Midterm Review Problems

Magnetics Problem

Q: A susceptible block is buried below the surface of the Earth. If the block is buried at the Earth's equator, what is the direction of the induced magnetization?

a) Vertical
b) Horizontal N-S
c) Horizontal E-W
d) At 45 degrees

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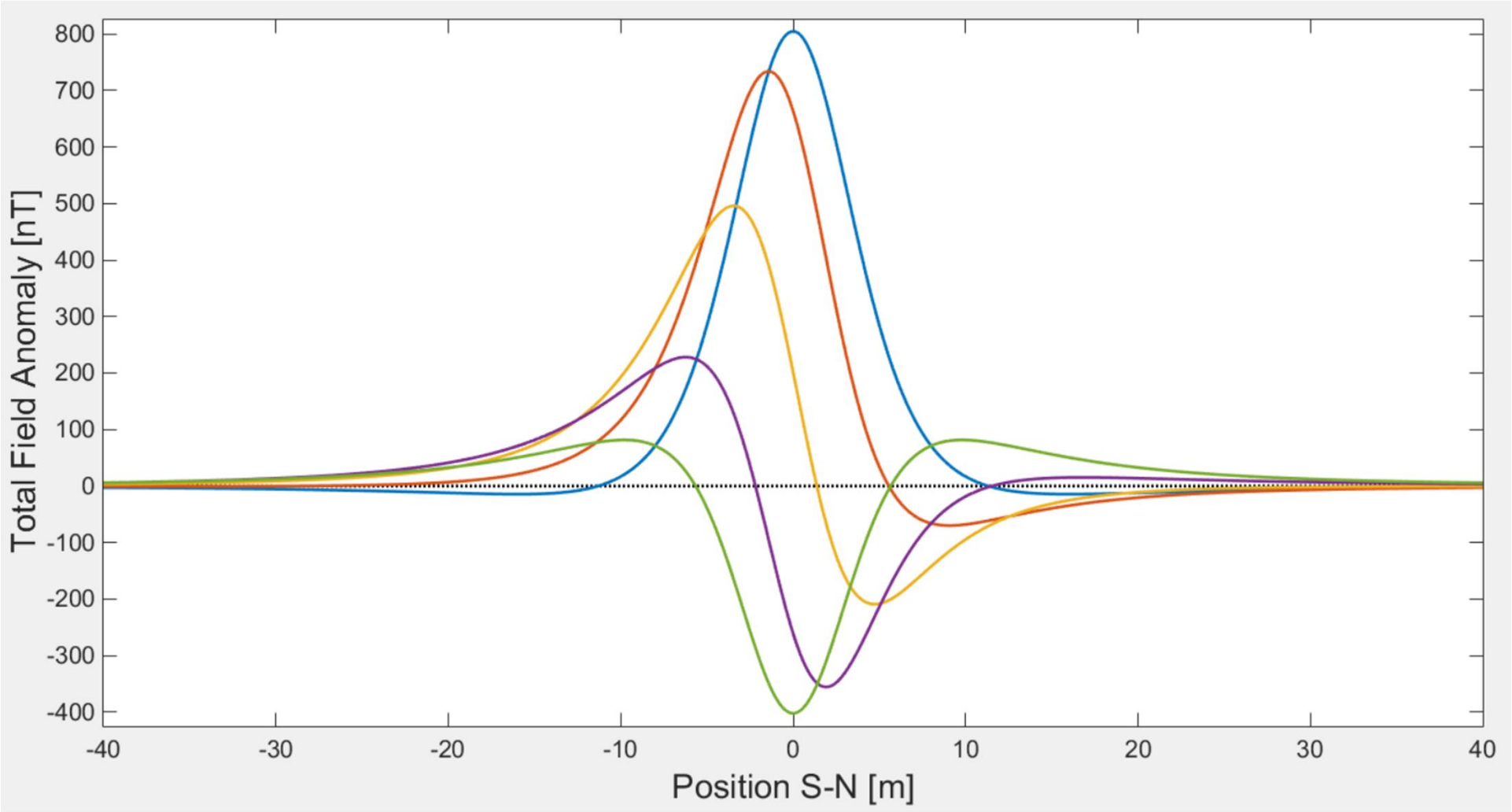
Q: Now if the block were buried at a latitude of 70 degrees North, what would be the shape of the total field anomaly? (what colour)



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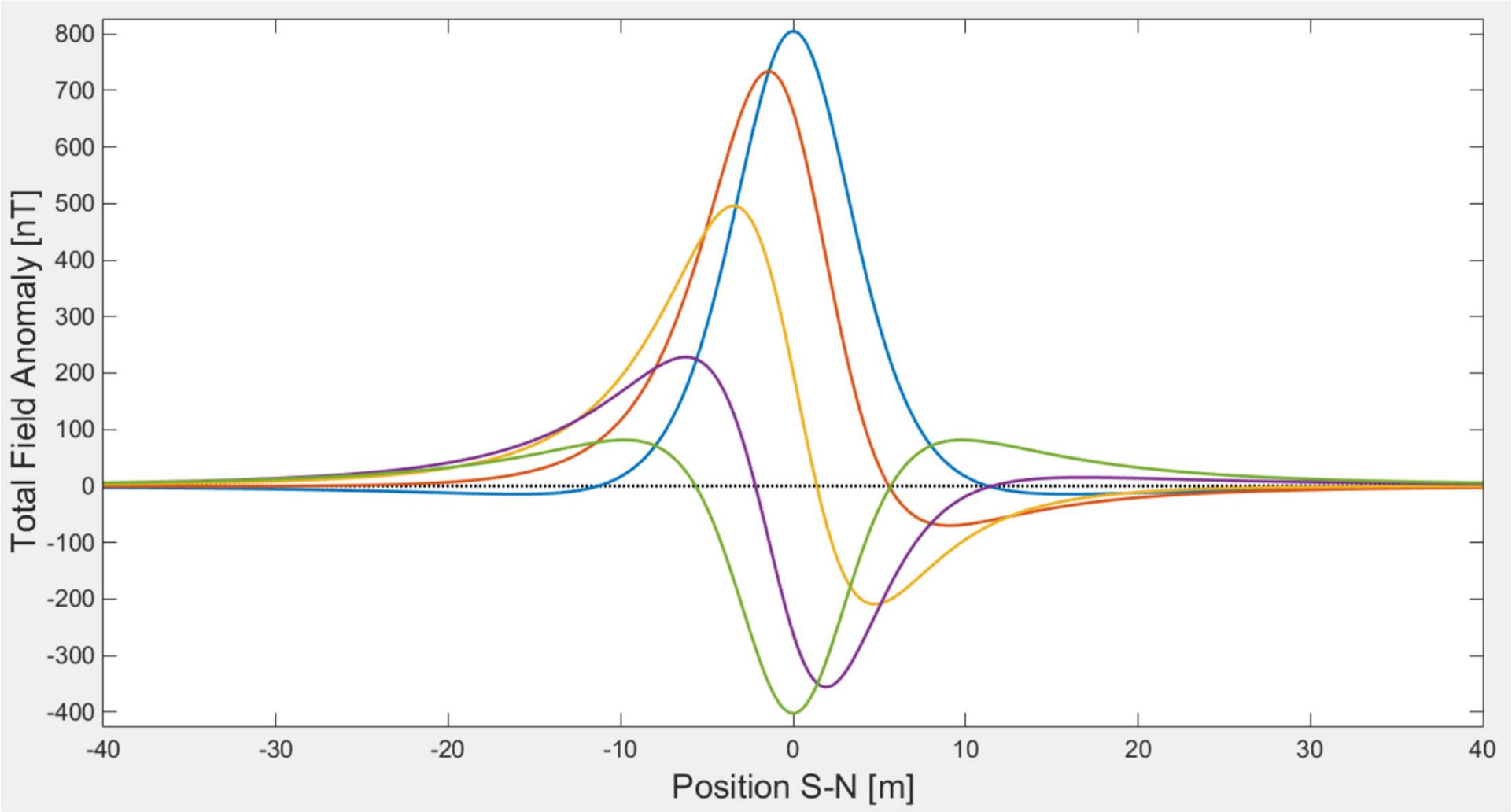
Q: Now if the block were buried at a latitude of 70 degrees North, what would be the shape of the total field anomaly? (what colour)

