

BUSH BOYS

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The Official Magazine of Father James Tierney's Bush Boys Books

A FRIENDLY MEAL

Mr Lawson explained his new idea. He wanted to call the main meal of the day, the convivium. This is a Latin word meaning banquet. Our English word convivial comes from convivium. Convivial means friendly or sociable. A sociable meal is one where people enjoy both the food and the conversation. It is always enjoyable to tell others about our doings and our opinions. However, it can be very frustrating when we are interrupted all the time or when our opinions are laughed at or criticised. It can also be enjoyable to sit and listen carefully. We might hear something interesting, be amused by a funny story or be given something to think about. But we might miss all this if we are more interested in having our say by butting in or starting up a separate conversation. Sometimes it can be very difficult to sit still and listen but practice makes perfect. By taking an interest in other people and listening carefully to what they have to say, we are prevented from becoming selfish and self-centred.



Father James Tierney
-
before he needed
spectacles

Look at Jack's log book entry below to find out Dad's rules for a convivium. You may like to have one of your own.

Log Books, Journals and Jottings

JACK wrote up dad's plan for a convivium:

A **convivium** is a (convivial) friendly meal together:

1. **Happy time** to eat, listen and talk.
2. **No fuss over spilt food** – but clean it up yourself.
3. **No fuss over table manners** – at least, not at the meal.
4. **Reports** on daily doings: all must listen.
5. **No other chatter** even if a report is dull or difficult.
6. **No interruptions** except to get things clear.
7. **Comments** must be **true/kind**, not destructive/egotistic.

From *New Boys in the Bush*, Chapter 18: The Convivium, page 168

Q. 9: *Why did Jesus Christ die on the cross?*

Jesus Christ died on the cross to take away the sins of the world, original and personal, by offering His Body and Blood in sacrifice to His Father.

From *Catholic Family Catechism Disciples' Edition with 50 Questions and Answers*, page 36

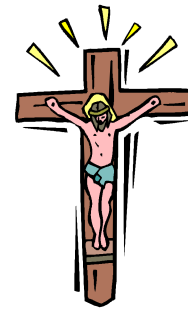
Make the Stations of the Cross and meditate upon the Passion and Crucifixion of Jesus Christ



Father James Tierney - Retired Parish Priest, Catechetics Consultant and Author

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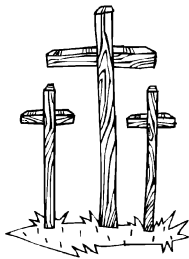
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A FRUIT AND THE PASSION

Most likely you are very familiar with the passionfruit, that smooth, round, purple fruit which is filled with sweet pulp, juice and seeds. But have you ever looked closely at a passionfruit plant and its flower? Spanish missionaries did. It was the 15th century and the Spanish had discovered the passionfruit in South America. You might look at a flower and see petals and leaves and seeds. However, these missionaries saw the 5 wounds of Christ, the Crown of Thorns, and other symbols of Christ's Passion on the cross. Every part of the passionfruit reminded them of some aspect of the Crucifixion of Jesus.

If we look at a passion flower we will see:

- ◆ 5 petals alternating with 5 sepals. Both sepals and petals look very similar except a sepal has a green hook or awn at its tips. These represent the 10 faithful apostles – Peter, who denied Jesus, and Judas Iscariot, the betrayer are not included.
- ◆ 100 or more filaments radiating out from the centre of the flower. These change colour along their length producing different coloured concentric rings which probably guide insects and humming birds to the nectar at the centre of the flower. This corona of filaments represents the Crown of Thorns. If they are blue and white they represent heaven and purity.
- ◆ 3 stigmas which are the female reproductive parts. These accept the pollen onto their sticky tips. Each stigma is supported by a style which are joined together just above the ovary. The three stigmas represent the three nails that fastened Jesus to the cross. The joined styles call to mind the pillar to which Jesus was bound during His scourging.
- ◆ the seed producing chalice-shaped ovary supported on its receptacle. This represents a hammer or the chalice used at the Last Supper.
- ◆ 5 anthers beneath the ovary. These are the male pollen producing organs. Each anther is supported by a filament. We think of the 5 Wounds of Christ when we see the anthers.



