(1) **NYEJURUKIA C NANCY**
18/ENG07/012
PETROLEUM ENGINEERING

(1.)

s-t graph (s(m) vs t(s))
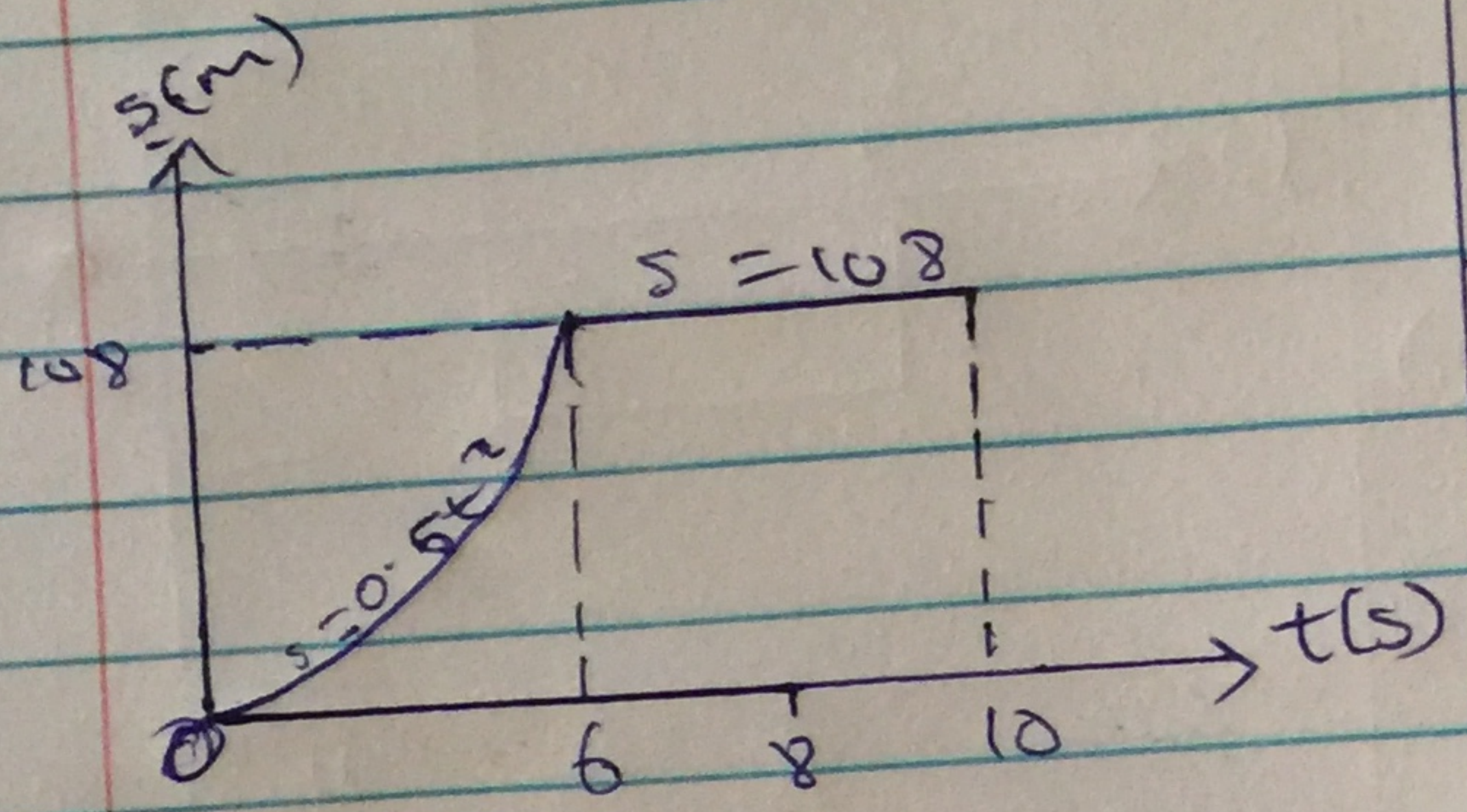
$V = \dfrac{dy}{dt}$