RED



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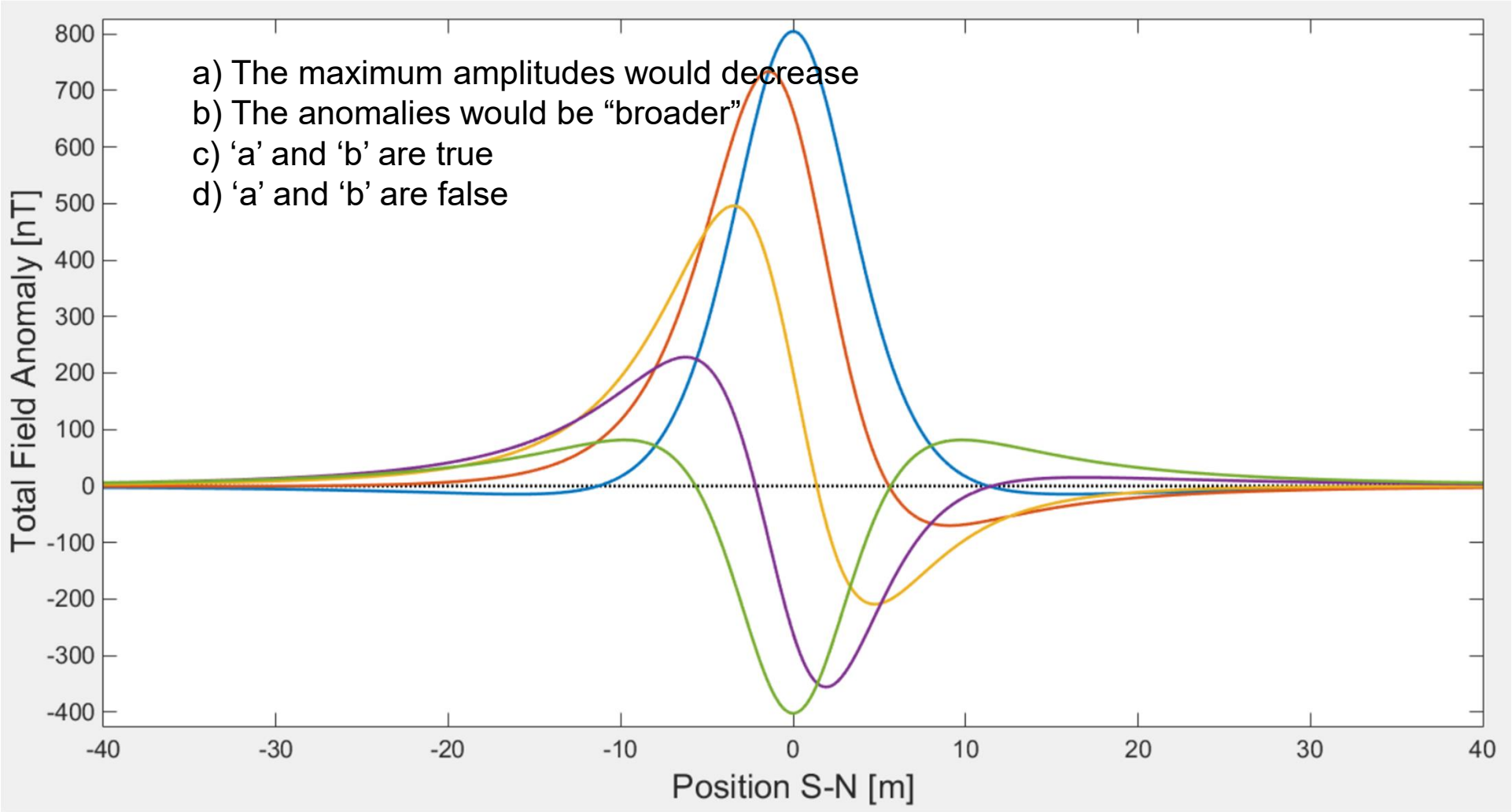
Q: The total field anomalies for this block were modeled for inducing fields at different angles. If the depth of the block was increased, how would the plot change?



