

Home learning activities

Subject
Science
Year Group
Year 8
Unit of work / Knowledge organiser
Pressure and Turning Moments
Activities
<ul style="list-style-type: none"> • Read through the sections of the 'Knowledge Organiser' on 'Pressure and Moments'. Make careful and detailed notes on sections 1-5 as well as the section titled 'Moments'. Include the 'calculation triangle' from Section 4. • Without looking at your notes, describe using your own words what causes pressure in gases (compare your answer with Section 3 afterwards). • Learn the meanings of the key words from the 'Pressure and Turning Moments Key Words' sheet and complete the key words from memory on the 'Key Words Test' sheet. Find your score using the 'Key Words' sheet. • Answer the 'Big Question' on 'Pressure on Solids' including the 'learning objectives' and 'key words' spaces. Submit your answer to your Science teacher upon return to school. • Complete the easier, medium or harder exam question on 'Pressure and Moments' depending upon your level of confidence with the work. Use the mark scheme (once you have tried the question) to mark your answers carefully.
Where do you complete the work?
In Study Books.
What to do if you finish the work? (Extension activity)
<ul style="list-style-type: none"> • Make sure you have completed the previous two weeks of work on 'Electricity and Magnetism' and then complete the 'mini project' on either 'Electricity' or 'Magnetism' (or both).
These websites might help:
<ul style="list-style-type: none"> • BBC Bitesize -> Secondary -> KS3 -> Science -> Physics -> Pressure

If you are struggling with your work or if you have finished.

Please email your classroom teacher directly using the email list found in the Home Learning section of the website.

Year 8—Pressure and moments

1. Pressure in solids

- Solids form a matter which possess rigidity, incompressibility and hence has definite shape and a definite volume
- Solids maintain their shape when subjected to an outside force
- Examples include rock, chalk, sugar, a piece of wood, plastic, steel or a nail.

2. Pressure in liquids

- Liquids possess a fixed volume, but have no fixed shape
- Liquids flow and change shape and therefore are not rigid. Liquids along with gases are called fluids
- Examples include water, oil and milk

3. Pressure in gas

- Gases state possesses high compressibility and therefore does not have neither definite shape or volume
- In gaseous state, the particles move about randomly and when they hit the wall of the container, they exert pressure on it. For example, when you blow a balloon, it expands because the particles of the gas exert pressure on the inner wall of the balloon.
- Examples include Oxygen, carbon dioxide, Hydrogen sulphide

4. Calculating pressure

$$\text{Pressure (Pa)} = \frac{\text{Force normal to a surface (N)}}{\text{Area of surface (m}^2\text{)}}$$

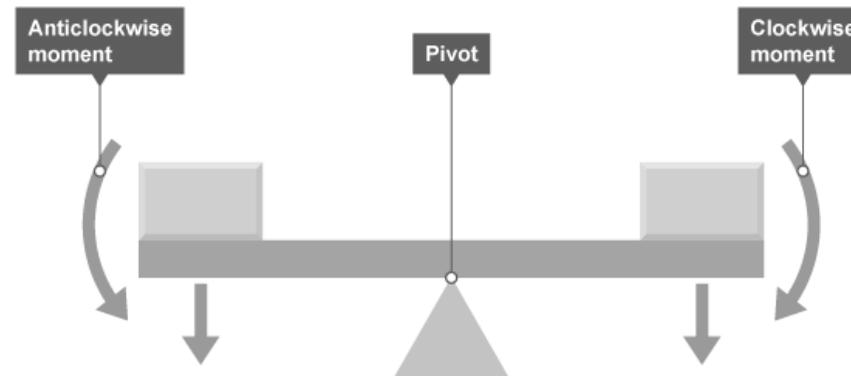
5. Pressure

To **increase pressure** - increase the force or reduce the area the force acts on. To cut up your dinner you can either press harder on your knife or use a sharper one (sharper knives have less surface area on the cutting edge of the blade).

To **reduce pressure** - decrease the force or increase the area the force acts on. If you were standing on a frozen lake and the ice started to crack you could lie down to increase the area in contact with the ice. The same force (your weight) would apply, spread over a larger area, so the pressure would reduce. Snow shoes work in the same way.

