P11 - 2.2 - $a = \frac{v}{t}$ Notes

$v_f = v_i + at$

$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t}$

$REST$ $v_i = 0$

$\Delta = final - initial$

Find "a" *if a car gets to* $39\frac{m}{s}$ *in* 3 *s from rest.*

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

$a = \frac{39 - 0}{3}$

$a = 13\frac{m}{s^2}$

t	v
0	0
1	13
2	26
3	39

Obviously!

$v = 0$ $v = 39$

$t = 3$ $a = ? = 13$

Find "t" *if it takes a boat from rest to* $36\frac{m}{s}$ *accelerating at* $9\frac{m}{s^2}$?

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

$9 = \frac{36}{t}$

$t \times 9 = \frac{36}{t} \times t$

$9t = 36$

$\frac{9t}{9} = \frac{36}{9}$

$t = 4s$

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

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

$t = \frac{36}{9}$

$t = 4s$

$v = 0$ $v = 36$

$a = 9$ $t = ? = 4$

Find "v" *if a fish* $a = 5\frac{m}{s^2}$ *for* 13 *seconds from rest?*

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

$5 = \frac{\Delta v}{13}$

$13 \times 5 = \frac{\Delta v}{13} \times 13$

$\Delta v = 65\frac{m}{s}$

$v_f - \cancel{v_i}^{0} = 65\frac{m}{s}$

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

$\Delta v = at$

$\Delta v = 5 \times 13$

$\Delta v = 65\frac{m}{s}$

$v = 0$ $v = ? = 65$

$t = 13$ $a = ? = 5$

Find "a" *of a rabit that accelerates from* $8\frac{m}{s}$ *to* $24\frac{m}{s}$ *in* 4 *seconds.*

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

$a = \frac{24 - 8}{4 - 0}$

$a = \frac{16}{4}$

$a = 4\frac{m}{s^2}$

Find "v" *of a fish get if it accelerates from rest at* $5\frac{m}{s^2}$ *for* 13 *seconds?*

OR

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

$5 = \frac{v}{13}$

$v = 65\frac{m}{s}$

$v_f = v_i + at$

$v_f = 0 + 5(13)$

$v_f = 65\frac{m}{s}$

$a = \frac{v_f - v_i}{t}$

$at = v_f - v_i$

$v_f = v_i + at$

How long to accelerate to $10\frac{m}{s}$ *from rest at* $2\frac{m}{s^2}$?

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

$t \times 2 = \frac{10}{t} \times t$

$2t = 10$

$t = 5\ s$

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

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

$t = \frac{10}{2}$

$t = 5\ s$

OR

$v_f = v_i + at$

$10 = 0 + 2t$

$t = 5\ s$

How long to accelerate from $6\frac{m}{s}$ *to* $18\frac{m}{s}$ *at* $2\frac{m}{s^2}$?

$v_f = v_i + at$

$18 = 6 + 2t$

$12 = 2t$

$t = 6\ s$

$v_f = v_i + at$

$t = \frac{v_f - v_i}{a}$

$t = \frac{18 - 6}{2}$

$t = 6s$

How fast does a car get accelerating at $3\frac{m}{s^2}$ *from* $10\frac{m}{s}$ *for* 6 *seconds?*

$v_f = v_i + at$

$v_f = 10 + (3)(6)$

$v_f = 28\frac{m}{s}$

Find the initial velocity of a truck that reaches $25\frac{m}{s}$ *acclelerating at* $5\frac{m}{s^2}$ *in* 2 *seconds?*

$v_f = v_i + at$

$25 = v_i + 5(2)$

$25 = v_i + 10$

$v_i = 15\frac{m}{s}$

$v_f = v_i + at$

$v_i = v_f - at$

$v_i = 25 - 5(2)$

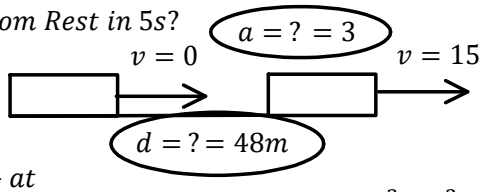
$v_i = 15\ m/s$

$v_f = v_i + at$ $\quad$ $v_f^2 = v_i^2 + 2ad$

P11 - 2.2 - $v_f = v_i + at,\ v_f^2 = v_i^2 + 2ad$ Notes

Find the Acceleration of a Bear reaching a Velocity of $15\frac{m}{s}$ *from Rest in* $5s$?