Looking at the passion plant we see:

- ◆ Tendrils. The passionfruit grows on very vigorous fast growing vines and has little tendrils which the plant uses to wrap itself around anything it comes into contact with, enabling it to climb to

great heights. These tendrils are a symbol of the whips used in the scourging.

- ◆ large 3-lobed leaves with pointed tips. These tips represent the Holy Lance.

Now it is obvious why this plant is called the passionfruit. Different countries have other variations on this name. It is also known as Christ's Crown, Christ's Bouquet, Crown of Thorn's, Jesus' Passion, Passion, Mother-Of-God's-Star and Christ's Thorn. This plant also has at least two non-Christian names: in Japan it is known as the clock plant and the Israelis know it as the clock flower. Both names come from the regularly shaped flowers which remind people of the face of a clock.

For spectacular photographs, showing all these flower structures clearly, visit: www.org.uk/mag/artsep06/bj-Passion-Flower.html

Jim was pensive. "The twins love passion fruit..."

Jack grinned. "You mean as a peace offering?"

"Pity we haven't a sugar bag," said Jim, "but we can toss 'em loose in the back of the Rover."

"Better test 'em first," said Joe.

His brothers didn't bother to remind him he had already tested one. They were too busy, biting in half and squelching out the pulp. The taste was great...

...The supply of fruit seemed limitless. They only picked ones turning violet. Anything a bit green was for next time. They ate as they worked, "Quality control," Jim called it. All were uniformly good.

From *New Boys in the Bush*, Chapter 20: The Tumbledown, page 183

Mr Lawson understood the value of symbols in teaching. He used mathematical symbols to reinforce his religion lesson. The triangle calls to mind the Three Divine Persons of the Blessed Trinity. The circle, the shape without an end, represents eternity. The straight line reminds us to keep on the straight and narrow by keeping the Ten Commandments. Mr Lawson asked Colleen to work out what an angle represents. Do you remember the answer? If not look it up on page 152 of *New Boys in the Bush*.

Enjoying Passionfruits

Passionfruit Toast

- ◆ Mix cream cheese and passionfruit pulp.
- ◆ Spread onto slices of raisin toast.
- ◆ Sprinkle with finely chopped pecans.

Passionfruit Cream in Meringue Cups

- ◆ Mix passionfruit pulp with apricot yogurt.
- ◆ Spoon into meringue shells.
- ◆ Decorate with strawberries and kiwifruit.
- ◆ Sprinkle with grated chocolate.

LEARNING TO SWIM

Jim waved his arm around and pointed at the pool. "Why *pretend* to go swimming? Let's teach ourselves, in our very own swimming pool."

Jack lacked his brother's imagination, aplomb, insouciance, and cheek. "Can we?" he posed cautiously.

Jim had no doubts. "We'll *discover* it for ourselves. That'll please Dad."

Jack was easily persuaded. "Okay." He jumped in. "Just watch," he boasted. "I'll show you how."

From *New Boys in the Bush*, Chapter 36: Learning by Design, page 320

Swimming might look very complicated and difficult to learn but did you know that swimming involves only two basic skills?

The first skill is floating. When we float, the weight of our body pushes downwards and we start to sink but the water in its turn pushes back up. There comes a point when the two forces are equal and we remain suspended in the water. Next time you are floating in water notice how your body is actually under the water, not lying along the surface of the water.

If you want to float successfully, spread your weight out evenly so that it comes in contact with as much water as possible: you want your body to be supported by the biggest upward force of water as possible. It doesn't matter what you weigh. Everyone can float. In fact really skinny people have more trouble floating than those who have some body fat. What is important is not weight but density. Density is the amount of weight per unit volume of a substance. Fat is less dense than muscle so a chubby person should easily be able to float.

