v_c $\quad v = \Delta d / t$

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v_v (varying) $\quad \bar{v} = \Delta d / t$

$\bar{v} = \frac{v_1 + v_2}{2}$

$\frac{v_1 + v_2}{2} = d / t$ multiply by "t"

$d = v t$

$$d = \left(\frac{v_1 + v_2}{2}\right) t$$

You go from 15 m/s to 25 m/s in 2.0 s.
How far did you go?

1) list data
   do any conversions

2) list base formula

3) isolate variable

4) plug in measurements

5) solve equation

6) do unit analysis

$$d = \left(\frac{v_1 + v_2}{2}\right) t$$

You go from 15 m/s to 25 m/s in 2.0 s.
How far did you go?

$v_1 = 15\ m/s$

$v_2 = 25\ m/s$

$t = 2s$

$d = ?$

$$d = \left(\frac{v_1 + v_2}{2}\right) t$$

$$d = \left(\frac{15\ m/s + 25\ m/s}{2}\right) 2s$$

$$d = 40\ m$$

by definition

$$a = \frac{\Delta v}{t}$$

$$\Delta v = v_2 - v_1$$
$$= v_f - v_i$$
$$= v - v_0$$

$$a = \frac{v_2 - v_1}{t}$$

multiply by "t" and add v

1

$$v_2 = v_1 + a t$$

$v = v_0 + at$

$v = at$

$v_2 = v_1 + at$

You are traveling at 15 m/s and accelerate at 2.0 m/s/s for 3.0 s. What is your ending velocity?

