

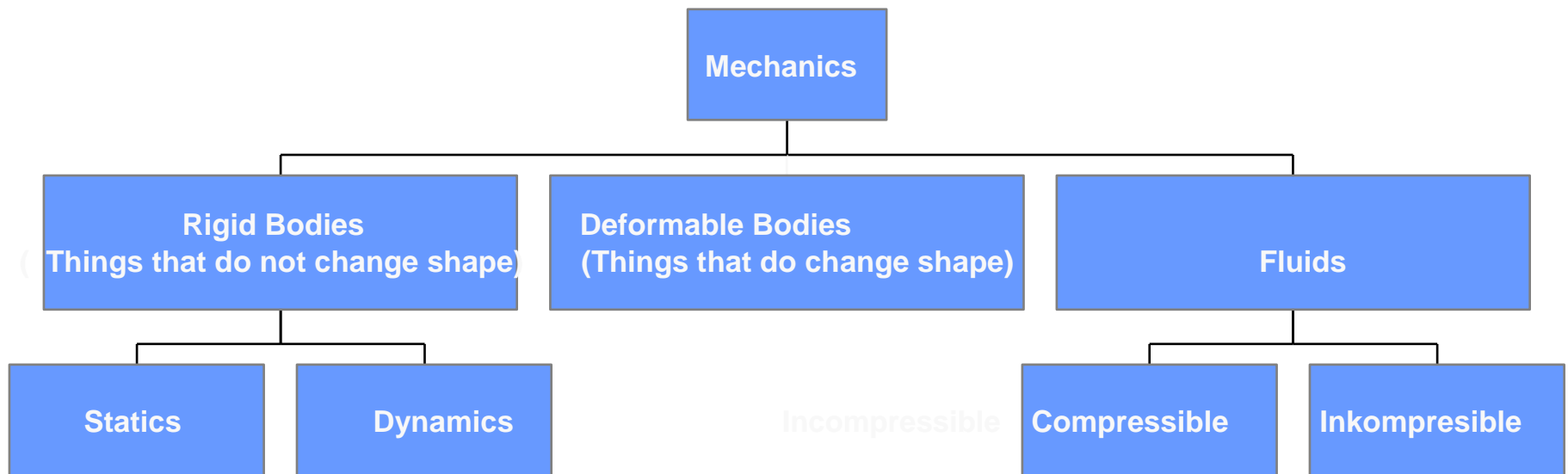
MEKANIKA TEKNIK

JURUSAN TEKNIK INDUSTRI

FT – UNSADA

Apa itu Mekanika?

Cabang ilmu fisika yang berbicara tentang keadaan diam atau gerakanya benda-benda yang mengalami kerja atau aksi gaya



Review Sistem Satuan

- Four fundamental physical quantities. Length, Time, Mass, Force.
- We will work with two unit systems in static's: SI & US Customary.

Name	Length	Time	Mass	Force
International System of Units (SI)	meter (m)	second (s)	kilogram (kg)	newton* (N) $\left(\frac{\text{kg} \cdot \text{m}}{\text{s}^2}\right)$
U.S. Customary (FPS)	foot (ft)	second (s)	slug* $\left(\frac{\text{lb} \cdot \text{s}^2}{\text{ft}}\right)$	pound (lb)

*Derived unit.

Bagaimana konversi dari SI ke US atau sebaliknya ?

SISTEM GAYA

GAYA

Gaya adalah interaksi antara benda-benda yang berpengaruh terhadap bentuk atau gerak atau keduanya pada benda yang terlibat.

