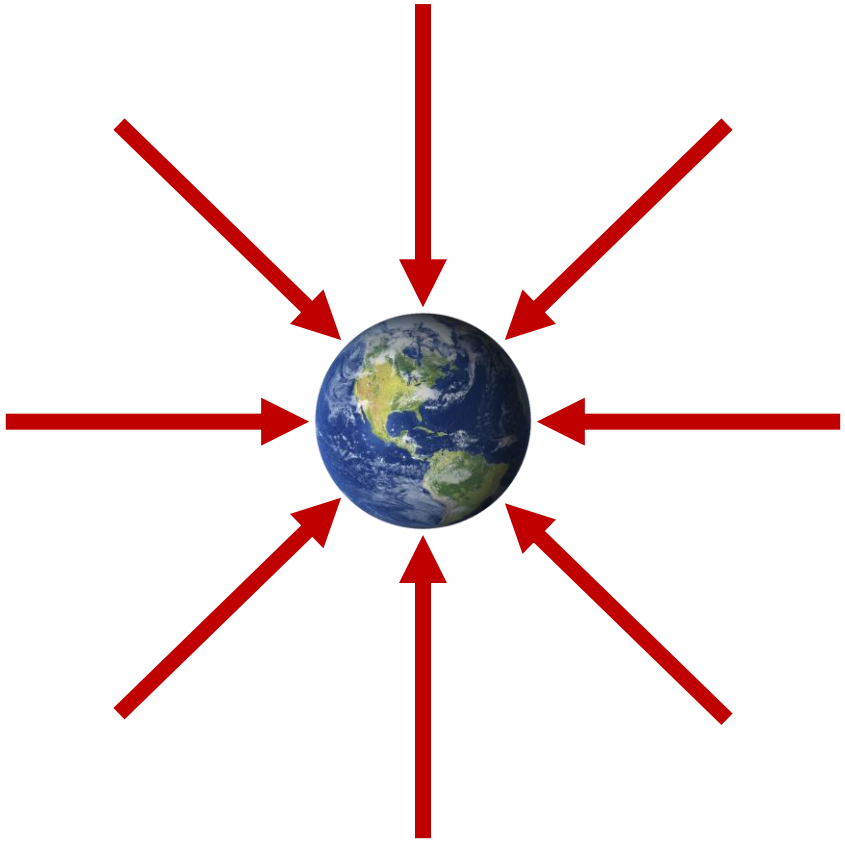
A force field is a vector field corresponding with a non-contact force acting on a particle at various positions in space



