	A	B	C	D
=				
1	pole	22		
2	man	11/2	5.5	
3	man's walking rate	5		
4	man's shadow	y		
5	pole's shadow	x+y		
6	distance from pole	32		
7		unnecessary info		

A1 pole

A street light is mounted at the top of a 22 ft tall pole. A man 5.5 ft tall walks away from the pole with a speed of 5 ft/sec along a straight path.

3. How fast is the LENGTH of HIS shadow changing when he is 32 ft from the pole?

$$\frac{22}{5.5}=\frac{x+y}{y}$$

$$22\ y=\frac{5.5}{}(x+y)$$

$$22\,y=\frac{5.5}{}x+\frac{5.5}{}y$$

$$22\,y-5.5\,y=5.5\,x$$

$$16.5\,y=\frac{5.5}{}x$$

$$y=\frac{5.5}{16.5}x\rightarrow y=\frac{1}{3}x \qquad x=\frac{16.5}{5.5}y\rightarrow x=3\,y$$

$L=x+y$ = 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 22 ft tall pole. A man 5.5 ft tall walks away from the pole with a speed of 5 ft/sec along a straight path.

3. How fast is the LENGTH of HIS shadow changing when he is 32 ft from the pole?

$$\frac{22}{5.5}=\frac{x+y}{y}$$

$$22\ y=\frac{5.5}{}(x+y)$$

$$22\,y=\frac{5.5}{}x+\frac{5.5}{}y$$

$$22\,y-5.5\,y=5.5\,x$$

$$16.5\ y=\frac{5.5}{}x$$

$$y=\frac{5.5}{16.5}x\rightarrow y=\frac{1}{3}x \qquad x=\frac{16.5}{5.5}y\rightarrow x=3\,y$$

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

y = *length of man's shadow*

Method 1

$16.5\,y=5.5\,x$

$$\frac{d}{dt}(16.5\,y=5.5\,x)$$

$$16.5\frac{dy}{dt}=5.5\frac{dx}{dt}$$

$$16.5\frac{dy}{dt}=5.5\,(5)$$

$$16.5\frac{dy}{dt}=27.5$$

$$\frac{dy}{dt}=27.5/16.5$$

$$=\frac{5}{3}\frac{ft}{sec}$$

$$\approx 1.667\frac{ft}{sec}$$

A street light is mounted at the top of a 22 ft tall pole. A man 5.5 ft tall walks away from the pole with a speed of 5 ft/sec along a straight path.

3. How fast is the LENGTH of HIS shadow changing when he is 32 ft from the pole?

$$\frac{22}{5.5}=\frac{x+y}{y}$$

$$22\ y=\frac{5.5}{}(x+y)$$

$$22\,y=\frac{5.5}{}x+\frac{5.5}{}y$$

$$22\,y-5.5\,y=5.5\,x$$

$$16.5\ y=\frac{5.5}{}x$$

$$y=\frac{5.5}{16.5}x\rightarrow y=\frac{1}{3}x \qquad x=\frac{16.5}{5.5}y\rightarrow x=3\,y$$

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

y = *length of man's shadow*

Method 2

$$y=\frac{1}{3}x$$

$$\frac{d}{dt}\left(y=\frac{1}{3}x\right)$$

$$\frac{dy}{dt}=\frac{1}{3}\frac{dx}{dt}$$

$$\frac{dy}{dt}=\frac{1}{3}(5)$$

$$\frac{dy}{dt}=\frac{5}{3}\frac{ft}{\sec}$$

$$\approx 1.667\frac{ft}{\sec}$$

	A	B	C	D
=				
1	pole	55		
2	man	5	5.	
3	man's walking rate	-11		
4	man's shadow	y		
5	pole's shadow	x+y		
6	distance from pole	18		
7		unnecessary info		

A1 pole

A street light is mounted at the top of a 55 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 11 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 18 ft from the pole?

$$\frac{55}{5.}=\frac{x+y}{y}$$

$$55\ \ y=\frac{5.}{}(x+y)$$

$$55\,y=\frac{5.}{}x+\frac{5.}{}y$$

$$55\,y-\ 5.\ \ y\ =5.\ \ \ x$$

$$50.\ \ \ y=\frac{5.}{}x$$

$$y=\frac{5.}{50.}x\rightarrow y=\frac{1}{10}x \qquad x=\frac{50.}{5.}y\rightarrow x=10\,y$$

