

Problem 1 – During part of its orbit around Earth, the Van Allen Probes travel along the line given by the equation $y = -1/2 x + 2$. Graph this line on the grid above.

Problem 2 – Earth's magnetic field is oriented along lines that are parallel to $y = 3/4 X$. Draw three of these lines across the grid above.

Problem 3 – What is the equation of the line that is perpendicular to the spacecraft trajectory? Plot this line on the graph above.

Problem 4 – What angle does the magnetic field make with respect to the direction along the spacecraft trajectory?

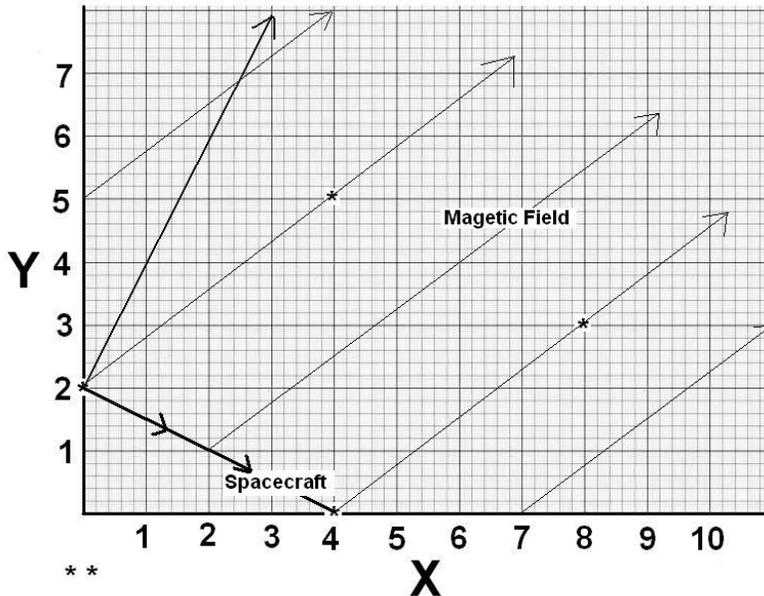
Problem 5 - What angle does the magnetic field make with respect to the direction perpendicular to the spacecraft trajectory?

Problem 1 – During part of its orbit around Earth, the Van Allen Probes travel along the line given by the equation $y = -1/2 x + 2$. Graph this line on the grid above. Answer: See below, labeled 'spacecraft'

Problem 2 – Earth's magnetic field is oriented along lines that are parallel to $y = 3/4 X$. Draw three of these lines across the grid above. Answer: See below: Labeled 'magnetic field'

Problem 3 – What is the equation of the line that is perpendicular to the spacecraft trajectory? Plot this line on the graph above.

Answer: The perpendicular line to $y = mx+b$ is $y = -1/m x + b$. The slopes are the negative reciprocals of each other. If the spacecraft direction is $y = -1/2 X + 2$, then the perpendicular is $y = 2x+2$ at point $(0,+2)$, as shown in the figure.



Problem 4 – What angle does the magnetic field make with respect to the direction along the spacecraft trajectory?

Answer: Use a protractor to measure the angle. It is **63 degrees**.

Problem 5 - What angle does the magnetic field make with respect to the direction perpendicular to the spacecraft trajectory?

Answer: It will be the compliment angle, $90-63 = 27$ **degrees**.