

PHYSICAL EDUCATION

Physical Education reveals the potential of the physical body God has created; our stewardship of it for Him; and ways in which we can co-operate together in unity to achieve common aims.

God calls us to honour Him with our bodies. Working with others we are to do this to give Him glory and build up the rest of the church.

'For physical training has some value, but Godliness has value in all things.' **1 Timothy 4:8**

'Do you not know that your body is a temple of the Holy Spirit, who is in you, whom you have received from God? You are not your own; you were bought with a price. Therefore, honour God with your body.' **1 Corinthians 6:19-20**

'This is what the Lord says; 'Let not the wise man boast of his wisdom or the strong man boast of his strength but let him who boasts boast about this: that he understands and knows me, that I am the Lord.' **Jeremiah 9:23-24**

'Now you are the body of Christ and each one is a part of it. If one part suffers, every part suffers with it; if one part is honoured, every part rejoices with it.' **1 Corinthians 12:26-27**

Our bodies are the temples of the Holy Spirit and we are called to honour God with them. We are to care for our bodies but not to boast about ourselves and our abilities but rather to boast about God.

Truth to Teach

Physical Education is to do with preparation for, and enjoyment of, life.

Way to Work

- a. To take part in a moderately wide range of sports at different levels and, if appropriate, to represent the school in competition.
- b. To perform appropriate routines involving physical activities and creative thinking (through Dance, Gymnastics, and Music and Movement) leading, if appropriate, to public displays.
- c. To give pupils opportunities to take part in Outdoor Pursuits through the Duke of Edinburgh Award Scheme.

Learning for Life

- d. To have learned valuable lessons from sports which leave pupils better able to play the real game of life successfully and by the rules.
- e. To have experienced the joy and physical demands of using one's body creatively and expressively.
- f. To have experienced the benefits of keeping one's body fit through the maintenance of a healthy lifestyle.
- g. To have learned to play corporately with others – experiencing what can be achieved as a team and how to serve the larger purpose.

Commentary on Physical Education

1. Truth/Concept

Physical Education is to do with the preparation for, and enjoyment of, life!

2. Preparation for Life

It is a feature of Paul's writing how often he uses a race as a metaphor for life. Chronologically, his references are as follows:

Acts 20:24 '....if only I may finish the race and complete the task the Lord Jesus has given me'

1 Corinthians 9:24 'Do you not know that in a race all the runners run, but only one gets the prize. Run in such a way as to get the prize.'

Galatians 2:2 Paul checked his gospel with the leaders at Jerusalem. '.... for fear that I was running or had run my race in vain.'

Galatians 5:7 Paul says to the Galatians, '...you were running a good race. Who cut in on you and kept you from obeying the truth?'

2 Timothy 4:7 'I have fought the good fight, I have finished the race, I have kept the faith.'

The writer to the Hebrews also uses the same metaphor:

Hebrews 12:1 '.... let us throw off everything that hinders and the sin that so easily entangles us and let us run with perseverance the race marked out for us.'

For Paul, his one desire was to run the race of life properly and to finish it. To do so, he fully understood the following:

- a) Only one gets the prize in a race. **(1 Corinthians 9:24)**
- b) Strict training is essential. **(1 Corinthians 9:25)**
- c) Aimless running is pointless; only a disciplined approach wins the prize **(1 Corinthians 9:24)**
- d) The winner gains a crown that does not last. (1 Corinthians 9:25)

He uses the image of a race as a means of inspiring his readers to keep going in their Christian life, in order to gain the crown 'that will last for ever' (**1 Corinthians 9:25**). The athletic competition he alludes to is not the most important thing. The inference is that his readers, and possibly himself, had experienced athletic competition, and so he uses this as a metaphor of the Christian life because so much of the life of a Christian is similar to the preparation for and actual participation in a race.

