

# Maidenhill School

# Knowledge Organiser

Year 10 – Term 5



**Be kind, Aspire, Persevere, Achieve**

Name:

Tutor: 10

# Planner



Week 1	Notes
Monday 13 <sup>th</sup> April	Geography field trip
Tuesday 14 <sup>th</sup> April	
Wednesday 15 <sup>th</sup> April	
Thursday 16 <sup>th</sup> April	Assembly – Army in education
Friday 17 <sup>th</sup> April	
Week 2	Notes
Monday 20 <sup>th</sup> April	
Tuesday 21 <sup>st</sup> April	
Wednesday 22 <sup>nd</sup> April	
Thursday 23 <sup>rd</sup> April	
Friday 24 <sup>th</sup> April	

Week 1	Notes	
Monday 27 <sup>th</sup> April	Internal exams	
Tuesday 28 <sup>th</sup> April		
Wednesday 29 <sup>th</sup> April		
Thursday 30 <sup>th</sup> April		
Friday 1 <sup>st</sup> May		
Week 2	Notes	
Monday 4 <sup>th</sup> May	INSET	
Tuesday 5 <sup>th</sup> May	Internal exams	
Wednesday 6 <sup>th</sup> May		Assembly – Stroud College
Thursday 7 <sup>th</sup> May		
Friday 8 <sup>th</sup> May		



Week 1	Notes	
Monday 11 <sup>th</sup> May	Internal exams	
Tuesday 12 <sup>th</sup> May		
Wednesday 13 <sup>th</sup> May		Assembly – Cirencester college
Thursday 14 <sup>th</sup> May		
Friday 15 <sup>th</sup> May		
Week 2	Notes	
Monday 18 <sup>th</sup> May		
Tuesday 19 <sup>th</sup> May		
Wednesday 20 <sup>th</sup> May		
Thursday 21 <sup>st</sup> May		
Friday 22 <sup>nd</sup> May		

# Self-certification / Out of lessons



## Self-certification

Every student is entitled to self-certify to go to the toilet on 2 occasions each term, when they do not have a medical exemption (this is issued by school only, in conjunction with parents). This will equate to 12 opportunities a year.

Sign below and show to your teacher. If you have a reason that requires this page to be refreshed before the end of term, please speak to your Head of Year.

Date	Time	Student signature

Insert medical exemption here (Head of Year)  
Review/end date:



## Student out of lesson record

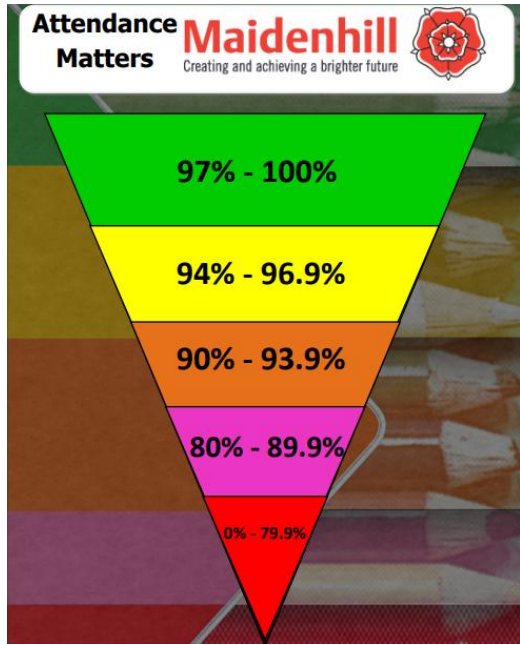
Date and time	Reason	Staff signature

Have a problem?  
Worried about someone or something?  
Need someone to talk to? Scan the QR code and let us know.

Reporting your concerns

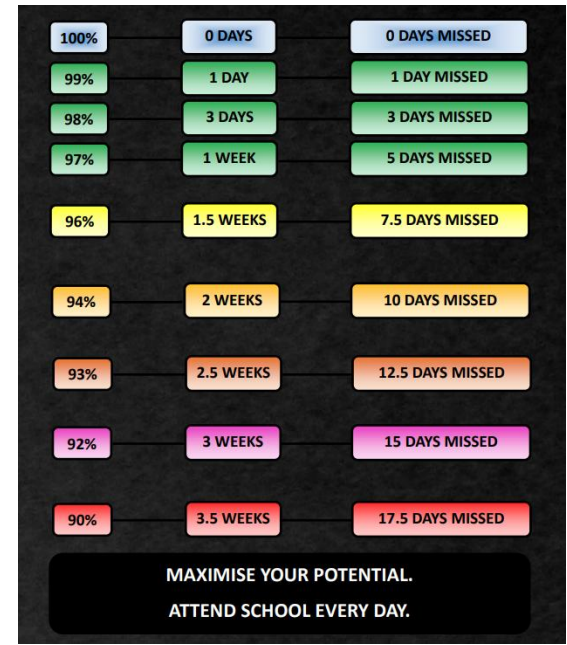


# Attendance Matters



## Attendance Groups

Green	Expected Attendance
Yellow	Risk of Underachievement
Amber	Serious Risk of Underachievement
Pink	Severe Risk of Underachievement (PA)
Red	Extreme Risk (PA)



