## PHYS1022 Mid-semester test

Please seat yourself so there is a gap or aisle on both sides of your position



## PLEASE PUT YOUR NAME AND TUTOR ON ALL SHEETS

Some things are <u>more important</u> than getting the 'right answer' in this test. Therefore take time to explain your working clearly.

Most marks are for showing you understand i.e.-

diagram fundamental principles assumptions mathematics

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diagram fundamental principles assumptions mathematics

- 1. A charged disc of radius, a, has surface charge density which varies with radial distance, r. The charge density is given by  $\sigma = \alpha / r \text{ Cm}^{-2}$  with  $\alpha$  a constant. Compute an expression for the total charge on the disc. [5 marks]
- Draw a graph of potential along the horizontal line that runs through the two charges, and rank the locations A to F on the basis of the electric potential at each point. [5 marks]



3. A conducting sphere of radius *a* is surrounded by a concentric spherical shell of radius *b*. There is charge +Q on the inner sphere and -Q on the outer shell - compute the electric field and then the potential difference between the two spheres using Gauss' law. [10 marks]

- The standard length test is now finished so please stop all work.
- Please remain quiet as there are some students still working.
- Please ensure your name & tutor's name are on the front of the answer book.
- Place your revision sheet inside the answer book.
- Pass your book along your row to the nearest aisle. **WHEN** your answer books have been collected from your row then leave QUIETLY by the BACK of the lecture theatre.