Worksheet for characterizing waves

- Is it a travelling wave? A linear (non-dispersive) travelling wave **keeps a constant shape as it travels**. As the text shows, this means the wave function must have the form

$$y \ = \ f(x - vt) \qquad or \qquad y \ = \ f(x + vt)$$

  Predict which of the following will be a linear travelling wave: write "yes" if you think it will, or "no" if you think it won't. AFTER you have filled in the spaces, go to the Pulse physlet and enter each function to see if you were correct.
  (Thanks to Vern Lindberg and Wolfgang Christian . You may use Vern's copy too.)

  a. _____ $Y = 2*\sin(x/2 - 2*t)$

  b. _____ $Y = 3*\cos((x/2 - 2*t)*(x/2 - 2*t))$

  c. _____ $Y = 3*\sin(x/2 - 2*t) * (x/2 - 2*t)$

  d. _____ $Y = 3*\sin(x/2 - 2*t) * (x/2 - 3*t)$

  e. _____ $Y = 3*\sin(x/2 - 2*t) * (x/2 + 3*t)$

  f. _____ $Y = 3*\sin(x/2 - 2*t) * (x/2 + 2*t)$

  g. _____ $Y = 2*\exp(-sqr(pi*x/2 - pi*t))$

  h. _____ $Y = 2*\exp(-sqr(pi*x/2 - pi*t))*(pi*x/2 - pi*t)$

  i. _____ $Y = 2*\exp(-sqr(pi*x/2 - pi*t))*(pi*x/2 + pi*t)$

- Determine the wave parameters. Go to [the wave parameter physlet.](#)
  (Thanks to Vern Lindberg and [Wolfgang Christian](#). You may use [Vern's copy](#) too.)

  For the wave shown in the TOP box, find the

  a. amplitude

  b. wavelength

  c. direction of motion

  d. wave speed

  e. period

  f. wave number

  g. angular frequency

  h. Write the equation for your guess at the function here, and test it by entering into the BOTTOM box. If you are right, the top and bottom graphs should be exactly the same.

  i. What must you do to make the wave travel in the opposite direction? Write the new equation below.

  j. What must you do to make the wavelength half its original value, with everything else the same? Write the new equation below.

  k. Show that you can switch the use of sin and cos function by adding or subtracting a phase constant. Write an equation which yields the same result as h), but uses the other trig function.