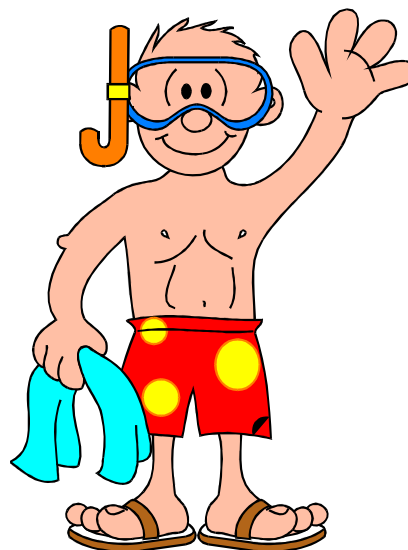
But if you want to swim, being able to float is not enough. I am sure you don't want to just bob about in the water. You will want to move about from place to place. This will involve learning a second skill: propulsion. By making movements with your arms and legs, you will be able to drive yourself forwards or backwards. The limbs can be moved in more than one way, and depending on what movements you choose, you will be able to swim the different strokes. The four basic swimming strokes are freestyle, breaststroke, butterfly and backstroke.

So perhaps you can float. You have added movements of your arms and legs in order to move yourself through the water. But there is another problem you will soon discover. If you have chosen to swim a stroke that involves putting your face into the water: you will only be able to swim a certain distance before you need to breathe. Your head will have to move up out of the water so that you can take a breath of air. It can be quite tricky learning to breathe at regular intervals without forgetting to

keep your arms and legs moving. But with lots of practise, all these skills can be learnt and you will be able to have lots of fun, safely in the water.

The Lawson boys' first attempts at swimming resulted in failure. They all sank straight to the bottom of the pool despite frantic thrashing movements with arms and legs. They soon tried holding themselves 'stiff like a spear' and were able to glide through the water once they got some 'boy propulsion'. Perhaps by assuming a spear-like position they were placing their body more evenly into the water, taking advantage of the greatest upward force of water possible. But the Bush Boys couldn't have been perfectly positioned. If they had been, they should have found that they didn't sink even when their glides came to an end.

So instead of trying to acquire the skill of floating first, the boys started with propulsion. If they had learnt to float they would have discovered that swimming wouldn't have involved so much energy: the water would have done a lot of the work for them.



Even if you can swim, you can improve your leg and arm movements and breathing technique by practising with a kickboard. Hold onto the board, face in the water and propel yourself through the water with strong leg movements. Do not bend your legs but move them as if shrugging off a pair of loose, woolly socks. Move your head to the side whenever you need a breath keeping your ears in the water. Change sides each breath. Practise freestyle arms by releasing one arm from the board and moving it backwards through the water and over your head before re-grasping the board. Repeat with the other arm. Take a breath every three strokes by turning the head to the side of the free arm. A breath should be taken at the moment when this arm is stretched out fully behind you.

A VERY SHORT HISTORY OF THE COW IN AUSTRALIA

It was 25th January 1788. Anchored in Sydney Cove was a ship called the *Supply*. On board this ship was an officer called Captain Arthur Phillips. We can imagine that he was in a state of great excitement. He planned to go ashore the next day to hoist the Union Jack and claim Australia for Britain. No doubt he had his musket ready to fire three shots and a bottle of spirits to drink a toast to King and country. Maybe he was also a very relieved man. After over eight months at sea, he was close to bringing all the ships of the First Fleet safely to their destination. By nightfall of January 26th over 1000 men, women and children (most of them convicts) would be at the Cove ready to begin the formidable task of establishing a colony. I am sure everyone was very relieved to step once again on dry land but what did they think when they saw the dry rugged bush so different to home?

