Sec 3 Physics e-Learning & hands-on Revision

Topics: Chapter 9 Lenses (part 2) **Date : _____**

Name : _____ ( ) **Class: _____**

Instructions:

- Use the resources **A, B** and **C** provided to investigate the characteristics of the images produced in each case shown in the table on page 2.
- Carry out the procedure as described.
- Sketch the ray diagrams for each case.

Resource A: Crocodile physics software

From http://johnlittlephysics.pbwiki.com/
→ Crocodile physics simulations → 2. Archive of simulations
→ Folders (right column) → Waves → Lens → download ray_diagram.cxp

[or directly via http://crocphy.pbwiki.com/]

- Open the above simulation and enlarge it by clicking on "**m**" (top left corner).
- By varying the **object distance u** (by moving the lens),
  - determine the corresponding **image distance v** (use "ruler"), and
  - note the image characteristics.
- Record all your measurements and observations in the table on page 2.

Resource B: Ray diagram simulation

From http://johnlittlephysics.pbwiki.com/
→ Ch. 9 Lenses → Ray diagram simulation!
Or access simulation at
http://www3.moe.edu.sg/edsoftware/ir/files/physics-thin-converging-lens/raydiagram/simulationactual.swf

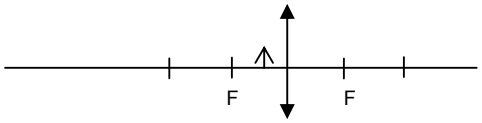
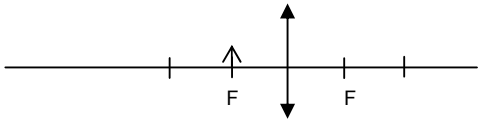
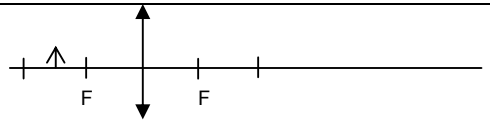
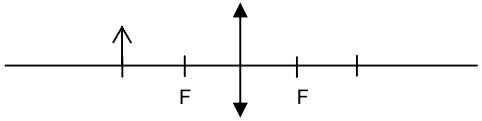
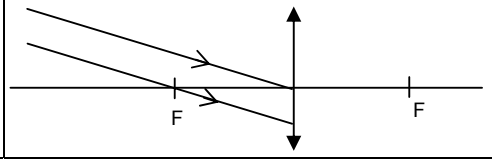
- Open the above simulation.
- For each set of values of **u** and **v** used in **Resource A**, verify the corresponding values using **Resource B**.
- Record the characteristics of the image and applications in each case in the table.

Resource C: Lens experiment

- Use the apparatus provided to conduct actual lens experiment measurements for **cases 1, 3, 4 and 5**. Record values in brackets below original values.
- **Image in case 1 is observed with the eye, whereas the image in cases 3, 4 and 5 are formed on the screen.**
- Observe the actual images formed and compare their characteristics with those obtained from the simulations.

Updated Class Worksheet 9.2 - Lens Applications

- Focal length of lens, f = 10.0 cm

Case	Ray diagram (sketch)	Object distance u	Typical values chosen		Image distance v	Characteristics of image			Application
			u / cm	v / cm		Nature	Orientation	Size relative to the object	
1		$u < f$							Magnifying glass
2a		$u = f$			$v = +\infty$	real			Spot light
2b					$v = -\infty$	virtual			Eyepiece of telescope
3		$f < u < 2f$				real	inverted	magnified	
4		$u = 2f$							
5		$u > 2f$							
6		u = infinity						diminished	