$V = 1.5t^2$

at $t = 6s$
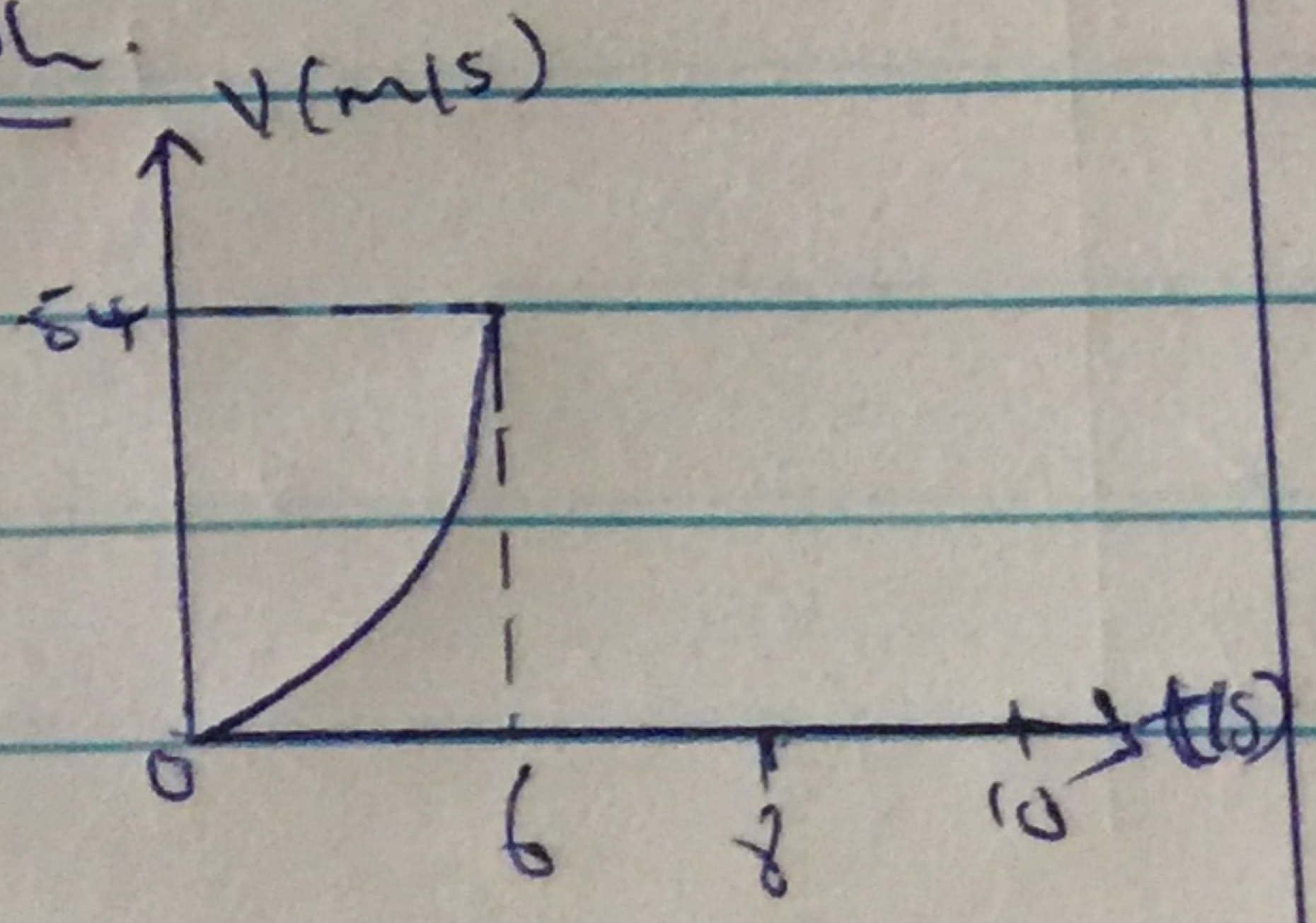
$V = 1.5 \times 6^2$

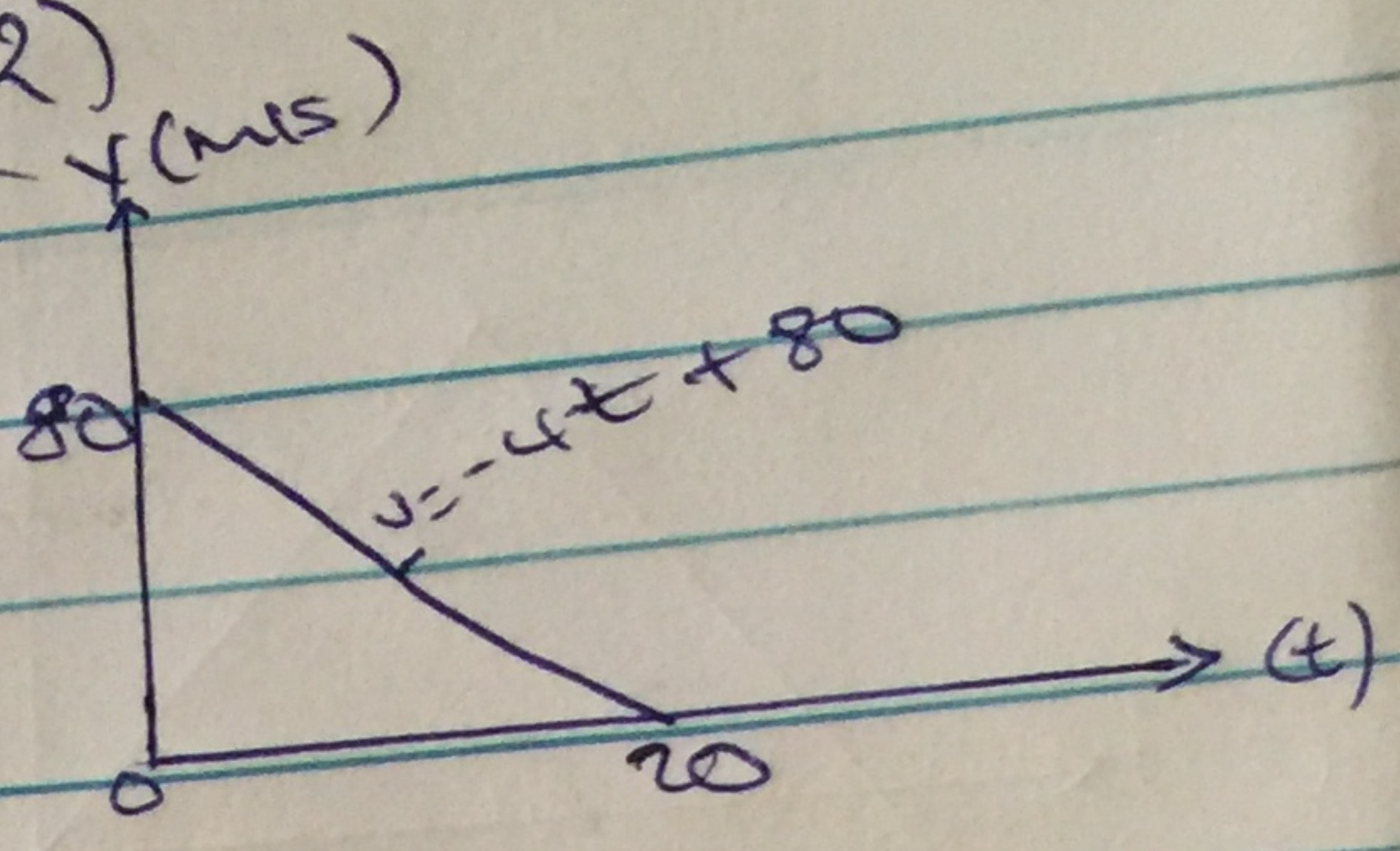$= 1.5 \times 36$

$V = 54 m/s$

from $t = 6s - 10s$, $s = 108$

$\therefore V = 0$

v-t graph.