In one ship were 3 cows and 2 bulls, 3 horses, 44 sheep, 32 pigs and "a very large quantity of poultry of every kind". Australia had never seen such animals before. Would these beasts adapt to their new homeland and multiply and flourish? Captain Phillips hoped so. The colony needed its own supply of fresh milk, beef, eggs, bacon and other products. And the cattle would be also be invaluable as draught animals. But Arthur Phillips was to be disappointed. His convicts didn't have the skills or inclination to look after the livestock. Most died or were lost or stolen. By the end of the first year of settlement, the animals had not multiplied in number. In fact there were fewer livestock than on the day the colony was established. But the colonists did not give up. More animals were imported. Much was learnt about looking after cattle in this more hostile environment. By 1803, the government herd numbered 2450 head of cattle. By 1820, NSW was self-sufficient in beef.

THE ORIGIN OF THE ILLAWARRA SHORTHORN

In *New Boys in the Bush*, the Lawsons' cow was an Illawarra Shorthorn. In the early days of settlement there was no such breed in Australia. This breed was developed from various shorthorn cattle such as the Jersey, the Durham, the Devonshire and the Ayreshire. By crossing different breeds, an improved breed resulted. The breeders were hoping to produce a cow that was both hardy and able to produce exceptional quantities of milk. By 1910, there was no further development of this particular cow. Perhaps the breeders were satisfied. The resulting cow, the Illawarra Shorthorn, was recognised as a breed in its own right.

The name Illawarra is an Aboriginal word and it refers to a region south of Sydney. This area of land

is bound on the eastern side by the Pacific Ocean and on the western side by a steeply rising, almost impenetrable escarpment. For some years, this area remained unexplored and unused by the early colonists. It was only in 1815 that settlers such as Charles Throsby, forced by drought to seek new pastures, showed interest in this part of NSW. The first land grants in the Illawarra were made in 1816 and soon cattle were being raised mainly for beef. The dairy industry came into being in the 1840's. Today the great dairy breed of the Illawarra is the Shorthorn.

FACTS ABOUT THE ILLAWARRA SHORTHORN

- ◆ It is an incredible milk producer. Each cow will give about 40 litres per day and maybe over 60 000 litres in a lifetime.
- ◆ Its milk is high in fat and protein and especially suitable for cheese making.
- ◆ It is a docile animal, easy to handle and manage.
- ◆ It is hardy, able to resist extreme temperatures.
- ◆ Its skin contains black pigment which prevents sunburn and skin cancers.
- ◆ It has short, sleek, bright red hair, also good for preventing sun related problems.
- ◆ It may have white flashes on its flanks.
- ◆ It has a chunky appearance, being wedge-shaped: narrow in the front and broader towards the back.
- ◆ It has strong hooves and legs.



DIFFERENT NAMES FOR COWS

Have you noticed that there are quite a few names associated with cattle? For example, do you know the difference between a heifer and a bull?

- ◆ Bulls are fully grown males.
- ◆ Steers or bullocks are males that have been operated on so they cannot breed.
- ◆ Heifers are young females.
- ◆ Cows are fully grown females

There are many breeds of cattle in Australia. Try and identify any cattle you see. Are they beef cattle or dairy cows?

Colleen and Kathleen came striding down the slope. "Stop teasing the cows, you silly boys," Colleen reproved them, "or ours won't let down her milk."

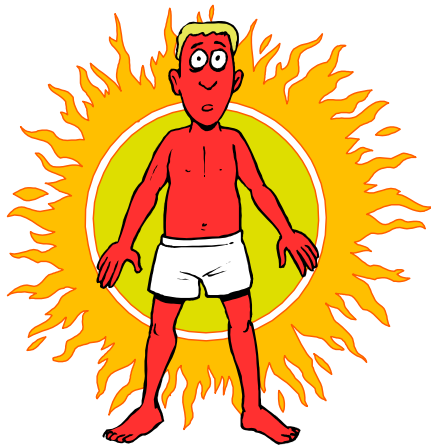
"What about the bull?" Joe challenged her. Kathleen said, "He's tame too. They're all tame."

The twins plunged into the midst of the herd, bull and all. And the beasts made room for them. Colleen snatched up a fistful of grass, and presented it on her palm to the nearest cow. It gobbled the grass, and slobbered its great tongue affectionately over her hand...