Gaya adalah **besaran vektor**:

- Besar (magnitude)
- Arah (direction and sense)
- Titik tangkap (point of application)

Satuan gaya:

SI units :

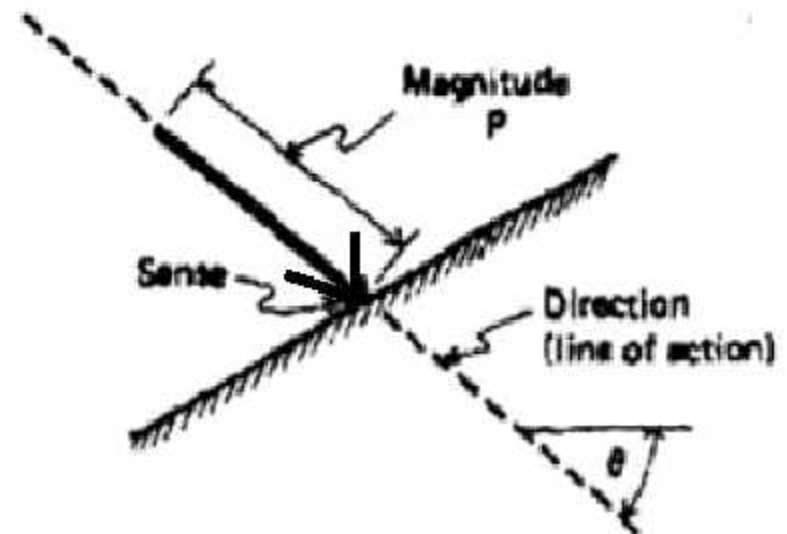
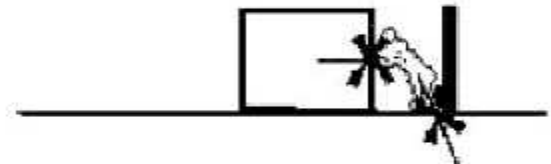
N (Newton)

kN (kilo Newton = 1000 Newton)

US units :

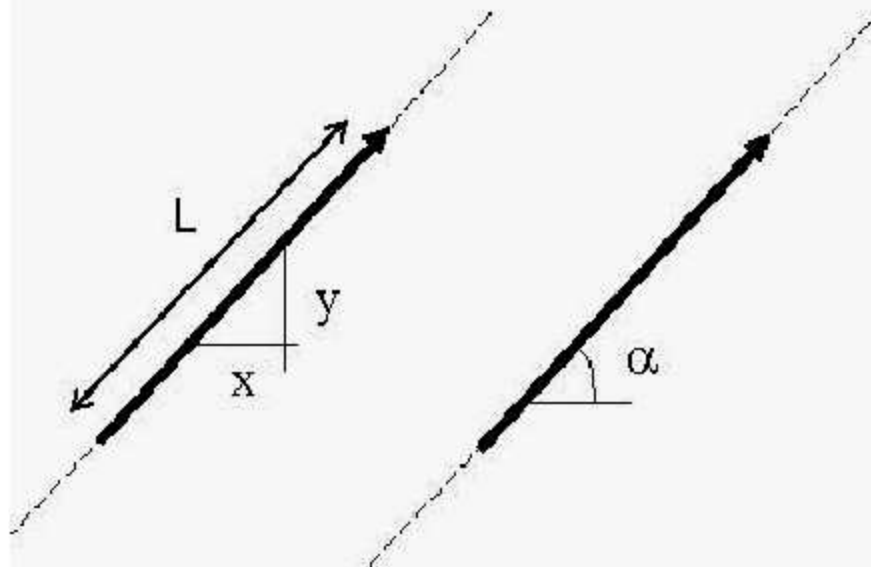
pound (lb, #)

kip (k) = 1000 pound



GAYA

- Presentasi gaya:
 - Secara matematis
 - Secara grafis
- Secara grafis:
 - sebagai garis :
 - panjang garis \rightarrow besar gaya
 - arah garis \rightarrow arah gaya
 - garis kerja \rightarrow garis yang panjangnya tak tertentu yang terdapat pada vektor gaya tersebut



Besar gaya : L Newton, misal jika 1 Newton digambarkan dengan panjang garis 1 cm , maka 4 Newton \approx 4 cm

Arah gaya dinyatakan dalam : $\text{tg } \frac{y}{x}$,
atau besar sudut α ($^{\circ}$)