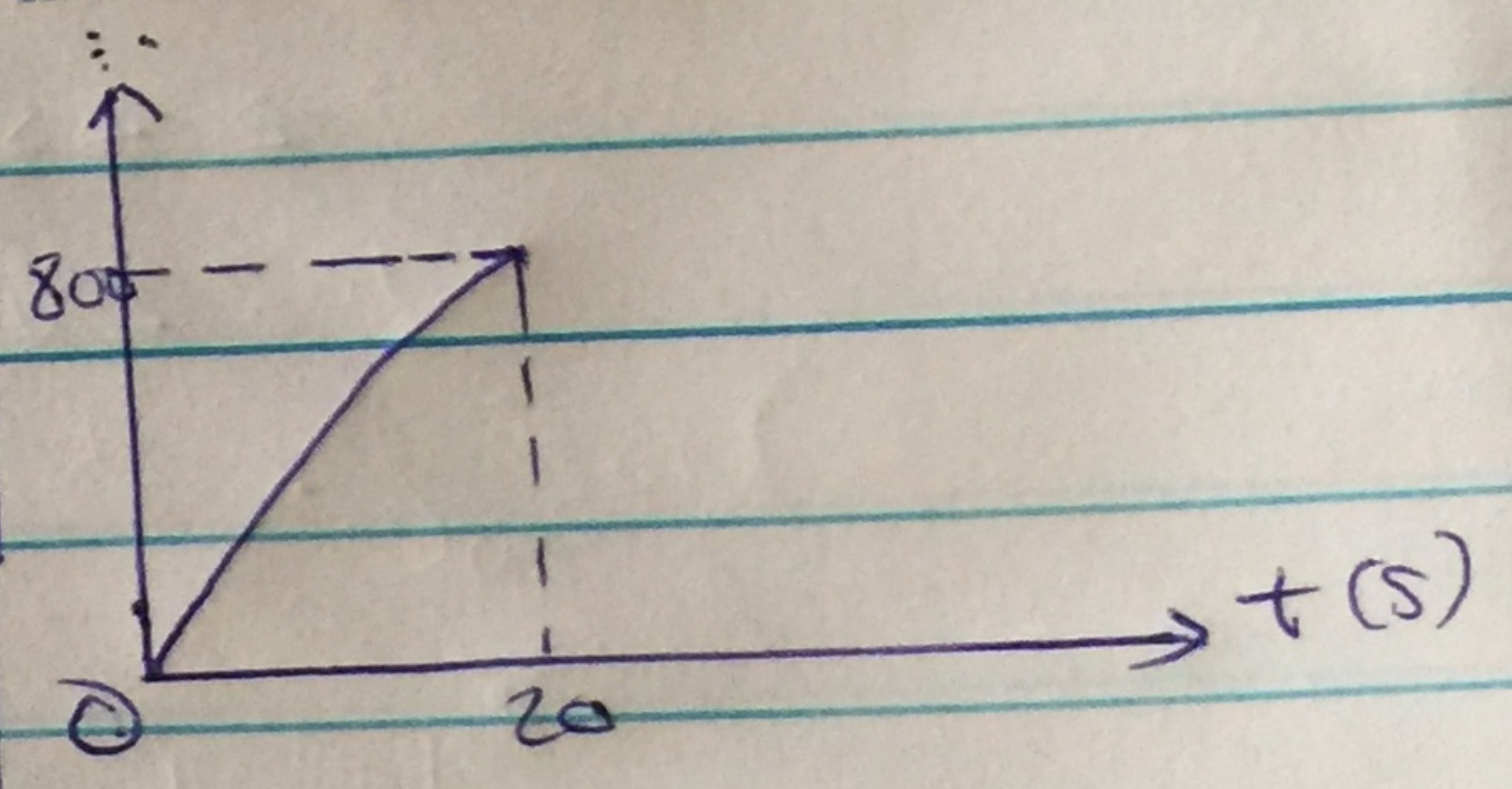

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(2) V(m/s)

i) $s = \int v\, dt$

$s = \int (-4t + 80)$

$s = -2t^2 + 80t$

at $t = 20s$

$s = -2(20)^2 + 80(20)$

$s = 1600 - 800 = 800 m.$

s-t graph

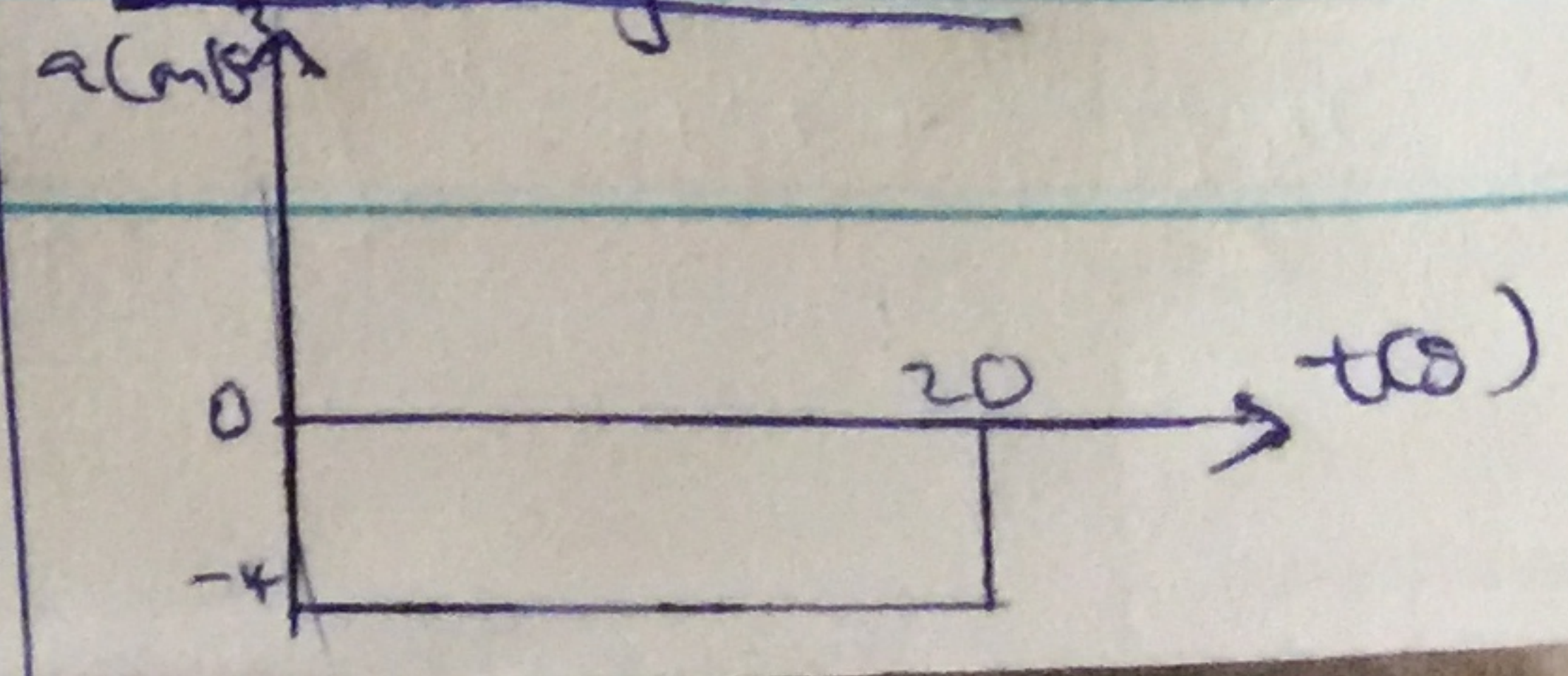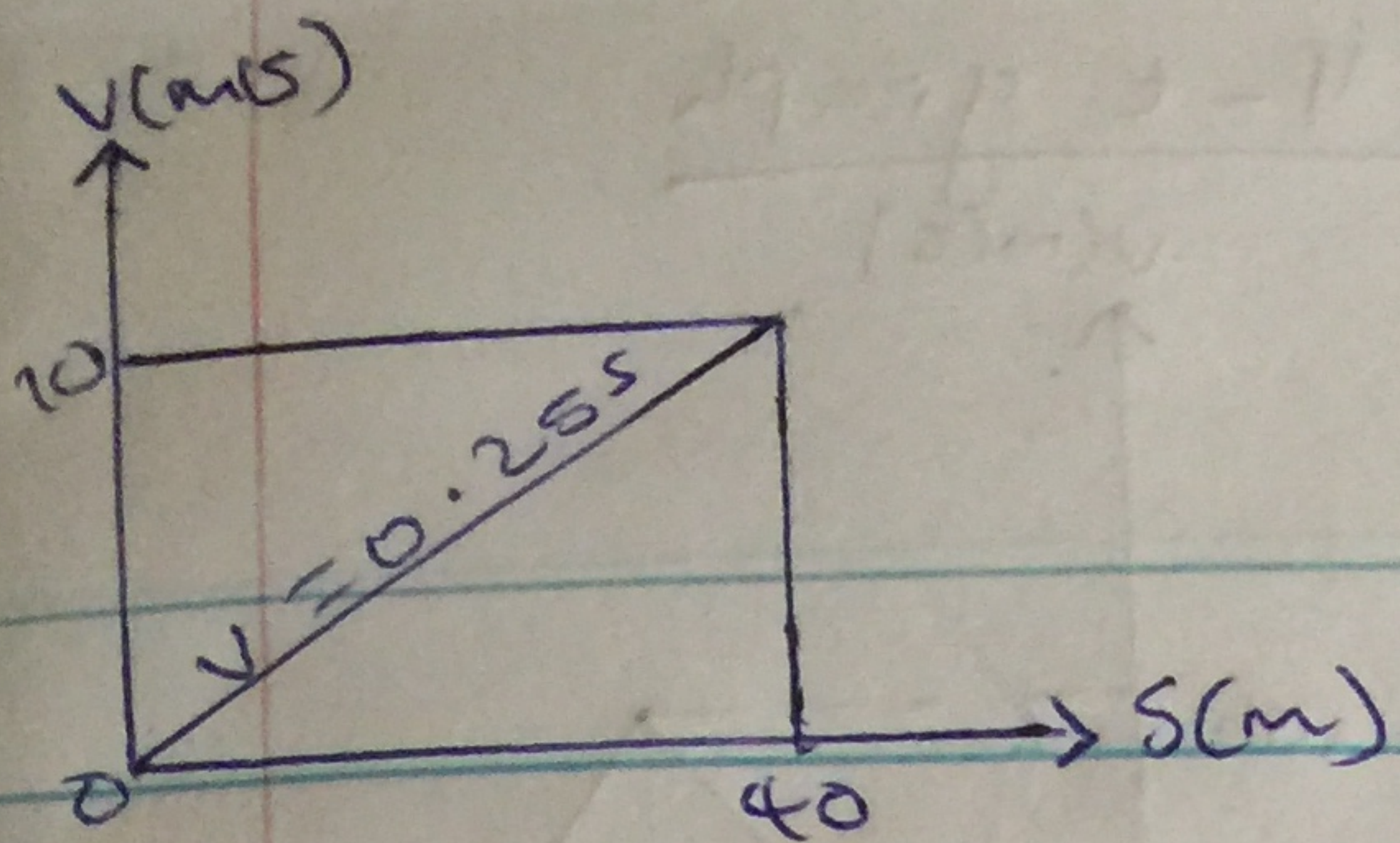ii) acceleration