## Personal Attendance Record

Week	Monday	Tuesday	Wednesday	Thursday	Friday	%	Colour	↑ → ↓
1								
2								
3								
4								
5								
6								

# Home School Agreement and uniform expectations



## As a student of the school I will:

- Attend school every day and on time
- Represent the school in a positive way on my way to and from school
- Wear the correct school uniform smartly at all times
- Ensure I have downloaded the ClassCharts app and actively use the platform so that I am up to date with notifications regarding my behaviour, attendance, homework and detentions
- Follow the "Maidenhill Expectations" for all students regarding their Behaviour for Learning and uphold the school's expectations to 'Be kind, Aspire, Persevere and Achieve'
- Not use my mobile phone in school
- Go to reception if I need to contact home
- Be polite and considerate to all members of the school community
- Ensure that my behaviour has a positive impact on other students' learning and progress
- Refuse to take part in bullying or anti-social behaviour, including on social media
- Take responsibility for my own learning and actively participate in lessons
- Actively seek ways to improve my work and respond effectively to feedback
- Complete all my classwork and homework to the best of my ability and on time
- Respect the environment of the school and its neighbourhood, and help to keep it clean and tidy, free from litter and graffiti
- Represent the school in a positive way in the local community and when participating in school activities or visits, and on social media
- Talk with my parent(s)/carer(s) and school staff about any concerns in school
- Pass any written correspondence to my parents'/carers' on the day they are issued
- Interact positively with any school social media platforms.

Student Signature .....

## Maidenhill Uniform

- ❖ Maidenhill school blazer needed at all times
- ❖ Maidenhill school tie
- ❖ Long or short sleeved plain white shirt, **tucked in when in the school building**
- ❖ Plain black, smart, tailored trousers
- ❖ Footwear should be a shoe and not a boot, and entirely black
- ❖ White, grey or black socks with no logos
- ❖ Black or nude tights. No patterns.
- ❖ Optional
  - Maidenhill skirt
  - Maidenhill shorts
  - Simple black belt
  - Maidenhill jumper



- ❖ Jewellery must be easily removed for practical lessons. Earrings must be studs and not dangle. Necklaces should be underneath the shirt
- ❖ Make-up should be discreet
- ❖ Hair must not be of extreme style or colour. Long hair should be tied back for health and safety reasons in certain subjects



## Maidenhill PE Uniform

- ❖ **NO JEWELLERY**
- ❖ Red Maidenhill PE polo shirt
- ❖ Red Maidenhill hooded jumper
- ❖ Optional Rugby shirt
- ❖ Options for the lower half:
  - Plain black shorts with less than 5cm logos
  - Black tracksuit bottoms with less than 5cm logos
  - Maidenhill leggings
  - Maidenhill skort
  - Plain black leggings with no logos
- ❖ Socks
  - White or black
  - Red needed for all fixtures
- ❖ Shoes
  - Suitable trainers
  - Optional studded boots for football/rugby



# Equipment and acceptable use of the school ICT facilities



## Equipment

You should be fully equipped for every lesson. Make sure you have the correct books for each lesson. It is always a good idea to pack your school bag the night before. Remember to check your timetable first. Here is a useful checklist.

### Essential requirements

- At least 2 black pens
- Green pen
- 2 pencils and 2 x 2b or 4b pencils for Art, Design and Nutrition
- Ruler
- Rubber
- Pencil sharpener
- Scientific calculator
- Whiteboard and whiteboard pen
- Headphones
- Reading book
- Plastic wallet and knowledge organiser

### Student property

You are expected to have your clothing marked with your name and, wherever possible, all other items of property which you are expected to bring to school with you such as bags, pencil cases and PE kit named too.

Money, bus passes and other similar items of value should always be carried with you and never left in bags around the school at break and lunchtimes.

You have the opportunity, if you wish, to hand valuables to a teacher before PE and arrangements will be made for safe keeping. The changing rooms are not always locked during lessons. If you do not do this, the school cannot guarantee full security for your property.