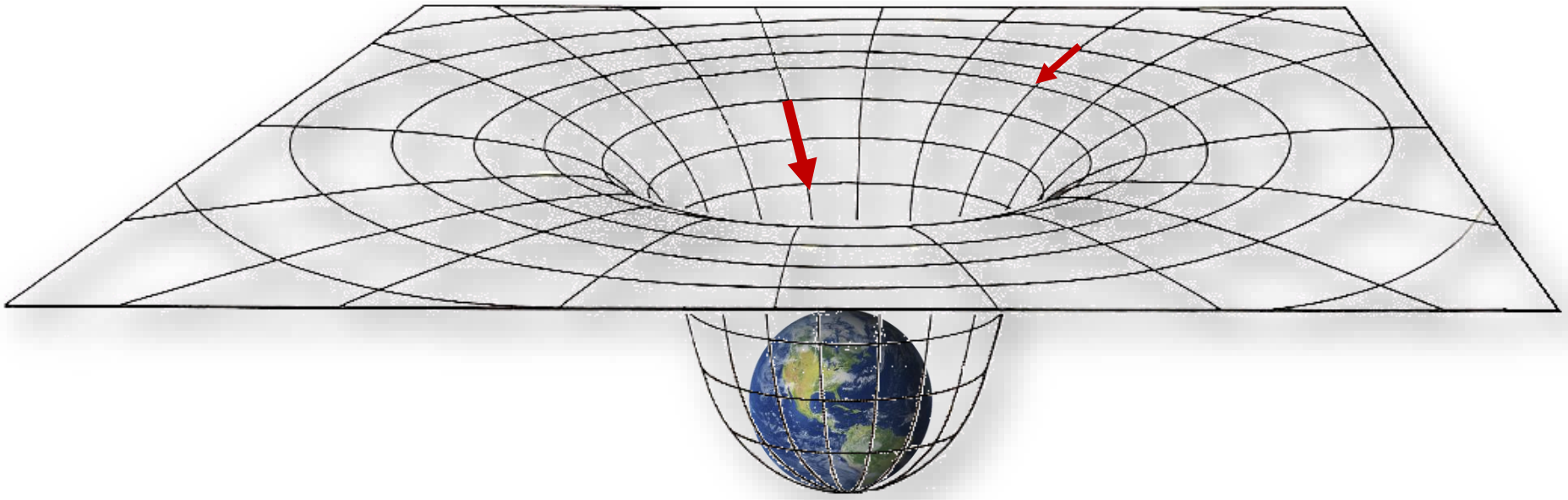


Gravity as a field



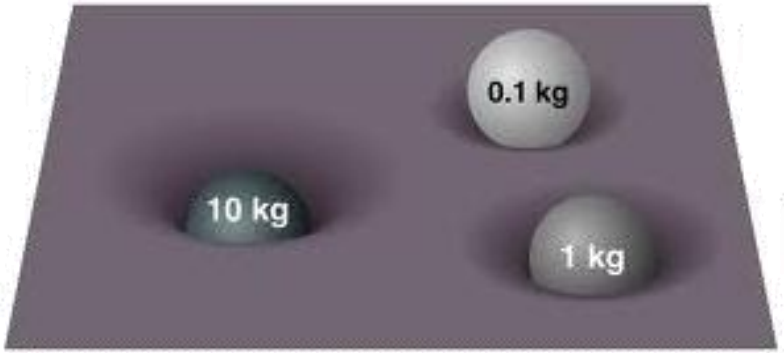
Gravity as a field

D.1



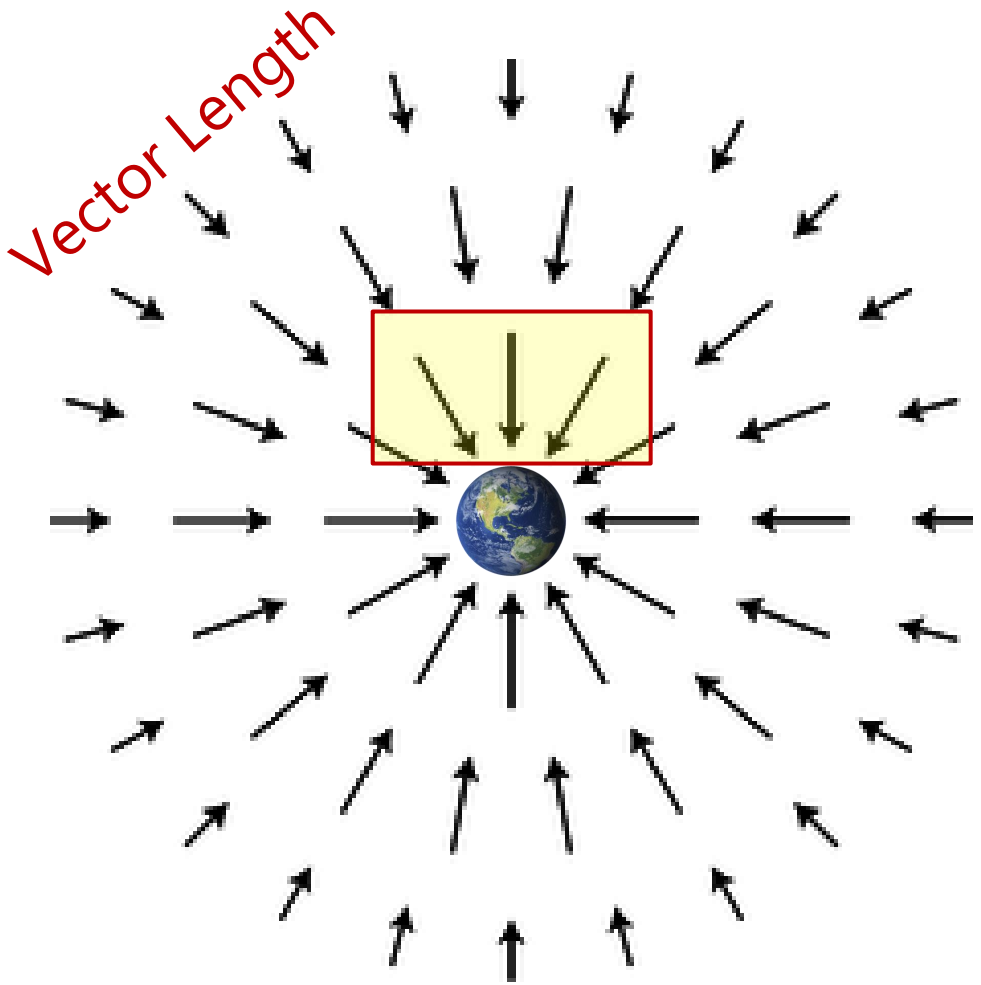
Gravity as a field

- The gravitational field distorts the space around the mass that is causing it so that any other mass placed at any position in the field will “know” how to respond immediately.
- Bigger masses “curve” the rubber sheet more than smaller masses.



