

Survivor Series Level 4

Year 7 and 8 students.

Survivor Series 2017

Level 4



For Year 7 and Year 8 students.
Curriculum level 4.

What to do.

For students.

1. You can work with a friend or two friends!
Teams can be different each day.
2. Do the tasks and enter your answers in your maths book and show your teacher.
3. If you are right you will get the next task.
4. If you are wrong, answer the task again.
5. When you have finished each day you will get a code word.
6. At the end of the week you will have 5 code words. Put them together and this will tell you where your school's Maths Week treasure is.
7. Good luck !





Knots is a very complicated mathematical topic. It is a modern branch of topology. To find equations for each knot is difficult but very useful. The DNA molecule which defines life is actually in the form of a knot. Hence the importance of knots in defining DNA.

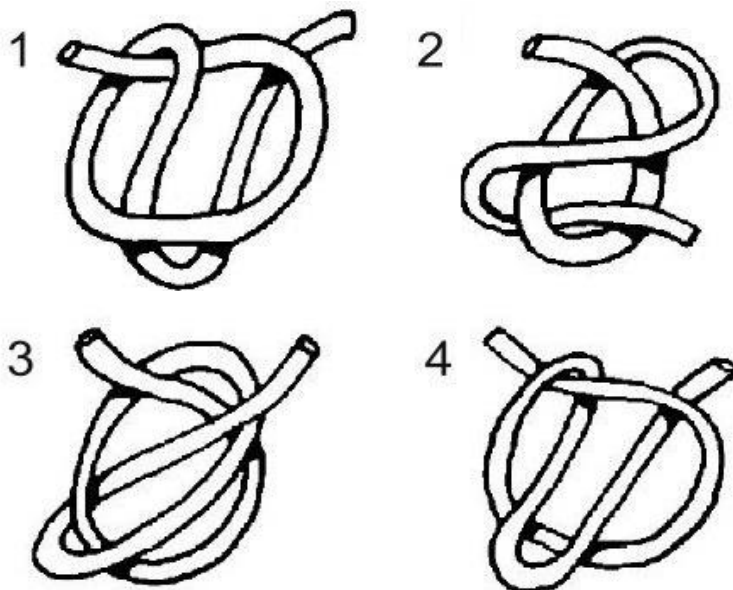
The Jones polynomial of an (m, n) -torus knot is

$$V(t) = \frac{t^{(m-1)(n-1)/2} (1 - t^{m+1} - t^{n+1} + t^{m+n})}{1 - t^2}$$

You may need a piece of string, a chord, a rope to answer these tasks.

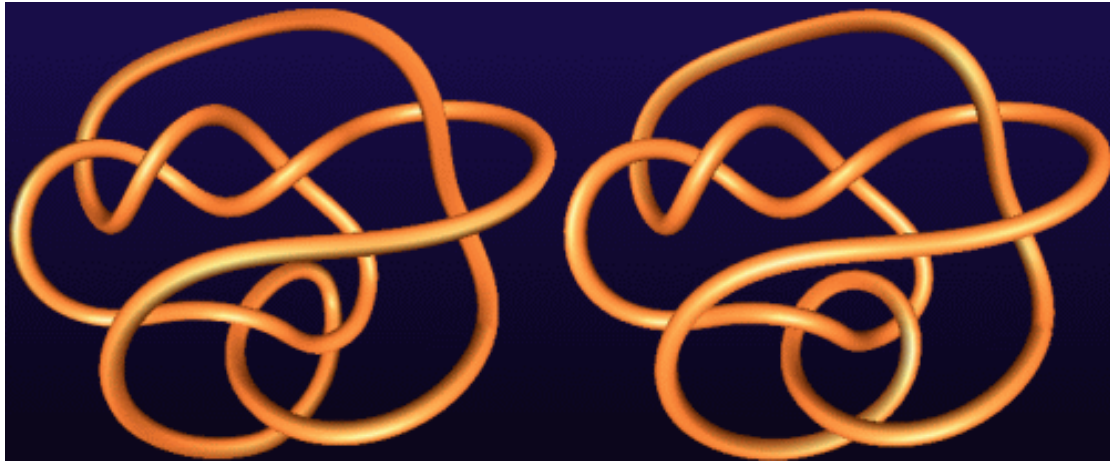
Task One. Not knots!

Which of these are knots and which of these are not knots?



Task Two. More Unknots!

Look for the difference in these two knots.
One of these is a knot. The other is an unknot.
Which is the unknot?



A

B

Task Three. Which one?

One of these is a trefoil knot. The other isn't.
Which one is the trefoil knot?



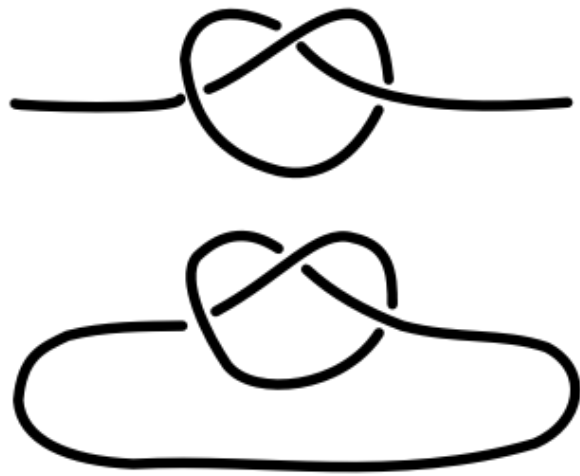
C

D



Task Four.

Tying special knots – a trefoil.