How Far did the Bear get in that time?



t	v
0	0
1	3
2	6
3	9
4	12
5	15

Obviously!

$v_f = v_i + at$
$v_f = at$
$a = \frac{v_f}{t}$
$a = \frac{15}{5}$
$a = 3\frac{m}{s^2}$

$v_f^2 = v_i^2 + 2ad$
$15^2 = 0^2 + 2(3)d$
$324 = 0 + 6d$
$324 = 6d$
$d = 37.5m$

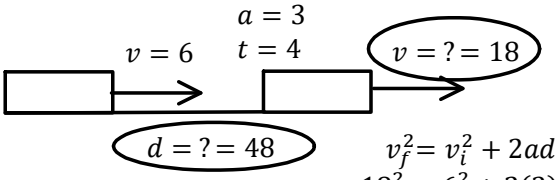
Algebra

$v_f^2 = v_i^2 + 2ad$
$d = \frac{v_f^2}{2a}$
$d = \frac{15^2}{2(3)}$
$d = 37.5\ m$

Isolate 1st

How far does a cheetah get running at $6\frac{m}{s}$ *accelerates at* $3\frac{m}{s^2}$ *for* $4\ s$. *What is her* v_f?

How Far did the Cheetah get in that time?

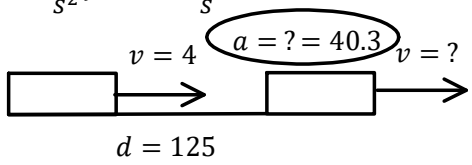


$v_f = v_i + at$
$v_f = 6 + 3(4)$
$v_f = 18\frac{m}{s}$

$v_f^2 = v_i^2 + 2ad$
$18^2 = 6^2 + 2(3)d$
$324 = 36 + 6d$
$288 = 6d$
$d = 48m$

$v_f^2 = v_i^2 + 2ad$
$d = \frac{v_f^2 - v_i^2}{2a}$
$d = \frac{18^2 - 6^2}{2(3)}$
$d = 48\ m$

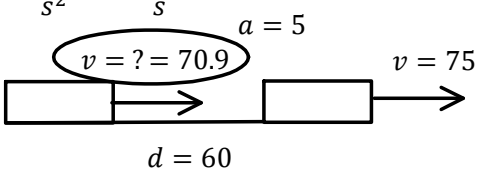
Find the v_f *of a boat if it accelerates at* $4\frac{m}{s^2}$ *from* $25\frac{m}{s}$ *in* $125\ m$?



$v_f^2 = v_i^2 + 2ad$
$v_f^2 = 25^2 + 2(4)(125)$
$v_f^2 = 1625$
$\sqrt{v_f^2} = \sqrt{1625}$
$v_f = 40.3\ m/s$

$v_f^2 = v_i^2 + 2ad$
$v_f = \sqrt{v_i^2 + 2ad}$
$v_f = \sqrt{25^2 + 2(4)(125)}$
$v_f = 40.3\ m/s$

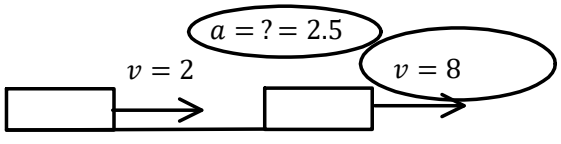
Find v_i *of a whale if it accelerates at* $5\frac{m}{s^2}$ *to* $75\ \frac{m}{s}$ *in* $60\ m$?



$v_f^2 = v_i^2 + 2ad$
$75^2 = v_i^2 + 2(5)(60)$
$5625 = v_i^2 + 600$
$\sqrt{5025} = \sqrt{v_i^2}$
$v_i = 70.9\frac{m}{s}$

$v_f^2 = v_i^2 + 2ad$
$v_i = \sqrt{v_f^2 - 2ad}$
$v_i = \sqrt{75^2 - 2(5)(60)}$
$v_i = 70.9\frac{m}{s}$

What is the accleration of an object which accelerates from $2\frac{m}{s}$ *to* $8\frac{m}{s}$ *in* $12\ m$?



$v_f^2 = v_i^2 + 2ad$
$8^2 = 2^2 + 2(a)(12)$
$64 = 4 + 24a$
$60 = 24a$
$a = 2.5\frac{m}{s^2}$

$v_f^2 = v_i^2 + 2ad$
$a = \frac{v_f^2 - v_i^2}{2d}$
$a = \frac{8^2 - 2^2}{2(12)}$
$a = 2.5\frac{m}{s^2}$