Similarly, as Christian teachers, we can teach children so much about living as disciples of Jesus by giving them the experience of athletic competition. By teaching the temporal (with its fading crown) they can learn vital lessons about the outworking of their calling (with the eternal crown). Physical education is about preparation for life as opposed to seeing it as an end in itself. We are equipping them with a metaphor for life. A grueling session in preparation for a 1500 metre race is uncomfortable at the time, but hopefully will contribute towards a good performance in the race itself. That is a helpful memory for a young person later on in times of challenge (studying for professional exams, for example). As one writer has wisely expressed it, 'Various activities and contests may be looked at as role-play of the Christian life.' (Dr Ruth C Hayrock. EBTTTS, p 405)

3. Enjoyment

Physical Education should contain moments of enjoyment and fun, as well as the more strenuous aspects of training. Telling a class, 'The next lesson is P.E.' usually tends to arouse more enthusiasm than telling them the next lesson is History or English or whatever! Young children generally enjoy running about and using their bodies; they rarely walk soberly in a playground! Playing in a team should be a pleasant experience, as should devising a dance or a gymnastic sequence, learning a new skill or improving a familiar one. Later on, many may take part in physical activities as a means of relaxation or recreation, whether that be a walk in the country, a round of golf, or a game of tennis. Some will miss out on these pleasures if looking back to PE at school only evokes memories of hard work and endless training sessions. We need to aim for a balance and give at least some scope for the expression of 'the joy of the Lord.'

Way to Work

1. Competitive Sports

Referring once again to Paul's metaphor of the race, 'all the runners run but only one gets the prize'. The very nature of a race is that it is competitive. Therefore, says Paul, 'run in such a way as to get the prize' (**1 Corinthians 9:24**). To give children this life metaphor, they all have to have access to athletic competition of one sort or another. Involving children in competitive sport carries great potential benefits but also significant dangers; there is an element of risk involved.

Benefits of Competition

i. It promotes teamwork.

The very essence of the body of Christ is the interdependence of the various members (**Romans 12:4-5**). The more opportunities children have to work co-operatively towards a common goal the better. Team games clearly provide such opportunities.

ii. It provides moments of challenge and controlled pressure.

Most children need regular and appropriate challenges to overcome, in safe conditions and overseen by adults. The regulated pressures in team games can equip youngsters to handle some of the stresses of adult life (particularly the need for staying cool in a crisis, for taking rapid decisions, for inter-relating with others in order to relieve pressure on them, for 'weathering the storm' etc.)

iii. It gives early experience of character development through difficulty.

Romans 5:3 points to the progression from suffering to perseverance, to character and to hope. Regular training towards the goal of being part of a successful team involves this 'journey'. Getting fit involves a small amount of suffering! Sticking with a training programme, or with a run of losing matches, develops perseverance. The fruit is a more developed character, which ultimately affects a person's outlook on life (hope).

iv. It develops goal-setting.

Good coaches have a plan for the season, which they communicate to their players. Team games involve short-term goals (half or a full game) medium-term goals and long-term goals (part or whole season). Team games help promote goal-orientation, both for an individual and for the group. Remember Paul in **Acts 20:24** '.... if only I may finish the race and complete the task the Lord Jesus has given me', and more poignantly, his overwhelming desire to 'gain Christ and be found in Him.'
(Philippians 3:7-14)

v. It promotes submission to a coach, and to the rules of the game.

Ultimately authority lies with the coach and, as a season progresses, children find out the value of submission in a variety of circumstances (from fun training sessions to being substituted or even left out of a team). (**1 Peter 5:5**) They will also have to learn to accept criticism.

Although very few soccer players end up as hooligans, a good proportion of youngsters involved in team games learn early the necessity and value of playing by the rules. Hopefully this will carry over into other areas of life.

vi. It gives opportunities both to lose and to win graciously.