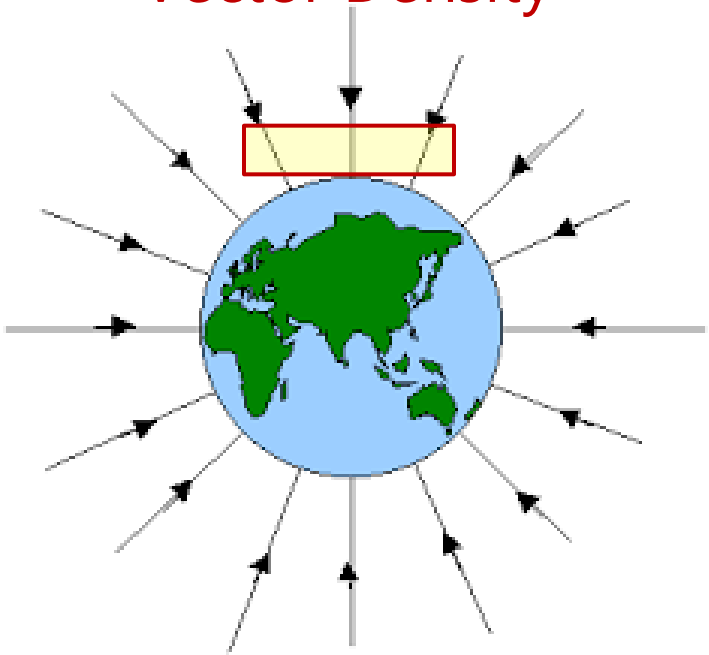
Gravity as a field

D.1



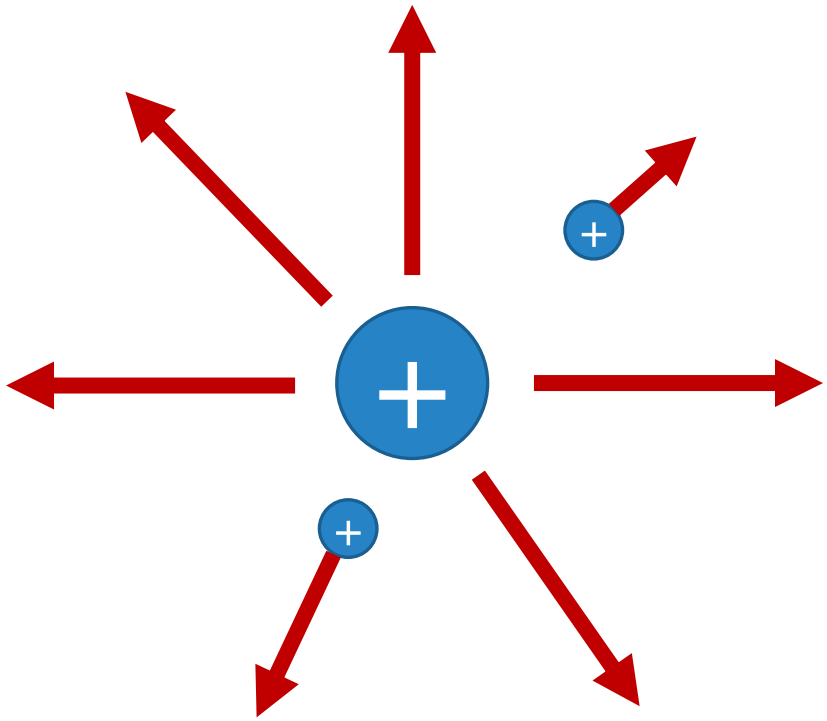
How do we visually represent the strength of the field?