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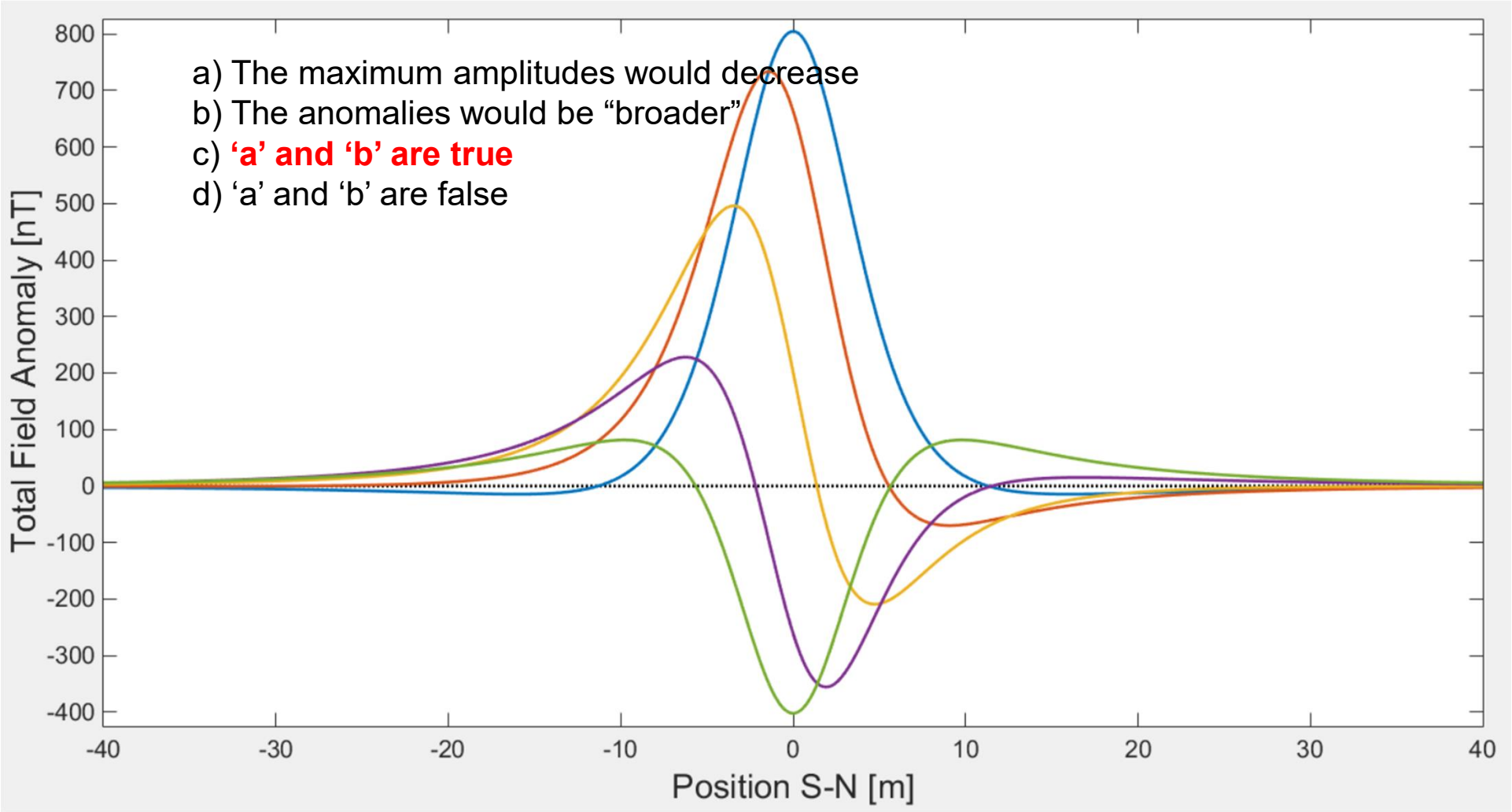

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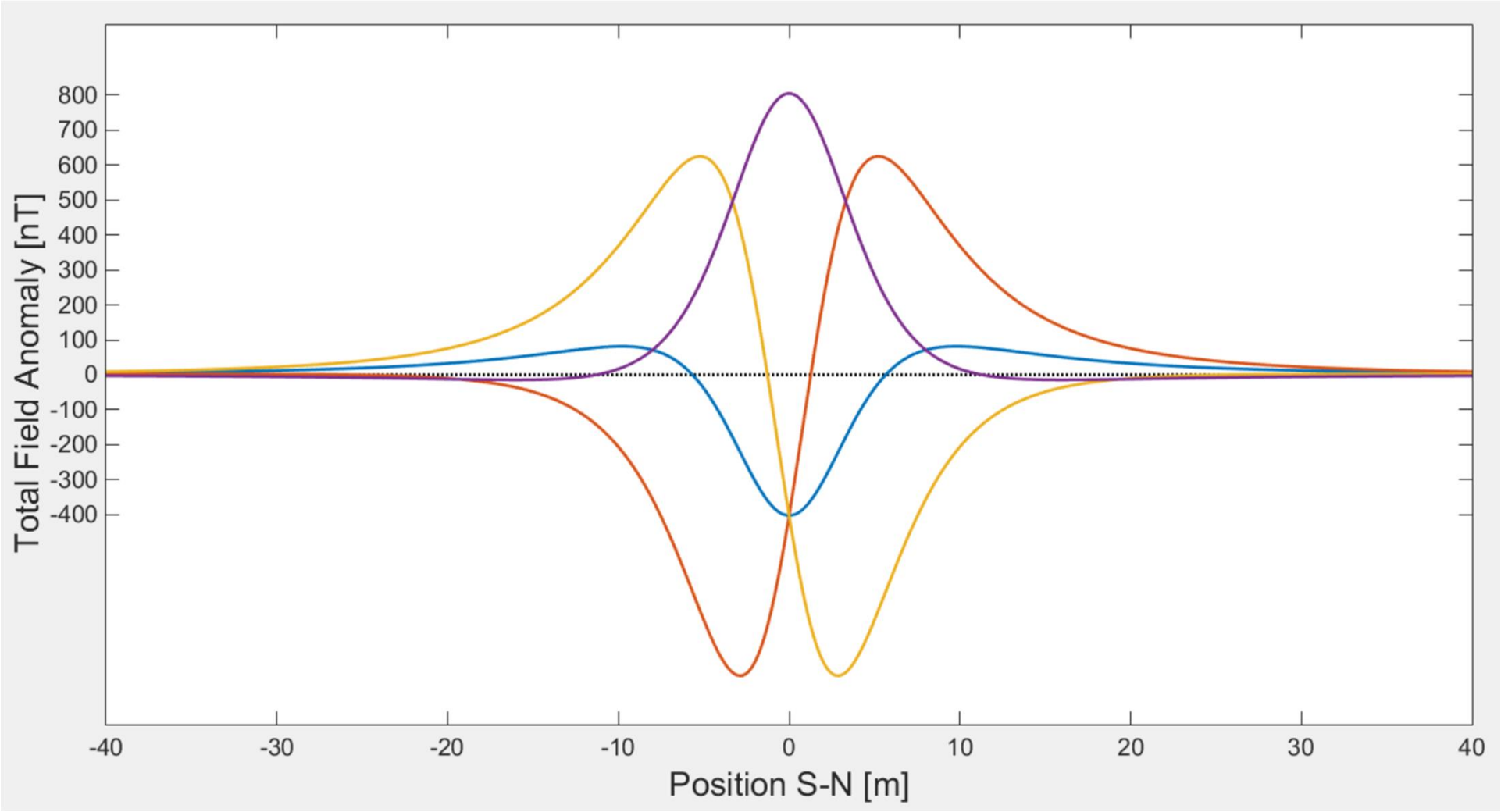
Q: Now consider the case where the block is buried at the equator. It turns out the magnetization is dominated by remanence in the upwards direction. Which curve best represents the expected anomaly?



