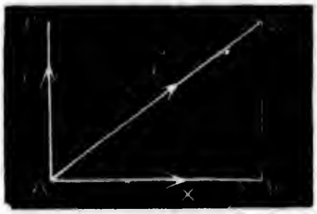
Thus, if $R$ be the force at $A$, represented by $AD$, and it be resolved into two forces in perpendicular directions—namely, $X$ along $AB$ and $Y$ along $AC$; then $X$ and $Y$ are the effective parts of $R$ resolved along $AB$ and $AC$ respectively. Completing the rectangle $A\ C\ D\ B$, $X$ and $Y$ will be respectively represented by $AB$, $AC$, and, calling the angle $BAD$, $\theta$, we have from the right-angled triangle $B\ A\ D$,



$$X = R \cos \theta,\ Y = R \sin \theta.$$

21. Hence, to find the effective part of a force in any given direction, or, more briefly, to resolve a force in any given direction, *multiply its magnitude by the cosine of the angle contained between its direction and the given direction:* and to resolve a force perpendicularly to a given direction, *multiply it by the sine of this angle.* Rule for.

22. So also from the same figure we obtain the Resultant ($R$) of two perpendicular forces ($X$, $Y$), and the angle ($\theta$) which its direction makes with one of them ($X$); for

$$R^2 = X^2 + Y^2;\ \text{and, } \tan \theta = \frac{Y}{X}.$$

23. When any number of Forces act at a point, their whole effect in any direction will be the Algebraic sum of the separate resolved Forces in this direction, which will evidently therefore be equal to their Resultant resolved in the same direction.

Hence also the algebraic sum of the separate resolved forces in direction of the Resultant is the Resultant itself, and the corresponding sum in a direction perpendicular to the Resultant is zero.

24. *To find the magnitude and direction of the Resultant of any forces acting at a point, their directions being all in one plane.* Resultant of any forces in one plane, and.