$a = \dfrac{dv}{dt}$

$\therefore a = -4 m/s^2$

at $t = 20s$, $a = -4 m/s^2$

a-t graph

(3)

V(m/s)

10 ──────────┐
     v=0.25s │
0 ─────────── 40 ──→ S(m)

$a = \left(\dfrac{dv}{ds}\right) v$

$v = 0.25 s$

$a = 10 \times d(0.25s)/ds$
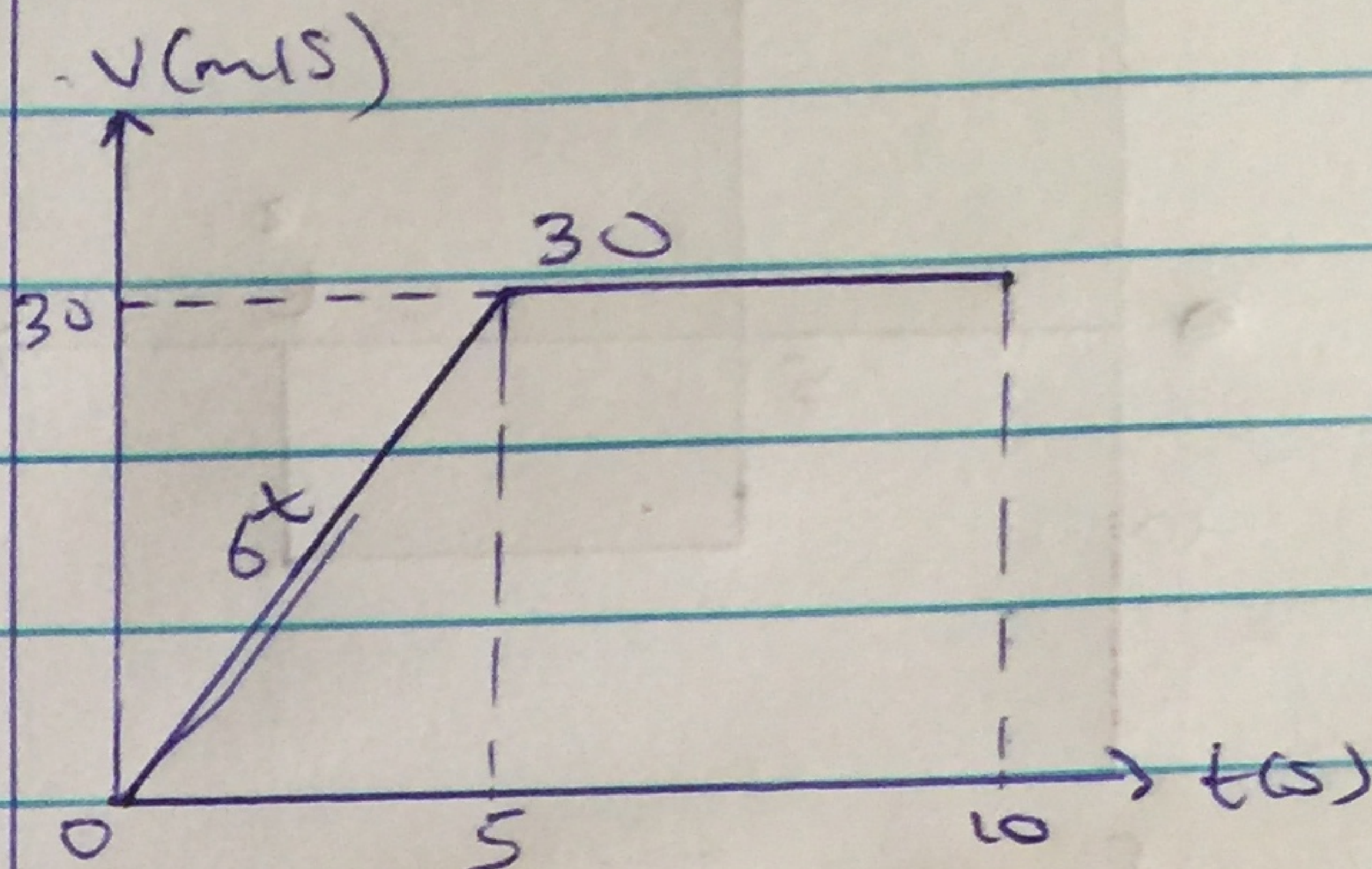
$a = 10 \times 0.25$