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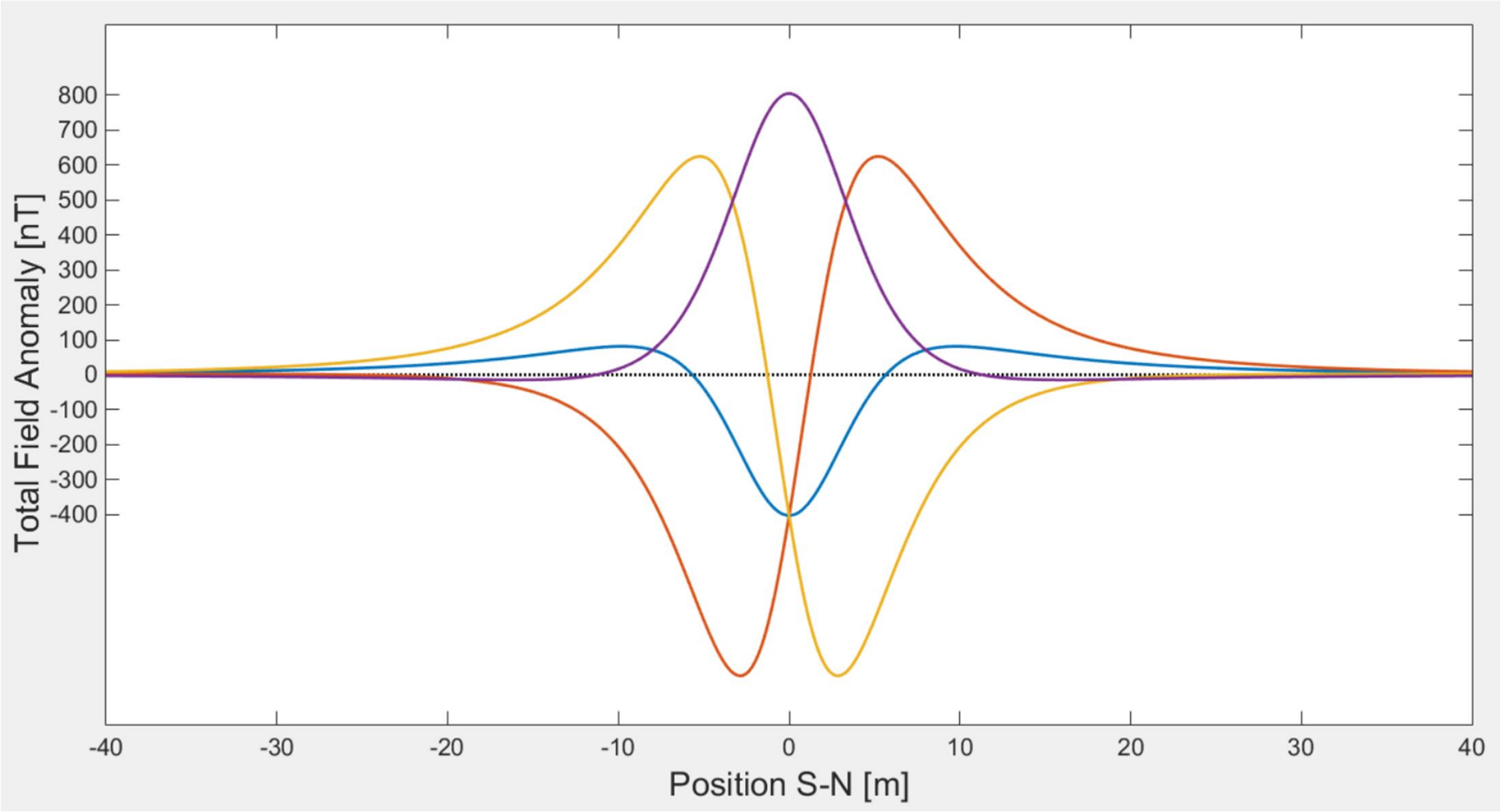
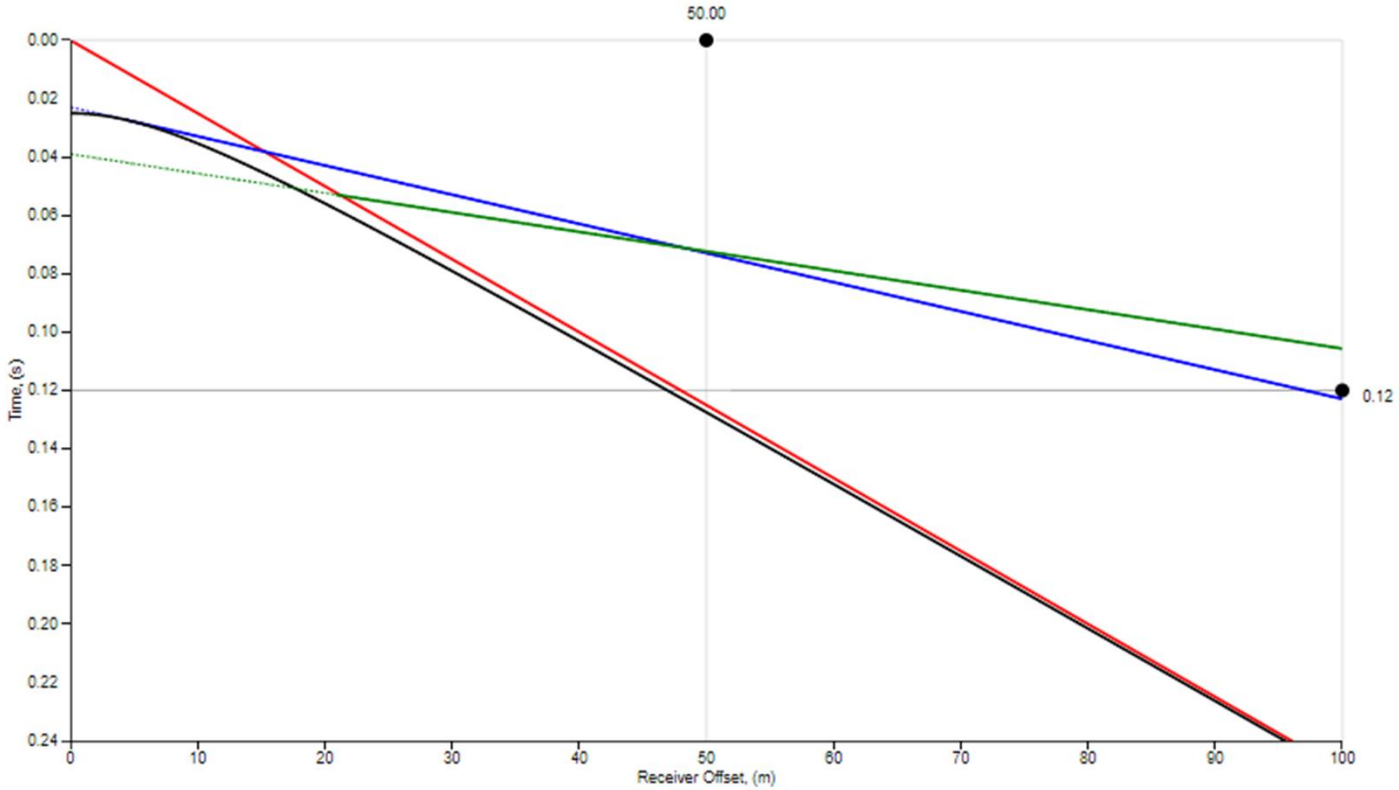


