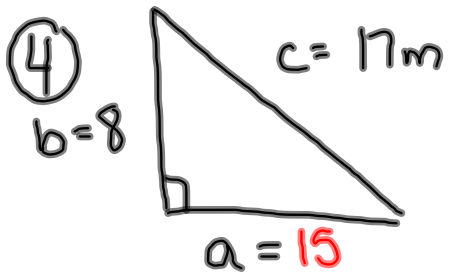
④



Given

$\frac{db}{dt} = -4\ m/s$ $\quad \frac{da}{dt} = ?$

$b = 8$ $\quad a = 15$

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

$$a^2 + b^2 = 17^2$$

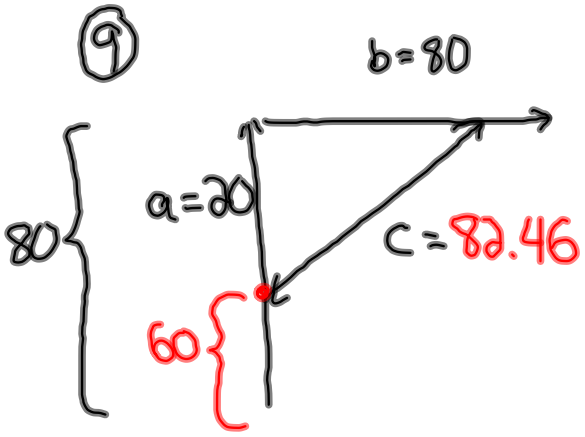
$$2a\frac{da}{dt} + 2b\frac{db}{dt} = 0$$

$$2(15)\frac{da}{dt} + 2(8)(-4) = 0$$

$$30\frac{da}{dt} = 64$$

$$\frac{da}{dt} = 2.13\ m/s$$

⑨



Given:

$\frac{da}{dt} = -30\,km/h$ $\quad a = 20$

$\frac{db}{dt} = 40\,km/h$ $\quad b = 80km$

$\frac{dc}{dt} = ?$ $\quad c = 82.46km$

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

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

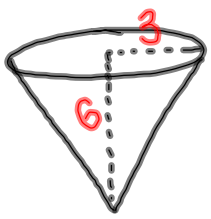
$$2(20)(-30) + 2(80)(40) = 2(82.46)\frac{dc}{dt}$$

$$-1200 + 6400 = 164.92\frac{dc}{dt}$$

$$5600 = 164.92\frac{dc}{dt}$$

$$31.5\,km/h = \frac{dc}{dt}$$

⑤



Given:

$\frac{dV}{dt} = \pi \ m^3/min$

$\frac{dh}{dt} = ?$

$h = 3m$

$\frac{r}{h} = \frac{3}{6}$

$6r = 3h$

$r = \frac{1}{2}h$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi\left(\frac{h}{2}\right)^2 h$

$V = \frac{1}{12}\pi h^3$

$\frac{dV}{dt} = \frac{1}{4}\pi h^2 \frac{dh}{dt}$

$\pi = \frac{1}{4}\pi(3)^2 \frac{dh}{dt}$

$\pi = \frac{9\pi}{4}\frac{dh}{dt}$

$4\pi = 9\pi \frac{dh}{dt}$

$\frac{4}{9} m/min = \frac{dh}{dt}$