Radiation Pressure:

Radiation pressure is the pressure exerted on a surface due to impact on it by the incident photon. The momentum of the photon is absorbed or reflected by the surface accordingly and as the rate of change of momentum is the force applied, the surface experiences a force.

Using Einstein's theory momentum of photons (mass less) is given by

$$p = E/c$$

here E is the energy of photons and c is speed of light.

Now if the intensity (amount of energy incident per unit area per unit time) of the radiation is I than power incident per unit time on the surface of area A will be

$$\frac{dE}{dt} = IA$$

Hence momentum incident per unit time on the surface will be (normal incident)

$$\frac{dp}{dt} = \frac{1}{c}\frac{dE}{dt}$$

(a) If the photons are absorbed by the surface, according to Newton's second law the force experienced by the surface will be given by

$$F = \frac{dp}{dt} = \frac{1}{c}\frac{dE}{dt} = \frac{IA}{c}$$

And the pressure on the surface due to radiation is

$$P = \frac{F}{A} = \frac{I}{c}$$

(b) Now if the photons are reflected back at the same speed from the surface, net rate of change of momentum of the photon beam will be

$$F = \frac{p_f - p_{in}}{dt} = \left(-\frac{dp}{dt}\right) - \frac{dp}{dt} = -2 * \frac{1}{c}\frac{dE}{dt} = -\frac{2IA}{c}$$

And the pressure experience by the surface will be

$$P = \frac{F}{A} = \frac{2I}{c}$$