Seismic Problem

Q: Below, we see the seismogram signatures from a 3 layer problem in which the velocity of each layer increases with depth. Which line corresponds to the signal which reflects off the first interface and returns to the surface?

a) Red
b) Blue
c) Black
d) Green



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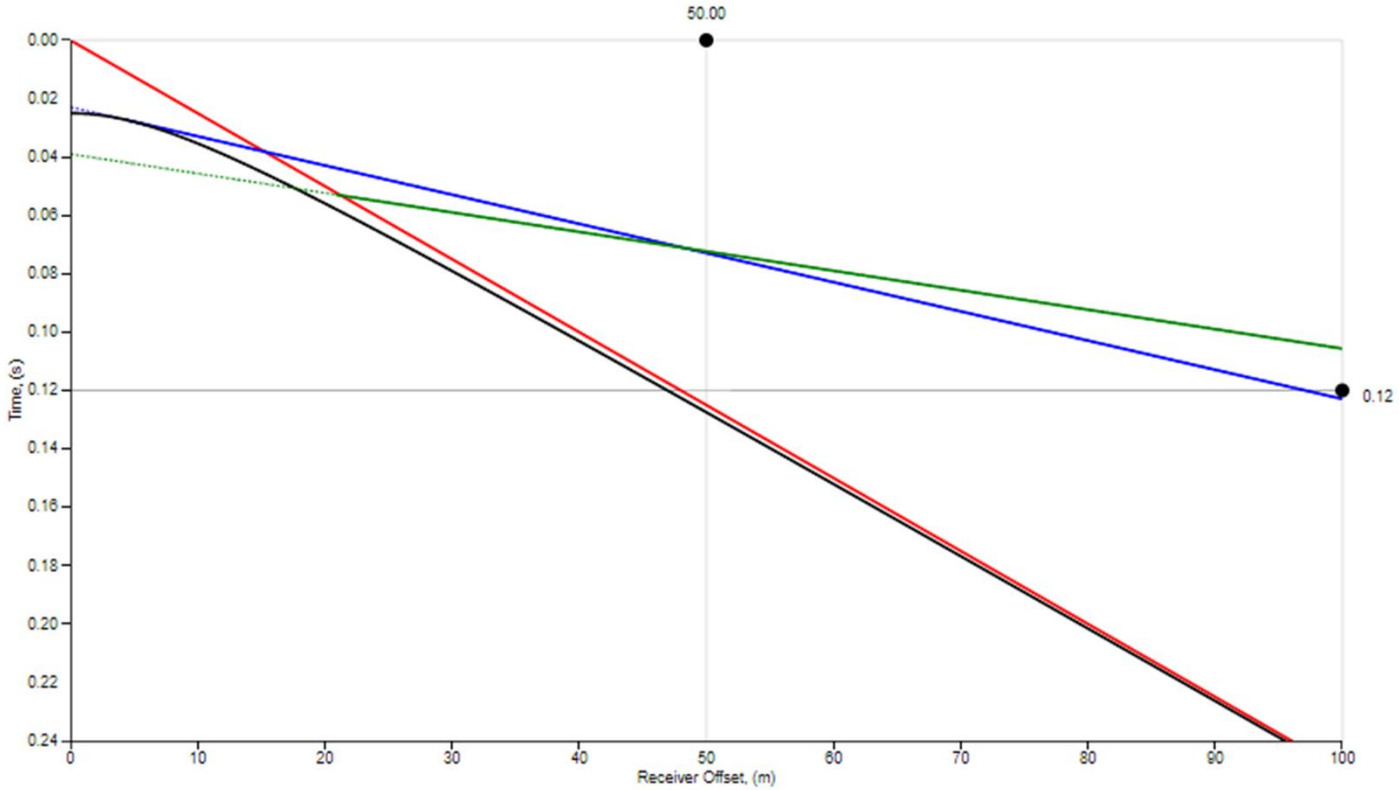

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Q: Below, we see the seismogram signatures from a 3 layer problem in which the velocity of each layer increases with depth. Which line corresponds to the signal which underwent a critical refraction at the interface between layer 2 and layer 3?