## Network rules

**Never share your password with anyone** – not even your best friend – if you suspect that someone knows it, change it or see an ICT technician as soon as possible

**Never share your user area with anyone** – email files to a friend or home as an attachment, or use Office 365 “One Drive”

**Always log off before leaving a computer**

**Never tamper with ICT equipment**, if your PC or laptop is damaged or not working properly, please inform a member of staff immediately. DO NOT disconnect, reconnect or move or swap any cables at any time

**Never give a stranger any information about you or your home**

**Always communicate with strangers politely** – ask a teacher to check before sending

**Don't suffer bullying** – report and give a printout of any email or other material that offends you to a teacher

**Avoid the spreading of computer viruses** – from the internet or home. Keep your home virus checking software up to date

**Do not attempt to download or install software** – use only the software provided

**Always give credit for information obtained from the internet**

**Do not eat or drink close to electronic equipment or in any computer room**

**Use your printing credits with care** – extra print credits in any one week can only be obtained through the permission of a teacher whose work you need to print

**The use of the internet at school must be in support of learning.** The use of all chat systems is strictly forbidden. Inappropriate use will result in access being withdrawn. A log of all internet access and activity is monitored throughout the day by the network staff so misuse of the system can be quickly identified and dealt with.

To access email from home, log on to [rmunify.com](http://rmunify.com). School emails should only be used to communicate with staff/students about school related matters. You can also speak with staff via the message function on ClassCharts.

Visit the website ‘[thinkyouknow](http://thinkyouknow.co.uk)’ for essential and excellent advice on using the internet safely outside of school.





# Behaviour for Learning

At Maidenhill School we believe that students have the right to learn, and teachers have the right to teach.

When you make good choices and follow the rules, you will be rewarded.

## Rewards

You can collect positive reward points in lessons and for completing quality homework. Rewards can be spent in the reward shop at the end of each term on vouchers, chocolate, stationery and much more! We have end of term rewards and end of year rewards in the form of our activities week, all to recognise the positivity and hard work you show each and every day.

If you make poor choices and do not follow the rules, then a clear set of consequences will follow.

## Consequences

**C2** – This is a verbal warning

**C3** – Issued with a BFL detention of 40mins

**C3r** – This is when you are sent out of a lesson, and you must move to the referral room. You will be issued with a 55mins detention. Those students that are removed from lesson five times in a term, will then receive a 1 day internal isolation in the refocus room for every subsequent C3r. This will be reset at the start of the next term

**C4** – Isolation in the refocus room

**C4e** – Educated off site at an alternative provision

**C5** – Fixed term suspension

## C5 Exclusions

**If a student receives a C5 they will be excluded from school for a fixed period of time.**

Incidents for which a students may be excluded include:

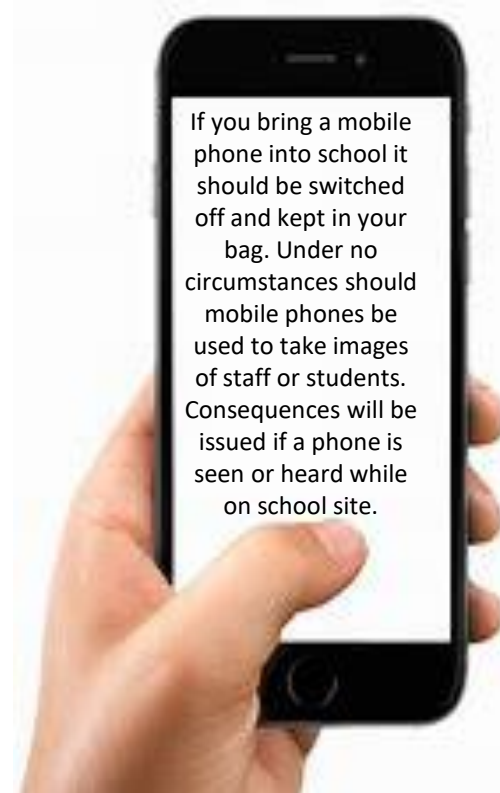
- In possession, under the influence of or dealing in illegal drugs. This also extends to alcohol and other toxic substances
- Serious physical or verbal aggression towards others
- Serious rudeness, defiance, threatening behaviour or inappropriate language towards a member of the school staff
- Anti-social behaviour such as theft or damage to property
- A build-up of incidents which are unacceptable and contravene school standards
- Repeated disruption and defiance which has disturbed the learning of other students
- Persistent poor behaviour

If a student persistently behaves in an unacceptable manner, this could lead to a permanent exclusion.

**In exceptional circumstances, it is appropriate for the Headteacher to permanently exclude a student for a first offence. These might include such things as:**

- Serious actual or threatened violence against another individual
- Sexual abuse or assault
- Supplying an illegal drug
- Carrying an offensive weapon

The school can take no responsibility for valuable items brought into school by students (so students are advised not to bring in expensive items).



If you bring a mobile phone into school it should be switched off and kept in your bag. Under no circumstances should mobile phones be used to take images of staff or students. Consequences will be issued if a phone is seen or heard while on school site.

**The following items are not allowed to be brought into school:**

- Alcohol and drugs
- Knives and other weapons
- Fireworks
- Cigarettes/e-cigarettes, vapes, tobacco, matches and lighters
- Tippex or other correcting fluids
- Aerosols
- Illegal substances
- Energy/fizzy drinks

*Smoking is not permitted in school or on the way to and from school. Students found to be smoking/vaping or in possession of smoking/vaping equipment will receive a significant sanction.*



## What is bullying?

Bullying is when one person or a group of people deliberately hurt, threaten or frighten someone over a period of time. It can be physical; like punching or kicking, or emotional like teasing or calling names.



