Name: _____

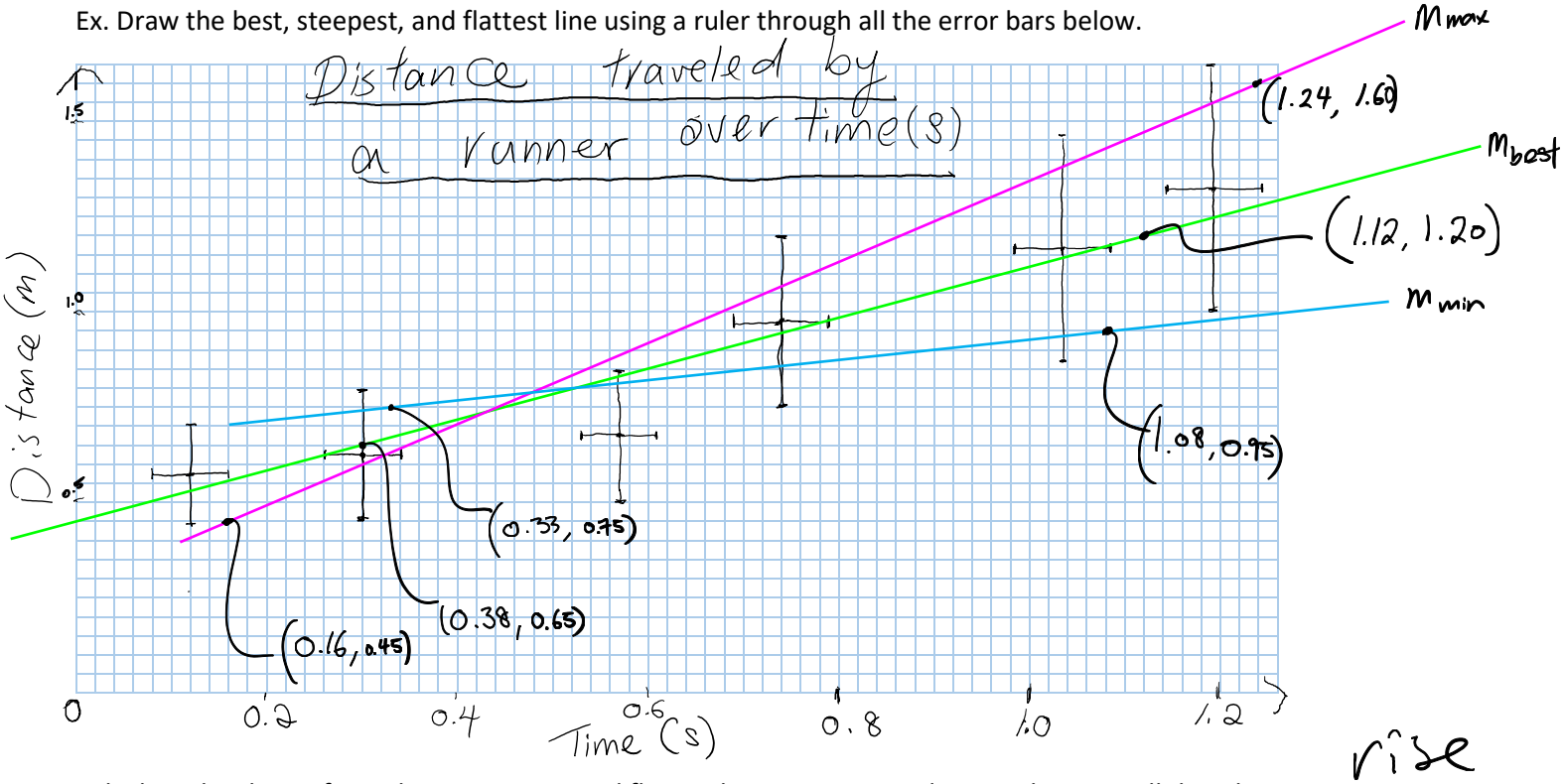
Slope Uncertainty

Hopefully, you now have 2 graphs with error bars on both. If you haven't drawn in the best fit line on your linearized graph (2nd graph), please do so before continuing.

<u>Maximum and minimum slope</u>

To calculate the error in our slope, we need to draw the steepest line and the flattest line through all our error bars. Make sure both line go through ALL your errors bars, touching the edges of your error bars is fine. Do not force your lines through the origin.