$a = 2.5 \, m/s^2$

a-s graph

a(m/s)²

2.5 ──────┐
         │
0 ─────── 40 ──→ S(m)

s(m)

(4) 225 ─ ─ ─ ─ ─ ─ ┐
                    │
            $S=30t-\frac{5}{?}$
75 ─ ─ ─┐
   $S=\frac{3}{2}t^2$ │
   $S=3t$
0 ──── 5 ── 6 ──→ t(s)
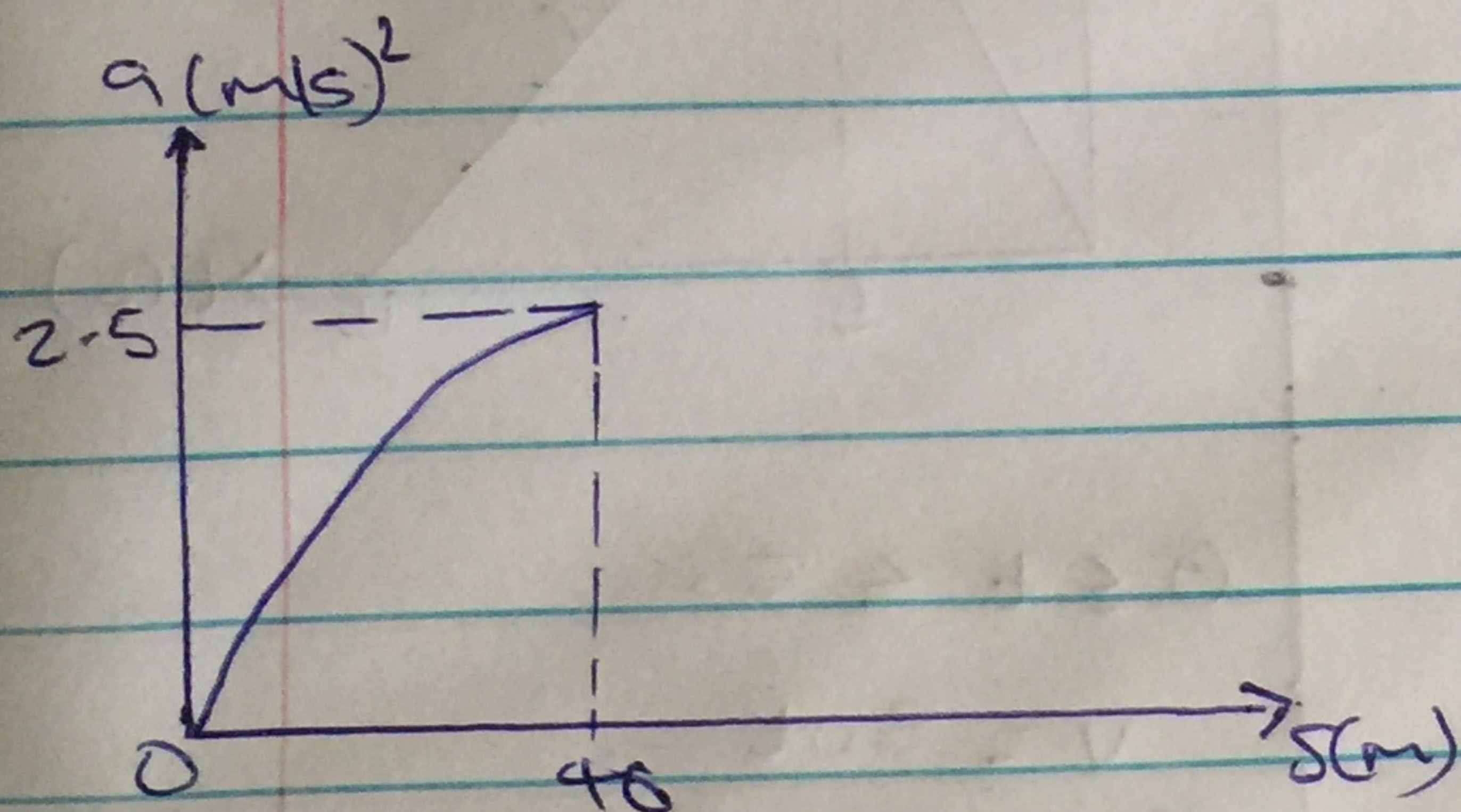
(i) $v = \dfrac{ds}{dt}$

at $t = 5s$

$v = 6t = 6 \times 5$

$= 30 \, m/s$

at $t = 10s$

$v = 30 \, m/s$

v-t graph

V(m/s)

30 ─ ─ ─ ─ ─ ─ 30
        $6t$
0 ──── 5 ──── 10 ──→ t(s)

(ii) $a = \dfrac{dv}{dt}$

at $t = 5s$

$a = 6 \, m/s^2$

at $t = 10s$

$a = 0 \, m/s^2$

a-t graph

a(m/s²)

6 ──────────┐
            │
0 ──── 5 ── 10 ──→ t(s)

5/

$a(m/s^2)$ graph with values 20, 0 at 5, -10, and time axis t(s), with t^2 marked