Bullying includes repeated:

- Hitting
- Insults
- Cruel nicknames
- Making threats
- Isolating someone
- Damaging, taking or hiding property
- Writing or telling lies about someone
- Sending cruel text messages, video messages or emails
- Spreading rumours
- Being unfriendly and turning others against someone
- Posting inappropriate comments on websites and social media

### Types

- Physical
- Cyber
- Verbal
- Emotional
- Prejudice based

### If you are being bullied, do not suffer in silence:

- Be firm – look the bully in the eye and tell them to stop
- Get away from the situation as quickly as possible
- Tell an adult, peer or friend what has happened, straight away
- If you are scared to tell someone, get a friend to go with you
- Keep on speaking up until someone listens
- Don't blame yourself for what has happened

### If you are being bullied, you can expect that:

- You will be listened to and taken seriously
- Action will be taken to help stop the bullying
- You will be involved in the process of deciding what action to take to stop the bullying and any worries that you may have will be listened to and respected
- You will be given the opportunity to talk about the way that the bullying has made you feel and to find strategies to deal with these feelings and to understand and cope with bullying behaviour
- If you are ever in fear of your physical safety, staff will take immediate action to keep you safe

### When you are talking about bullying, be clear about:

- When it started
- What has happened to you
- How often it has happened
- Who was involved
- Who saw what was happening
- Where and when it happened
- What you have already done about it



# 100 Colorful Words to Use in Place of "Said"

**Rhyme**  
Rhyming words occur every other in poems, sometimes in patterns.

**Rhythm**  
The flow of a poem, often affected by the punctuation and shape of a poem.

**Onomatopoeia**  
When a word imitates the sound it makes (e.g. BANG, SPLASH)

**Similes**  
Compares two different things, using the words "like" or "as".

**Metaphors**  
Identifies something as being the same as something else.

**Alliterations**  
More than one word beginning with the same letter (close together in text).

**Repetition**  
When words and phrases are repeated multiple times.

**Tone and Pace**  
Have a big impact on rhythm and affected by punctuation.

## POETIC TECHNIQUES

admitted  
agreed  
assured  
avowed

bawled  
complained  
confessed  
cried  
croaked  
denied  
fretted  
gaspd  
groaned  
gurgled  
moaned  
mumbled  
pleaded  
protested  
sniffled  
sobbed  
squeaked  
stammered

argued  
barked  
bellowed  
boasted  
boomed  
coughed  
demanded  
griped  
growled  
hissed  
insisted  
interrupted  
jeered  
ranted  
raved

added  
asked  
babbled  
bargained  
blurted  
chortled  
clucked  
explained  
grumbled  
gulped  
grunted  
lied  
murmured  
mused  
muttered

## Conjunctions

**Addition**  
Further  
Also  
Too  
Besides  
Finally  
Last  
Additionally  
In addition  
Then

**Summary**  
In short  
In other word  
Anyway  
In brief  
It seems  
Clearly  
In sum  
After all  
In general

**Place**  
There  
Here  
In the back  
Adjacent to  
Next to  
Nearby  
Beyond  
Opposite to  
At that point

**Example**  
Such as  
For one thing  
For instance  
For example  
That is  
Specifically  
Illustrated by  
In particular

**Comparison**  
Equally  
A similar ...  
Likewise  
Similarly  
Comparable  
As with  
Another ... like  
In the same way

**Time**  
Meanwhile  
Finally  
At last  
Presently  
Currently  
In the past  
In the meantime  
Eventually  
Immediately

## PUNCTUATION

**QUESTION MARK**  
Use at the end of a sentence when asking a question.

**EXCLAMATION MARK**  
Use at the end of a sentence to express a strong feeling.

**PERIOD**  
Use at the end of a sentence.

**COLON**  
Use to introduce a list or a definition.

**APOSTROPHE**  
Use in contractions and to show when something belongs to someone.

**PARENTHESIS**  
Use to add extra information to a sentence without taking away from the idea.

**HYPHEN**  
Use to join separate words to make one word.

**SEMICOLON**  
Use to connect subjects and verbs into a single sentence.

**COMMA**  
Use to separate parts in a sentence or in a list.

**QUOTATIONS**  
Use around words that are spoken.

**ELLIPSIS**  
Use to show suspense or that someone is thinking.

LITERARY DEVICE	DEFINITION	EXAMPLE
Simile	A comparison using "like" or "as"	Her eyes were like shining stars
Metaphor	A comparison without using "like" or "as"	Life is a journey
Personification	Giving human qualities to non-human things	The wind whispered through the trees
Hyperbole	An exaggeration for emphasis	I've told you a million times
Alliteration	Repetition of the same sound at the beginning of words	Peter Piper picked a peck of pickled peppers
Onomatopoeia	Words that sound like what they mean	Buzz, hiss, sizzle
Irony	A contrast between what is expected and what actually happens	A fire station burning down
Foreshadowing	Hinting at what will happen later in the story	The ominous music in a horror movie
Symbolism	Using objects or actions to represent ideas or qualities	A dove as a symbol of peace
Imagery	Descriptive language that creates a picture in the reader's mind	The sun set over the ocean, painting the sky with shades of orange and pink