Winning without becoming proud (**1 Corinthians 10:20**) and losing without resentment (**2 Corinthians 6:10**) are learned responses, usually through frequently getting it wrong. Like many of the character issues of team sports, the fruit is delightful but the process can be messy! It seems likely that if the mess is made and cleared up at school, a lot of heartache can be saved later on. Kipling's words, as quoted over the player's entrance to the centre court at Wimbledon, are not inappropriate. 'If you can meet with triumph and disaster and treat those two impostors just the same....'

vii. It should encourage the combination of training with natural 'flair'

Team games give innumerable opportunities for children to demonstrate both obedience and faith. Obedience is replicating set patterns of play, practiced on the training ground, and faith is shown in experimenting, taking risks and exhibiting natural flair.

Dangers of Competition

Despite all the benefits described above, competitive games are not without their drawbacks. They are the arena for the display both of the best and of the worst character attributes. They can also lead to unpleasant side-effects, which need to be guarded against. 'The foxes do not have to be very large before they can spoil the vine.' **(Song of Solomon 2:15).**

1. The development of an overly competitive spirit in children

The main virtue of competitive sport is what is achieved through participation (outlined above). The development of a 'competitive spirit' is not the object, but unfortunately often results. Good sportsmen are in danger of becoming competitive inappropriately: in class, in their friendships, in seeking a position, in always wanting to be first.

A few suggestions as to how to combat these dangers might be useful: -

- a) Emphasize the value of goal-setting in life above the concept of defeating others.
- b) Keep emphasizing the virtues of competitive sport. A useful little motto is:
 - Without fuss,
 - Within the rules,
 - With each other,

This covers issues such as no over-reacting to success, to failure, or to the referee; playing according to the rules and to the coach's instructions and playing as a team.

- c) Keep emphasizing the enjoyable aspects of sport. Winning merely adds to the enjoyment, it is not the sole reason for enjoying a game.

2. The elevation of sport above other aspects of school life.

This is a very real long-term danger which for many years was an unfortunate feature in many grammar and public schools. To combat this, constantly place athletic ability as a God-given gift of equal value to intellectual, musical and artistic abilities. Perhaps regular displays of artwork, musical items in assemblies, public recognition of good and improved grades alongside publication of sports results would even things out.

3. The elevation of sport in a child's life above his/her relationship with God.

This is a very reasonable fear for Christian parents, particularly in this age of saturation television coverage of sport. A few comments might help.

- a) The same fear applies to many other aspects of life: music, friendships, any consuming interest or hobby. Promotion of the wisdom given in **Matthew 6:33** would seem to be relevant 'Seek first his kingdom and His righteousness, and all these things will be given to you as well.'
- b) The denial of opportunity to play competitive sport will only breed frustration or resentment amongst the athletically inclined. Some outlet needs to be found. **Colossians 3:21** is perhaps relevant to parents.
- c) Moderation in all things. A constant reminder needs to be given that although God may call some to be professional sportsmen or women, it will not be many. And anyway, there is more to life than football.

4. The detrimental effect on the less physically able.

A very real issue, so how do we help them?

- a) For those whose co-ordination and physical abilities are of a particularly low level, another activity (possibly swimming) could be suggested, although the parents would probably have to take responsibility for this.
 - For the willing, but poorly coordinated
 - Regularly emphasize their other strengths, occasionally publicly
 - In training, pair them up with others of a similar standard
 - In practice games, avoid putting all the weaker players on the same side. Consistently emphasize their part in team sports
 - Occasionally give them administrative tasks, i.e. time-keeping
- b) The Key is regular communication which:
 - Shows recognition that their real strengths lie elsewhere
 - Commends their moments of success (without being patronizing)

5. Those who are less able in competitive sports might well shine in Dance or Gymnastics. (see Display)

School Matches

As a school, we will be looking to develop our fixtures list to provide even competition with other local schools, within the constraints imposed by the timetable, transport and finances. For boys this will be in football, rugby and, possibly, basketball. For girls this will be in hockey, netball and, possibly, rounders and tennis. There may also be scope for the development of teams competing in leagues at weekends. For both boys and girls, the Christian Schools Athletics Meeting at Southampton in July each year provides an excellent focal point for the summer term.

