

19.	v_0	v_f	a	d	t
	0		-9.80 m/s^2	-25.0 m	

Either find v_f or t

$$v_f^2 = v_0^2 + 2ad$$

$$= 2(-9.80 \text{ m/s}^2)(-25.0 \text{ m})$$

$$v_f = -22.1 \text{ m/s}$$

$$v_{\text{average}} = \frac{v_f + v_0}{2}$$

$$= \frac{-22.1 \text{ m/s} - 0}{2}$$

$$= -11.1 \text{ m/s}$$

20.	v_0	v_f	a	d	t
	14.0 m/s	0	-9.80 m/s^2	?	?

a) $v_f^2 = v_0^2 + 2ad$

$$0 = (14.0 \text{ m/s})^2 + 2(-9.80 \text{ m/s}^2)(d)$$

$$d = \frac{-(14.0 \text{ m/s})^2}{2(-9.80 \text{ m/s}^2)}$$

$$= 10.0 \text{ m}$$

b) $a = \frac{v_f - v_0}{t}$

$$-9.80 \text{ m/s}^2 = \frac{0 - 14.0 \text{ m/s}}{t}$$

$$t = 1.43 \text{ s}$$

21.	v_0	v_f	a	d	t
	X	-1.90 m/s	?	2.75 m	4.50 s

Find v_0 first

$$d = \left(\frac{v_f + v_0}{2} \right) t$$

$$2.75 \text{ m} = \left(\frac{-1.90 \text{ m/s} + v_0}{2} \right) (4.50 \text{ s})$$

$$v_0 = \frac{2(2.75 \text{ m})}{4.50 \text{ s}} + 1.90 \text{ m/s}$$

$$= 3.12 \text{ m/s}$$

Now find a

$$a = \frac{v_f - v_0}{t}$$

$$= \frac{-1.90 \text{ m/s} - 3.12 \text{ m/s}}{4.50 \text{ s}}$$

$$= -1.12 \text{ m/s}^2$$

Lesson 3 - Projectiles

1. We are asked to find the horizontal component

$$\therefore \text{ use } v = \frac{d}{t}$$

Find t from vertical component

v_0	v_f	a	d	t
0	X	9.80 m/s^2	90.0 m	?

$$d = v_0 t + \frac{1}{2} a t^2$$

$$90.0 \text{ m} = \frac{1}{2} (9.80 \text{ m/s}^2) t^2$$

$$t = \sqrt{\frac{2(90.0 \text{ m})}{9.80 \text{ m/s}^2}}$$

$$= 4.29 \text{ s}$$

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

$$d = vt$$

$$= (10.0 \text{ m/s})(4.29 \text{ s})$$

$$= 42.9 \text{ m}$$

2. We are asked to find the horizontal component

$$\therefore \text{ use } v = \frac{d}{t}$$

Find t from vertical component

v_0	v_f	a	d	t
0	X	9.80 m/s^2	$1.50 \times 10^2 \text{ m}$?

$$d = v_0 t + \frac{1}{2} a t^2$$

$$1.50 \times 10^2 \text{ m} = \frac{1}{2} (9.80 \text{ m/s}^2) t^2$$

$$t = \sqrt{\frac{2(1.50 \times 10^2 \text{ m})}{9.80 \text{ m/s}^2}}$$

$$= 5.53 \text{ s}$$

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

$$d = vt$$

$$= (25.0 \text{ m/s})(5.53 \text{ s})$$

$$= 1.38 \times 10^2 \text{ m}$$