1. Moments

A force or system of forces may cause an object to turn. A **moment** is the turning effect of a force. Moments act about a point in a clockwise or anticlockwise direction. The point chosen could be any point on the object, but the **pivot** - also known as the fulcrum - is usually chosen.



The anticlockwise moment acts downward on the left, and the clockwise moment acts downwards on the right

To calculate moments:

$$\text{Moment} = \text{force} \times \text{distance from the pivot}$$

Year 8 'Pressure & Turning Moments Keywords' Sheet

Q	Words	Explanation
1	aerodynamic	Another name for streamlined.
2	hydraulic	Machine systems which use liquids under pressure, e.g. car brakes.
3	lever	A ridged bar which can be turned about a fixed point or pivot. It makes life easier, e.g. opening a paint pot.
4	air resistance	The force that slows down an object travelling through the air - it is a type of friction. It is commonly called 'drag'.
5	friction	The force that acts between two objects which are touching. It tends to prevent one moving over the other.
6	Pneumatic	Machine systems which use air under pressure, e.g. lorry brakes.
7	acceleration	The rate of increase in velocity or speed - measured in m/s^2
8	deceleration	The opposite of acceleration, used to mean the rate of reduction in speed.
9	distance	A measure of length or how far an object has travelled. Measured in cm, m, or km.
10	streamlined	An object that has a very low air resistance is said to be
11	moment	Force applied x distance from the pivot
12	compressed	Particles in gases are far apart so they can be squashed together or c_____
13	force	A push or a pull. It can alter the position or direction of an object.
14	pressure	The force acting per unit area. Usually measured in Newton per m^2 or Pascals.
15	Newton	The unit for measuring force and weight.
16	antagonistic	A term used to describe a pair of muscles that work to create opposite effects to each other, e.g. the biceps and triceps.
17	weight	The pull of the force of gravity on an object, measured in Newtons.
18	pivot	The point around which a lever turns.
19	time	A measure of how long an event takes to happen. It is measured in seconds, minutes, hours, days or years.
20	velocity	The speed of an object in a particular direction, e.g. 15m/s northwards.

Year 8 'Pressure & Turning Moments Keywords' Test

Q	Words	Explanation
1		Another name for streamlined.
2		Machine systems which use liquids under pressure, e.g. car brakes.
3		A ridged bar which can be turned about a fixed point or pivot. It makes life easier, e.g. opening a paint pot.
4		The force that slows down an object travelling through the air - it is a type of friction. It is commonly called 'drag'.
5		The force that acts between two objects which are touching. It tends to prevent one moving over the other.
6		Machine systems which use air under pressure, e.g. lorry brakes.
7		The rate of increase in velocity or speed - measured in m/s^2
8		The opposite of acceleration, used to mean the rate of reduction in speed.
9		A measure of length or how far an object has travelled. Measured in cm, m, or km.
10		An object that has a very low air resistance is said to be
11		Force applied x distance from the pivot
12		Particles in gases are far apart so they can be squashed together or c_____
13		A push or a pull. It can alter the position or direction of an object.
14		The force acting per unit area. Usually measured in Newton per m^2 or Pascals.
15		The unit for measuring force and weight.
16		A term used to describe a pair of muscles that work to create opposite effects to each other, e.g. the biceps and triceps.
17		The pull of the force of gravity on an object, measured in Newtons.
18		The point around which a lever turns.
19		A measure of how long an event takes to happen. It is measured in seconds, minutes, hours, days or years.
20		The speed of an object in a particular direction, e.g. 15m/s northwards.

Pressure on solids



Big Question

The point of a nail has an area of 0.25 cm^2 , and an average person has a weight of 700 N. Explain in detail why it is possible to lie on a bed of 4000 nails, but not on a single nail. (6 marks, QWC)

What I need to know

Learning objective	✓	Answer
Calculate pressure.		
Describe the factors that affect pressure.		
Describe the effect of different pressures.		

Key words

Add all the key words you need to answer the Big Question in this box.

Answer to the Big Question

Now you need to write your answer to the question.

This is a QWC question. This means you will be marked on:

- spelling
- grammar
- organising your ideas and information clearly
- using key scientific words.

