

## Chapter 1

1. Evaluate each of following to three significant figures and using appropriate prefix:

- a)  $(354 \text{ mg})(45 \text{ km}) / (0.0356 \text{ kN})$                       c)  $(0.00453 \text{ Mg})(201 \text{ ms})$   
b)  $435 \text{ MN} / (23.2 \text{ mm})$                                       d)  $435(10^3) \text{ lb} / (20 \text{ in})^2$

2. a) The mass density of aluminum is  $5.26 \text{ slug/ft}^3$ . What is specific weight of aluminum ( $\text{lb/in}^3$ )?

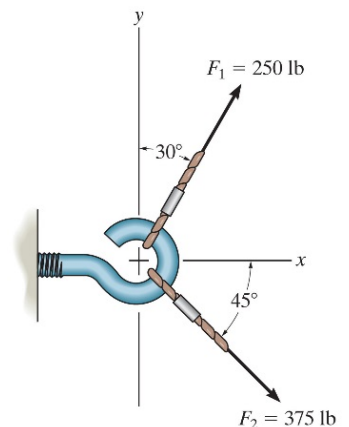
b) The function  $s(t)$ ,  $s(t) = v_0 t + \frac{1}{2} a t^2$ , can be used to calculate the distance of a particle traveling with initial velocity  $v_0$  and constant acceleration  $a$  in  $t$  seconds. If  $v_0 = 120 \text{ m/min}$  and  $a = 2 \text{ km/min}^2$ , how far the particle traveled in 5 s?

3. a) The Pascal (Pa) is actually a very small unit of pressure. It is defined as  $1 \text{ Pa} = 1 \text{ N/m}^2$ . Calculate the pressure that an object has mass 5 kg sitting on the circular table with diameter  $d = 5 \text{ cm}$ . Use proper prefix.

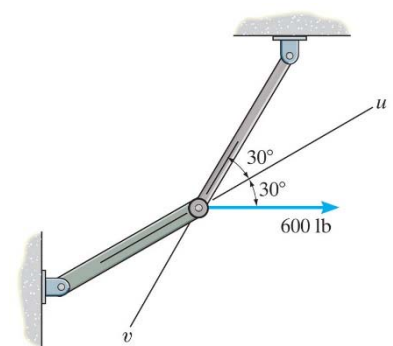
b) A rocket has weight of 8050 kips on earth. What is the mass of the rocket on earth and on moon in slug? Assume the gravity is  $g = 5.30 \text{ ft/s}^2$  on moon.

## Chapter 2

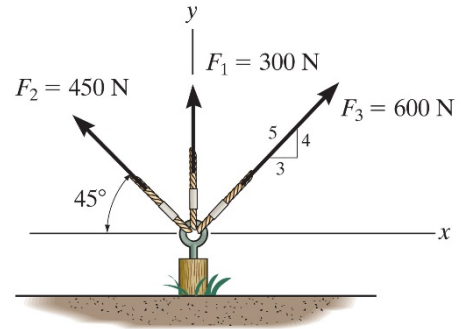
1. Use **graphical method** to determine the magnitude of the resultant force  $\mathbf{F}_r = \mathbf{F}_1 + \mathbf{F}_2$  and its direction in angle.



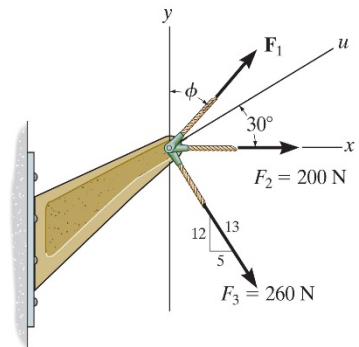
2. Use **graphical method** to resolve the horizontal 600 lb force into components acting along the  $u$  and  $v$  axes. Find the magnitudes of  $F_u$  and  $F_v$ .



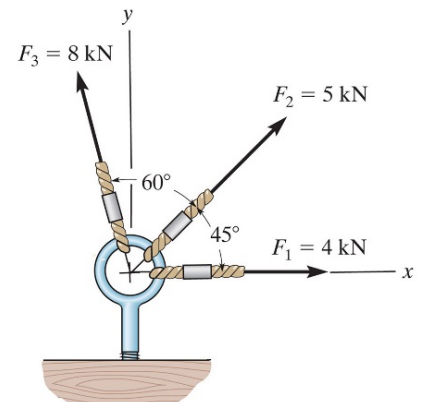
3. Use Cartesian Vector to determine the magnitude of the resultant force and its direction in angle.



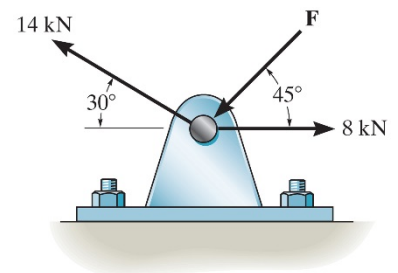
4. If the magnitude of the resultant force acting on the bracket is to be 450 N directed along the positive  $u$  axis, determine the magnitude of  $F_1$  and its angle  $\phi$  from  $y$  axis.



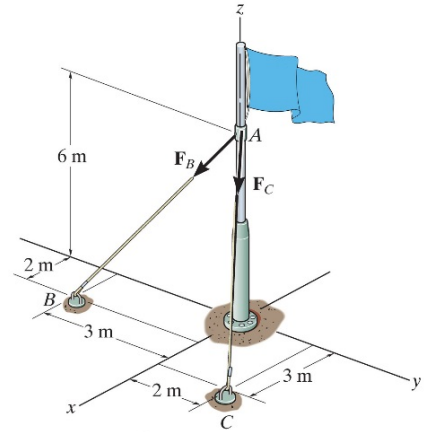
5. If you like to add another force  $F_4$  so the total resultant force of four forces will be in the positive  $y$  direction, determine the direction  $\theta$  of the force  $F_4$ . What will be the magnitude of resultant force  $F_R$ .



6. Three forces acts on a bracket. Determine the magnitude of force  $F$  so the magnitude of resultant force is as small as possible. What is the magnitude of the resultant force? (hint: you may need to use derivative in calculus to find the minimum, so write the magnitude of  $F_R$  as a function of unknown force  $F$ ).



7. Two cables AB and AC pulled from the pole OA. If  $\mathbf{F}_B = [200, -300, -600]$  N, and cable AC has magnitude 560 N,
- Determine the position vector  $\mathbf{r}_{AC}$  and its unit vector.
  - Find the Cartesian components in x, y and z of force  $\mathbf{F}_C$ .
  - Find the total force  $\mathbf{F}_R$  acting at point A on the pole in Cartesian components.
  - What are the magnitude of  $\mathbf{F}_R$  and its directional angles?



8. Two cables AB and AC support the flag pole, OA from the end of the pole to the wall as shown in the figure.
- Calculate the force  $F_C$  in Cartesian components.
  - Determine the angle  $\phi$  between the flag pole OA and cable AC.
  - Calculate the component forces of  $F_C$  that are parallel and perpendicular to the pole OA.

