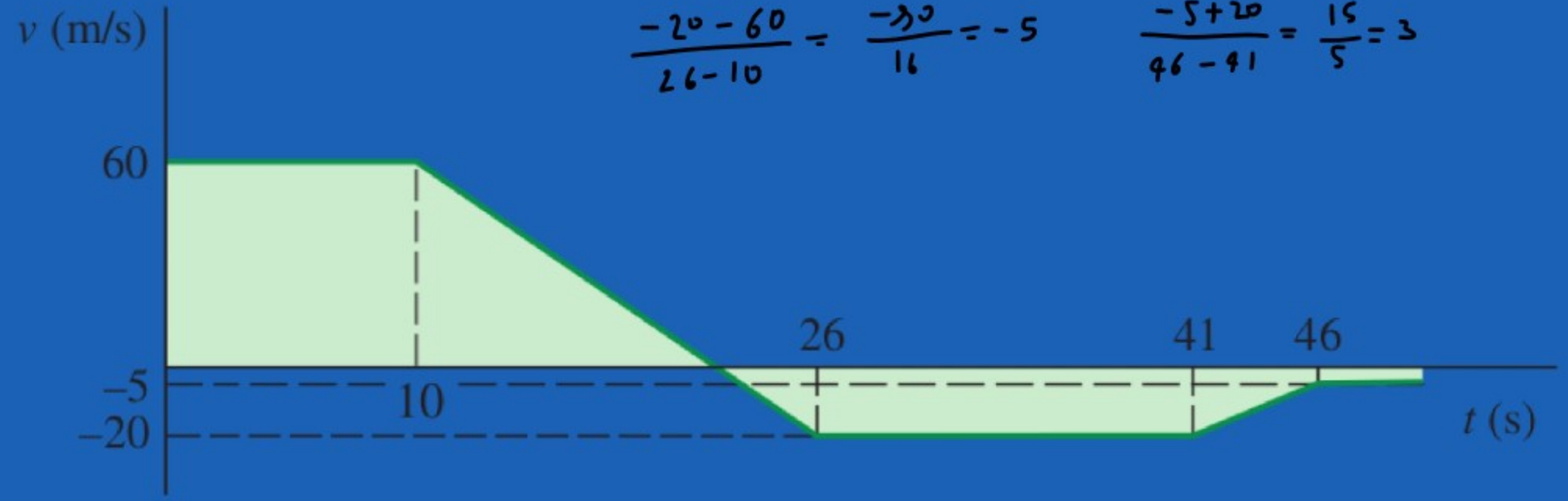
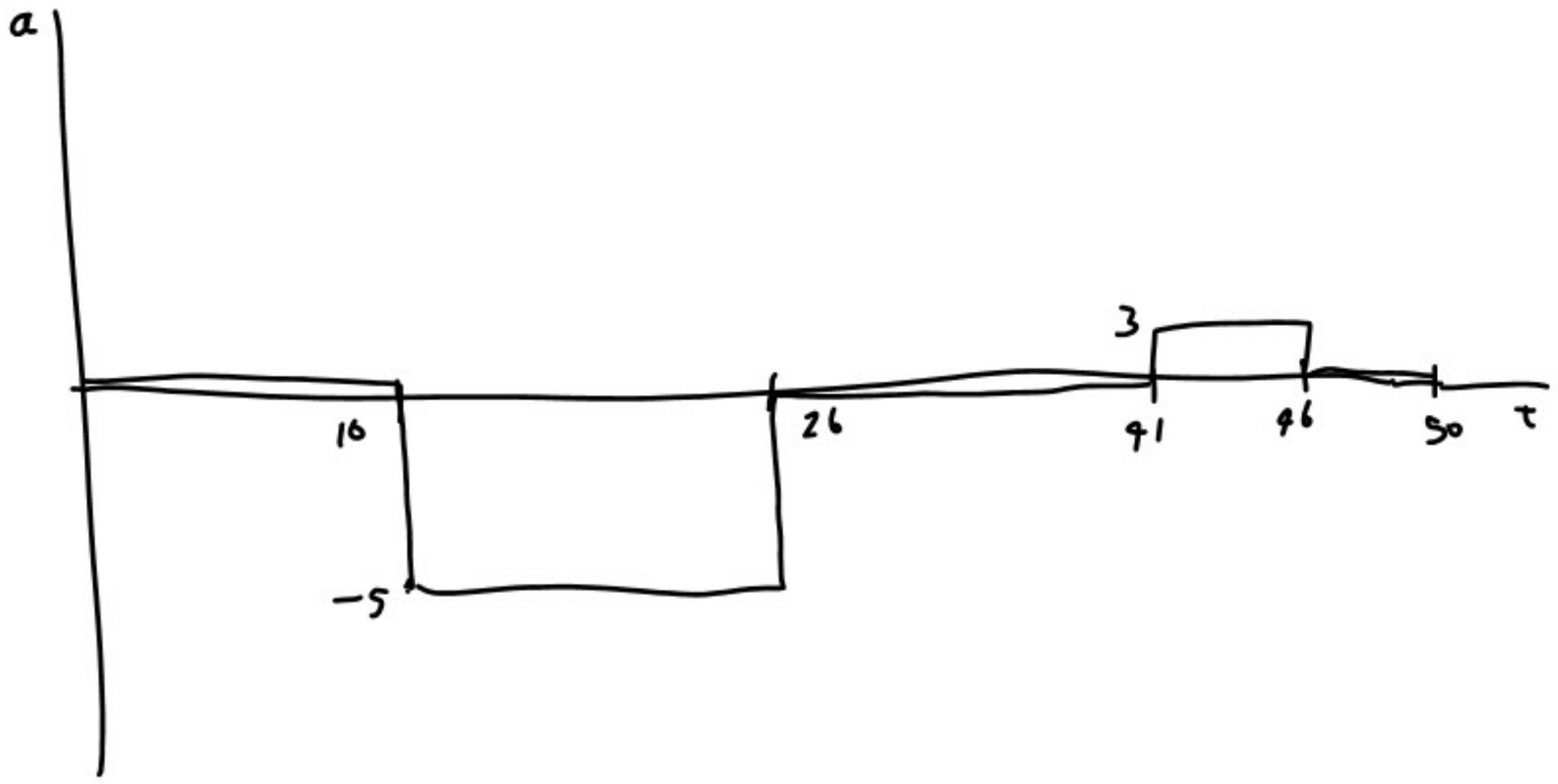
A particle moves in a straight line with the velocity shown in the figure. Knowing that $x = -540$ m at $t = 0$, (a) construct the a–t and x–t curves for $0 < t < 50$ s, and determine (b) the total distance traveled by the particle when $t = 50$ s, (c) the two times at which $x = 0$.