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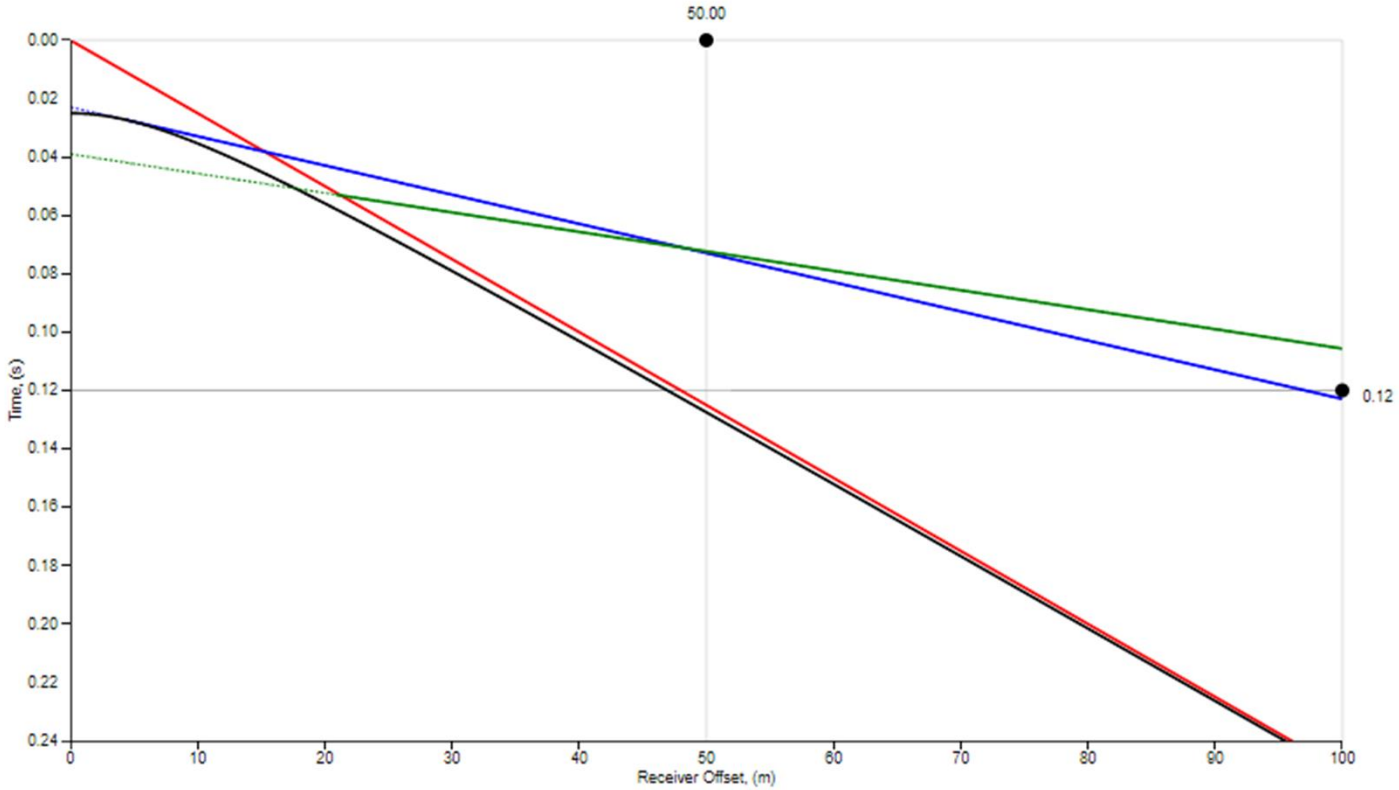

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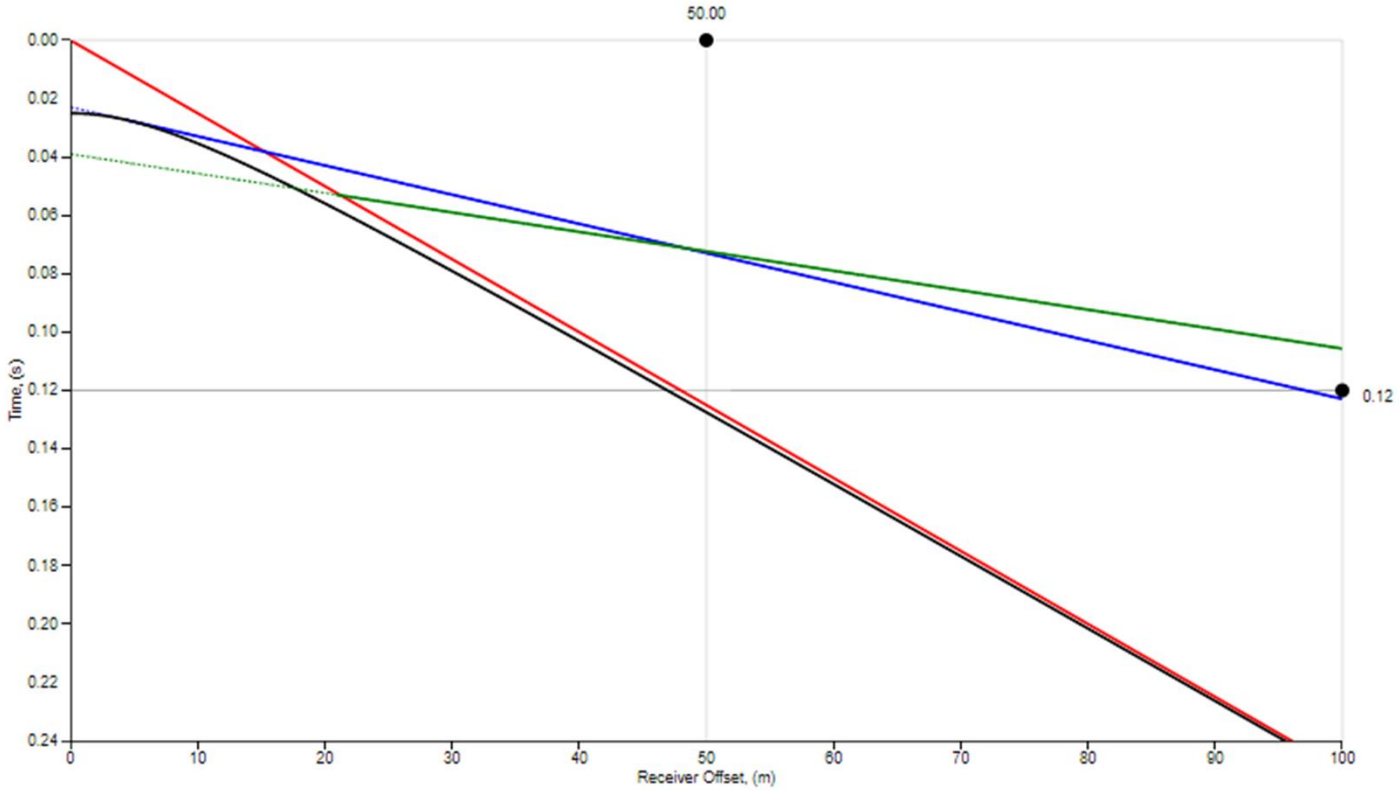

