Geometrical Problem.

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Figure 24.

Let OQ, OR be two straight lines meeting at O, and P any point. Required to draw through P a straight line cutting off a given area OAB from the two straight lines.

Draw PD parallel to OR cutting OQ in D.

Construct a $\triangle$OPC equal to the given area, and such that OP is one of its sides, and that another of its sides, OC, lies along OQ.

Take OE a mean proportional to OC, OD.

Draw OF perpendicular to OC and equal to half of it.

Join EF, and cut off FG = OF.

Take OA = EG. Then PAB is the required straight line.

Proof :

Sqs. on OE, OF = sq. on EF

= sqs. on EG, GF, + 2 rect. EG . GF

$\therefore$ sq. on OE = sq. on EG + 2 rect. EG . GF

= sq. on OA + rect. OA . OC (since OC = 2GF)

$\therefore$ rect. OC . OD = sq. on OA + rect. OA . OC

rect. OC . (OA + AD) = sq. on OA + rect. OA . OC

$\therefore$ rect. OC . OA + OC . DA = sq. on OA + rect. OA . OC

$\therefore$ sq. on OA = rect. OC . DA

$\therefore$ $OC : DA :: OA^2 : DA^2$

$\therefore$ $\triangle OPC : \triangle DPA :: \triangle OAB : \triangle DAP$

$\therefore$ $\triangle OAB = \triangle OPC$ = given area.

Colour-sensation and Colour-blindness, with Experiments.

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