

## Investigating Electric Fields

Use PHET interactive [CHARGES AND FIELDS](#).

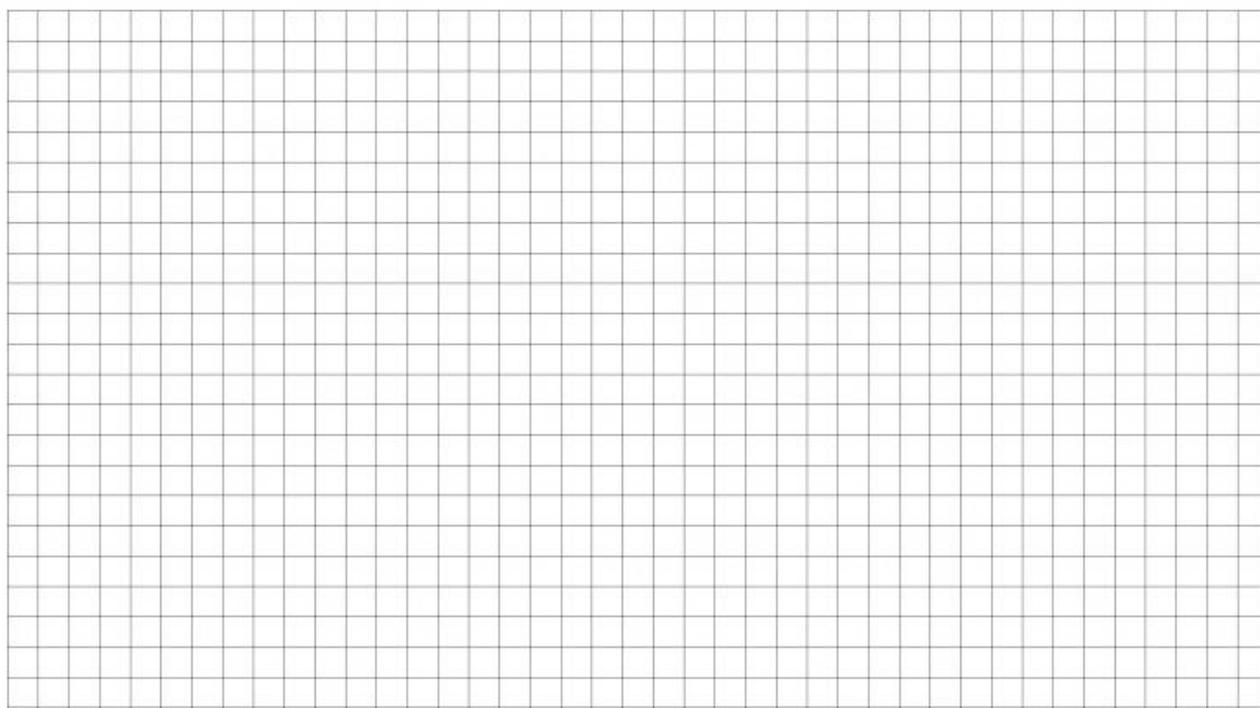
1. UNTICK the **electric field** box.
2. TICK the **grid** box.
3. PLACE a positive charge on the left(ish) side of the grid and then bring a sensor onto the grid.
4. Move the **sensor** around the charge.
5. TICK the **values** box and bring the tape tool onto the grid.



6. Move the sensor away from the point charge along a major grid line and use the **tape measure** tool to make five distance field strength measurements