2. Display

As something of a balance to competitive sports, it would seem that there is a place for combining physical activity with a more creative element. For girls this would be through Dance, and for boys through Gymnastics. In both areas there is scope for improvisation and the construction of their own sequences, while there is also a need for specific instruction in certain steps and movements. There are a number of benefits in promoting both activities, with only two obvious dangers.

1. Benefits of display

It makes room for creativity

In dance there is plenty of scope for the interpretation of music and mood through movement, as well as room for simple mime work. There may also be links with school plays that are being performed. In Gymnastics, children enjoy developing their own sequence of movements individually, in pairs and in groups.

It highlights the virtue of practice

Good displays need a lot of practice and improve as a result. Perfection is not the final goal but putting on a reasonable show should be.

It should promote teamwork

Dance and Gymnastics give room for both individual and group expression in different ways to team sports. In some ways the reliance on team members is greater, particularly if lifting is involved.

It provides a challenge

The goal of public performance gives focus, as well as being a spur towards achieving as high a standard as is reasonable. It also provides children with a golden opportunity to overcome self-consciousness.

It combines sensitivity with strength

Both activities require a certain level of physical fitness and strength, but also call for sensitivity and delicate balance; qualities not always evident on the games field!

It provides opportunities for the non-games player

For both girls and boys, an individual who appears clumsy in ball games can be surprisingly graceful or well-balanced in Dance or Gymnastics. Equally, the star games player can suddenly feel like a fish out of water in the gym. Not that this needs to be pointed out, but it does help him or her to understand the non-games player's struggles during games lessons.

Dangers of display

Safety

In Gymnastics the danger of an accident is probably nearer than in any other sport, because awkward landings seem fairly common. Sensible pairings and good discipline are the best safety measures, as well as early spotting of outrageous and potentially dangerous improvisations.

The display can exalt its participants

Any display, by its very nature, attracts attention and is therefore open to a 'look at me' mentality (**Romans 12:3**). Dance can more easily be 'to the Lord' than Gymnastics and, as such, is an obvious means of worship (**Exodus 15:20-21**). As far as Gymnastics is concerned, the more the focus is on what the group can accomplish together the better, rather than on what the individual can do. The exception to this is the non-games player who suddenly comes into his/her own when demonstrating a complicated movement, and who would probably benefit from a good dose of public affirmation.

Learning for Life

Having outlined in some detail what we seek to achieve in Physical Education, we now need to consider how we intend to deliver this within the constraints of the school timetable.

1. Timetable

All pupils in Y7 – Y11 have two sessions per week allocated to Physical Education. These sessions are of 1.25 hours and 1.5 hours respectively (including time for changing and any transportation necessary).

2. Competitive Sports

To achieve our goals of raising the standard of selected sports in the school, and thereby reaping the benefits of competitive sports, as described above, realistically we need to give both sessions to competitive sports as opposed to allocating one of the two sessions to general P.E. If we only give one session we will not see a significant improvement in standards, and neither will we be able to compete on equal terms with local schools. To this end, all boys will do rugby in the Autumn Term and football in the Spring Term, thus corresponding with what other schools in the area are doing. In the same way, the girls will do hockey in the Autumn Term and netball in the Spring Term. As far as the Summer Term is concerned, a little more flexibility is possible. The focus for all pupils will be athletics. During their other session I would suggest Basketball for all boys, with scope for extra athletics practice if needed for training towards the Southampton meeting, or for individuals close to being able to achieve the next award in the Five Star Award Scheme. The Y7 – Y8 girls could play Rounders, and the Y9 – Y11 girls could play Tennis, assuming we have sufficient teaching staff. The girls also could do some extra athletics as outlined for the boys, above.