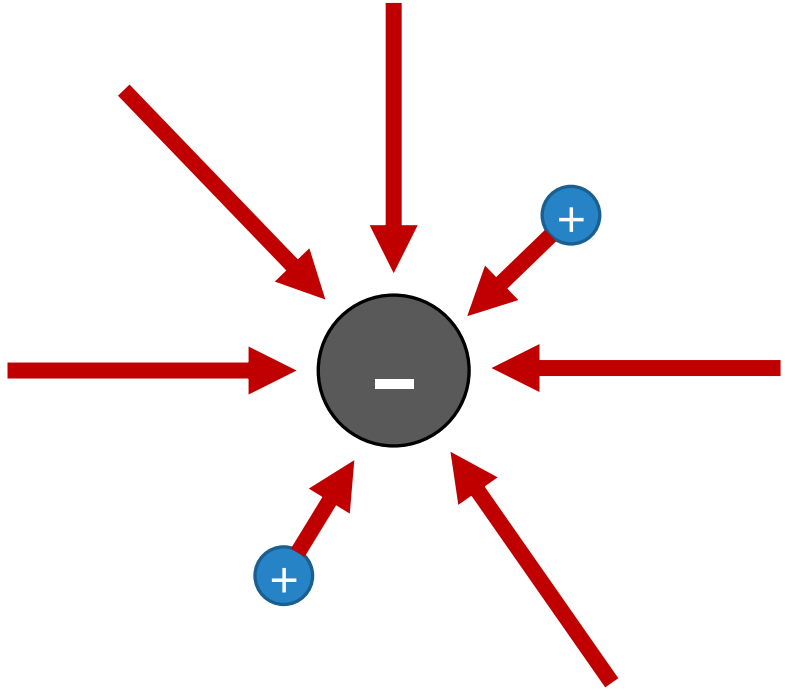
Vector Density



Electric Fields

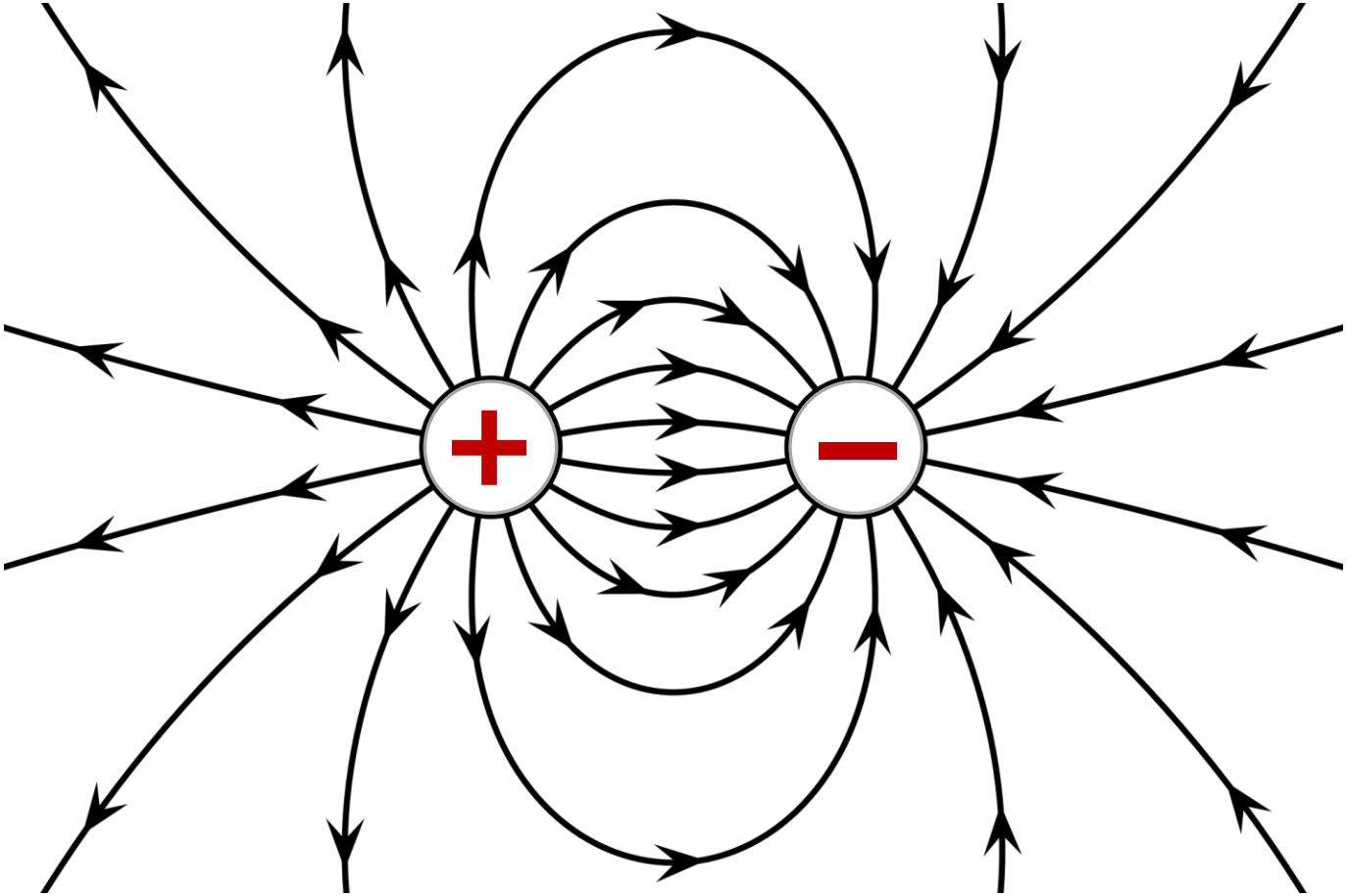
Electric Fields point in the direction that a _positive_ charge would travel