A trefoil knot is the simplest example of a basic knot. It is the only knot with a crossing of three. When the ends of the rope are joined together you will get the trefoil. The trefoil is often seen in icons.



Try making a trefoil with your string, chord, or rope!

Task Five.

Tying special knots – the reef knot.



The reef knot is the basic of all good knots. It is at least 4000 years old! It is sometimes called the “square knot”. The reef knot is often used by sailors. It is the favourite knot of the scouts!!

With your chord try to tie a reef knot. Who can do it?

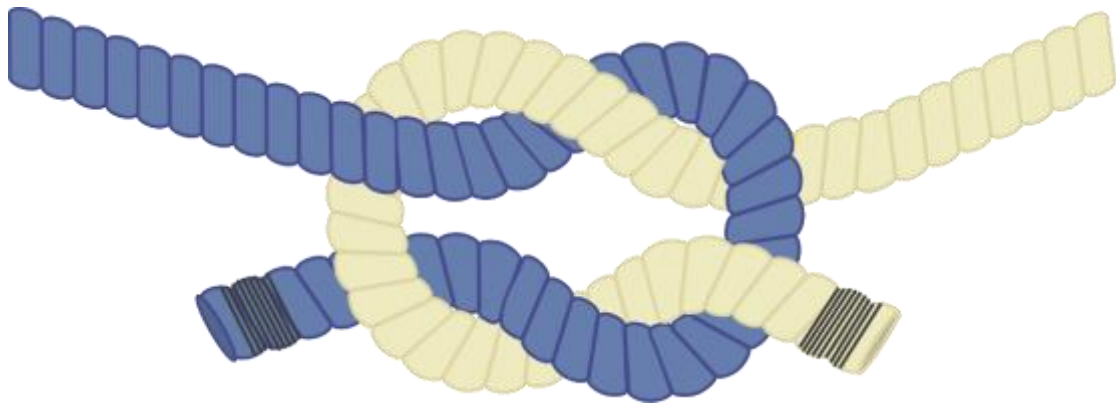


Task Six.

Is this a knot or an unknot?



Task Seven. Tying special knots – Granny's Knot.



This knot has been called Granny's Knot since about 1849.

It is very close to the Reef Knot. In fact when attempting to tie the Reef Knot people often tie this one instead.

It is not as strong as the Reef Knot and can slip when loaded heavily.

It is the most common reasons for shoe laces to become undone!

Granny Knots are often the basic knot in Crochet.



Try constructing a Granny Knot !

Task Eight. Tying special knots – The Bowline.



The Bowline is an ancient knot which is very strong. It used to form a fixed loop which doesn't slip at the end of a rope.

It sometimes is called the King of the Knots.

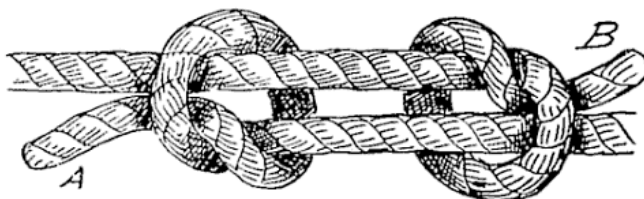
Mountaineers use the Bowline.
Soldiers are taught the Bowline.
Yachties use the Bowline.

It is supposed to be easier to tie and experts can tie it with one hand!!
The bowline is also easy to untie.

Can you tie a Bowline?



Task Nine. Tying special knots – Fisherman's Knot.



This knot is useful for joining two lines.
It is more famous for using in fishing but can be used elsewhere.
The fisherman's knot is used for joining thin nylon lines

Try tying a Fisherman's Knot.

Task Ten. A famous New Zealand Mathematician.

What is this man's name?

Everyone has heard about the Nobel Prize which is awarded each year for Physics, Chemistry, Medicine, Literature, Peace, Economics. Surprisingly there is no Nobel Prize for Mathematics!

Instead the Fields Medal was established in 1936 and is awarded every four years to the World's most brilliant research in Mathematics. This man was awarded the Field's Medal in 1990.



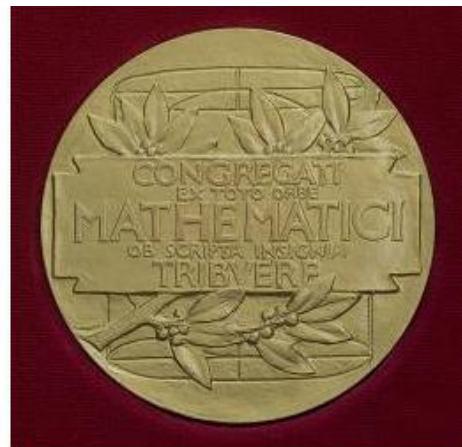
His research was involved with knots. He discovered a dazzling new formula for describing an ordinary knot. It could be a granny knot, a shoe-lace knot, a trefoil, a fisherman's knot or a complicated knot like the bowline. His formula works with all types of knots. It is very complicated and links with the DNA molecule. This is what made him famous. The DNA molecule is the molecule of life and is present in all living cells.

The formula equation called after our famous New Zealander gives biologists a method of comparing DNA links of different people and of animals. Before this formula was discovered it took weeks to compare DNA's.

Now it takes a few seconds!

For his outstanding work with knots this person was awarded the Fields Medal and must be regarded as one of New Zealand's best mathematicians.

In code his name is **RHQ UZTFGZM INMDR**



When you get your results for all of today's tasks correct show them to your Teacher and you will receive today's clue for finding the treasure.