### Common Techniques

- D DIRECT ADDRESS
- A ALLITERATION
- F FACT
- O OPINION
- R RHETORICAL QUESTION
- R REPETITION
- E EMOTIVE LANGUAGE
- S STATISTICS
- T THREE (LIST OF)
- I IMPERATIVE

### Transactional Writing

- Letters
- Reviews
- Reports
- Articles

**THERE** → (Refers to a place)  
He went in the door over there.

**THEIR** (Shows ownership)  
Their cat is the sweetest.

**THEY'RE** (A contraction for "they are")  
They're going to the movies.

## Verbs to sharpen your analysis

THIS SHOWS	THIS SUGGESTS	THIS HIGHLIGHTS	THIS INTERESTS
Demonstrates	Implies	Emphasises	Fascinates
Reveals	Infers	Stresses	Amuses
Exposes	Hints at	Reinforces	Satisfies
Discloses	Signifies	Spotlights	Terrifies
Uncovers	Connotes	Underlines	Enthrals
Encapsulates	Denotes	Accentuates	Enthuses
Proves	Insinuates	Underscores	Stimulates
Validates	Intimates	Foreshadows	Galvanises
Exhibits	Advocates	Exaggerates	Animates
Establishes	Poses	Reiterates	Rouses
Denotes	Conjures	Magnifies	Stirs
Displays	Symbolises	Zeroes in on	Placates
Flaunts	Points towards	Promotes	Provokes
Showcases	Indicates	Publicises	Deceives
Presents	Alludes to	Pinpoints	Astonishes



# Multiplication Table Grid I-12

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

10  
9  
8  
7  
6  
5  
4  
3  
2  
1  
0  
-1  
-2  
-3  
-4  
-5  
-6  
-7  
-8  
-9  
-10



# Unit 12 – Right Angled Triangles

## Keywords

**Cosine ratio:** the ratio of the length of the adjacent side to that of the hypotenuse. The sine of the complement.

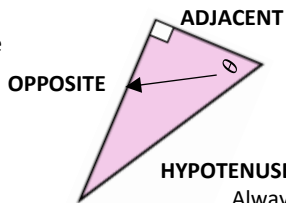
**Sine ratio:** the ratio of the length of the opposite side to that of the hypotenuse.

**Tangent ratio:** the ratio of the length of the opposite side to that of the adjacent side.

**Hypotenuse:** longest side of a right-angled triangle. It is the side opposite the right-angle.

## Hypotenuse, adjacent and opposite

Always opposite an acute angle  
Useful to label second Position depend upon the angle  
in use for the question



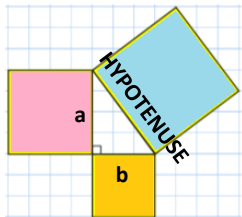
ONLY right-angled triangles are labelled in this way

Next to the angle in question  
Often labelled last

Always the longest side  
Always opposite the right angle  
Useful to label this first

## Pythagoras theorem

**(Hypotenuse)  $c^2 = a^2 + b^2$**



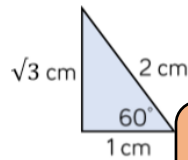
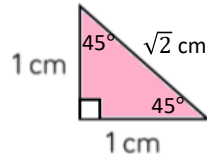
This is commutative – the square of the hypotenuse is equal to the sum of the squares of the two shorter sides

### Places to look out for Pythagoras

- Perpendicular heights in isosceles triangles
- Diagonals on right angled shapes
- Distance between coordinates
- Any length made from a right angles

## Key angles

These sides could be calculated using Pythagoras



Because trig ratios remain the same for similar shapes you can generalise from the following statements.

