	A	B	C	D
=				
1	pole	44		
2	man	11/2	5.5	
3	man's walking rate	8		
4	man's shadow	y		
5	pole's shadow	x+y		
6	distance from pole	30		
7		unnecessary info		

A1 pole

A street light is mounted at the top of a 44 ft tall pole. A man 5.5 ft tall walks away from the pole with a speed of 8 ft/sec along a straight path.

3. How fast is the LENGTH of HIS shadow changing when he is 30 ft from the pole?

$$\frac{44}{5.5}=\frac{x+y}{y}$$

$$44\ \ y=\frac{5.5}{}(x+y)$$

$$44\,y=\frac{5.5}{}x+\frac{5.5}{}y$$

$$44\,y-\ 5.5\ y\ =5.5\ \ x$$

$$38.5\ \ y=\frac{5.5}{}x$$

$$y=\frac{5.5}{38.5}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{38.5}{5.5}y\rightarrow x=\ 7\ y$$

L=x+y = length of pole's shadow

y =length of man's shadow

There are a variety of routes to the answer for the question of how fast is the tip of the shadow moving and how fast the man's shadow is changing its length.

I will show two of these methods

A street light is mounted at the top of a 44 ft tall pole. A man 5.5 ft tall walks away from the pole with a speed of **man_rate** ft/sec along a straight path.

3. How fast is the LENGTH of HIS shadow changing when he is 30 ft from the pole?

$$\frac{44}{5.5}=\frac{x+y}{y}$$

$$44\ y=\frac{5.5}{}(x+y)$$

$$44\,y=\frac{5.5}{}x+\frac{5.5}{}y$$

$$44\,y-5.5\,y=5.5\,x$$

$$38.5\ y=\frac{5.5}{}x$$

$$y=\frac{5.5}{38.5}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{38.5}{5.5}y\rightarrow x=7\,y$$

$L=x+y$ = *length of pole's shadow*

y = *length of man's shadow*

Method 1

$$38.5\,y=5.5\,x$$

$$\frac{d}{dt}(38.5\,y=5.5\,x)$$

$$38.5\frac{dy}{dt}=5.5\frac{dx}{dt}$$

$$38.5\frac{dy}{dt}=5.5\,(8)$$

$$38.5\frac{dy}{dt}=44.$$

$$\frac{dy}{dt}=44./38.5$$

$$=\frac{8}{7}\frac{ft}{sec}$$

$$\approx 1.143\frac{ft}{sec}$$

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$$y=\frac{5.5}{38.5}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{38.5}{5.5}y\rightarrow x=7\,y$$

$L=x+y$ = length of pole's shadow

y = length of man's shadow

Method 2

$$y=\frac{1}{7}x$$

$$\frac{d}{dt}\left(y=\frac{1}{7}x\right)$$

$$\frac{dy}{dt}=\frac{1}{7}\frac{dx}{dt}$$

$$\frac{dy}{dt}=\frac{1}{7}(8)$$

$$\frac{dy}{dt}=\frac{8}{7}\frac{ft}{sec}$$

$$\approx 1.143\frac{ft}{sec}$$

	A	B	C	D
=				
1	pole	40		
2	man	5	5.	
3	man's walking rate	-9		
4	man's shadow	y		
5	pole's shadow	x+y		
6	distance from pole	12		
7		unnecessary info		

A1 pole

A street light is mounted at the top of a 40 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 9 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 12 ft from the pole?

$$\frac{40}{5.}=\frac{x+y}{y}$$

$$40 \quad y=\underline{5.}\,(x+y)$$

$$40\,y=\underline{5.}\,x+\underline{5.}\,y$$

$$40\,y-\ 5.\ y\ =5.\ \ x$$

$$35.\quad y=\underline{5.}\,x$$

$$y=\frac{5.}{35.}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{35.}{5.}y\rightarrow x=\ 7\ y$$

$L=x+y$ = length of pole's shadow

y = length of man's shadow

There are a variety of routes to the answer for the question of how fast is the tip of the shadow moving and how fast the man's shadow is changing its length.