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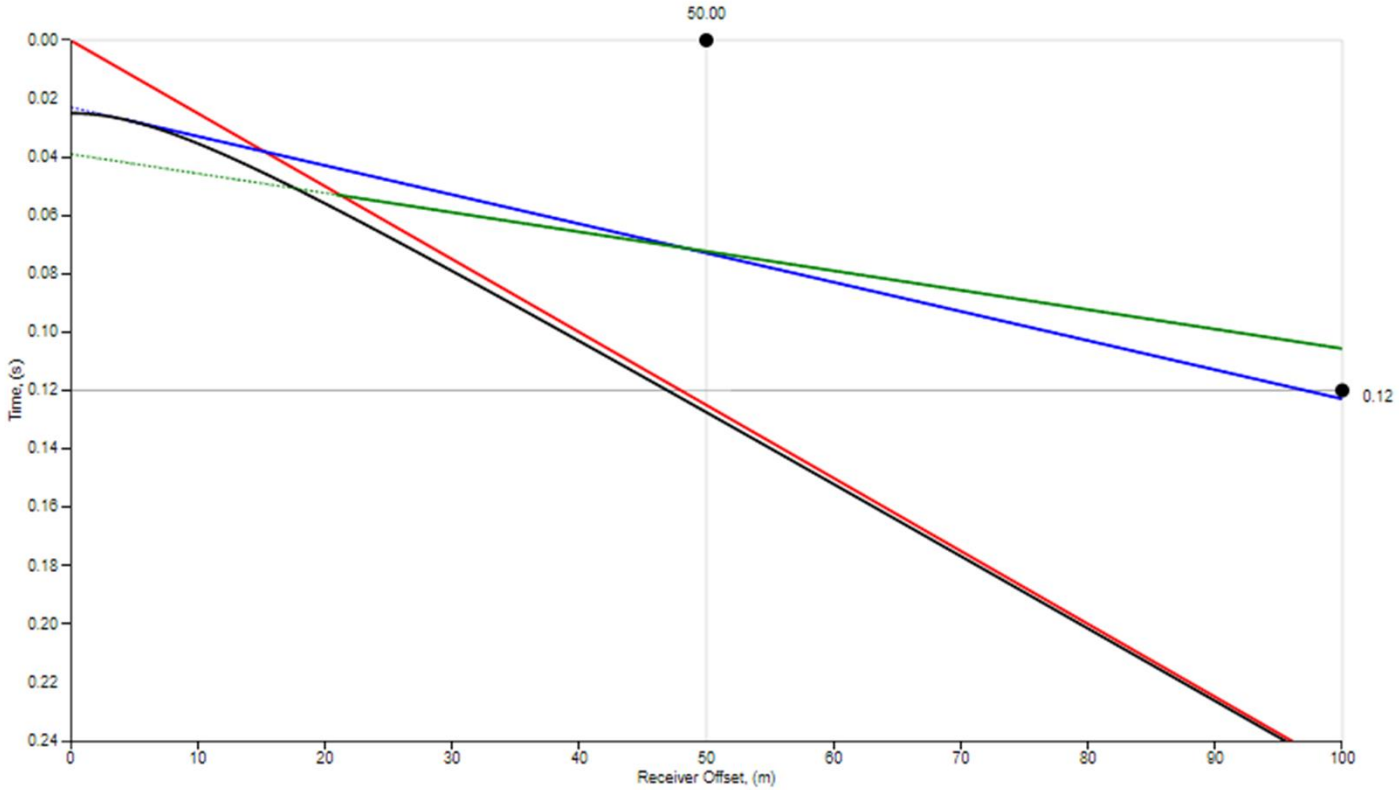
Q: Below, we see the seismogram signatures from a 3 layer problem in which the velocity of each layer increases with depth. What is the critical distance for the signal that underwent a critical refraction at the interface between layer 1 and layer 2?