Exam Question – Pressure and Moments (Easier)

Tom tries on four types of footwear in a sports shop.



ski boot



trainer



ice skate



walking boot

- (a) (i) When Tom tries on the footwear, which one sinks into the carpet the most?

.....

1 mark

- (ii) When Tom tries on the footwear, what is the same for each type of footwear? Tick the correct box.

the area of the footwear

Tom's weight on the footwear

the material of the footwear

the weight of the footwear

1 mark

(b) The drawing below shows a snowshoe.



How do snowshoes help people to walk in deep snow?

.....
.....

1 mark

(c) Choose the correct word from the list to complete the sentence below.

air resistance friction gravity magnetism

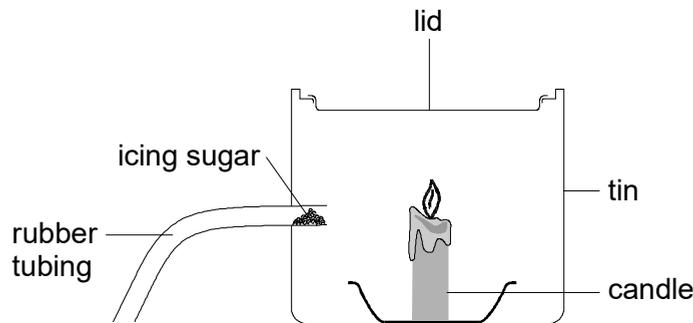
When Tom is ice skating the force of
between the skate and the ice is less than when he is walking on a carpet.

1 mark

Maximum 4 marks

Exam Question – Pressure and Moments (Medium)

A teacher set up the following apparatus behind a safety screen. She placed 1 g of icing sugar in the end of the rubber tubing inside the tin, as shown below.



The teacher blew through the other end of the rubber tubing. The icing sugar came into contact with the flame. There was a loud explosion and the lid was blown off the tin.

- (a) Complete the following sentence describing the energy changes which took place.

..... energy in the icing sugar changed to
..... energy and energy.

3 marks

- (b) As a result of the explosion, the lid of the tin was pushed off. Explain what had happened to the gas molecules inside the tin to make this happen.

.....
.....
.....
.....

2 marks

- (c) When icing sugar is burned in this experiment, the gas **used** and the gas **produced** are the same as when energy is released from sugar in the cells of the body.

- (i) Which gas, in the air, is **used** when the icing sugar burns?

.....

1 mark

- (ii) Give the name of the gas **produced** when the icing sugar burns.

.....

1 mark

(d) The table below shows the energy values of four food substances.

food substance	energy value, in kJ per 100 g
icing sugar	1680
curry powder	979
flour	1450
custard powder	630

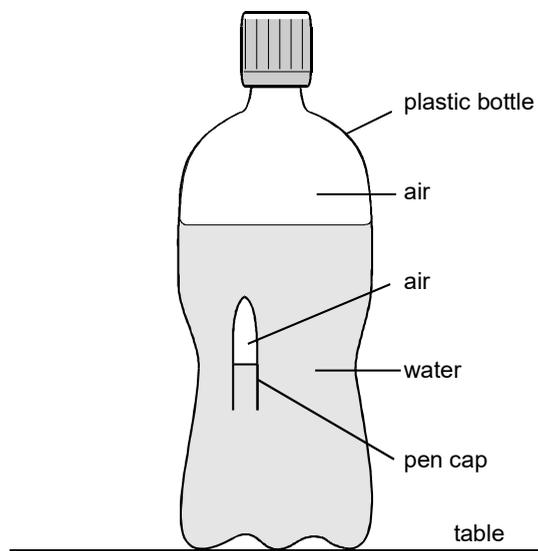
The teacher repeated the experiment with 1 g of custard powder.
What difference would this make to the experiment?

.....
.....

1 mark
Maximum 8 marks

Exam Question – Pressure and Moments (Harder)

A pen cap floats in a plastic lemonade bottle three-quarters full of water. If you squeeze the bottle the pen cap sinks to the bottom. If you then let go of the bottle, the pen cap floats to the surface.



(a) When the bottle is squeezed what, if anything, happens to:

(i) the distance between the air molecules inside the bottle?

.....

1 mark

(ii) the distance between the water molecules inside the bottle?

.....

