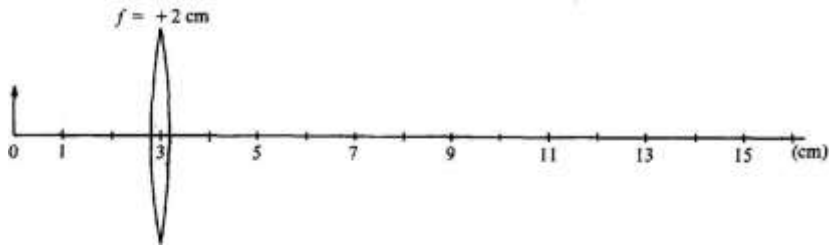
HOLIDAY OF PHYSICS S4

1. An object is placed 3 cm to the left of a convex (converging) lens of focal length $f = 2\ cm$ as shown below .

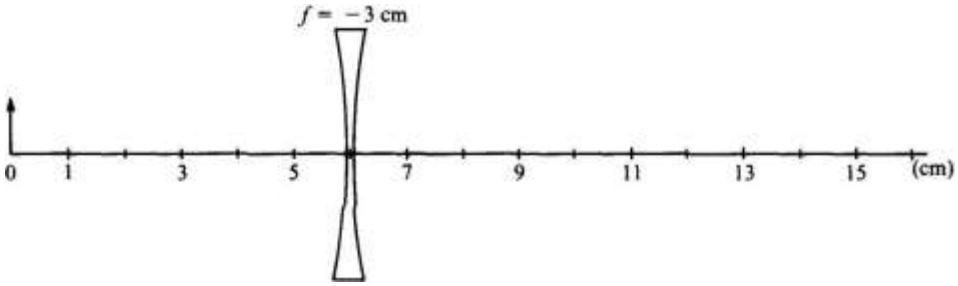


a. Use a graph paper to sketch a ray diagram to construct the image.

b.Use lens equation to determine the image position.

c. etermine image magnification.

The converging lens is removed and a concave (diverging) lens of focal length $f = -3\ cm$ is placed as shown below



i.Sketch a ray diagram using graph paper to construct the image.

ii.Use your graph or lens equation to determine the distance of this image from the lens.

iii.State the properties of the obtained image

2.Six identical cells, each with an electromotive force (emf) ε =1.5 V and internal resistance r=1 Ω are connected in parallel**.** This battery is then connected to an external resistor R =3 Ω

a.Use the above elements to draw a complete electric circuit including one

ammeter and one voltmeter.

a) What is the equivalent emf of the parallel combination of cells?

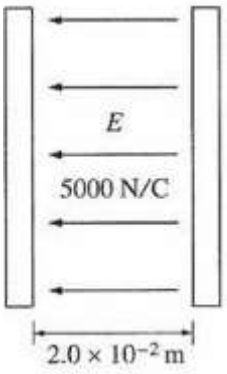
b)What is the equivalent internal resistance of the battery?

c) What is the total current supplied by the battery?

d) What is the electric current supplied by each cell?

g) What is the electric power delivered to the external resistor?

3.Two parallel conducting plates are separated by a distance of 2.0 x10^{-2} m. One plate has an electric charge +Q. An electric field of 5 000 N/C is directed to the left in the space between the plates, as shown in the diagram below.



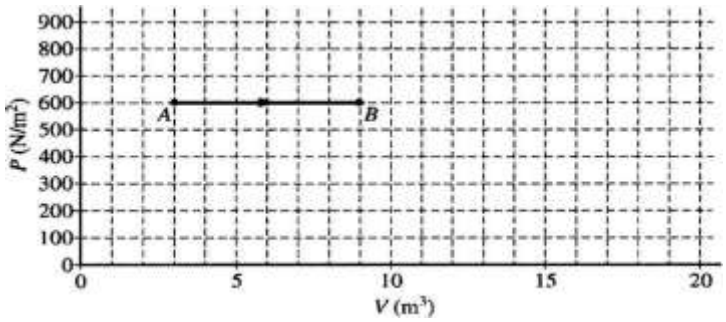
e) Copy the diagram and indicate which plate is positive (+) and which is negative (-).

f) Determine the potential difference between the plates.

g) An electron is initially located at a point midway between the plates. i)Determine the magnitude of the electrostatic force on the electron at this location. Magnitude of the electron's charge $e = 1.6x10^{-19}C$

i) State its direction. Explain your answer.

4.The diagram below of pressure P versus volume V shows the expansion of 2.0 moles of a monatomic ideal gas from state A to state B .As shown in the diagram, $P_A = P_B = 600\ N/m^2$,$V_A = 3.0\ m^3$ and $V_B = 9.0\ m^3$



a) **a.** Use sign convention to calculate the work done by the gas as it expands.

b) i)Use aproppriate expression of the ideal gas law that includes the number of moles and ideal gas constant to find the temperature T_A of the gas at state A . The ideal gas constant R=8.31 J/K.mol

ii) Find the temperature T_B of the gas at state B .

iii) Calculate the change in internal energy of the gas as it expands. Remember that this is isobaric process and the gas is monatomic.

c) Calculate the heat added to or removed from the gas during this expansion.