Try This

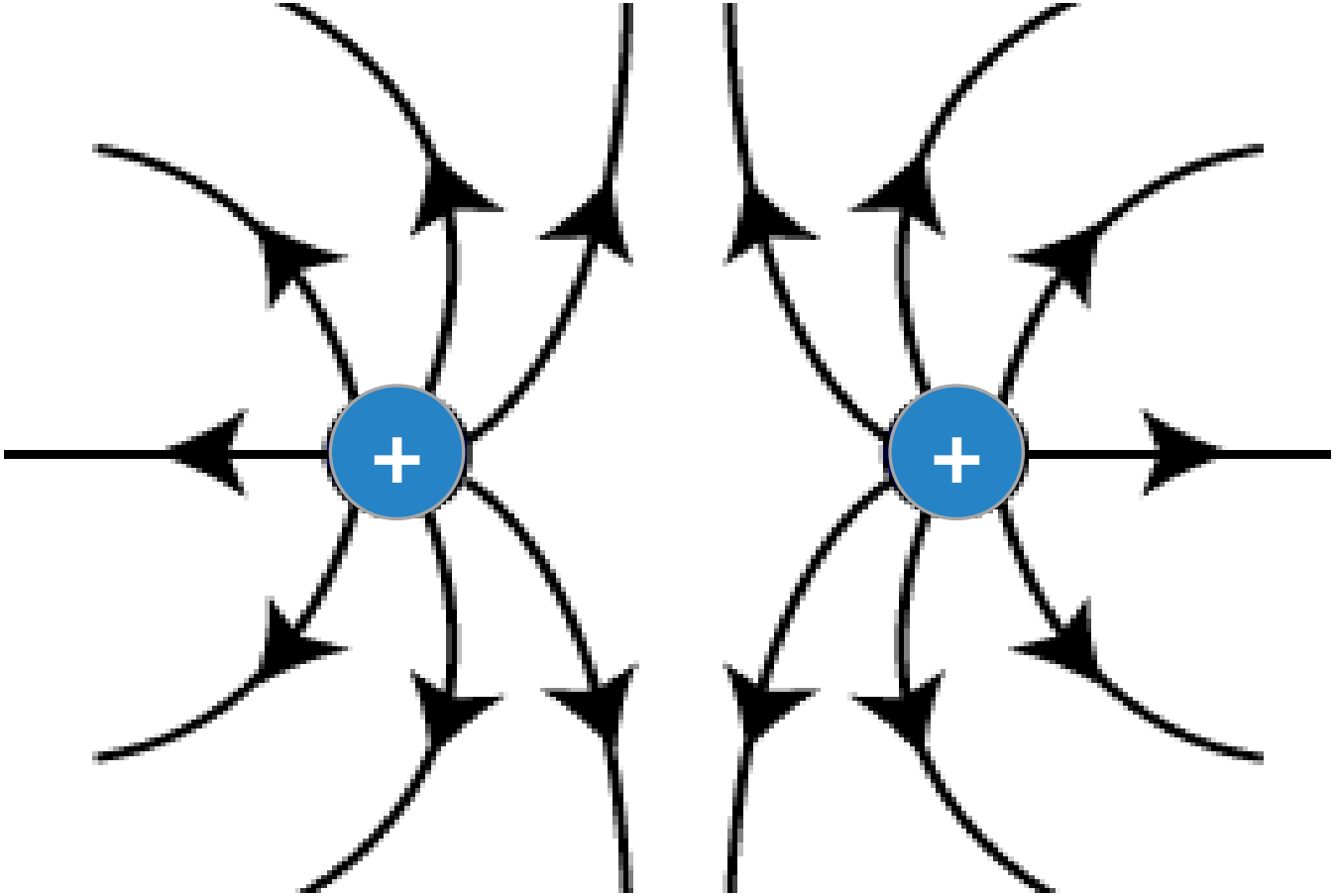
Label these charges as positive (+) or negative (-)



