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

Therefore the range of the object

$$d = vt$$
$$= (25.0 \text{ m/s})(5.53 \text{ s})$$
$$= 1.38 \times 10^2 \text{ m}$$

**3.** We are asked to find the vertical component.

Find $t$ from the horizontal component.

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

$$t = \frac{d}{v}$$
$$= \frac{100 \text{ m}}{18.0 \text{ m/s}}$$
$$= 5.56 \text{ s}$$

Vertical component

| $v_0$ | $v$ | $a$ | $d$ | $t$ |
|---|---|---|---|---|
| 0 | × | 9.81 m/s$^2$ | ? | 5.56 s |

$$d = v_0 t + \frac{1}{2} a t^2$$
$$= \frac{1}{2}(9.81 \text{ m/s}^2)(5.56 \text{ s})^2$$
$$= 152 \text{ m}$$

**4.** We are asked to find the vertical component.

Find $t$ from the horizontal component.

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

$$t = \frac{d}{v}$$
$$= \frac{48.0 \text{ m}}{20.0 \text{ m/s}}$$
$$= 2.40 \text{ s}$$

Vertical component

| $v_0$ | $v$ | $a$ | $d$ | $t$ |
|---|---|---|---|---|
| 0 | × | 9.81 m/s$^2$ | ? | 2.40 s |

$$d = v_0 t + \frac{1}{2} a t^2$$
$$= \frac{1}{2}(9.81 \text{ m/s}^2)(2.40 \text{ s})^2$$
$$= 28.3 \text{ m}$$

**5.** We are asked to find the vertical component.

| $v_0$ | $v$ | $a$ | $d$ | $t$ |
|---|---|---|---|---|
| 0 | × | 9.81 m/s$^2$ | ? | 5.50 s |

$$d = v_0 t + \frac{1}{2} a t^2$$
$$= \frac{1}{2}(9.81 \text{ m/s}^2)(5.50 \text{ s})^2$$
$$= 148 \text{ m}$$

**6. a)** We are asked to find he horizontal component.

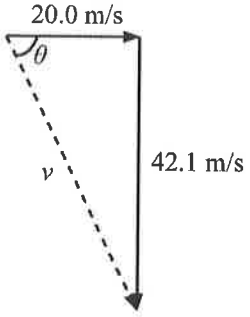
$$v = \frac{d}{t}$$
$$d = vt$$
$$= (20.0 \text{ m/s})(4.20 \text{ s})$$
$$= 84.0 \text{ m}$$

**b)** Horizontal velocity = 20.0 m/s

Find final vertical velocity:

| $v_0$ | $v$ | $a$ | $d$ | $t$ |
|---|---|---|---|---|
| 0 | ? | 9.81 m/s$^2$ | | 4.20 s |

$$a = \frac{v_f - v_0}{t}$$
$$9.81 \text{ m/s}^2 = \frac{v_f - 0}{4.20 \text{ s}}$$
$$v_f = 41.2 \text{ m/s}$$




$$v_R = \sqrt{v_x^2 + v_y^2}$$
$$= \sqrt{(20.0 \text{ m/s})^2 + (41.2 \text{ m/s})^2}$$
$$= 45.8 \text{ m/s}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$
$$= \frac{41.2 \text{ m/s}}{20.0 \text{ m/s}}$$
$$\theta = 64.1°$$

45.8 m/s 64.1°