Special Relativity Solutions 5:
MINKOWSKIAN GEOMETRY II

Refer to the attached completed diagram on grid paper.

[easy]   1.   2 x 20 m =40m

[easy]   2.   20m

[easy]   3. $slope = \dfrac{4}{5}$

[medium] 5.   AA' see B time "running slow" by factor: $\dfrac{c\Delta t_B}{c\Delta t_{AA'}} = \dfrac{9m}{15m} = \dfrac{3}{5}$

[medium] 6.   BB' see A' time "running slow" by a factor $\dfrac{c\Delta t_{A'}}{c\Delta t_{BB'}} = \dfrac{15m}{25m} = \dfrac{3}{5}$

Hey, the same factor!

[hard]   7.

i) $\dfrac{*-B'}{B-B'} \times 20m = 0.36 \times 20m = 7.2m$

ii) $ds = \sqrt{-c^2 dt^2 + dx^2} = \sqrt{-\left(9.6m\right)^2 + \left(12m\right)^2} = 7.2m$

[easy]   8. $\dfrac{7.2m}{12m} = \dfrac{3}{5}$

Which is the same as $\sqrt{1-\left(\dfrac{v}{c}\right)^2} = \sqrt{1-\left(\dfrac{4}{5}\right)^2} = \sqrt{\dfrac{9}{25}} = \dfrac{3}{5}$

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