Our Physical Education Programme in the Senior School will therefore look like this:

	Boys (Y7 – Y11)	Girls (Y7 – Y8)	Girls (Y9 – Y11)
Autumn Term	Rugby	Hockey	Hockey
Spring Term	Football	Netball	Netball
Summer Term	Basketball & Athletics	Rounders & Athletics	Tennis & Athletics

3. Display

If we are to make progress with competitive sports there is, unfortunately, no room on the timetable for regular Dance and Gymnastics. We need, therefore, to set up as soon as possible a Dance and Gymnastics club for those interested, meeting during a lunch hour. In addition, when the weather is wet, I suggest that we seek to put on introductory sessions in Dance and/or Gymnastics.

4. Outdoor Pursuits

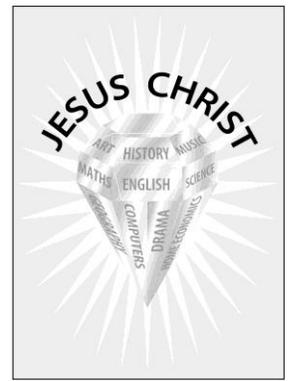
For Y7 and Y8 we need to seek opportunities to provide taster sessions in activities such as Abseiling, Rock-climbing, Canoeing, Sailing, etc. For Y9 – Y11 we need to seek to work towards setting up the Duke of Edinburgh's Award Scheme.

5. GCSE P.E.

In years 10 and 11 we offer a GCSE in P.E. through the Midland Examining Group. This enables those with a particular interest in sport to study the theoretical side of P.E. (40% of final mark) and to improve their standards in four particular activities (60% of the final mark). At present the sports being studied are Football (boys) or Hockey (girls) plus Badminton, Orienteering, and Track and Field Athletics. All students work on these four sports. At some time in the future it might be possible to extend the range of activities so that there is a greater element of choice.

RESOURCES

Refer to 'Towards a Christian Curriculum' by Barbara Lord



Science

Science reveals God the creator and His creation.

Psalm 24:1 'The earth is the Lord's and the fullness thereof.'

This profound statement shows God's supreme ownership and knowledge of every aspect and function of our world. God created the world in the beginning and the force of His power and the energy of the Holy Spirit brought forth life and the world we know. God created order and structure, from the smallest atom in each element to the infinity of His universe. Even in our lives, He tells us 'not to despise the day of small beginnings' and not to limit Him, for 'with God all things are possible'.

Science is the study of the wonders of creation in order to enhance our worship of the creator and our knowledge of His creation.

- 'For since the creation of the world God's invisible qualities – His eternal power and divine nature – have been clearly seen, being understood from what has been made.' **Romans 1:20**
- 'Great are the works of the Lord; they are pondered by all who delight in them.' **Psalm 111:2**
- 'The Son is the radiance of God's glory and the exact representation of His being, sustaining all things by His powerful word.' **Hebrews 1:3**

God never changes and all the wisdom and knowledge we have today in the laws of chemistry, physics and biology are still held together by the Word of God.

Science is the study of creation to equip us to steward and rule, as God has commanded.

- 'God said to them.... fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground.' **Genesis 1:28**

Aims

- Through observation and demonstration to unfold the mysteries of creation, its laws and the principles of its properties.
- To learn that it is because of God's steadfast nature, that man can hypothesize and experiment.
- To learn humility in approaching the vastness of the scientific unknown compared to the amount so far revealed to man.
- To have our eyes (and our spirits) opened to the vastness and wonder of God's creation.
- To have our understanding of creation developed, to enable us to steward the rule of it more effectively.

Sample Science Curriculum

Truth to Teach

'The heavens declare the glory of God; the skies proclaim the work of His hands.' **Psalm 19:1**

Way to Work

1. Through observation and demonstration to unfold the mysteries of creation's order, its laws and its characteristics.
2. To learn that everything has a place and a purpose within God's creation.
3. To learn humility in approaching the vastness of the scientific knowledge unknown compared to the amount so far revealed to man.