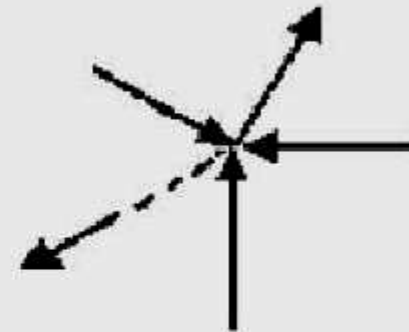
SISTEM GAYA

Macam sistem gaya:

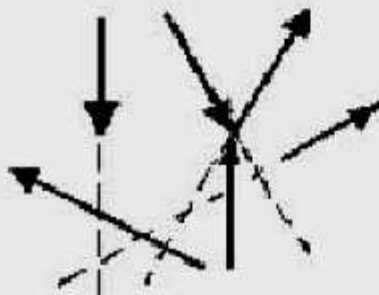
- collinear
- coplanar
 - *Concurrent*
 - *Parallel*
 - *Non-concurrent, non-parallel*
- space
 - *Noncoplanar, parallel*
 - *Noncoplanar, concurrent*
 - *Noncoplanar, nonconcurrent,*



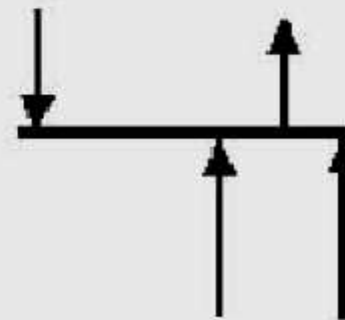
collinear



Concurrent



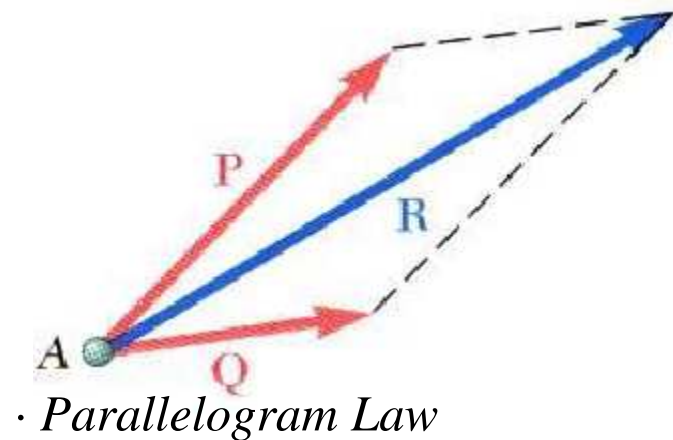
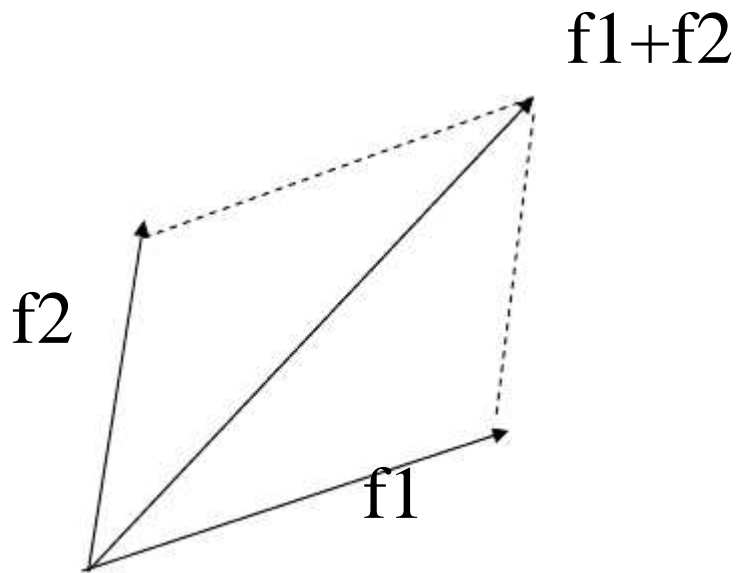
Non-Concurrent
Non-Parallel