a) 8 m
b) 15 m
c) 22 m
d) 50 m



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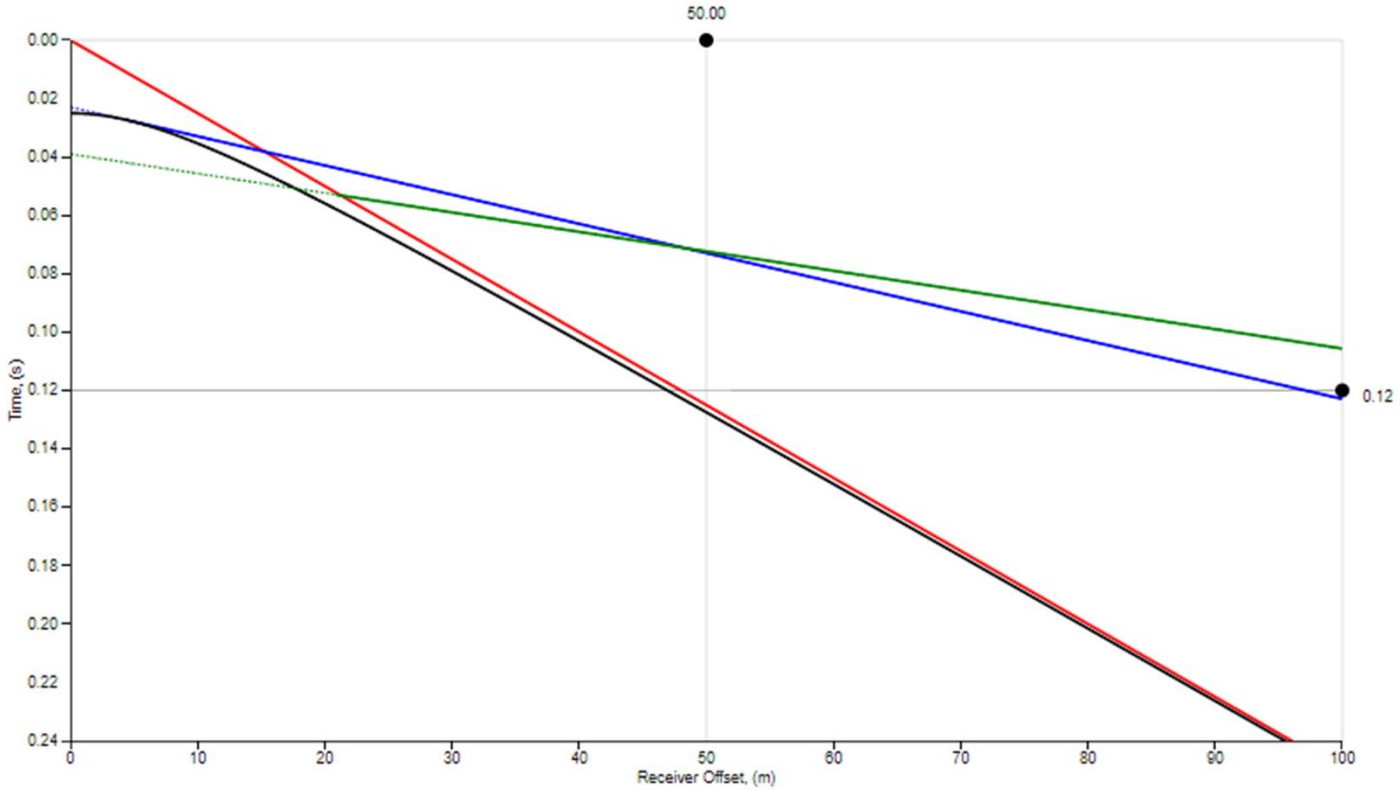

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GPR Problem

Q: You are performing a zero-offset survey over a very thin pipe as well as over a very thick pipe. What differences do you expect in their respective radargram signatures?

a) The slope at large offsets will be different
b) The signature of the thick pipe will no longer be described by a hyperbola
c) ‘a’ and ‘b’ are correct
d) ‘a’ and ‘b’ are incorrect

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Q: Consider performing a zero-offset survey over a rectangular block structure. What can be said about the resulting radargram signature?

a) At locations that are not directly over the top of the block, the travel time is represented by a hyperbolic equation
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a) 2.5
b) 10 ns
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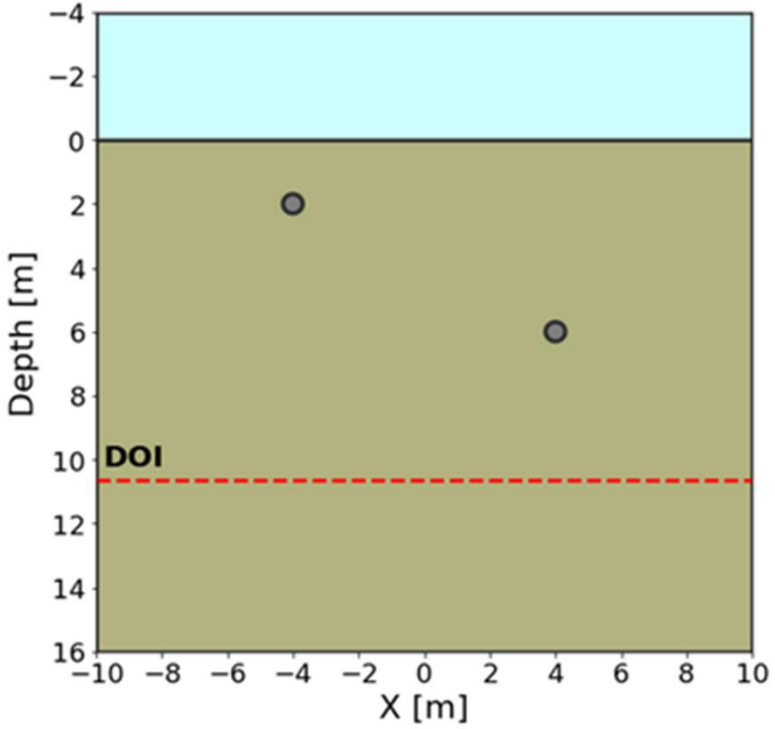
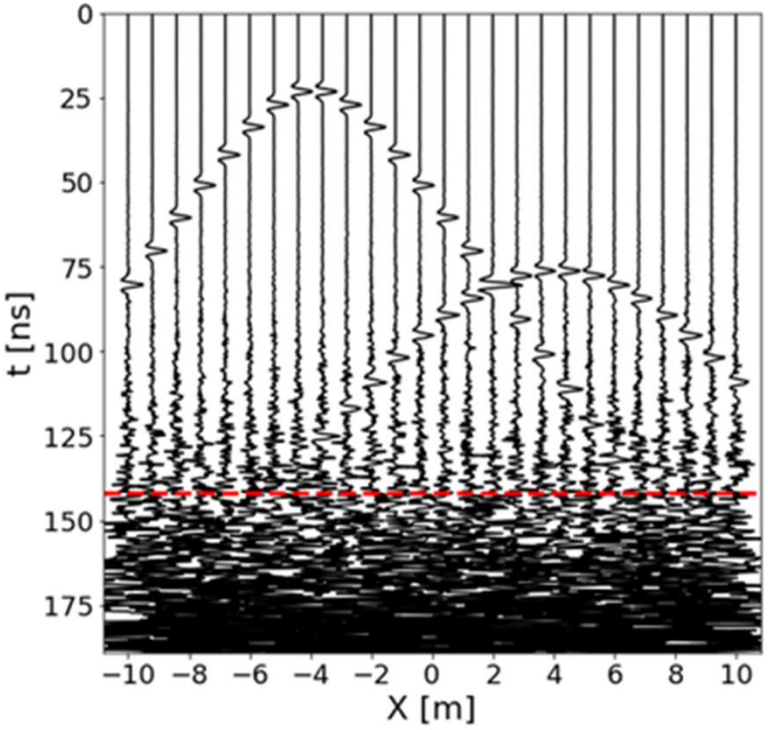
a) If the dielectric permittivity was increased
b) If the electrical conductivity was decreased
c) If the operating frequency was decreased
d) None of the above





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