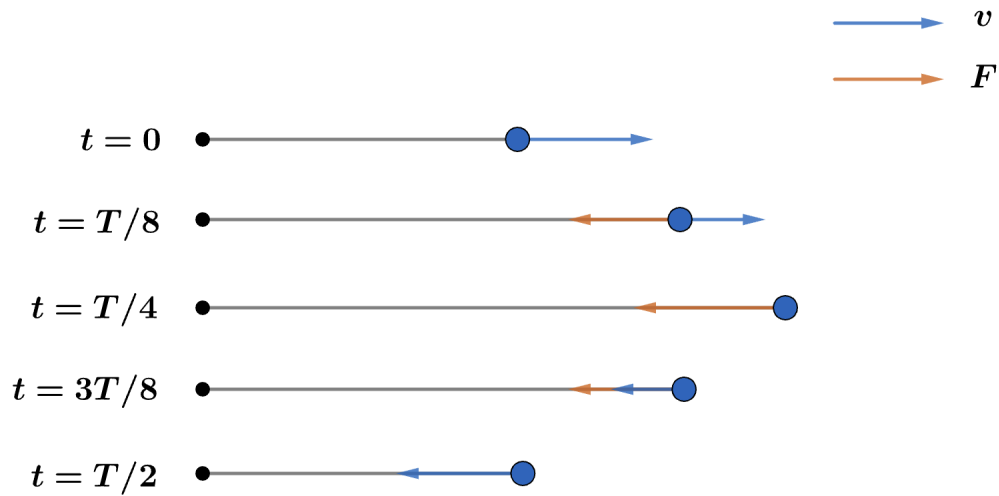


# 2009 F=ma Exam: Problem 23

Kevin S. Huang

Recall the instantaneous power delivered to the mass is  $P = Fv$  where  $F$  is the spring force and  $v$  is the velocity of the mass.



- At  $t = 0$ , there is no force on the mass so  $P = 0$ .
- At  $t = T/8$ , the force and velocity are pointing in opposite directions so  $P < 0$ .
- At  $t = T/4$ , the mass is at rest so  $P = 0$ .
- At  $t = 3T/8$ , the force and velocity are pointing in the same direction so  $P > 0$ .
- At  $t = T/2$ , there is no force so  $P = 0$ .

Thus, power delivered is first maximized at  $t = 3T/8$  so the answer is D.