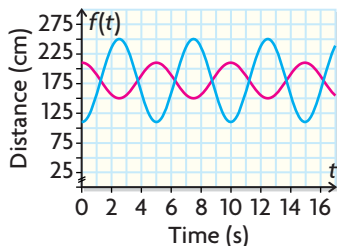
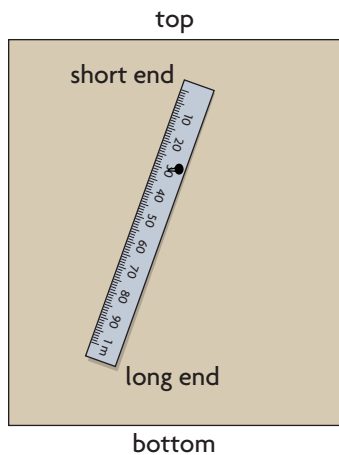


- Steven is monitoring the height of one particular step on an escalator that takes passengers from the ground level to the second floor. The height of the step in terms of time can be modelled by the graph shown.
  - What is the period of the function, and what does it represent in this situation?
  - Determine the equation of the axis for this periodic function.
  - What do the peaks of the periodic function represent in this situation?
  - State the range of the function.
  - If the escalator completes only 10 cycles before being shut down, what is the domain of the periodic function?
  - Steven states that the stair will be at ground level at  $t = 300$  s. Is he correct? Justify your answer.
- Sketch a sinusoidal function that passes through  $(0, -4)$  and has a period of 20, an amplitude of 3, and an equation of the axis  $y = -1$ .
- Determine the coordinates of the point after a rotation of  $65^\circ$  about  $(0, 0)$  from the point  $(7, 0)$ .
- Graph  $f(x) = -4 \cos(0.5(x + 90^\circ)) - 6$  using transformations of  $f(x) = \cos x$ .
  - State the amplitude, period, and equation of the axis.
  - Calculate  $f(135^\circ)$ .
  - Determine the range of  $f(x)$ .



- Keri has drilled a hole at the 30 cm mark in a metre stick. She then nails the metre stick onto a piece of plywood, through the hole. If she rotates the stick at a constant rate, then the distance from its long end to the top of the plywood can be modelled by the function in blue in the graph shown. If she rotates the stick at the same constant rate, then the distance from its short end to the top of the plywood can be modelled by the function in red.
  - What do the troughs of the sinusoidal functions represent in this situation?
  - How do the periods of the sinusoidal functions compare? Why is this so?
  - How far is the nail from the top of the plywood?
  - What is the amplitude of each sinusoidal function, and what does it represent in this situation?
  - What is the range of each sinusoidal function?
  - If Keri rotates the metre stick five complete revolutions, what is the domain of the sinusoidal function?
  - Determine the equation of each sinusoidal function.
  - What is the distance between the short end of the metre stick and the top of the plywood at  $t = 19$  s?