V-t graph

$v(m/s)$

100 ---- , triangle peaking near 100, axis marks 5, 15, →t(s), O
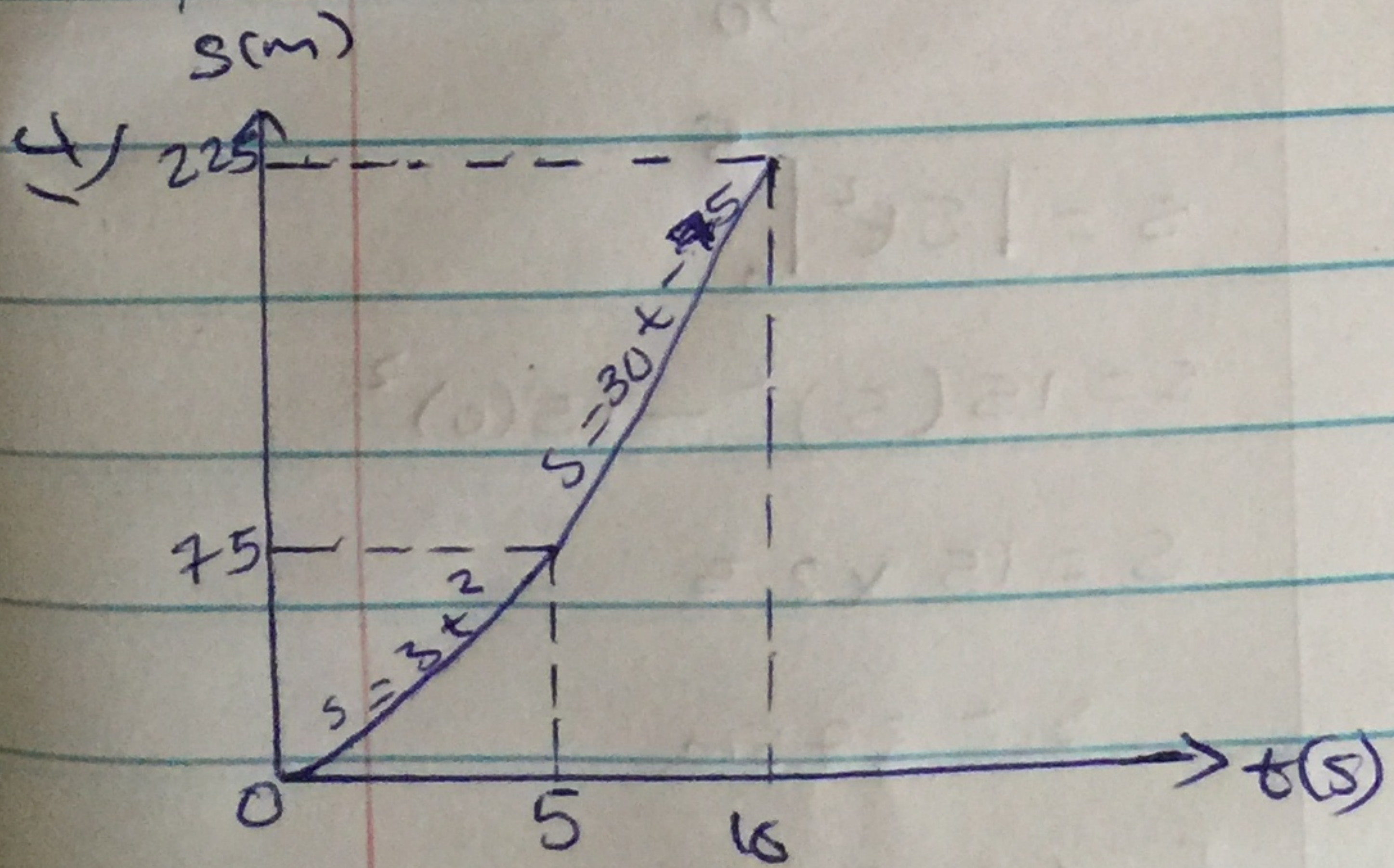