$\frac{-20-60}{26-10} = \frac{-80}{16} = -5$ $\quad\quad$ $\frac{-5+20}{46-41} = \frac{15}{5} = 3$

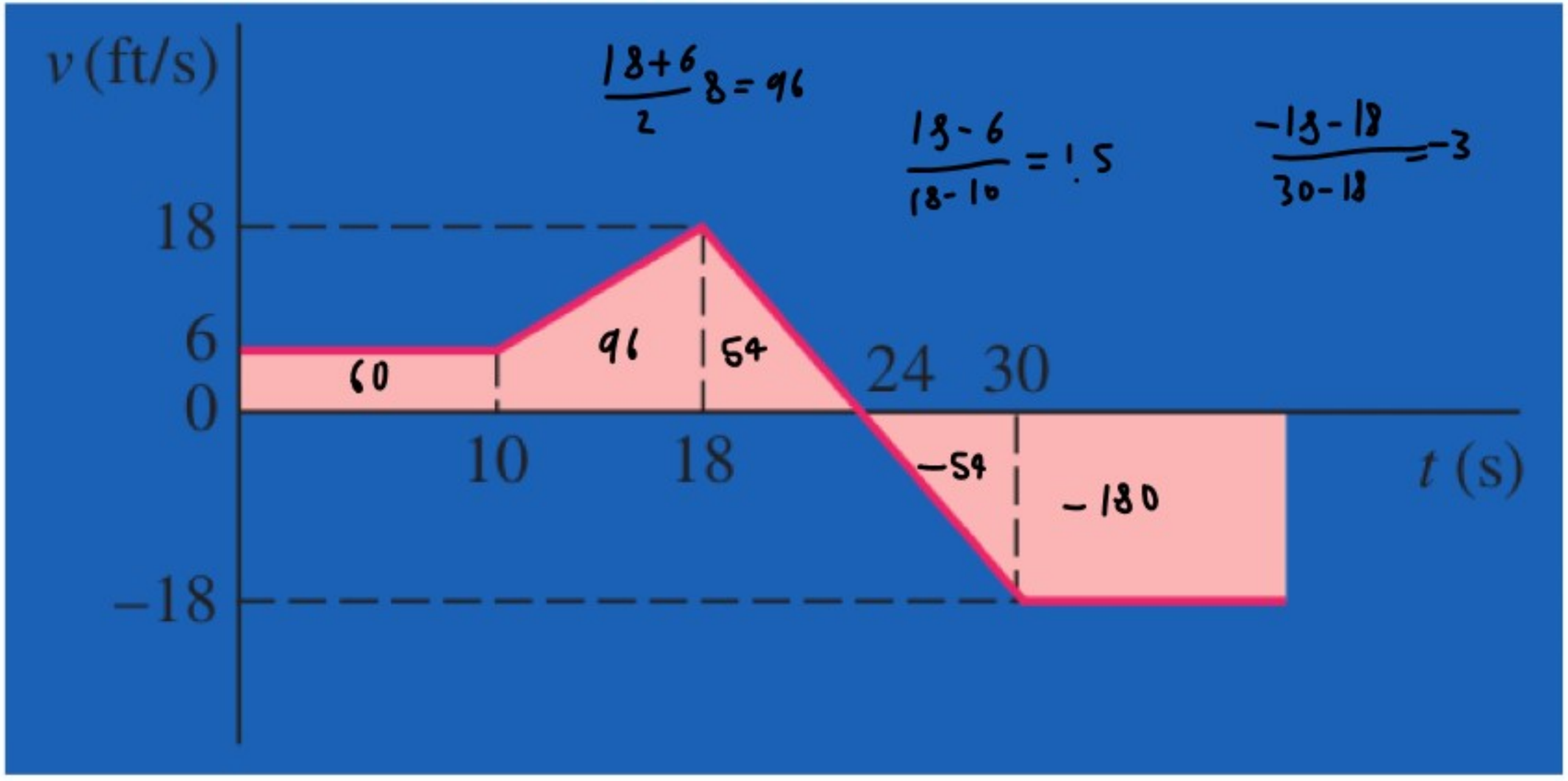


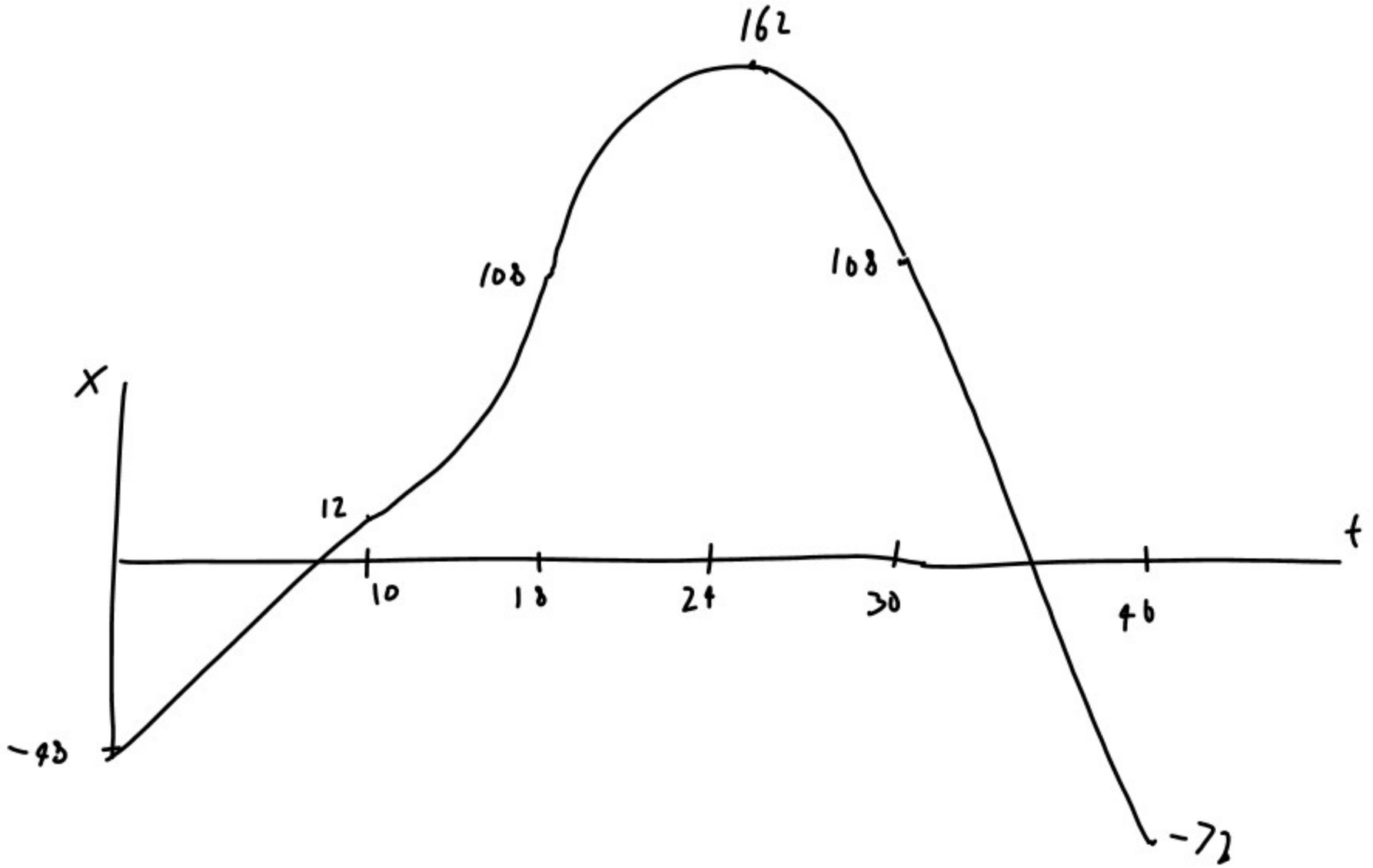

a
3
10
26
91
96
50
t
−5

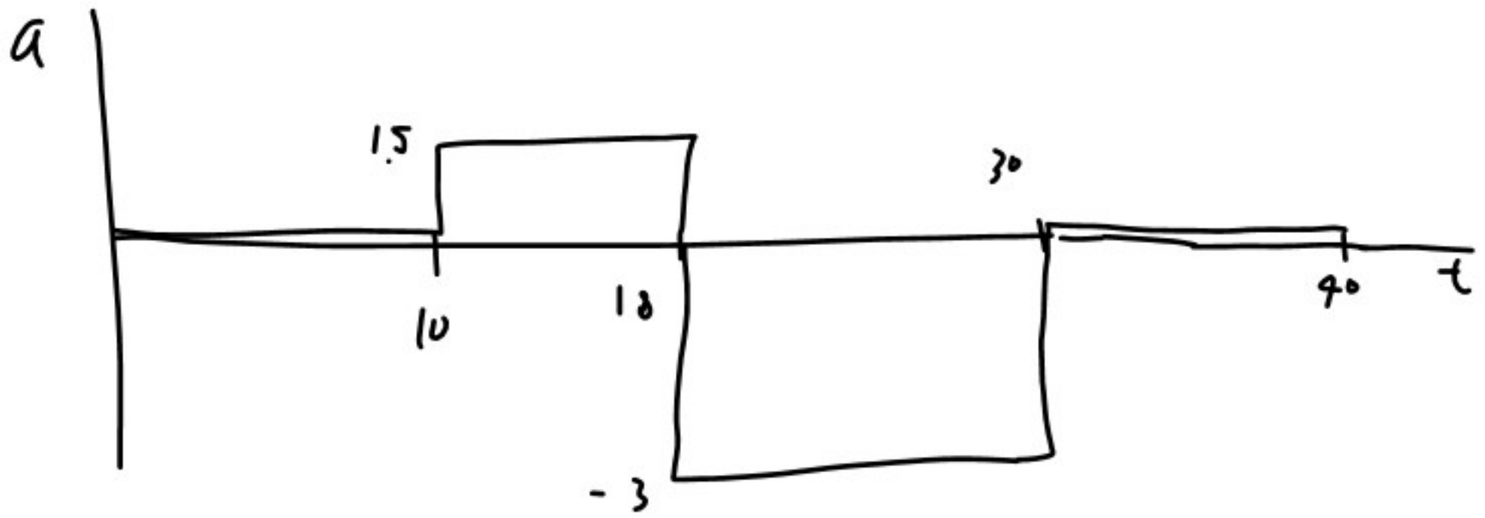
$|420-(-540)|+|-2.5-420| = 960+|-422.5| = 960+422.5 = \boxed{1382.5\ m}$

$|x(22)-x(0)|+|x(50)-x(22)|$