1 mark

(iii) the pressure of the air trapped inside the pen cap?

.....

1 mark

(iv) the volume of the air trapped inside the pen cap?

.....

1 mark

(b) Explain why the pen cap sinks when you squeeze the bottle.

.....
.....
.....
.....

2 marks

Maximum 6 marks

Mark Scheme – Pressure and Moments (Easier)

1. (a) (i) ice skate *accept 'skate'* 1
 (ii) Tom's weight on the footwear ✓
if more than one box is ticked, award no mark
- (b) any **one** from 1
 • they do not sink in
 • they have a big surface *accept 'they are wide' or 'they are big'*
accept 'they spread out your weight'
do not accept 'you won't get your feet stuck in the snow'
accept 'they reduce the pressure'
do not accept 'they spread out your pressure'
- (c) friction 1

[4]

Mark Scheme – Pressure and Moments (Medium)

- (a) chemical *accept 'potential' or 'stored'* 1
 any **two** from 2
 • sound
 • thermal *accept 'heat'*
 • kinetic *accept 'movement'*
 • light
- (b) any **two** from 2
 • they gained energy *accept 'they move more quickly'*
 • they hit the lid with greater force *accept 'they hit the lid harder'*
 • they hit the lid more often *accept 'the pressure inside the tin increased'*
accept 'the molecules are closer together'
accept 'more molecules are present'
- (c) (i) oxygen *accept 'O₂'* 1
 (ii) any **one** from 1
 • carbon dioxide *accept 'CO₂'*
 • water vapour *accept 'H₂O'*
accept 'carbon monoxide'
- (d) any **one** from 1
 • it was quieter
 • the lid didn't move as high *accept 'the lid was not pushed off'*
 • less energy released *accept 'it does not work'*

[8]

Mark Scheme – Pressure and Moments (Harder)

- | | | | |
|-----|-------|--|---|
| (a) | (i) | they get closer or it gets less | 1 |
| | (ii) | nothing or same distance | 1 |
| | (iii) | it increases | 1 |
| | (iv) | it decreases | 1 |
| (b) | | water flows into the cap | 1 |
| | | <i>accept 'water flows or is pushed or got into the cap'</i> | |
| | | <i>or 'the air in the cap takes up less space'</i> | |
| | | <i>accept 'the air in the cap is under pressure'</i> | |
| | | any one from | 1 |
| | | • increasing the density | |
| | | • less upthrust | |
| | | • pen cap now less buoyant | |
| | | <i>accept 'increasing the weight'</i> | |
| | | <i>do not accept 'the pen cap gets heavier'</i> | |

[6]

Electricity – Mini Project

Watch this video: <https://www.youtube.com/watch?v=KYKVf6edvcA>

Task	Description
1	Draw and label 10 components (symbols) of a circuit
2	Draw a series circuit and explain the current around the circuit
3	Draw a parallel circuit and explain the current around the circuit
4	Design a poster on electrical safety in the home. You must include a slogan and at least 5 different ways to stay electrically safe!
5	Find out what voltage is
6	Watch the video on Electricity and write your own summary Electricity
7	Make a board game or card game on energy resources or make a model island with a number of renewable energy resources on it.
8	Generate a glossary of the keywords from this topic. A glossary is a detailed list of keywords and their meanings or descriptions.

Magnetism – Mini Project

Watch this video: <https://www.youtube.com/watch?v=zKUetTDGNoM>

Task	Description
1	Research the discoveries of William Gilbert on Magnetism.
2	<ul style="list-style-type: none">• Sometime a person is described as having a 'magnetic personality'. What does this mean?• Some times two people are described as having ideas that are 'poles apart'. What does this mean?
3	How does a compass work?
4	Write a paragraph containing some information about magnets and magnetism. Also write a sentence to summarise which metals are magnetic and which are not.
5	Some modern cars are made of Aluminium. What problems will this cause for scrap yard owners? Explain why?
6	Not all the magnets are shaped like a bar. Think of a horseshoe-shaped (u-shaped) magnet. Design an experiment to find out the size and shape of the magnetic field around it.
7	<ul style="list-style-type: none">• What is the difference between a permanent magnet and a temporary magnet?• How can we make an electromagnet?• How does an electric bell work?