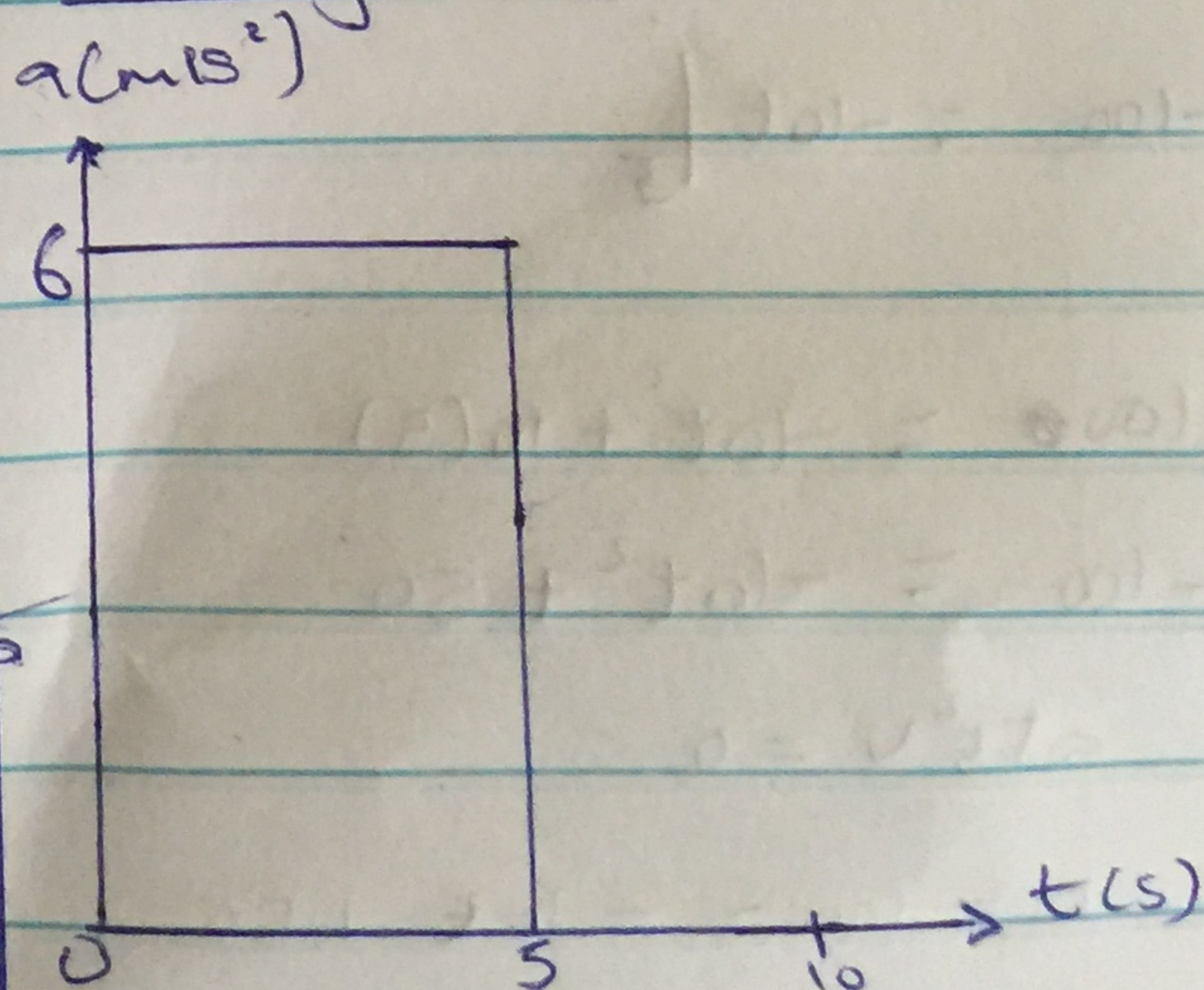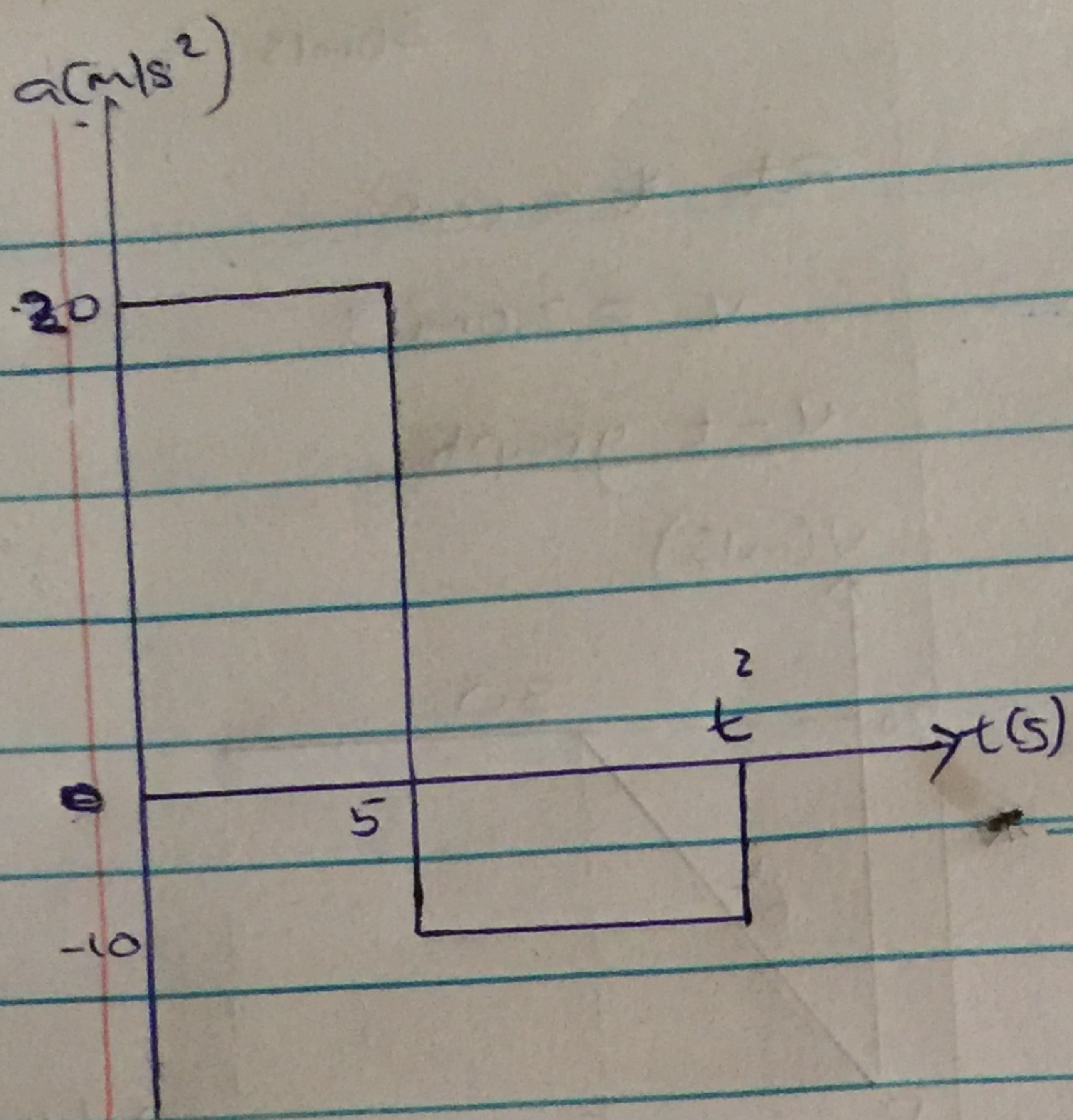
i) $v = \int a\, dt$

