

WORKSHEET: BOYLE'S LAW

Algebra Review

1. Solve for X

$$\frac{124}{3} = \frac{3x}{3}$$

$$\underline{\underline{x = 4}}$$

$$\frac{7x}{7} = \frac{57}{7}$$

$$\underline{\underline{x = 8.14}}$$

$$\frac{11x}{4} = \frac{27.7}{11}$$

$$\underline{\underline{x = 2.52}}$$

Boyle's law Problems

Equation $P_1 V_1 = P_2 V_2$

1) $P_1 = ?$

$V_1 = 10 \text{ ml}$

$P_2 = 100 \text{ kPa}$

$V_2 = 15 \text{ ml}$

Solution

$$\frac{P_1 V_1}{V_1} = \frac{P_2 V_2}{V_1} = P_1 = \frac{P_2 V_2}{V_1}$$

$$P_1 = \frac{100 \times 15}{10} = 150 \text{ kPa}$$

$$\underline{\underline{P_1 = 150 \text{ kPa}}}$$

2.

$P_1 = 760 \text{ mm Hg}$

$V_1 = 2.5 \text{ L}$

$P_2 = ??$

$V_2 = 25 \text{ L}$

Solution

$$\frac{P_1 V_1}{V_2} = \frac{P_2 V_2}{V_2} \quad P_2 = \frac{P_1 V_1}{V_2}$$

$$P_2 = \frac{760 \times 2.5}{25}$$

$$\underline{\underline{= 76 \text{ mm Hg}}}$$

3. $P_1 = 1.55 \text{ atm}$ $V_1 = 27.7 \text{ ml}$
 $P_2 = 3.60 \text{ atm}$ $V_2 = ??$

Solution

$$\frac{P_1 V_1}{P_2} = \frac{P_2 V_2}{P_2} \quad V_2 = \frac{P_1 V_1}{P_2}$$

$$V_2 = \frac{1.55 \times 27.7 \text{ ml}}{3.60}$$

$$\underline{\underline{= 11.9 \text{ ml}}}$$

4. $P_1 = 37.7 \text{ psi}$ $P_2 = 18.2 \text{ psi}$
 $V_1 = ??$ $V_2 = 17.8 \text{ L}$

$$\frac{P_1 V_1}{P_1} = \frac{P_2 V_2}{P_1} \quad V_1 = \frac{P_2 V_2}{P_1}$$

$$V_1 = \frac{18.2 \text{ psi} \times 17.8 \text{ L}}{37.7 \text{ psi}}$$

$$\underline{\underline{= 8.6 \text{ L}}}$$

5. $V_1 = 5.5 \text{ L}$ $V_2 = ?$
 $P_1 = 2.7 \text{ atm}$ $P_2 = 3.6 \text{ atm}$

$$\frac{P_1 V_1}{P_2} = \frac{P_2 V_2}{P_2} \quad V_2 = \frac{P_1 V_1}{P_2}$$

$$V_2 = \frac{2.7 \times 5.5}{3.6} = \underline{\underline{4.1 \text{ L}}}$$

6 $P_1 = 1.75 \text{ atm}$ $V_1 = 50.0 \text{ ml}$
 $P_2 = ?$
 $V_2 = 5.0 \text{ ml}$

$$P_2 = \frac{P_1 V_1}{V_2}$$

$$= \frac{1.75 \times 50.0}{5.0}$$

$$P_2 = \underline{\underline{17.5 \text{ atm}}}$$

10 $P_1 = 1.00 \text{ atm}$ $V_1 = 2.00 \text{ L}$
 $P_2 = 0.27 \text{ atm}$ $V_2 = ?$

$$V_2 = \frac{P_1 V_1}{P_2}$$

$$= \frac{1.00 \times 2.00}{0.27}$$

$$= \underline{\underline{7.41 \text{ atm}}}$$

7 $P_1 = 1.0 \text{ atm}$ $V_1 = 1000 \text{ ml}$
 $P_2 = 5.0 \text{ atm}$ $V_2 = ?$

$$V_2 = \frac{P_1 V_1}{P_2}$$

$$= \frac{1 \times 1000}{5}$$

$$V_2 = \underline{\underline{200 \text{ ml}}}$$

$$V_2 = \underline{\underline{200 \text{ L}}}$$

11 $P_1 = 1.65 \text{ atm}$ $V_1 = ?$
 $P_2 = 0.454 \text{ atm}$ $V_2 = 755 \text{ ml}$

$$V_1 = \frac{P_2 V_2}{P_1}$$

$$V_1 = \frac{0.454 \times 755}{1.65}$$

8 $P_1 = 150 \text{ atm}$ $V_1 = 400 \text{ L}$
 $P_2 = 3.0 \text{ atm}$ $V_2 = ?$

$$V_2 = \frac{P_1 V_1}{P_2} = \frac{150 \times 400}{3}$$

$$V_2 = \underline{\underline{20,000 \text{ L}}}$$

$$\underline{\underline{207.7 \text{ ml}}}$$

9 $P_1 = 1.20 \text{ atm}$ $V_1 = 1.00 \text{ L}$
 $P_2 = ?$ $V_2 = 0.500 \text{ L}$

$$P_2 = \frac{P_1 V_1}{V_2} = \frac{1.20 \times 1.00}{0.500}$$

$$P_2 = \underline{\underline{2.4 \text{ atm}}}$$