...The boys climbed down, and made friends with the cows. "Jim asked, "How can we tell which is mine?"

Kathleen, ever gentle, told him, "You've forgotten. Dad told us ours would be an Illawarra Shorthorn, with a calf at heel" – she was proud of the jargon – "and that Mr Castonelli had bought it for us from a friend of his. So it's got to be the red one." She pointed. "And that's the only one with a calf. All the rest are mouse-coloured, so they must be the Jerseys."

From *New Boys in the Bush*, Chapter 9: The Promised Land, pages 86-87



The only regret their parents seemed to have was the raw-red of sunburnt faces, necks and legs. Lower arms, of course, were already tanned. Mum lamented, "You're terribly sunburnt."

Nanna knew the remedy. "They need the tomato treatment." Jack wondered what that was. But Nanna went on, "And they need to wear hats."...

... Dad came in with a bowl of tomatoes cut in halves. He looked them up and down, and laughed. "Burnt to a frazzle all over. Here's your First Aid."

He rubbed raw tomato into Joe's red patches, and to Joe's surprise, it was soothing. "You and Jim do each other," he told Jack. "Don't worry if its messy with juice and seeds. Your skin's so hot, it'll dry quickly for getting dressed."

From *New Boys in the Bush*, Chapter 37: Not the Whole Truth, pages 330, 332

SUNBURNT

Everyone knows about sunburn. It's what we all try and avoid when we go outside in the summer. Perhaps your mother shouts, "Where's your hat? Don't forget the sun block", every time you disappear out the back door. If you come back and take the time to smooth lotion all over your exposed skin and then thrust your head into a floppy hat, you will probably never have to suffer the discomfort of sunburn.

We all know what sunburn feels like. Our skin is all hot and prickly and super, super sensitive. It is pure agony pulling our clothes over our damaged skin. If we are really unlucky, our skin may start to blister. A few days after being burnt, you might find your skin peeling away in strips.

Why does sunburn hurt? The pain is a natural response to damage. The nerves in your skin detect the damage and send a message to the brain, "Alert! Alert! The skin is burnt. Take action: get out of the sun!" Hopefully, further damage will be avoided by the body responding to the pain.

Have you ever wondered why your skin turns red? If you press on sunburnt skin it will turn white. Pressing empties the capillaries or vessels of blood. So it is blood which is giving a sunburnt person his lobster look. When the skin cells are damaged, the body responds by increasing the blood flow to that area. Building materials for repairing the damage are transported in this blood.

Most skins can take a little bit of exposure to the sun without damaging the skin. This amount is different for different people. Perhaps you have very fair skin. Then you will be heading indoors long before your well-tanned or naturally brown friend. What is it that protects tanned and naturally brown skin from burning? It is a pigment called melanin. When the sun shines on the skin, melanin is produced by special cells called melanocytes. Melanin protects skin cells from damage by absorbing harmful UV radiation. The more melanin you have, the browner your skin will be and the longer you will be able to stay out in the sun without burning. Naturally brown skin does not need the effect of the sun to produce melanin. This pigment is produced continuously regardless of sun exposure. But if your skin is naturally fair, you will have to allow time for your skin to make this protective pigment. You will probably not go brown in one day and if you tried, you'd end up burning your skin.

So if you want to spend time safely in the sun, it can be a good idea to apply a sunblock and wear protective clothing to keep the sun's rays away from your skin.

How does sunblock work? Sunblock contains chemicals which absorb the harmful ultraviolet radiation coming from the sun. It turns it into heat

SUNBURNT AGAIN

and prevents it reaching the skin's cells. If the rays can't reach the skin cells, it cannot do any damage. There is one downside to sunblocks. If no rays reach the melanocytes, no melanin will be produced and so the skin will not acquire any natural protection against sunburn.

