

## Homework

10% The image of needle is placed at 45cm from lens and 90cm if image is moved 5cm find displacement and power

$u = -45\text{cm}$        $v = 90\text{cm}$       By lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} + \frac{1}{45} = \frac{1}{90} \Rightarrow f = 30\text{cm}$$

$$u_1 = 45 + 5 = -50$$

$$\frac{1}{90} + \frac{1}{-50} = \frac{2}{150} \Rightarrow v_1 = 75\text{cm}$$

displacement  $\Rightarrow 90 - 75 = 15\text{cm}$  towards lens

$$\text{Power} = \frac{1}{f} \Rightarrow \frac{1}{0.30\text{m}} = +3.33\text{D}$$

A lens with power +3D and other  $\phi 1.5\text{D}$  in contact will they be convergent or diverg

$$\text{Power of combination} \Rightarrow +3\text{D} + (-1.5\text{D}) = +1.5\text{D}$$

As power is +ve it is convex lens and is converging

$$P = \frac{1}{f} \Rightarrow \frac{1}{2} = 0.5\text{m}$$

Find nature focal length of lens in which should be placed with concave lens of  $f = 0.25\text{m}$  it produces real image

5 times the size of object

$$\text{concave} \Rightarrow f = -25 \text{ cm} \quad \text{Power} = -4 \text{ D}$$
$$\text{in combination} \Rightarrow u = -20 \text{ cm} \quad v = ?$$
$$M = \frac{-5}{1} = \frac{v}{-20} \Rightarrow v = 100 \text{ cm}$$

By lens formulae  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\frac{1}{f} - \frac{1}{25} = \frac{1}{100} - \left(-\frac{1}{20}\right) \Rightarrow \frac{1}{f} - \frac{1}{25} = \frac{20+100}{20 \times 100}$$
$$f = \frac{5000}{500} \Rightarrow f = 10 \text{ cm} \Rightarrow P = \frac{1}{f} = 10 \text{ D}$$

here focal = +ve lens is convex Real lens

You are given lens with power +10D, +5D, -5D, -20D and -10D

(i) 20cm      (ii) -10cm      (iii) -20cm  
(iv) 20/3cm      (v) -

(i) lens with power  $\Rightarrow$  10D, -5D

$$\Rightarrow \frac{100}{5} = 20 \text{ cm}$$

(ii) lens with power 10, -20D

(iii) +5D and -10D

(iv) 10D and 5D