$v_1 = 15\ m/s$

$a = 2.0\ m/s^2$

$t = 3.0\ s$

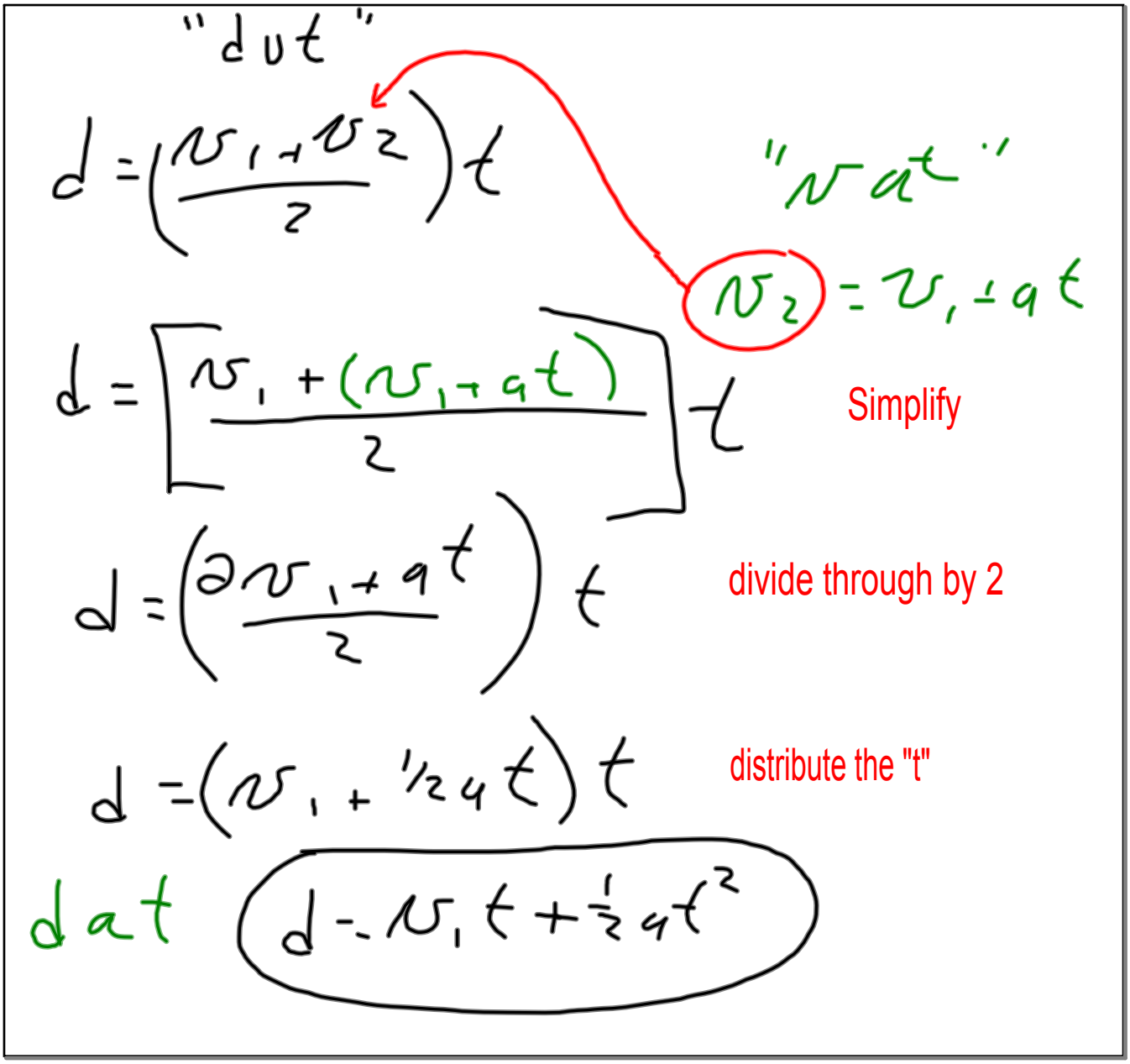
$v_2 = ?$

$v_2 = v_1 + at$

$v_2 = 15\ m/s + 2.0\ m/s^2 (3.0\ s)$

$v_2 = 15\ m/s + 6\ m/s$

$v_2 = 21\ m/s$


"dvt"
$d = \left(\frac{v_1 + v_2}{2}\right)t$
"vat"
$v_2 = v_1 + at$
$d = \left[\frac{v_1 + (v_1 + at)}{2}\right]t$
Simplify
$d = \left(\frac{2v_1 + at}{2}\right)t$
divide through by 2
$d = (v_1 + \frac{1}{2}at)t$
distribute the "t"
dat
$d = v_1 t + \frac{1}{2}at^2$

$$d = v_1 t + \frac{1}{2} a t^2$$

dat

How far does a ball fall if it is thrown downward at -15 m/s and strikes the ground 2.0 s later?