What if you don't have any sunscreen? The Bush Boys didn't take any with them when they went on their exploring adventures. What they did have were hats with brims to protect their faces, shirts with sleeves that could roll down to protect their arms and also, they avoided the sun as much as possible. They looked for a pool in the shade when they wanted to swim.

However, before they discovered all these ways of protecting their skin, they had to endure the discomfort of very sun reddened and burnt skin. The only parts of their bodies that weren't damaged were their lower arms which were brown and so had good supplies of protective melanin.

Do you remember what treatment Nanna suggested to ease the boys' sunburn? It was "the tomato treatment." Dad cut raw tomatoes in half and applied the juice to the boys' sensitive skin. Something present in tomatoes helps to speed up the healing process. If you don't have any tomatoes and you get burnt, you could try dabbing your skin with a face cloth soaked with milk or vinegar. A cool bath may help relieve the pain. Perhaps you could try two things at once and add vinegar to your bath water.

Tomatoes seem to be doubly good when dealing with sunburn. If you eat a lot of tomatoes you may decrease your chances of getting sunburnt in the first place. Tomatoes contain an anti-oxidant called lycopene which is a substance involved in preventing cell damage.

Find a diagram of a cross-section of skin. Look for the epidermis, dermis, malpighian layer and the subcutaneous layer. Locate hair follicles, nerves, blood vessels, sweat glands, melanocytes, subcutaneous fat etc. Draw your own representation of the structure of skin.

Q 40. *What is the leader's duty before setting out*

Before setting out, the leader's duty is to plan out everything; leave every family with written directions of where the party is going, when they'll be back, and whom to contact if overdue.

From *The ABC of Camping*

LOST!

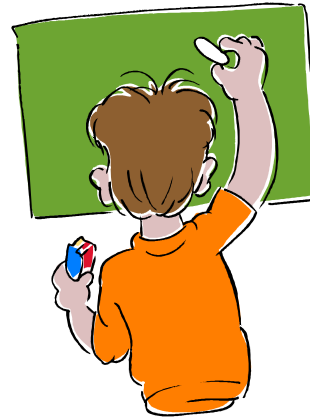
Q. 42. *How do we avoid getting lost?*

We avoid getting lost by following a good leader, not splitting-up the party, navigating by creeks and ridges, map and compass, sun and stars.

Also hand-held GPS, Ground Position Satellites.

From *The ABC of Camping*

On their very first afternoon exploring, Jack, Jim and Joe got lost. They finally found their way back to *Terra Sancta* much to their relief. Read Jack's log book entry (*New Boys in the Bush*, page 281) to find out what explorers must do if they realize they no longer know where they are.



Like many city folk, Mum's only dread of the bush was getting lost," She summed up: "Well, you've been lost — as I said would happen. I don't suppose you'll do it again, and there's nothing more to go wrong"...

...However, Nanna believed that God helps those who help themselves. She had a practical suggestion. "Use the white board" - she pointed across the kitchen to Mum's memory-aid for shopping items—"and write where you're going and when you'll be back. All the best explorers do it. By the way," she remarked, as though she had only just thought of it. "When we park the car in a strange town, we ask ourselves, 'How are we going to find it again?' Same when you're in a new part of the bush; turn round often, and see what it should look like on the return journey."

From *New Boys in the Bush*, Chapter 31: Explorers Reporting, pages 276, 277

POWER FROM THE SUN

When darkness descends at the end of a day, we flick a switch on the wall and a light bulb begins to glow giving us light. Possibly, we never think about how marvellous electric lighting is. We probably take our lights for granted.

But what if we lived in a house without electricity like the Lawsons? How would we find our way around the house at night? Would we have to use torches? After thinking about the problem of the absence of electricity, Mr Lawson comes up with a way to have low wattage electric globes in many of the rooms of the house, regardless. He decides to use power collected from the sun, during the day, to light up the house, at night. The lights will be powered by solar energy.

There are two forms of solar energy:

1. photovoltaic conversion
2. solar thermal conversion

It is the first type of solar energy that Mr Lawson is using in his electric light system.