Try This

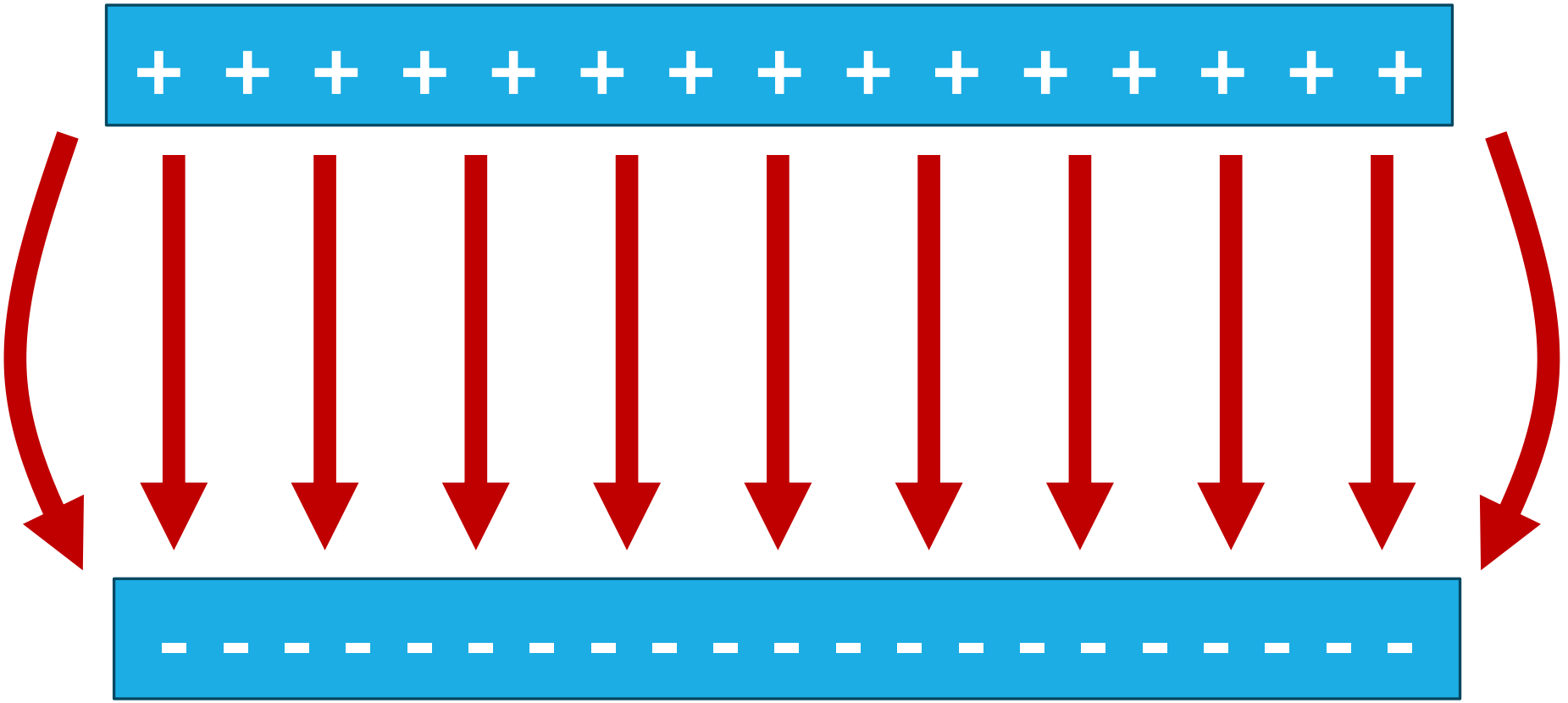
D.2

Predict what the field lines will look like:



