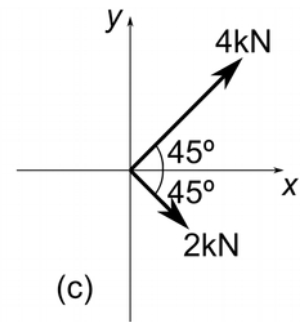
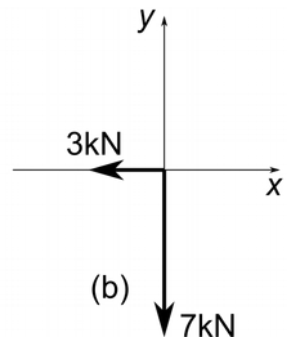
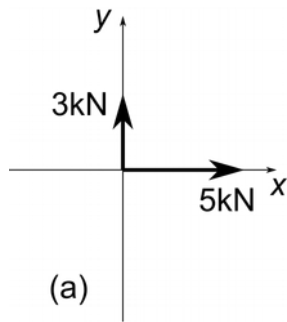


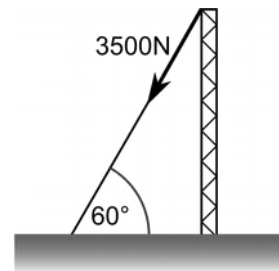
# Forces – 1 – Practice

1.



For each of the diagrams a, b, c, calculate the size and direction (relative to the +ve x-axis) of the resultant of the two forces.  $(5.83\text{kN}, 31^\circ; 7.62\text{kN}, -113^\circ; 4.47\text{kN}, 18^\circ)$

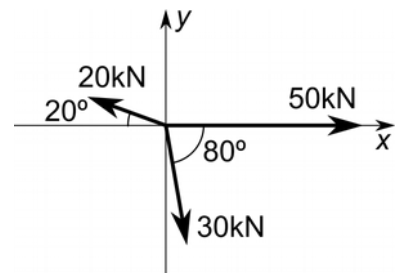
2. A vertical mast is held upright with a guy wire with a tension (force) of 3.5 kN. The guy wire meets the ground at  $60^\circ$  angle to the horizontal.



Calculate the size of:

- (a) the horizontal component of this force that prevents the pole from tipping over,
- (b) the vertical component of this force which presses the pole into the ground.  $(1.75\text{ kN}, 3.03\text{ kN})$

3. Three forces act at a point, as shown in the diagram.  
 50 kN at angle  $0^\circ$   
 30 kN at angle  $-80^\circ$   
 20 kN at angle  $160^\circ$  (to positive x-axis)

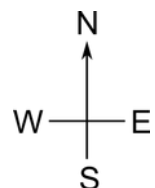


Draw a **vector diagram to scale**, to calculate the resultant of the three forces.  $(43\text{kN}, -32^\circ)$

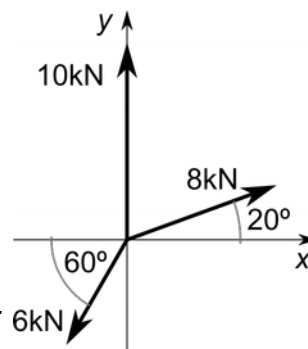
*Hints: Use a scale of  $10\text{ kN} \rightarrow 2\text{cm}$ ;*

*take vectors in order given; start at top left of page.*

4. A hovercraft travelling across an ice sheet has a thrust of 5.0kN from its propeller, pushing it to the North. The wind, blowing from the West, produces a force of 1.2kN on the craft. You can ignore other forces. Calculate the resultant force (size and direction) acting on the craft.  $(5.14\text{kN}, 13^\circ\text{ East of North})$



5. Three forces act at a point, as shown in the diagram.  
 8 kN at angle  $20^\circ$  (all measured to positive x-axis)  
 10 kN at angle  $90^\circ$   
 6 kN at angle  $240^\circ$



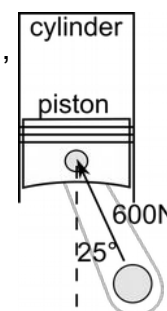
Draw a **vector diagram to scale**, to calculate the resultant of the three forces.  $(8.8\text{kN}, 59^\circ)$

*Hints:*

*Draw a rough sketch first to see the shape that diagram will be;*  
*choose a point on page to start;*  
*choose a scale that will give biggest diagram.*

6. Air in the cylinder of a car engine is being compressed by a con-rod pushing on a piston with a force of 600N at an angle of  $25^\circ$  to the vertical, as shown.

Calculate the vertical component of the force on the piston.  $(544\text{N})$



7. The tension in the rubber cord of a catapult is 30N and the angle between the two parts of the cord is  $40^\circ$  as shown.
- (a) Draw a vector diagram showing the two forces adding to give the resultant force on the stone.
- (b) Calculate the resultant force on the stone.  $(56\text{N})$   
*(hint: use the symmetry of the diagram)*

