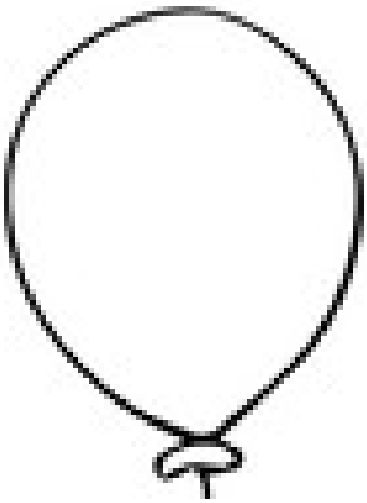
Gas Pressure

Help improve your understanding of pressure by completing the following questions.

Questions

1. Draw the gas particles onto the picture of the balloon.



2. Describe the movement of the gas particle in the balloon.

_____

_____

3. Complete the sentence using the words in the box.

volume	colliding	decreases	pressure	volume increases

The gas particles in the balloon are _____ with the inside walls of the balloon. This creates _____ that keeps the balloon inflated. When a balloon full of air is squeezed the _____ of the balloon _____. This means that the particles have less space to move in. The lower the space the more the pressure _____. If the pressure increases too much the balloon will pop.

Mission Assignment: Describe gas pressure using a particle model

KS3-03-03

Gas Pressure

Investigate relationship between force applied and the volume of gas.

Equipment
- Stand, 2 bosses, 2 clamps
- Sealed 5 cm^3 syringe (sealed at approx. 3 cm^3)
- Slotted masses.

Method
1. Mount the syringe in a clamp stand with the plunger is upright.
2. Pull the syringe back and forth a few times to ensure the plunger doesn't stick to the sides of tube. Let the plunger settle and record the volume of gas in the syringe.
3. Place a 100g slotted mass on to top the plunger (you can use another clamp to stabilise the slotted mass). Record the force applied using 100g is approximately 1N. Record the volume of gas in the syringe.
4. Continue adding slotted masses on top of the plunger and recording the volumes.

Force applied (N)	Volume in syringe (ml)

Analysis & Conclusion
1. Plot a scatter plot of force (x-axis) against volume in syringe (y-axis). Draw a line of best fit.
2. What can you conclude about the relationship between the force applied and volume of a gas.

_____

_____

Challenge

Calculate the pressure inside the syringe using the formula (for a 5cm^3 syringe).

$$\text{Pressure (N/cm}^2\text{)} = 10\text{N/cm}^2 + \frac{\text{Force (N) x length of syringe (cm)}}{5\ \text{cm}^3}$$

Determine the relationship between pressure and volume of a gas.

Mission Assignment: Describe gas pressure using a particle model

KS3-03-03

Gas Pressure

Read the information about gas pressure and complete the comprehension task

Compared to solids and liquids, the particles in a gas are more spread out. They move randomly and freely. Gas can be contained, for example in a canister. The particles of gas will hit the walls inside the canister. Because there are millions of particles hitting the walls at the same time, it creates force. This is called gas pressure.

If you force the particles into a smaller space, the particles hit the walls more often. This means the pressure has increased. A good example of this is if you pump up a beach ball – the more you pump the beach ball up, the more particles are forcing the beach ball to grow and therefore there is greater pressure inside the beach ball.

Another way to increase gas pressure is to increase the temperature because it gives them more energy to move about more quickly. When you remove gas from something, the pressure inside it will decrease. For example, a vacuum pump can withdraw pressure from another container, removing particles of gas and reducing the gas pressure.

1. How do the particles move in a gas?

2. Where can gas be contained?

3. What do the particles of gas do inside a container?

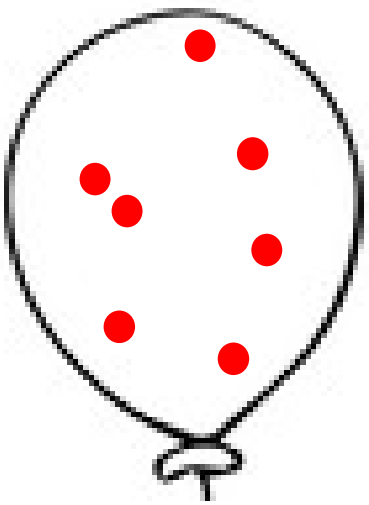
4. Name two ways gas pressure increases?

5. Explain what would happen if an inflatable is over-inflated. Why does this happen?

Gas Pressure

Help improve your understanding of pressure by completing the following questions.

Random arrangement of particle spread out in balloon



Questions

1. Draw the gas particles onto the picture of the balloon.

2. Describe the movement of the gas particle in the balloon.

Moving very quickly in all directions

3. Complete the sentence using the words in the box.

volume	colliding	decreases	pressure	volume	increases

The gas particles in the balloon are colliding with the inside walls of the balloon. This creates pressure that keeps the balloon inflated. When a balloon full of air is squeezed the volume of the balloon decreases. This means that the particles have less space to move in. The lower the space the more the pressure increases. If the pressure increases too much the balloon will pop.

Gas Pressure

Investigate relationship between force applied and the volume of gas.

Method

1. Mount the syringe in a clamp stand with the plunger is upright.
2. Pull the syringe back and forth a few times to ensure the plunger doesn't stick to the sides of tube. Let the plunger settle and record the volume of gas in the syringe.
3. Place a 100g slotted mass on to top the plunger (you can use another clamp to stabilise the slotted mass). Record the force applied using 100g is approximately 1N. Record the volume of gas in the syringe.
4. Continue adding slotted masses on top of the plunger and recording the volumes.

Equipment

- Stand, 2 bosses, 2 clamps
- Sealed 5 cm^3 syringe (sealed at approx. 3 cm^3)
- Slotted masses.

Force applied (N)	Volume in syringe (ml)
Students' own answers	

Analysis & Conclusion

1. Plot a scatter plot of force (x-axis) against volume in syringe (y-axis). Draw a line of best fit.

2. What can you conclude about the relationship between the force applied and volume of a gas.

Should find as pressure increases volume decreases

Challenge

Calculate the pressure inside the syringe using the formula (for a 5cm^3 syringe).

$$\text{Pressure (N/cm}^2\text{)} = 10\text{N/cm}^2 + \frac{\text{Force (N) x length of syringe (cm)}}{5\ \text{cm}^3}$$

Determine the relationship between pressure and volume of a gas.

Mission Assignment: Describe gas pressure using a particle model
ANSWERS

KS3-03-03

Gas Pressure

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Another way to increase gas pressure is to increase the temperature because it gives them more energy to move about more quickly. When you remove gas from something, the pressure inside it will decrease. For example, a vacuum pump can withdraw pressure from another container, removing particles of gas and reducing the gas pressure.

1. How do the particles move in a gas?
   Particles in a gas are more spread out. They move randomly and freely.

2. Where can gas be contained?
   e.g. canister, gas cylinder

3. What do the particles of gas do inside a container?
   The particles of gas will hit the walls inside the canister.

4. Name two ways gas pressure increases?
   Force the particles into a smaller space
   increase the temperature

5. Explain what would happen if an inflatable is over-inflated. Why does this happen?
   It would burst as the pressure would become too high