So what does photovoltaic conversion mean? If we look at the name we will get a clue. 'Photo' means light, 'voltaic' means producing electric current and 'conversion' means changing something from one form to another. Therefore, a photovoltaic cell is a device which will produce electricity when exposed to the sun.

Photovoltaic cells usually consist of panels containing two layers of different materials. When sunlight hits these two layers, one layer becomes positively charged. The other layer becomes negatively charged. The solar panel acts in the same way as a battery: if the positive and negative ends are connected by a wire, current will flow to light globe.

The amount of electric current generated by a solar panel depends on many factors. How big is the solar panel? How much of its surface is exposed to the sun? How strong is the sun? This will depend on the time of day, the weather and the latitude. How long is the solar panel exposed to the sun? Is there any dust or cloud or mist or dirt stopping the sun reaching the solar panel? If you read the extract from *New Boys in the Bush*, you will see that Mr Lawson thought about all these things before choosing the position of his solar panel.

The Lawson's solar panel was intended to supply enough energy to power a few light bulbs and even then, Mr Lawson advised they didn't turn all the lights on at once. If he wanted to power something bigger than a light bulb, he would have to buy a larger panel or connect a few together. This would involve more expense and result in a much heavier solar power cell.

The second form of solar energy is solar thermal conversion. From looking at the name, we can see

this involves turning energy from the sun into heat. This heat is used to produce an electrical current.

Have you ever used a magnifying glass to light a fire? How does it work? The sun's rays are concentrated by the glass, and an intense heat is produced which sets alight any flammable material which is placed in its path. Solar thermal conversion systems work in the same way as the magnifying glass. They use mirrors or reflectors to concentrate sunlight onto containers full of liquid. This liquid can be water, but there are other liquids which are more suitable because they retain heat better than water. The liquid heats up to a very high temperature to produce steam. This steam is used to turn a turbine. The turning motion of a turbine is used to create electricity. But how does rotation produce an electric current? If a coiled wire is rotated between the two poles of a magnet an electrical current is generated.



So putting this all together: the sun's rays are concentrated onto a container of liquid. The liquid heats and produces steam which turns a turbine. The rotating motion of the turbine produces an electric current. Easy!

The fourth job began with Dad staggering up the ladder with the new and bigger solar panel. He told them, "Just as well the front roof slopes north. We can sit it on the verandah roof and leaning up the house roof. It's high enough to miss any shadow from the windmill. Even a slight shadow on one of these old solar panels cuts off most of the current because its cells are wired in series. Also, it's close to the battery, to save power losses in the wires. These blocks - he had two short chunks of 3" x 1" hardwood - "will tilt it to 35°, the latitude of Guntawang. On the equinoxes, the midday sun will be square-on to the panel, and that will give a good average output over the whole year."

They bolted it in place, and ran its wires down to a metal box outside the front door. Dad had wired it up on his own on Wednesday and Friday afternoons. It had a 12-volt lead-acid deep cycle battery, an inverter to make 240 volts AC, and a switch box and fuses. Its wiring to the various rooms was already connected. Dad switched the solar panel into the battery, and the ammeter read 10 amps. "Beautiful," purred Dad.

From *New Boys in the Bush*, Chapter 25: Mind and Muscle, pages 228, 229

Can you think of some advantages of solar power over other forms of energy?

THE IRRATIONAL PI

On the roof of *Terra Sancta* is a room that was not part of the original house. Dad calls the room, The Lookout. The boys are anxious to explore this special room at the top of the house. When they see the view from The Lookout's window, they are amazed. This panoramic view inspires them to rename the room. Jack suggests they call it Pisgah Heights after the mountain that Moses stood upon when he looked out over the Promised Land. Jim puts forth a slight variation: The Pisgah Roof Room. Having a maths teacher for a father, it doesn't take long for the boys to go from Pisgah Roof Room, to PRR, to PR^2 , and finally to πR^2 (pi R squared).