Parallel

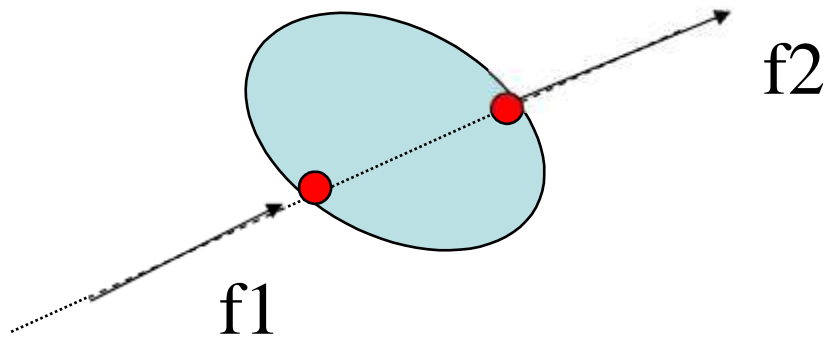
Fundamental Principles

- **The parallelogram law for the addition of forces:** Two forces acting on a particle can be replaced by a single force, called resultant, obtained by drawing the diagonal of the parallelogram which has sides equal to the given forces

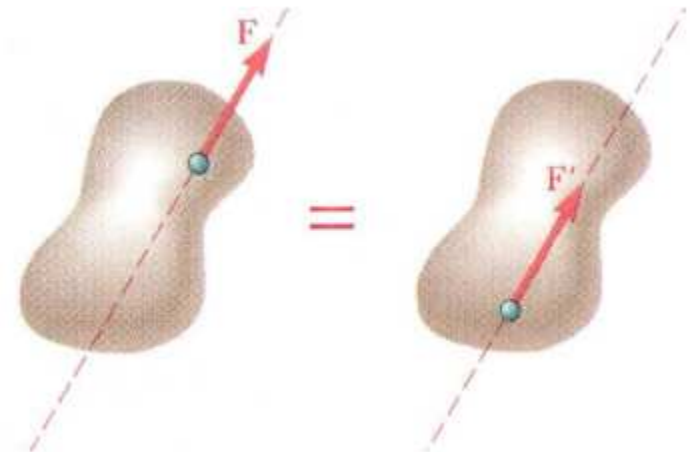


Fundamental Principles (cont')

- **The principle of transmissibility:** A force acting at a point of a rigid body can be replaced by a force of the the same magnitude and same direction, but acting on at a different point on the line of action



f_1 and f_2 are equivalent if their magnitudes are the same and the object is rigid.



• *Principle of Transmissibility*

RESULTAN GAYA

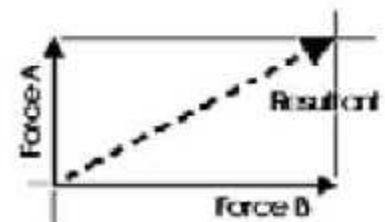
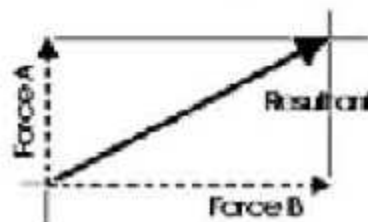
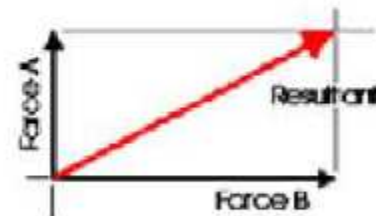
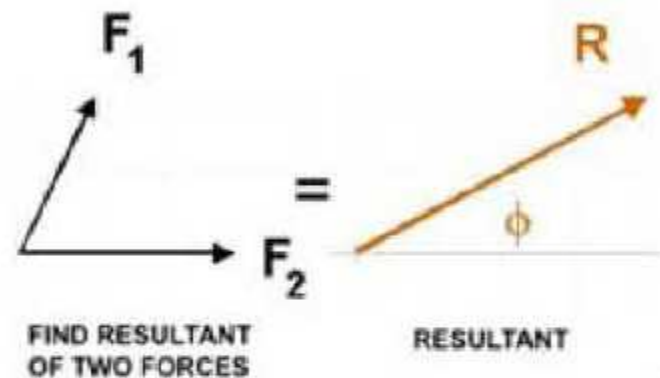
Resultan gaya

