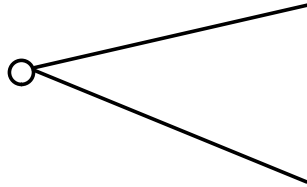


**Aim 87: What is the parallelogram of forces? MR12**

★ HW: Worksheet & GB p10 #2, p14 #30, p19 #14, 17, p35 #20

★ Quiz :Law of Sines, Law of Cosines, Ambiguous Case, Triangle problems requiring 2 steps, Area problems and Parallelogram of Forces.

Do Now: 1) One soccer player can kick a ball 40 feet and another player can kick the ball 30 feet. If both players kick the ball at the same time how far will the ball travel?



Vocabulary:

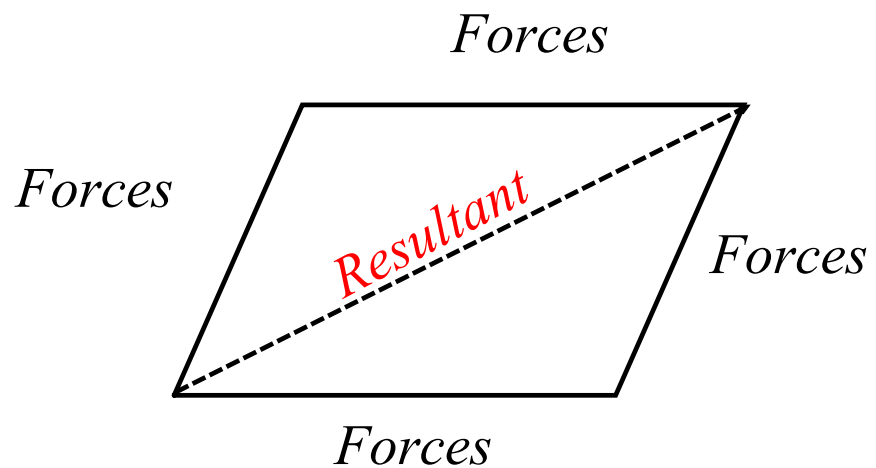
Magnitude - size

Applied force - vector or directed line segment

Resultant - the single force that has the same affect as the combination of the applied forces.

**The Parallelogram of forces is graphical method of finding the resultant force from two separate forces by drawing the two forces as two sides of a parallelogram, with the diagonal equal to the resultant force.**

What do we know about parallelograms?

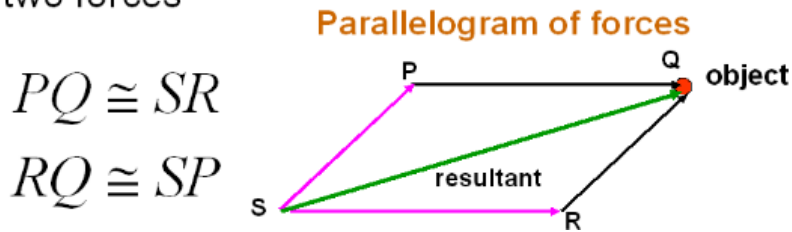


*Resultant* - the diagonal of the parallelogram or the result of the forces.

Magnitude - the size of the resultant force.

How do we find the combined forces acting on a certain object?

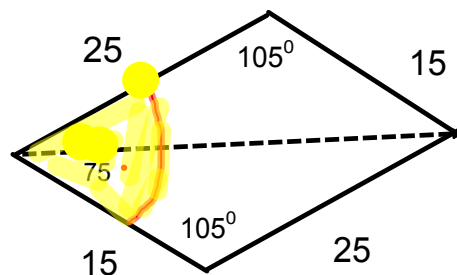
We need to draw a parallelogram based on the two forces



$PQ$  and  $RQ$  are vectors that represent two forces applied to an object at point  $Q$ . The **resultant** ( **the diagonal of the parallelogram**) of these two forces is represented by the vector  $SQ$ .

The amount of resultant is called **magnitude**.

2) Two forces of 25 and 15 pounds act on a body so that the angle between them measures  $75^\circ$ . Find the magnitude of the resultant to the nearest pound.



Answer:

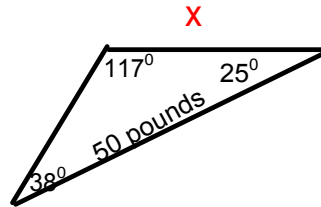
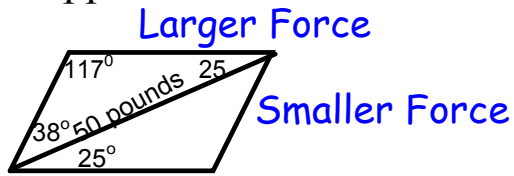
$$R^2 = 25^2 + 15^2 - 2(25)(15) \cos 105^\circ$$

$$R^2 = 1044.1143$$

$$R = 32$$

3) Two forces act on a body so that the resultant is a force of 50 pounds. The measures of the angles between the resultant and the forces are  $25^\circ$  and  $38^\circ$ .

Find to the nearest pound the magnitude of the larger applied force.



$$\frac{\sin 38}{x} = \frac{\sin 117}{50}$$