

## Useful formulas for reloaders

### Energy in foot-pounds

$$\frac{\text{bullet weight in grains} \times \text{velocity}^2}{450400} = \text{ft-lbs}$$

Example: 150gr. bullet at 2700 fps

$$\frac{150 \times 2700^2}{450400} = 2428 \text{ ft-lbs}$$

### Sectional Density

A bullet's weight in pounds divided by the square of its diameter in inches.

$$\frac{W}{7000 D^2} = \text{SD}$$

Example: 150 gr. bullet, .308" in diameter

$$\frac{150}{7000 \times .308^2} = .226$$

### Sight Correction

This formula will show how much change in inches will be needed to correctly zero your sights.

$$M = \left( \frac{D}{R} \right) \times S$$

Where M = movement in inches needed to zero sights.

D = impact deviation of bullet in inches.

(how far off from the aim point that the bullet is hitting.)

R = range in inches.

S = sight radius. (distance between sights)

Example: firearm is hitting 6" low at 50 yards.

$$D = 6" \quad R = 50 \times 36 = 1800" \quad S = 20"$$

$$M = \frac{6"}{1800} \times 20"$$
$$M = .067"$$

.067" of sight adjustment is needed to zero firearm.

# Appendix B

## Free Recoil Energy

Using this formula, you can calculate the amount of recoil for any given gun and load.

$$\text{Free Recoil Energy (ft-lbs)} = \frac{(W1 Vp + 4700 W2)^2}{64.348 Wg}$$

Where: W1 = weight of bullet in pounds. (grains divided by 7000 equals pounds)

W2 = weight of powder charge in pounds.

Wg = weight of gun in pounds.

Vp = muzzle velocity of bullet in feet per second.

Example: W1 for a 150 gr. bullet = 150 divided by 7000 = .021

W2 for a 50 gr. charge = 50 divided by 7000 = .007

Wg for a 9 pound rifle = 9

Vp for a velocity of 2700 fps = 2700

$$\frac{(.021 \times 2700 + 4700 \times .007)^2}{64.348 \times 9}$$

$$\frac{(56.7 + 32.9)^2}{579.132} = 13.86 \text{ ft-lbs}$$