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 three of these methods

A street light is mounted at the top of a 55 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 11 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 18 ft from the pole?

$$\frac{55}{5.}=\frac{x+y}{y} \qquad 55\ y=\underline{5.}\ (x+y)$$

$$55\ y=\underline{5.}\ x+\underline{5.}\ y$$

$$55\ y-\ 5.\ y\ =5.\ x$$

$$50.\ y=\underline{5.}\ x$$

$$y=\frac{5.}{50.}x\rightarrow y=\frac{1}{10}x \qquad x=\frac{50.}{5.}y\rightarrow x=\ 10y$$

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

y = *length of man's shadow*

Method 1

$y=\frac{1}{10}x$ & $L=x+y \rightarrow L=x+\frac{1}{10}x) \rightarrow L=\frac{11}{10}x$

$$\frac{d}{dt}(L=\frac{11}{10}x)$$

$$\frac{dL}{dt}=\frac{11}{10}\frac{dx}{dt}$$

$$=(\frac{11}{10})^{-}11$$

$$=\frac{-121}{10}\frac{ft}{sec}$$

$$=-12.1\frac{ft}{sec}$$

A street light is mounted at the top of a 55 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 11 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 18 ft from the pole?

$\frac{55}{5.}=\frac{x+y}{y}$

$55\ \ y=\frac{5.}{}(x+y)$

$55\,y=\frac{5.}{}x+\frac{5.}{}y$

$55\,y-\ 5.\ \ y\ =5.\ \ \ x$

$50.\ \ \ y=\frac{5.}{}x$

$y=\frac{5.}{50.}x\rightarrow y=\frac{1}{10}x \qquad x=\frac{50.}{5.}y\rightarrow x=\ 10y$

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

y = *length of man's shadow*

Method 2

$50.\ y=5.\ x$

$\frac{d}{dt}(50.\ y=5.\ x)$

$50.\ \frac{dy}{dt}=5.\ \frac{dx}{dt}$

$50.\ \frac{dy}{dt}=5.\ (^{-}11)$

$50.\ \frac{dy}{dt}=^{-}55.$

$\frac{dy}{dt}=^{-}55./50.\ =\frac{^{-}11}{10}\ \frac{ft}{sec}\approx^{-}1.1\ \frac{ft}{sec}$

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

$=^{-}11+\frac{^{-}11}{10}=\frac{^{-}121}{10}\ \frac{ft}{sec}$

$\approx^{-}12.1\ \frac{ft}{sec}$

A street light is mounted at the top of a 55 ft tall pole. A man 5 ft tall walks towards the pole with a speed of 11 ft/sec along a straight path.

4. How fast is the TIP of his shadow moving when he is 18 ft from the pole?

$$\frac{55}{5.}=\frac{x+y}{y}$$

$$55\ y=\frac{5.}{}(x+y)$$

$$55\,y=\frac{5.}{}x+\frac{5.}{}y$$

$$55\,y-5.\ y=5.\ x$$

$$50.\ y=\frac{5.}{}x$$

$$y=\frac{5.}{50.}x\rightarrow y=\frac{1}{10}x \qquad x=\frac{50.}{5.}y\rightarrow x=10y$$

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

y = length of man's shadow

Method 3

$$y=\frac{1}{10}x$$

$$\frac{d}{dt}\left(y=\frac{1}{10}x\right)\rightarrow\frac{dy}{dt}=\frac{1}{10}\frac{dx}{dt}$$

$$\frac{dy}{dt}=\frac{1}{10}(-11)=\frac{-11}{10}\frac{ft}{sec}\approx-1.1\frac{ft}{sec}$$

$L=x+y$ & $x=10y\rightarrow L=10y+y=11y$

$$\frac{d}{dt}(L=11y)$$

$$\frac{dL}{dt}=11\frac{dy}{dt}$$

$$=(11)\frac{-11}{10}$$

$$=\frac{-121}{10}\frac{ft}{sec}$$

$$=-12.1\frac{ft}{sec}$$