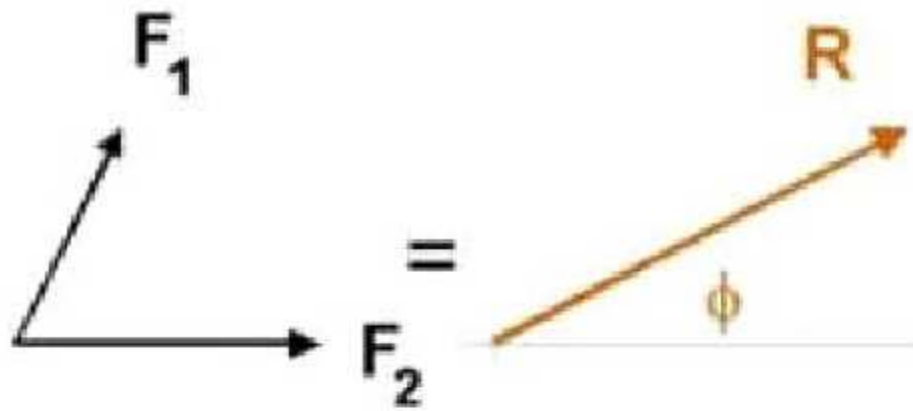
- Dua atau lebih gaya yang tak sejajar dapat dijadikan sederhana menjadi satu resultan gaya tanpa mengubah efek translasional maupun rotasional yg ditimbulkannya pada benda dimana gaya-gaya tsb. bekerja.

→ pengaruh kombinasi gaya-gaya tsb setara dgn pengaruh satu gaya yang disebut sebagai resultan gaya-gaya tsb.

Cara mencari besar dan arah resultan gaya:

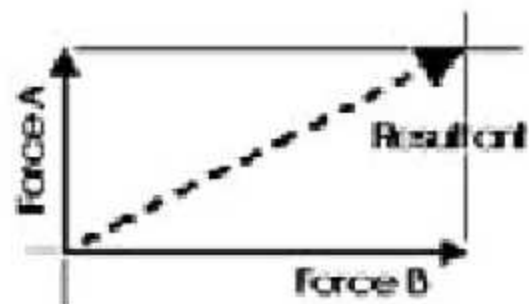
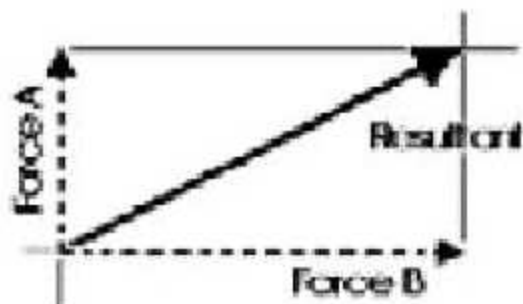
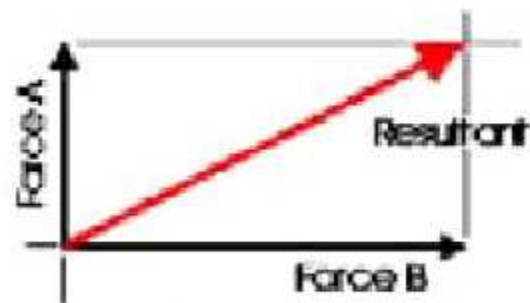
- Parallelogram/jajaran genjang gaya atau segitiga gaya
- Polygon gaya
- aljabar