**Tan30 =  $\frac{1}{\sqrt{3}}$**   
**Tan60 =  $\sqrt{3}$**

**Cos30 =  $\frac{\sqrt{3}}{2}$**   
**Cos60 =  $\frac{1}{2}$**

**Sin30 =  $\frac{1}{2}$**   
**Sin60 =  $\frac{\sqrt{3}}{2}$**

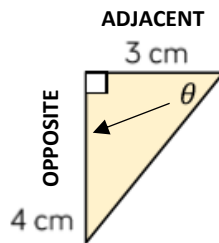
**Tan45 = 1**

**Cos45 =  $\frac{1}{\sqrt{2}}$**

**Sin45 =  $\frac{1}{\sqrt{2}}$**

## Sin, Cos, Tan: Angles

### Inverse trigonometric functions



Label your triangle and choose your trigonometric ratio

Substitute values into the ratio formula

$\text{Tan } \theta = \frac{4}{3}$

$\theta = \text{Tan}^{-1} \frac{4}{3}$

$\theta = 53.1^\circ$

$\theta = \text{Tan}^{-1} \frac{\text{opposite side}}{\text{adjacent side}}$

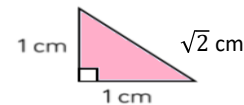
$\theta = \text{Sin}^{-1} \frac{\text{opposite side}}{\text{hypotenuse side}}$

$\theta = \text{Cos}^{-1} \frac{\text{adjacent side}}{\text{hypotenuse side}}$

## Key angles 0° and 90°

**Tan0 = 0**

~~**Tan90**~~



**Sin0 = 0**

**Sin90 = 1**

**Cos0 = 1**

**Cos90 = 0**

## Sparx codes

### Using Pythagoras' theorem in 2D

- Applying Pythagoras' theorem in 2D – U828 and U385
- Understanding sin,cos and tan – U605
- Find unknown sides and angles in right-angled triangle – U283 and U545

### Enrichment Opportunities

<https://www.youtube.com/watch?v=CAkMUdeB06o>





# Maths Foundation Unit 13 – Probability

$$\text{Probability} = P(X) = \frac{\text{number of ways an outcome can happen}}{\text{total number of possible outcomes}}$$

**Keywords**

**Probability:** The chance of something happening as a numerical value.

**Impossible:** The outcome cannot happen.

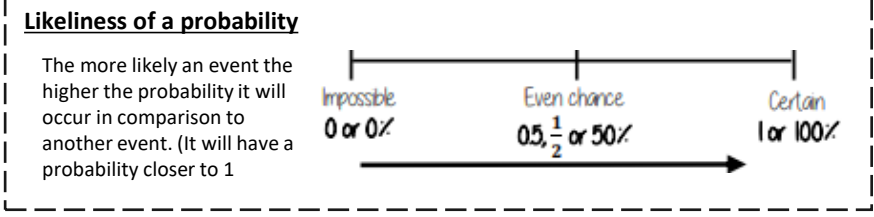
**Certain:** The outcome will definitely happen.

**Even chance:** There are two different outcomes each with the same chance of happening.

**Mutually Exclusive:** Two events that cannot both occur at the same time.

**Experimental probability:** The probability of an event happening when actual experiment carried out.

**Theoretical probability:** The likelihood of an event occurring



**Sum to 1**

Probability is always a value between 0 and 1

P means probability

2 reds

$P(\text{Red}) = \frac{2}{5}$

Total marbles

The probability of getting a red ball is  $\frac{2}{5}$   
 $\therefore$  The probability of NOT getting a red ball is  $\frac{3}{5}$   
 The sum of the probabilities is always 1

**Venn Diagrams**

100 students were asked if they played rugby or football. 40 played rugby, 25 played football and 11 did both.

**Venn diagram probability** is used to state the probability of or predict the **possible outcomes** of one or more event(s) occurring.

$P(\text{Just Rugby}) = \frac{29}{100}$

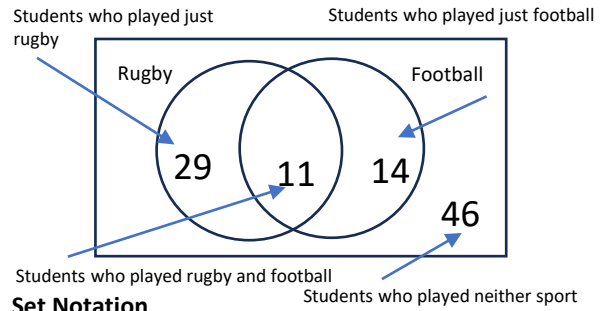
**Sample space diagram**

A sample space diagram shows all the possible outcomes. You can use it to find the theoretical probability.

The possible outcomes from rolling a dice

	1	2	3	4	5	6
H	1,H	2,H	3,H	4,H	5,H	6,H
T	1,T	2,T	3,T	4,T	5,T	6,T

$P(\text{Even number and tails}) = \frac{3}{12}$



**Sparx codes**

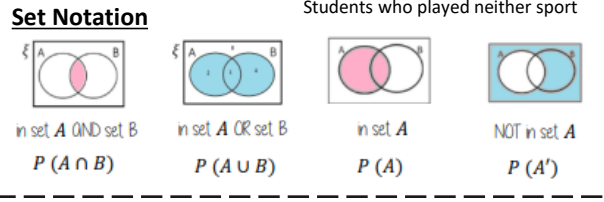
Find probabilities of mutually exclusive and exhaustive events – U510