But what is π or pi? This is one of the most important constants in mathematics. A constant is something which remains the same. So pi always has the same value. It is approximately equal to 3.14159

But where does pi come from? It is all to do with the measurement of a circle. If you take a circle of any size and measure its diameter and its circumference and then divide the circumference measurement by the diameter measurement, the answer will always be 3.14159 or pi. It doesn't matter what size circle you measure, the ratio of circumference to diameter will always be constant and equal pi. Or you could measure the area and the radius of a circle. If you divide the area by the radius squared, you will always get the same number, pi.

Where does the name pi come from? Pi is the first letter of the Greek word for perimeter. It was probably chosen because perimeter is another word for circumference and pi is used to find the perimeter or circumference of a circle.

To find an accurate value for pi you would need to measure a circle's circumference and diameter very, very accurately. But this is very, very difficult. Archimedes was the first person to estimate the value of pi rigorously. He didn't get out his ruler but instead determined pi's value using a completely arithmetical procedure. He was the first person to make a theoretical calculation of pi.

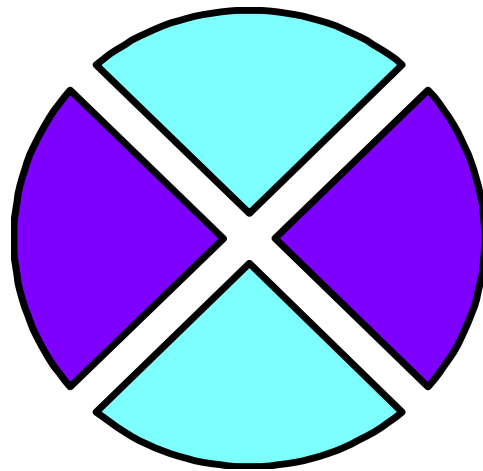
Do you know why we will never be able to determine pi exactly? This is because pi is a special sort of irrational number called a transcendental number. An irrational number cannot be expressed as a fraction m/n where m and n are integers. If anyone tells you that pi is equal to $22/7$, you will know this cannot really be true. Pi might be approximately equal to $22/7$ but not exactly equal. When an irrational number such as pi is written as a decimal there will be an unending stream of numbers after the decimal point. But for most calculations, rounding pi up so it has three decimal places i.e. 3.142 is accurate enough for most calculations.

Over the centuries, mathematicians have been

fascinated by pi. Some men have spent long periods of time trying to write pi with as many decimal places as possible. Someone has even written a mnemonic to help him remember the numbers after the decimal place. In a mnemonic, each successive digit is represented by the number of letters in the corresponding word. For example, look at "How I want a drink, champagne of course, after the heavy lectures involving quantum mechanics. All of thy geometry Herr Planck..." Can you see that 'how' has 3 letters and represents the digit '3', 'I' has 1 letter and stands for one...Using the above mnemonic, write pi to 21 decimal places.

So how can we use pi? If we want to know the area or the circumference of a circle all we need is one measurement, the radius of that circle, and pi. Perhaps you already know these formulas: $A=\pi R^2$ and $C=2\pi R$ (A = area, R = radius, C =circumference)

Look up the Bible verse 1 Kings 7, 23. Here you will find a list of specifications for the great temple of Solomon. This temple was built around 950 BC. You can work out the ratio of circumference to diameter using the dimensions given. Pi turns out to be 3 which is accurate to one significant figure.



... to Jim and Joe: "I say, let's call this lookout Pisgah Heights. It's a panoramic view, like that mountain Moses spied out the Promised Land from. I think Pisgah means a beautiful view."

"Yeah," agreed Jim. "Let's call this the Pisgah Roof Room, PRR, or 'P R squared' for short. We can write it like 'pi R squared' for the area of a circle. Dad likes a mathematical twang." And he scribbled on his hand with a felt pen: PR^2 and πR^2 to show them.

"No, too fancy," ruled Jack. "Pisgah Heights it is."

From *New Boys in the Bush*, Chapter 9: The Promised Land, pages 89, 90