FIND RESULTANT
OF TWO FORCES

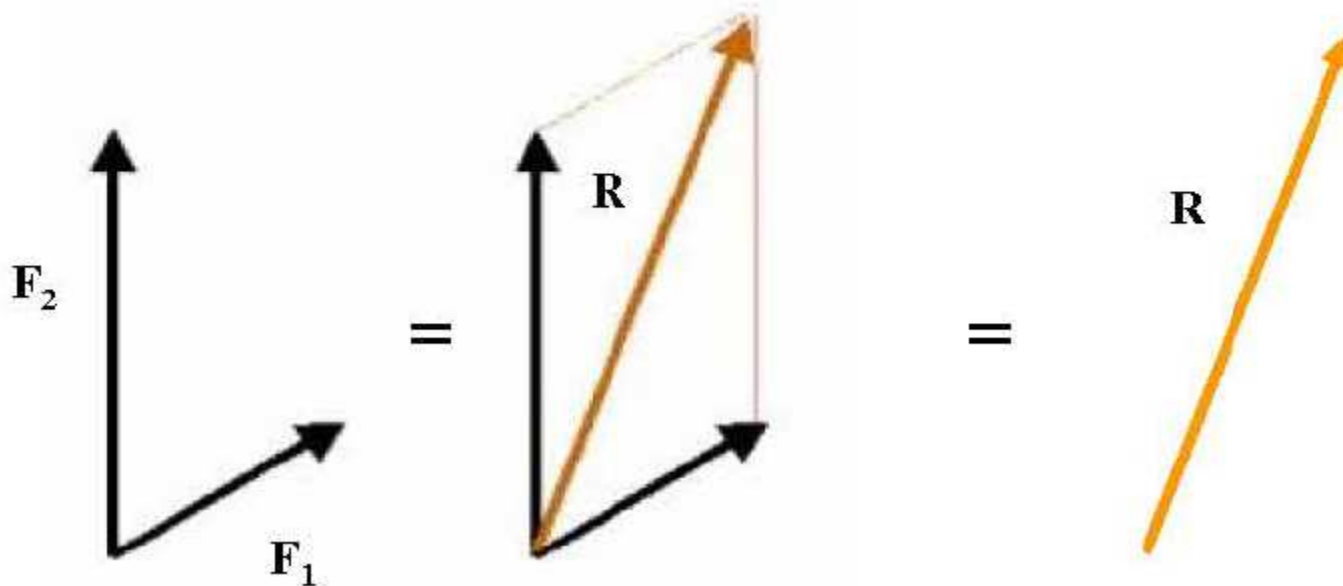
RESULTANT



RESULTAN GAYA

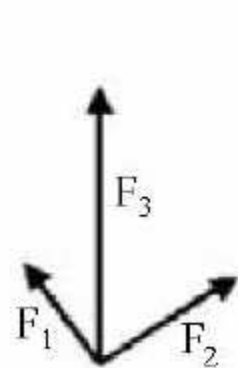
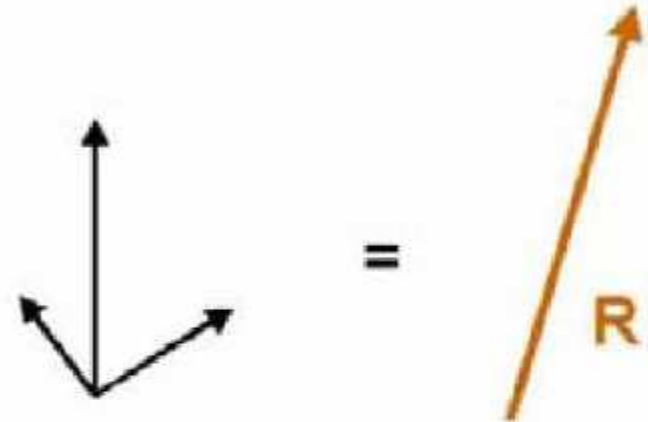
Metoda paralellogram/jajaran genjang gaya :

- Resultan gaya dinyatakan dgn diagonal jajaran genjang yg dibentuk oleh kedua vektor gaya.