Work out probabilities from sample space diagrams – U104

Estimate and interpret probabilities based on experimental data – U580

Use Venn diagrams to solve probability problems – U476 and U748

Work out probabilities using tree diagrams – U558



**Tree Diagrams**

A probability tree diagram is a way of organising the information of two or more probability events. It shows all the possible outcomes of the events

Here is a tree diagram for two tosses of a coin

**To calculate the overall probabilities:**

- multiply probabilities along the branches
- add probabilities down columns

**Enrichment Opportunities**

13



# Maths Higher Unit 12 Congruence & Similarity

## What do I need to be able to do?

- Enlarge by a positive scale factor
- Enlarge by a fractional scale factor
- Identify similar shapes
- Work out missing sides and angles in similar shapes
- Use parallel lines to find missing angles
- Understand similarity and congruence

## Keywords

- Enlarge:** to make a shape bigger (or smaller) by a given multiplier (scale factor)
- Scale Factor:** the multiplier of enlargement
- Centre of enlargement:** the point the shape is enlarged from
- Similar:** when one shape can become another with a reflection, rotation, enlargement or translation.
- Congruent:** the same size and shape
- Corresponding:** items that appear in the same place in two similar situations

## Similar shapes and scale factors U110/U578

Compare the equivalent side on both shapes

Scale Factor is the multiplicative relationship between the two lengths

Remember angles do not increase or change with scale

Shape ABCD and EFGH are similar

Notation helps us find the corresponding sides

## Congruency and Similarity – U790/U866/U877

Congruent shapes are identical – all are the same

Because all the angles are the same and AC=KM BC=LM triangles ABC and KLM are **congruent**

Because all angles are the same, but all sides are enlarged by 2 ABC and HIJ are **similar**

## Conditions for Congruent Triangles

Triangles are congruent if they satisfy any of the following conditions

- Side-side-side:** All three sides on the triangle are the same size
- Angle-side-angle:** Two angles and the side connecting them are equal in two triangles
- Side-angle-side:** Two sides and the angle in-between them are equal in two triangles (it will also mean the third side is the same size on both shapes)
- Right angle-hypotenuse-side:** The triangles both have a right angle, the hypotenuse and one side are the same

## Fractional scale factors

Fractions less than 1 make a shape **SMALLER**

R is an enlargement of P by a scale factor  $\frac{1}{3}$  from centre of enlargement (15,1)

SF:  $\frac{1}{3}$  - R is three times smaller than P

## Identify similar shapes

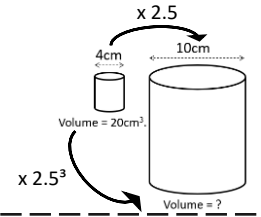
Angles in similar shapes do not change. e.g. if a triangle gets bigger the angles can not go above 180°

Similar shapes

Scale Factor: Both sides on the bigger shape are 1.5 times bigger

Compare sides:  $6:9$  is  $2:3$  and  $8:12$  is  $2:3$

## Volume Scale Factor



To find the scale factor we would look at the side lengths. In this example the SF is 2.5.

To find the volume for new cylinder you must multiply the old volume by the the scale factors cubed. In this example we would do  $20 \times (2.5)^3 = 312.5cm^3$

## Enrichment Opportunities

Enrich Maths. All about ratios



# Maths Higher Unit 13 More Trigonometry



## What do I need to be able to do?

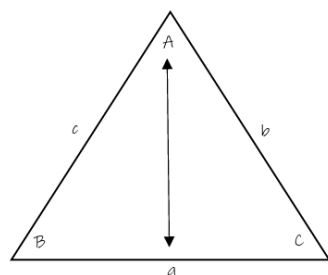
- Understand and use upper and lower bounds in calculations
- Use Sine rule to solve 2D problems
- Use Cosine rule to solve 2D problems
- Use Pythagoras' Theorem and trigonometry in 3D
- Draw and recognise trigonometric graphs

### Labelling a non-rightangled triangle

Capital letters are used for the 3 angles

Lower case letters for the 3 sides

Letters of the same type are opposite each other



## Keywords

**Enlarge:** to make a shape bigger (or smaller) by a given multiplier (scale factor)

**Scale Factor:** the multiplier of enlargement

**Constant:** a value that remains the same

**Cosine ratio:** the ratio of the length of the adjacent side to that of the hypotenuse. The sine of the complement.

**Sine ratio:** the ratio of the length of the opposite side to that of the hypotenuse.

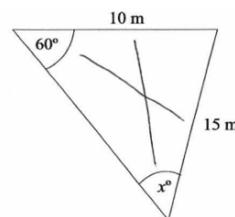
**Tangent ratio:** the ratio of the length of the opposite side to that of the adjacent side.