$d = ?$

$v_1 = -15\ m/s$

$t = 2.0\ s$

$a = -9.8\ m/s^2$

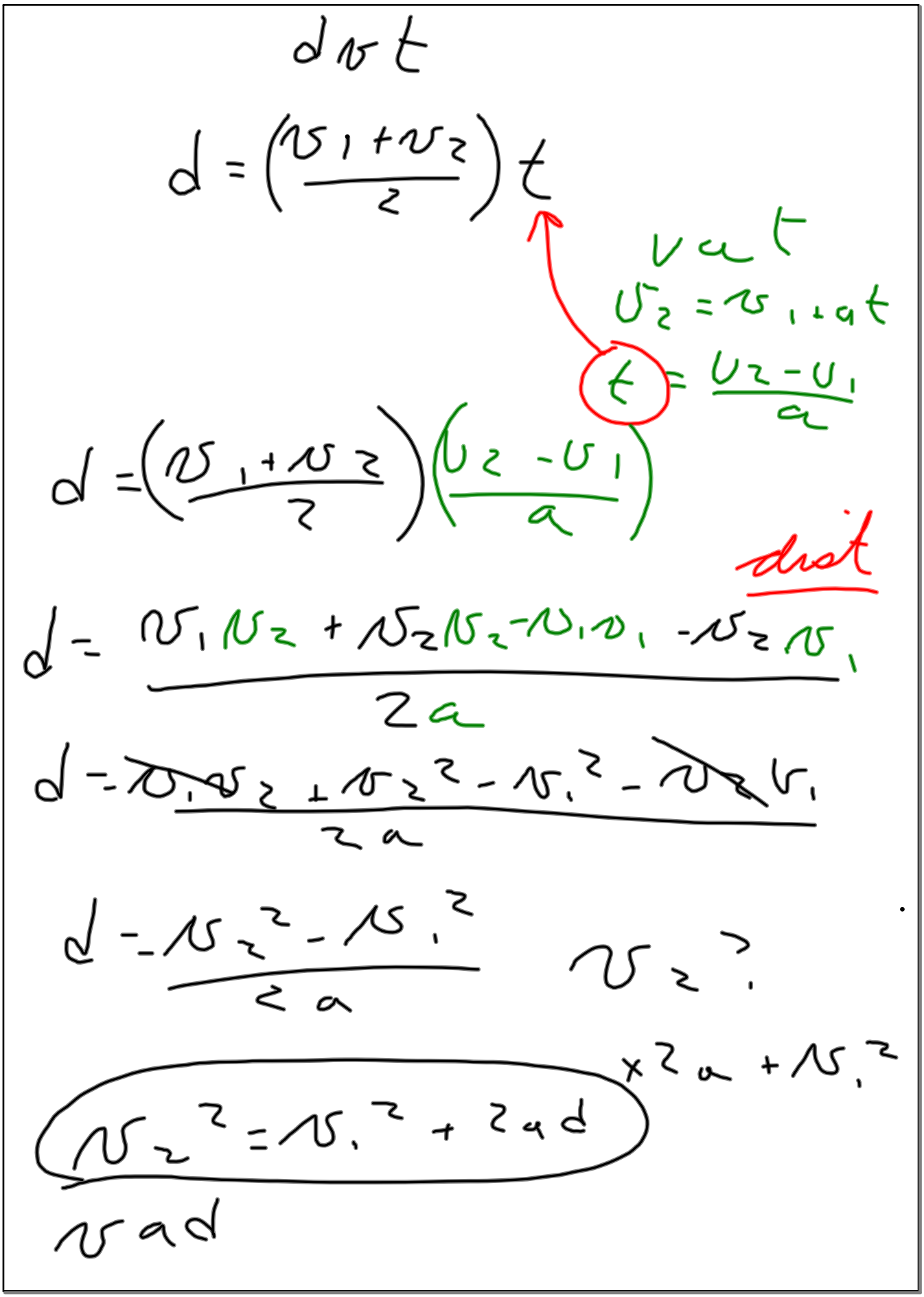
$$d = v_1 t + \frac{1}{2} a t^2$$

$$d = (-15\ m/s)(2.0\ s) + \frac{1}{2}(-9.8\ m/s^2)(2.0\ s)^2$$

$$d = -30\ m + (-20\ m)$$

$$d = -50\ m$$

down


d = rt
d = ((v1 + v2)/2) t
v = u + at
v2 = v1 + at
t = (v2 - v1)/a
d = ((v1 + v2)/2)((v2 - v1)/a)
dist
d = (v1v2 + v2v2 - v1v1 - v2v1)/2a
d = (v1v2 + v2^2 - v1^2 - v2v1)/2a
d = (v2^2 - v1^2)/2a
v2 ?
x 2a + v1^2
v2^2 = v1^2 + 2ad
v ad

What velocity does a ball hit the ground at if it's thrown downward at -15 m/s from a 25 m cliff?

$v_2 = ?$

$v_1 = -15\ m/s$

$d = -25\ m$

$a = -9.8\ m/s^2$

"vad" $v_2^2 = v_1^2 + 2ad$

$$v_2 = \sqrt{v_1^2 + 2ad}$$

$$v_2 = \pm\sqrt{(-15\ m/s)^2 + 2(-9.8\ m/s^2)(-25\ m)}$$

$$v_2 = \sqrt{225\ m^2/s^2 + (+490\ m^2/s^2)}$$

$$v_2 = \pm\sqrt{715\ m^2/s^2}$$

$$v_2 = -27\ m/s$$

Downward!