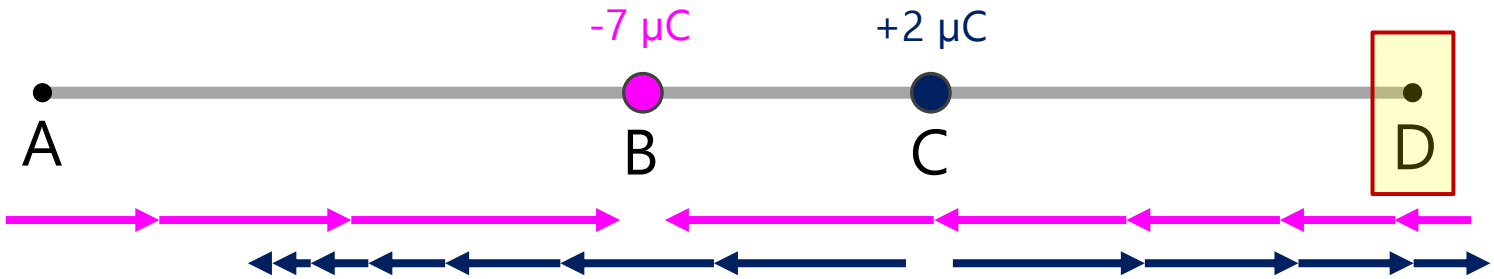
Try This

Predict what the field lines will look like:



Think about this…

Two isolated point charges, –7 μC and +2 μC, are at a fixed distance apart. At which point is it possible for the electric field strength to be zero?



Forces cancel out

Magnets! Rules of Interaction

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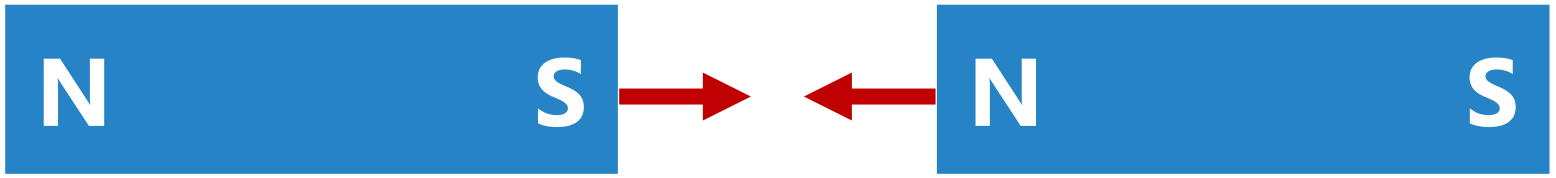
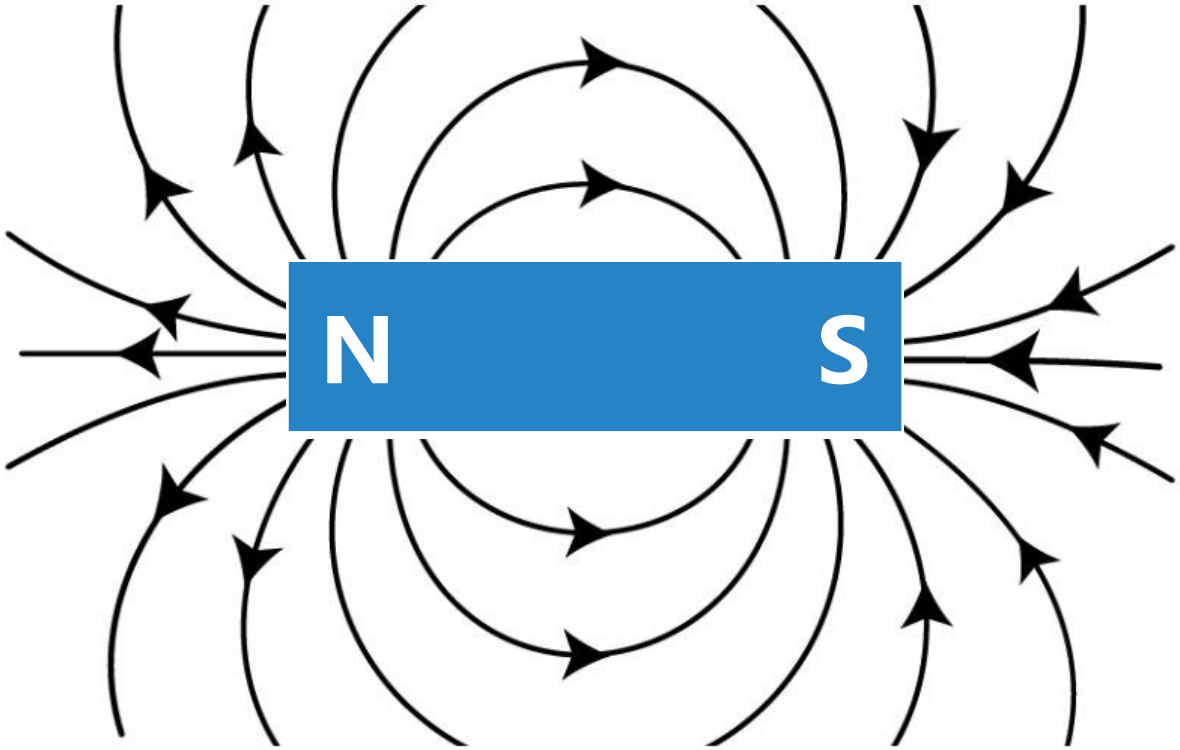