I will show four of these methods

A street light is mounted at the top of a 40 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 9 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 12 ft from the pole?

$$\frac{40}{5.}=\frac{x+y}{y}$$

$$40\ y=\underline{5.}\ (x+y)$$

$$40\,y=\underline{5.}\ x+\underline{5.}\ y$$

$$40\,y-5.\ y=5.\ x$$

$$35.\ y=\underline{5.}\ x$$

$$y=\frac{5.}{35.}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{35.}{5.}y\rightarrow x=7\,y$$

$L=x+y$ = *length of pole's shadow*

y = *length of man's shadow*

Method 1

$$y=\frac{1}{7}x\ \&\ L=x+y\rightarrow L=x+\frac{1}{7}x)\rightarrow L=\frac{8}{7}x$$

$$\frac{d}{dt}\left(L=\frac{8}{7}x\right)$$

$$\frac{dL}{dt}=\frac{8}{7}\frac{dx}{dt}$$

$$=\left(\frac{8}{7}\right)\text{-}9$$

$$=\frac{\text{-}72}{7}\ \frac{ft}{\sec}$$

$$=\text{-}10.2857\ \frac{ft}{\sec}$$

A street light is mounted at the top of a 40 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 9 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 12 ft from the pole?

$\frac{40}{5.}=\frac{x+y}{y}$

$40 \quad y=\frac{5.}{}(x+y)$

$40\,y=\frac{5.}{}x+\frac{5.}{}y$

$40\,y-\ 5.\ y\ =5.\ \ x$

$35.\quad y=\frac{5.}{}x$

$y=\frac{5.}{35.}x \rightarrow y=\frac{1}{7}x \qquad x=\frac{35.}{5.}y \rightarrow x=\ 7\ y$

$L=x+y$ = length of pole's shadow

y = length of man's shadow

Method 2

$35.\ y=5.\ x$

$\frac{d}{dt}(35.\ y=5.\ x)$

$35.\ \frac{dy}{dt}=5.\ \frac{dx}{dt}$

$35.\ \frac{dy}{dt}=1.\cdot \mathbf{man}\,(-9)$

$35.\ \frac{dy}{dt}=-45.$

$\frac{dy}{dt}=-45./35.\ =\frac{-9}{7}\ \frac{ft}{sec}\approx -1.286\ \frac{ft}{sec}$

$\frac{d}{dt}(L=x+y)\rightarrow \frac{dL}{dt}=\frac{dx}{dt}+\frac{dy}{dt}$

$=-9+\frac{-9}{7}=\frac{-72}{7}\ \frac{ft}{sec}$

$\approx -10.2857\ \frac{ft}{sec}$

A street light is mounted at the top of a 40 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 9 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 12 ft from the pole?

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$$40\,y-5.\ y=5.\ x$$

$$35.\ y=\frac{5.}{}x$$

$$y=\frac{5.}{35.}x\rightarrow y=\frac{1}{7}x \qquad x=\frac{35.}{5.}y\rightarrow x=7\,y$$

L=x+y = length of pole's shadow

y =length of man's shadow

Method 3

$$y=\frac{1}{7}x$$

$$\frac{d}{dt}\left(y=\frac{1}{7}x\right)\rightarrow\frac{dy}{dt}=\frac{1}{7}\frac{dx}{dt}$$

$$\frac{dy}{dt}=\frac{1}{7}(-9)=\frac{-9}{7}\frac{ft}{sec}\approx-1.286\frac{ft}{sec}$$

L=x+y & x =7 y→L =7 y+y=8 y

$$\frac{d}{dt}(L=8\,y)$$

$$\frac{dL}{dt}=8\frac{dy}{dt}$$

$$=(8)\frac{-9}{7}$$

$$=\frac{-72}{7}\frac{ft}{sec}$$

$$=-10.2857\frac{ft}{sec}$$