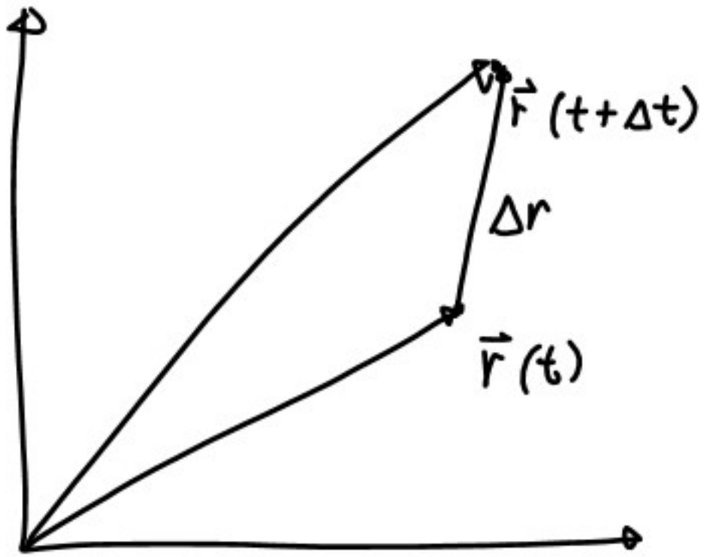
A particle moves in a straight line with the velocity shown in the figure. Knowing that $x = -48$ ft at $t = 0$, draw the a–t and x–t curves for $0 < t < 40$ s and determine (a) the maximum value of the position coordinate of the particle, (b) the values of t for which the particle is at a distance of 108 ft from the origin.




162
108
108
X
12
t
10
18
24
30
46
-93
-72


a
1.5
10
18
30
40
t
-3

$V = \frac{dx}{dt}$ x and v scalars



avg $\vec{v} = \frac{\Delta \vec{r}}{\Delta t}$

$\vec{V} = \lim_{\Delta t \to 0} \frac{\Delta \vec{r}}{\Delta t} = \frac{d\vec{r}}{dt}$ $\quad \vec{a} = \frac{d\vec{v}}{dt}$

speed vs velocity

speed is always scalar
always positive

speed $|\vec{v}|$