IDEAL GASES

1. a) There are no (or entirely negligible) intermolecular forces between the gas molecules.

The volume occupied by the molecules themselves is entirely negligible relative to the volume of the container.

b) Choose any three of the five bullet points near the top of the Chemguide page.

2. Using pV = nRT, but expanding it to the form:

$$pV = \frac{\text{mass (g)}}{\text{mass of 1 mole (g)}} \times RT$$

$$102000 \times \frac{3.75}{1000} = \frac{\text{mass}}{2} \times 8.31441 \times 294.5$$

$$\text{mass} = \frac{102000 \times 3.75 \times 2}{1000 \times 8.31441 \times 294.5}$$

$$= 0.312 \text{ g}$$

Make sure that you understand why the pressure is 102000, why the 3.75 dm^3 was divided by 1000, and why the temperature is recorded as 294.5. A silly mistake would be to forget that hydrogen is H_2, and so put 1 rather than 2 in as the mass of 1 mole in grams.

If you prefer to rearrange the equation before you put the numbers in, that's fine. Similarly, if you chose to work out the volume by dividing 3.75 by 1000 to give 0.00375 before you put it into the equation, that's also fine. Do whatever you are most comfortable with. All the matters is that you get the right answer.

3. As before:

$$pV = \frac{\text{mass (g)}}{\text{mass of 1 mole (g)}} \times RT$$

$$101000 \times \frac{2.50}{1000} = \frac{4.17}{\text{mass of 1 mole (g)}} \times 8.31441 \times 291$$

$$\text{mass of 1 mole} = \frac{4.17 \times 8.31441 \times 291 \times 1000}{101000 \times 2.50}$$

$$= 40.0 \text{ g}$$

The RMM of the gas is therefore 40.0

(The mass of 1 mole is simply the RMM expressed in grams.)

Again, as long as you have got the answer right, and shown your working, it doesn't matter whether you have done this differently.