$v = \int 20\, dt$

$v = 20t$

at $t = 5s$

$v = 20 \times 5 = 100 m/s$

$5s < t \le t^2$

$\int_{100}^{v} = \int_{5}^{t^2} -10\, dt$

$v - 100 = -10t \big|_{5}^{t^2}$

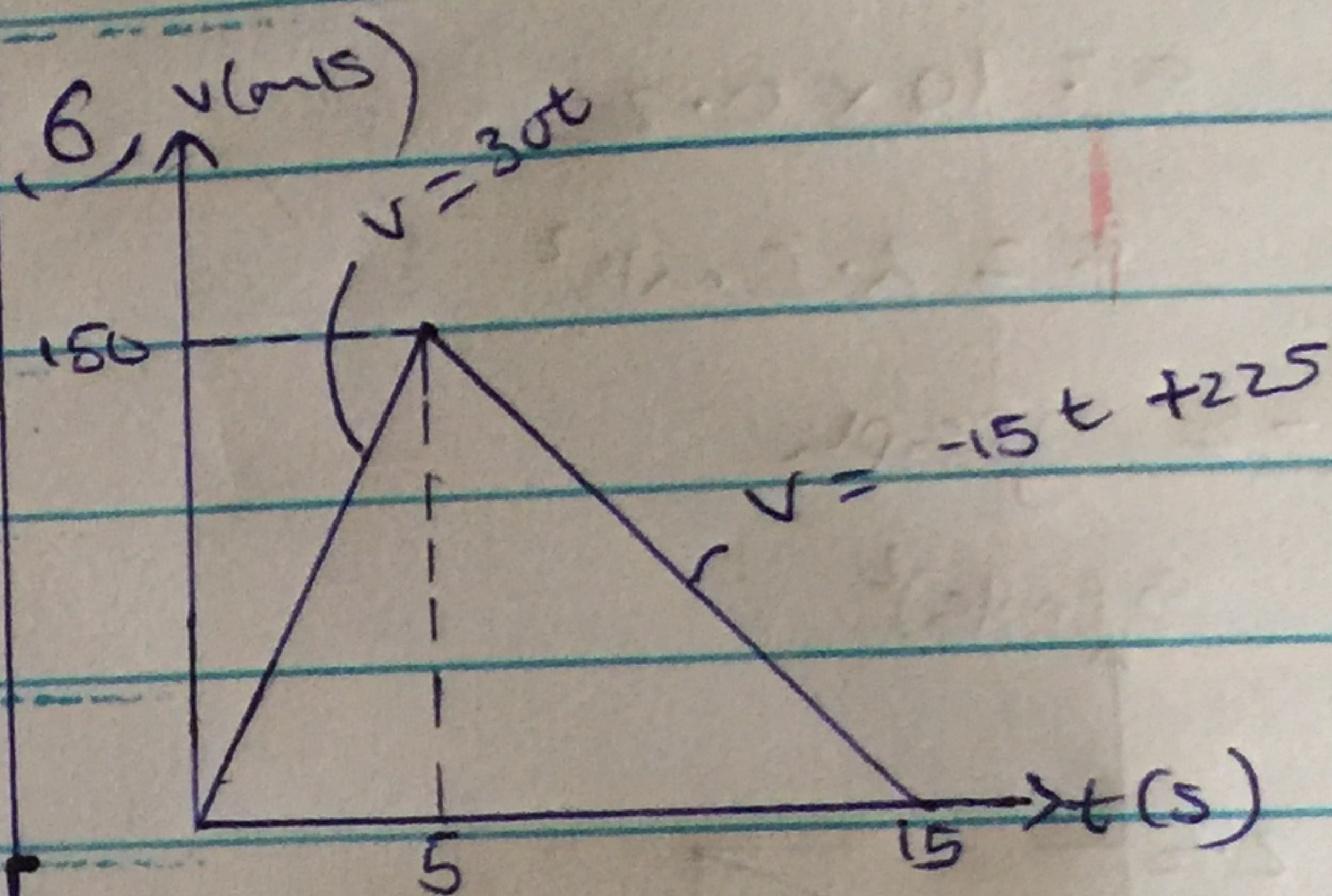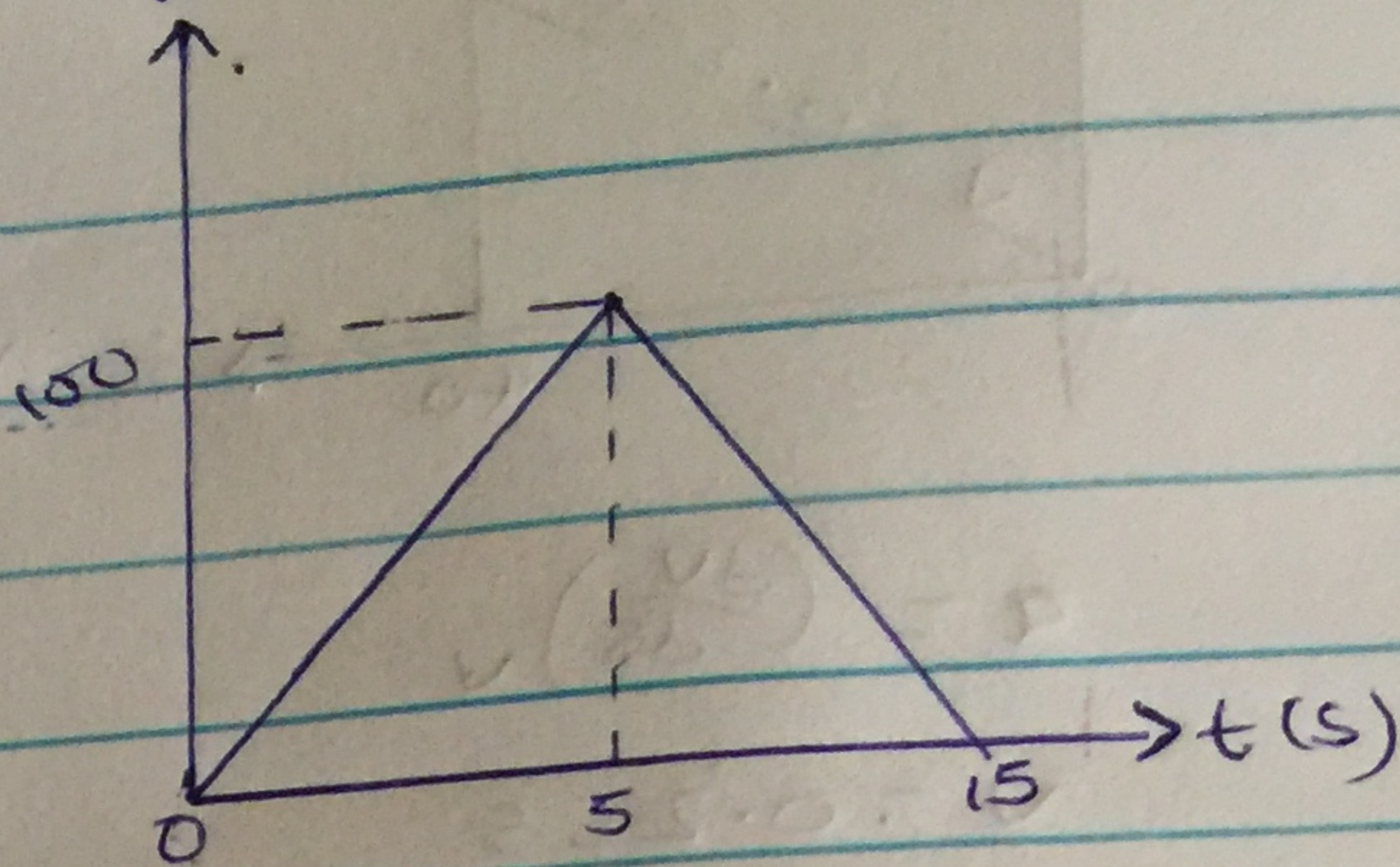$v - 100 = -10t^2 + 10(5)$

$v - 100 = -10t^2 + 50$

at $v = 0$

$0 - 100 = -10t + 50$

$10t^2 = 150$

$t = 15s$

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6) $v(m/s)$

$v = 30t$, 150 ----, triangle, $v = -15t + 225$, axis marks 5, 15, →t(s)

$0 \le t \le 5s$

$v = 30t$

$\int_{0}^{5} ds = \int_{0}^{5} 30t$

$s = |15t^2|_{0}^{5}$

$s = 15(5)^2 - 15(0)^2$

$s = 15 \times 25$

$s = 375m$

$5s \le t \le 15s$

$v = -15t + 225$

$\int_{375}^{s} ds = \int_{5}^{15} (-15t + 225)\, dt$

$$S - 375 = \frac{-15t^2}{2} + 225t \Big|_5^{15}$$

$$S - 375 = \left[\frac{-15(15^2)}{2} + 225(15) \right] -$$

$$\left[\frac{-15(5)^2}{2} + 225(5) \right]$$

$$S - 375 = \left[\frac{-15 \times 225}{2} + 3375 \right] -$$

$$\left[\frac{-15 \times 25}{2} + 1125 \right]$$

$$S - 375 = (-1687.5 + 3375) -$$

$$(-187.5 + 1125)$$

$$S - 375 = 1687.5 - 937.5$$

$$S - 375 = 750$$

$$S = 1125 \, m \, //$$

S-t graph.