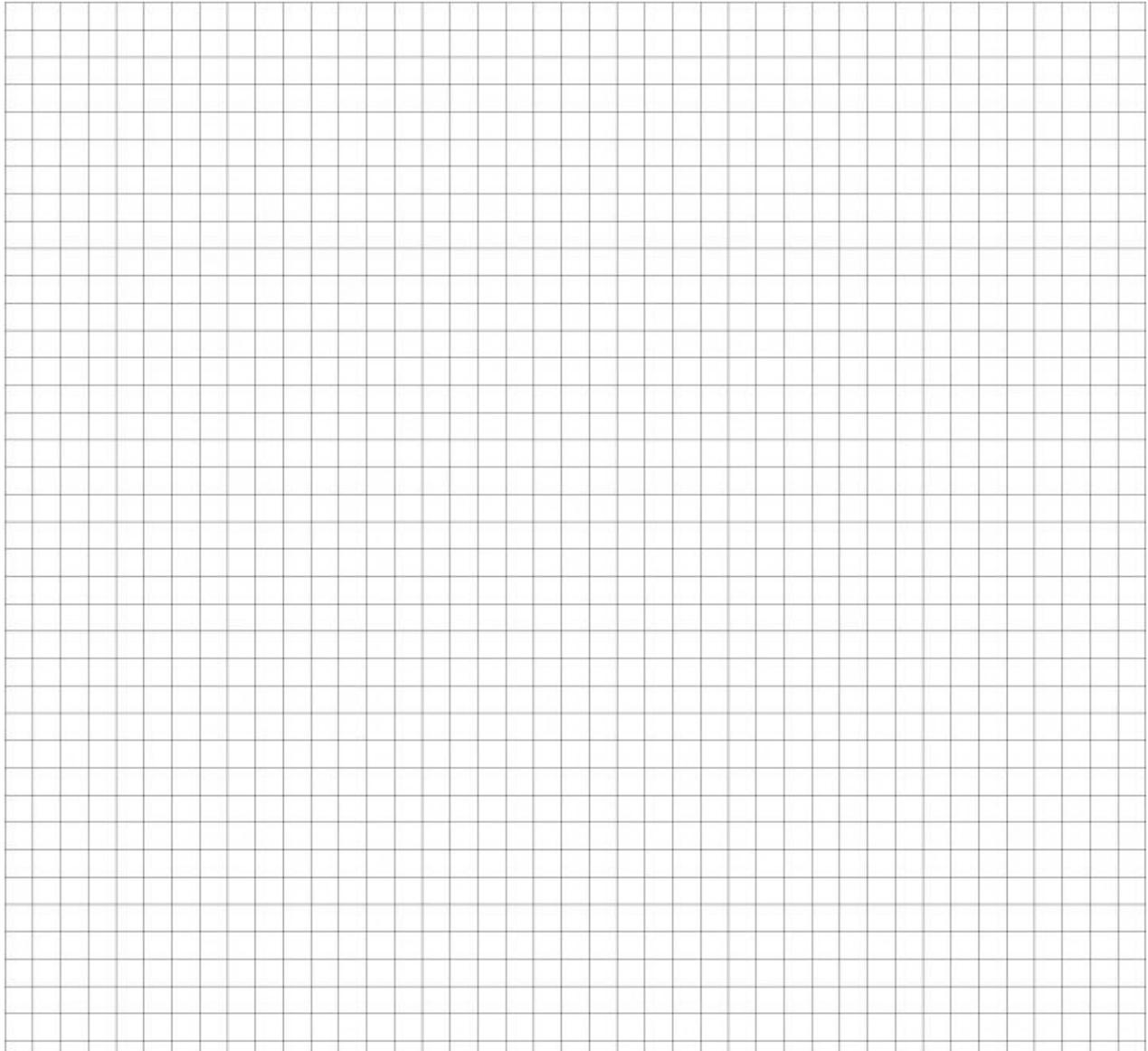
| distance / $\pm 0.002$ m | field strength / $\pm 0.01$ Vm <sup>-1</sup> |
|--------------------------|--|
| 0.498                    | 36.0   |

7. TICK the electric field box
8. PLOT a graph of field strength against distance. Add trend line.



9. PLOT a graph of  $1/r^2$  against field strength. Add trend line.

|                                   |   |
|-----------------------------------|---|
| $1/r^2 / \pm 0.01 \text{ m}^{-1}$ | field strength / $\pm 0.01 \text{ Vm}^{-1}$ |
| 4.0                               | 36.0  |



10. What is the relationship between separation and field strength for a point electric charge?

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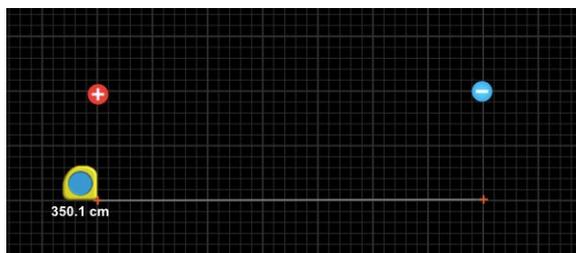


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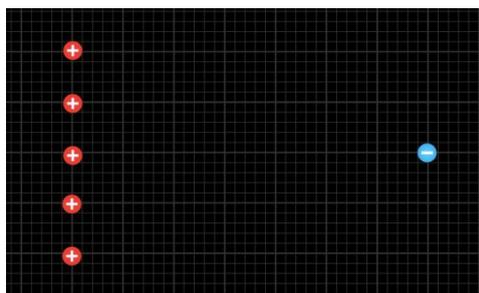
11. UNTICK the electric field box
12. PLACE a positive charge on the left(ish) side of the grid and a negative charge 7 large grid squares away.



13. Move the sensor around the grid.
14. TICK the electric field box.
15. Use field lines to represent the field and sketch the field below. Add arrows to show the direction of the field. Follow the rules for electric fields.

16. **Replace** the negative charge with a positive in the same position.
17. UNTICK the electric field box.
18. Move the sensor around the grid.
19. TICK the electric field box.
20. Use field lines to represent the field and sketch the field below.

21. Replace the second positive charge with a negative. Add four more positive charge equally spaced along a perpendicular. These represent a charged straight surface.



22. UNTICK the electric field box.
23. Move the sensor around the grid.
24. TICK the electric field box.

25. Use field lines to represent the field and sketch the field below.

26. Add a sixth positive charge. Add five more negative charges equally spaced along a perpendicular. These represent a second oppositely charged straight surface.



27. UNTICK the electric field box.

28. Move the sensor around the grid.

29. TICK the electric field box.

30. Use field lines to represent the field and sketch the field below.

31. Compare your sketches with those on the slide show Y11 IBDP Physics 5.1a - [Electric Fields](#)

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