**Inverse:** function that has the opposite effect.

**Hypotenuse:** longest side of a right-angled triangle. It is the side opposite the right-angle.

### Sine rule – angles

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

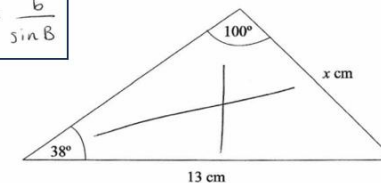


Work out the size of angle  $x$ .  
Give your answer to 3 significant figures.

$$\begin{aligned} \frac{\sin x}{10} &= \frac{\sin 60}{15} \\ \sin x &= \frac{\sin(60)}{15} \times 10 \\ \sin x &= \frac{\sqrt{3}}{3} \\ x &= \sin^{-1}(\text{Ans}) \\ &= 35.3 \text{ (3sf)} \end{aligned}$$

### Sine rule – sides (U952)

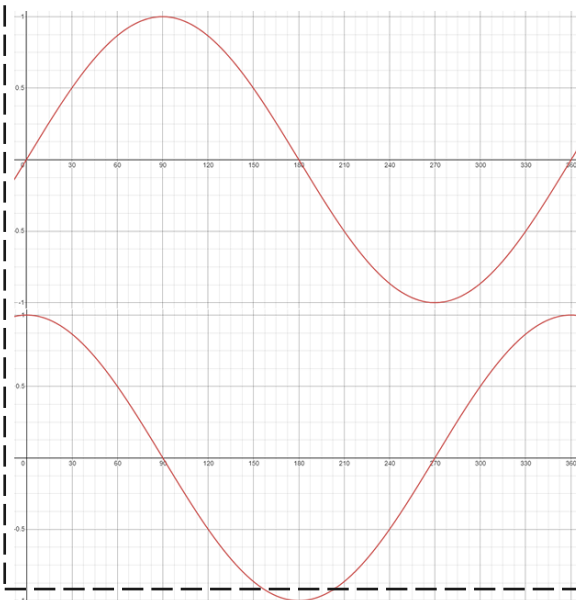
$$\frac{a}{\sin A} = \frac{b}{\sin B}$$



Work out the value of  $x$ .  
Give your answer to 1 decimal place.

$$\begin{aligned} \frac{x}{\sin(38)} &= \frac{13}{\sin(100)} \\ x &= \frac{13}{\sin(100)} \times \sin(38) \\ &= 8.1 \text{ (1dp)} \end{aligned}$$

## Trigonometric graphs U450



$y = \sin x$  Periodic every  $360^\circ$

Key coordinates:

- (0, 0)
- (90, 1)
- (180, 0)
- (270, -1)
- (360, 0)

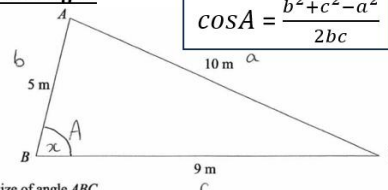
$y = \cos x$  Periodic every  $360^\circ$

Key coordinates:

- (0, 1)
- (90, 0)
- (180, -1)
- (270, 0)
- (360, 1)

### Cosine rule – angles

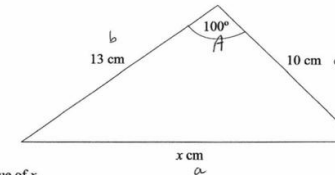
$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$



Work out the size of angle  $ABC$ .  
Give your answer to the nearest degree.

$$\begin{aligned} \cos x &= \frac{(5)^2 + (9)^2 - (10)^2}{2(5)(9)} \\ \cos x &= \frac{1}{15} \\ x &= \cos^{-1}(\text{Ans}) \\ &= 86 \text{ (nearest degree)} \end{aligned}$$

### Cosine rule – sides (U591)



Work out the value of  $x$ .  
Give your answer to 1 decimal place.

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A \\ x^2 &= (13)^2 + (10)^2 - 2(13)(10) \cos(100) \\ x^2 &= 314.1485... \\ x &= \sqrt{\text{Ans}} \\ &= 17.7 \text{ (1dp)} \end{aligned}$$

Date	KO*	WB*	TT*	Date	KO*	WB*	TT*
13/4				4/5	IN	S	ET
14/4				5/5			
15/4				6/5			
16/4				7/5			
17/4				8/5			
20/4				11/5			
21/4				12/5			
22/4				13/5			
23/4				14/5			
24/4				15/5			
27/4				18/5			
28/4				19/5			
29/4				20/5			
30/4				21/5			
1/5				22/5			

You should also have:

- Pencil case
- Reading book
- Calculator
- Headphones
- Plastic wallet
- Protractor
- Sharpener
- Compass
- (no scissors)



You should also have when needed:

- Ingredients
- PE kit
- Completed homework

**RUBBER**

**PENCIL**

**WHITEBOARD PEN**

**GREEN PEN**

**BLACK PEN**

**RULER**

You can borrow core items without penalty between 8.30-8.45am before passing your Head of Year <sup>16</sup>