Applications of Trigonometric Functions /20

1. Devon is the last to board a Ferris wheel at a community fair. The loading platform is 2 m above the ground. The Ferris wheel has a diameter of 16 m and completes one revolution in 48 s.
   1. Write an equation for Devon’s height as a function of time in the form .
   2. If the ride lasts for 6 min 13 s, at what height above the ground will Devon be when the ride stops?
2. At high tide, the average depth of water in a harbor is 15.9 m, and at low tide the average depth is 10.9 m. On a particular day the first low tide occurs at 5:15 am and the first high tide occurs at 11:21 am.
   1. Write a trigonometric function that relates the depth of the water in the harbor, d, to the time, t.
   2. A cruise ship needs a depth of at least 12 m of water to dock safely. For how many hours per tide cycle can the ship dock safely?
3. The table shows the average monthly temperature, in degrees Celsius, for Winnipeg. The plotted data have a maximum and a minimum value, and a pattern that might be modelled by an equation of the form , where T is the temperature and m is the month.

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| Month, m | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Temperature, T | -19 | -16 | -8 | 3 | 11 | 17 | 20 | 18 | 12 | 6 | -5 | -14 |

* 1. Write the equation for the function.
  2. Use the model to predict the average monthly temperature for October. How does this value compare with the actual recorded value? Is the model a good model?

1. The water wheel on a paddle steamer has a radius of 2 m. The wheel rotates at 5 rev/min and has 0.2 m submerged in the water. Determine a trigonometric equation that describes the height of a point on the water wheel if the point starts at the surface of the water and moves upwards.