Ex. Draw the best, steepest, and flattest line using a ruler through all the error bars below.



Calculate the slope of your best, steepest, and flattest line. Do not round your values. Recall that slope = $\frac{\text{rise}}{\text{run}}$ and the units of your slope is: $\frac{\text{units in y axis}}{\text{units in x axis}}$

$m_{best} = \frac{1.20 - 0.65}{1.12 - 0.38} = 0.7\overline{432}\ m/s$

$m_{min} = \frac{0.95 - 0.75}{1.08 - 0.33} = 0.2\overline{6}\ m/s$

$m_{max} = \frac{1.60 - 0.45}{1.24 - 0.16} = 1.064814815\ldots\ m/s$

Name: _____

Now you should have a maximum (steepest line), best (best fit line), and minimum slope (flattest line). Write them below:

m_{max} = 0.7432 m/s

m_{best} = 0.26 m/s

m_{min} = 1.064814815... m/s

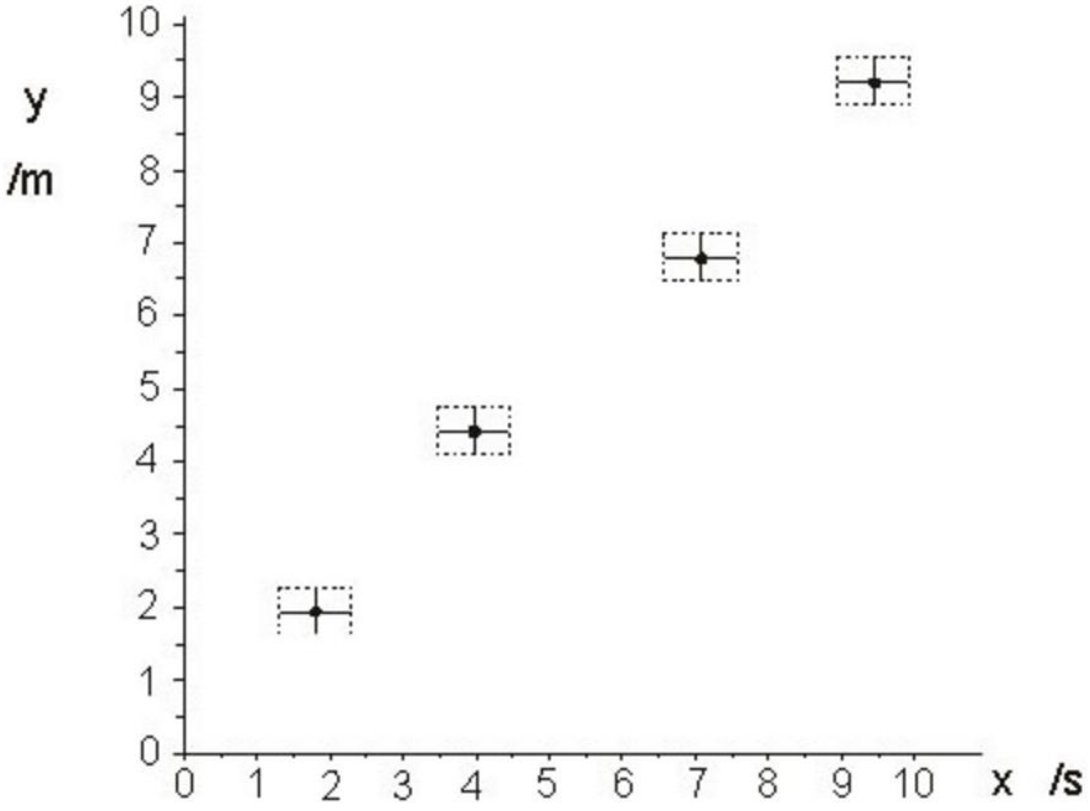
To find the uncertainty of a slope = $\frac{m_{max} - m_{min}}{2} = \Delta m_{best}$
*do not round!

Making sure you round your slope uncertainty to 1 sig fig and you round your best slope to the same place value as your uncertainty, you would then write your final slope value as (don't forget units!):

ex. $\Delta m_{best} = \frac{1.064814815... - 0.26666...}{2} = 0.399074...$ m/s $\therefore$ 0.7 ± 0.4 m/s

Try the example below. Draw your slopes, calculate your best slope, and your slope uncertainty.

Distance of a runner covered over time



http://www.saburchill.com/physics/chapters/0075.html