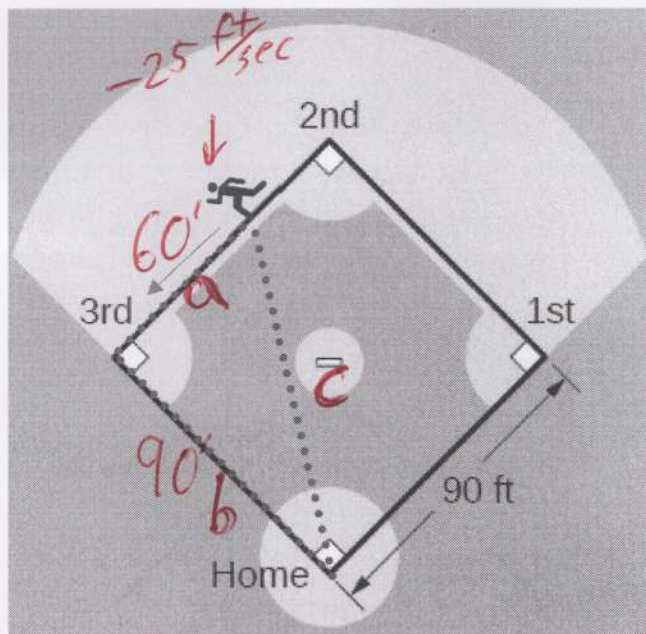


Name \_\_\_\_\_

1) A baseball diamond has the shape of a square, and each side is 90 feet long. A player is running from second to third base, and he is 60 feet from reaching third. He is running at a speed of 25 feet per second. At what rate is the player's distance from home plate decreasing?



$$a^2 + b^2 = c^2$$

$$60^2 + 90^2 = c^2$$

$$c = \sqrt{11700}$$

$$2a \frac{da}{dt} + 2b \frac{db}{dt} = 2c \frac{dc}{dt}$$

$$2(60)(-25) + 2(90)(0) = 2(\sqrt{11700}) \frac{dc}{dt}$$

$$-3000 + 0 = 2\sqrt{11700} \frac{dc}{dt}$$

$$\frac{dc}{dt} = \frac{-3000}{2\sqrt{11700}}$$

$$\frac{dc}{dt} \approx 13.87 \text{ ft/sec}$$

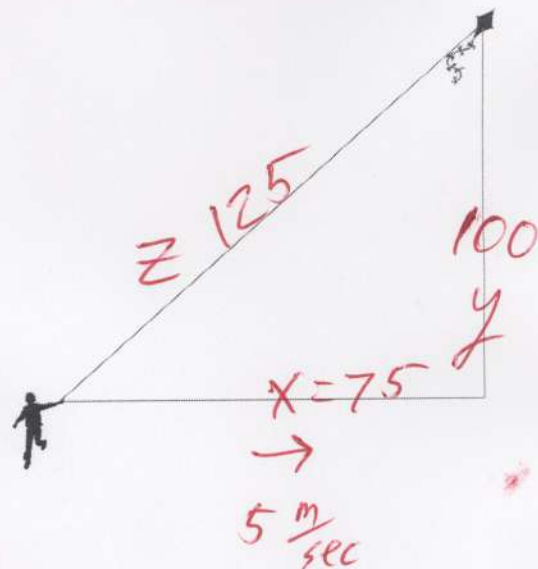
2) A kite is flying 100 m high, where the wind causes it to move horizontally at the rate of 5 m per second. To maintain the kite at a height of 100 m, the person must allow more string to be let out. At what rate is the string being let out when the length of the string already out is 125 m?

$$x^2 + y^2 = z^2$$

$$x^2 + 100^2 = 125^2$$

$$x = \sqrt{125^2 - 100^2}$$

$$x = 75$$



$$2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 2z \frac{dz}{dt}$$

$$2(75)(5) + 2(100)(0) = 2(125) \frac{dz}{dt}$$

$$\frac{dz}{dt} = \frac{2(75)(5)}{2(125)}$$

$$\boxed{\frac{dz}{dt} = 3 \text{ m/sec}}$$

3) Oil is dripping from your car and forming a circular puddle. The radius of the puddle is expanding at the rate of 2 inches per minute. What is the rate of change of the circle's area when the radius is exactly 8 inches?

$$A = \pi r^2$$



Oil Puddle

$$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$$

~~$$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$$~~

$$\frac{dA}{dt} = 2\pi (8)(2)$$

$$\boxed{\frac{dA}{dt} = 32\pi \text{ OR About } 101 \frac{\text{in}^2}{\text{min}}}$$