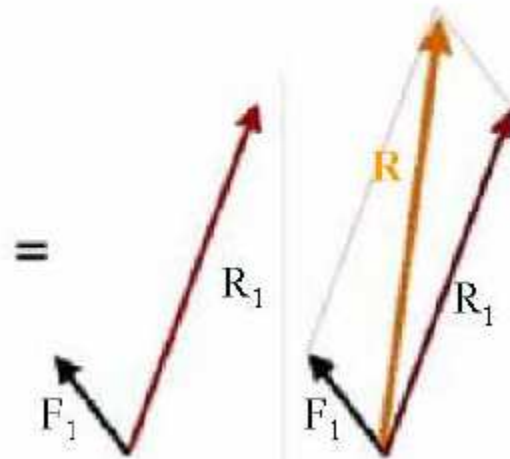
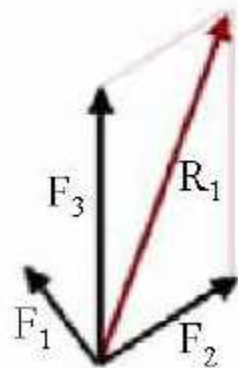


RESULTAN GAYA

Mencari resultan gaya-gaya:
metoda paralellogram/
jajaran genjang gaya



tiga gaya

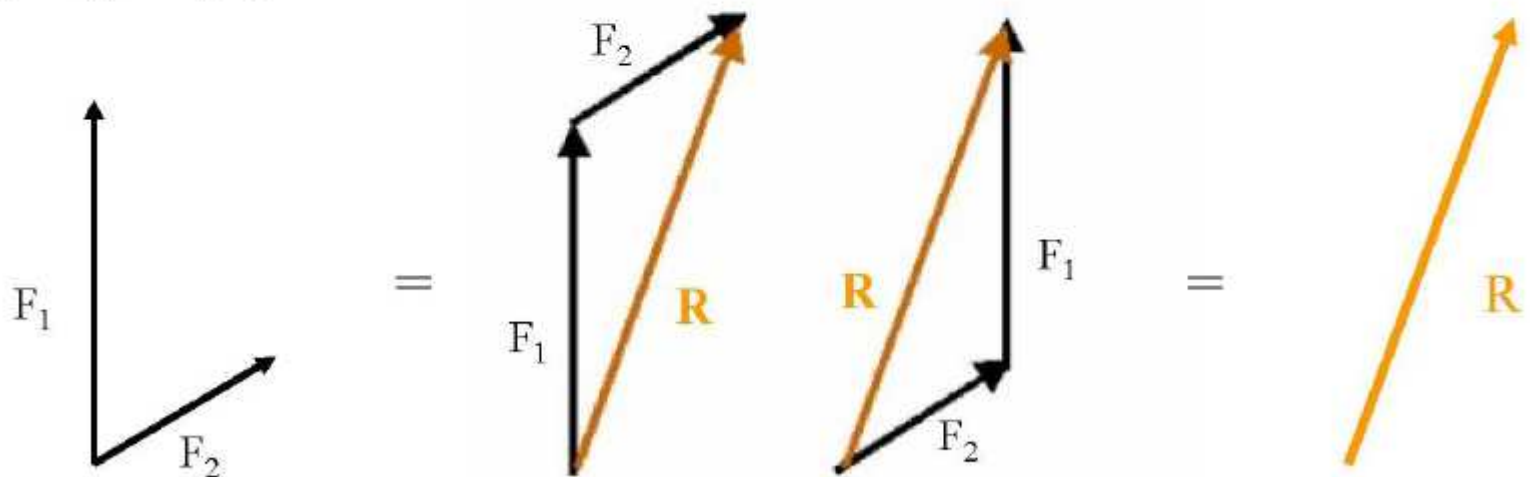


Gaya
resultan
final

RESULTAN GAYA

Mencari resultan gaya-gaya: **Metoda polygon gaya**

Masing-masing vektor gaya digambar berskala dan saling menyambung (ujung disambung dengan pangkal, urutan tidak penting). Garis penutup, yaitu garis yang berawal dari titik awal vektor pertama ke titik akhir vektor terakhir, merupakan gaya resultan dari semua vektor tsb. gaya resultan tersebut menutup polygon gaya.



dua
gaya

"TIP TO TAIL" TECHNIQUE

RESULTAN GAYA

Mencari resultan gaya-gaya:
Metoda polygon gaya

tiga gaya