Magnetic Fields

D.3

Magnetic field lines point from North to South

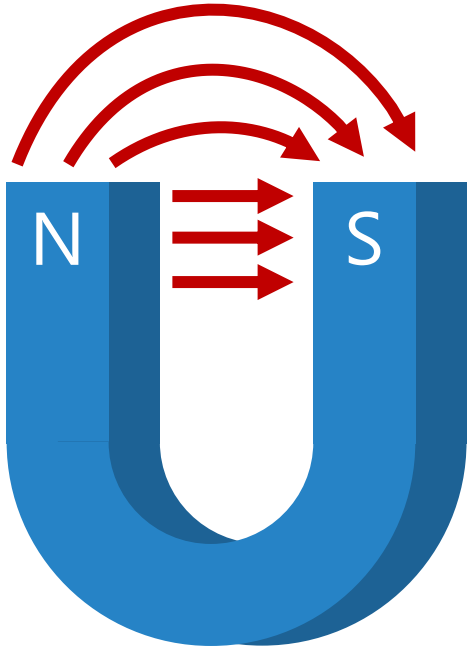


A compass would align with these field lines

Magnetic Fields

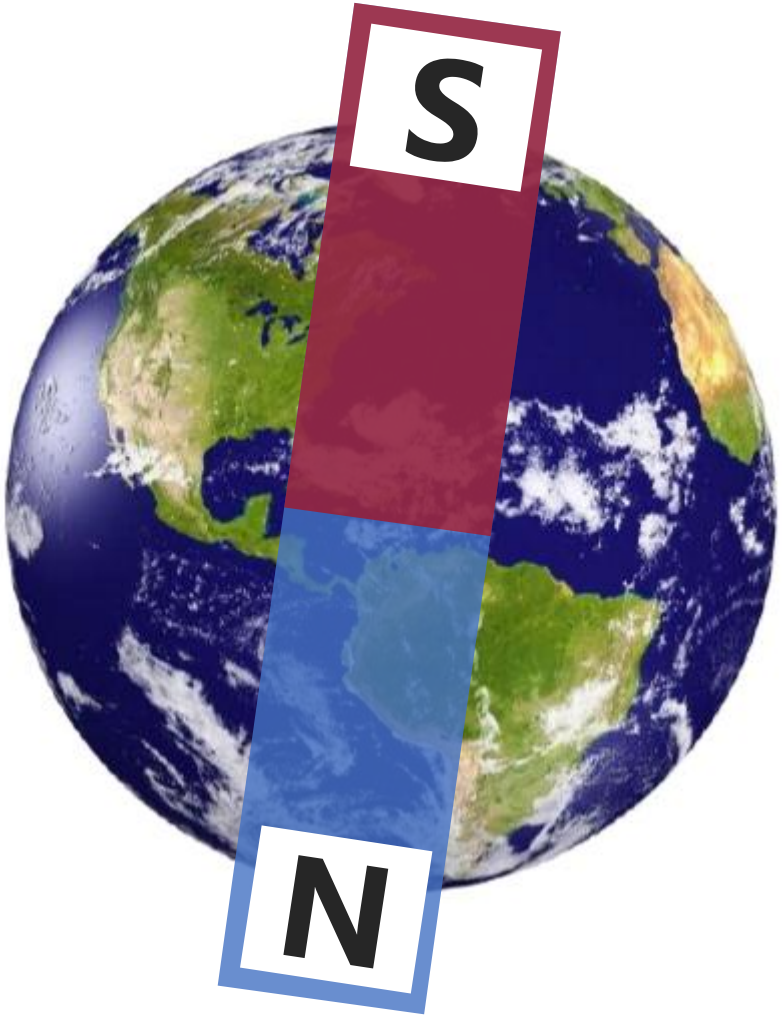
D.3

A horseshoe magnet is just a bent bar magnet. The rules for magnetic fields still apply.



The Earth is a Magnet

D.3



Lesson Takeaways

- ❑ I can draw gravitational fields using vectors
- ❑ I can describe the role of a test charge or test mass in representing force fields
- ❑ I can describe gravitational fields as warping spacetime
- ❑ I can draw electric fields for point charges and charged plates using vectors
- ❑ I can draw magnetic fields around north and south poles