Learning for Life

1. To have had our eyes opened to the vastness, wonder and systematic order of God's creation.
2. To understand more of God, through the study of His creation.
3. To be willing, if so gifted, to serve God and mankind through the use of existing scientific knowledge.
4. To be willing, if so gifted, to be used by God to reveal and proclaim more of the unknown creation; wherever possible for the well-being and service of mankind.
5. To recognize that science has only a limited place in knowledge and should never become the ultimate authority in our lives and that life is God's to give and take away.
6. To be equipped to take up our role as caretakers of our planet.

Objectives

1. To enhance worship of the Creator through understanding of creation.
2. To encourage a right attitude to creation.
3. To enable pupils to rule and reign more effectively in their own lives.
4. To prepare pupils for life in today's technologically oriented society and to provide a basis for further study of science where appropriate.
5. To stimulate curiosity, interest and enjoyment of science and nature.
6. To enable pupils to realize the usefulness and limitations of scientific knowledge and methods.
7. To encourage and develop the ability to solve problems.
8. To encourage and develop team qualities, including leadership qualities where appropriate.
9. To develop skills and abilities relevant to the study of science.
10. To train pupils to make and record observations accurately and in the necessary detail.
11. To train in safe practice.
12. To encourage pupils to question the effects and methods of science.
13. To develop the ability to explain observations.
14. To develop the ability to analyse given data and to propose and test hypotheses derived from this data.

Ecology

Creation

God created a world which is finely balanced, where living things are dependent on each other and need each other to maintain the balance of life.

Fall

Through greed, ignorance and a lust for power people have altered the balance and put the world and things in it in jeopardy.

Redemption

How can we be good stewards of God's creation? How can we rectify the problems we face or at least limit their effect?

Energy

Creation

God's creation was planned to provide for all our physical needs at the time of creation.

Energy cannot be created on earth, only transferred from one form to another, and ultimately becomes heat energy.

Fall

People, particularly in the western world, are using up energy resources very quickly as we look for a more comfortable life, with little regard for those in less well-off countries or for the long-term prospects for our world.

Redemption

We need to learn to use energy resources with care, without waste, thinking of the needs of others in the future as well as ours today.

Health

Creation

God created man in His own image. Our bodies are the temple of the Holy Spirit.

Fall

Disease came into the world through sin. God's plan to redeem His creation will ultimately rule out sickness, but in the meantime, all of us are, and will be, affected by disease in one form or another.

Redemption

In order to keep disease at bay, we need to understand how our bodies work and what can cause them to go wrong. We also need to be disciplined about how we use them and understand that how we behave can lead others to sin.

Elements, Mixtures and Compounds

Creation

The pattern of the building blocks of God's creation shows a definite order, both concerning the atomic structure and the behaviour of the elements. Finding out more about these patterns shows us more about God's nature.

Fall

Some aspects of atomic structure have been abused, particularly in the use of atomic power (fission) for mass destruction. People now live under the threat of annihilation as a result of a few people in a few moments.

Redemption

Science and scientists need to be supervised with God's wisdom and understanding and care must be taken to consider long term consequences of our intended use of His building blocks.

Light/Sound

Creation

Light and sound are the primary means God gave us to communicate. Without light and sound we become isolated and helpless.

Fall

The media of music, television, radio, magazines etc. can and often do use light and sound to promote materialism, greed, pornography to name but a few things – Satan's territory.

Redemption

Light and sound can also be used to reflect God's glory and bring people to God. As Christians we are light in the darkness and should not be afraid to demonstrate an alternative.

Matter

Creation

God's plan for creation allows for different processes essential to life because the transportation of different substances to enable chemical reactions require that these substances have different forms e.g. if air was solid how would it move or breathe? If water was solid how would it reach the roots and be absorbed into the plants? If wood was liquid how would we make a wooden stool? How could the water-cycle work if water could not take different forms? Three states of matter allow for all the processes to take place.

Fall

People have used the theory of different states particularly that of gases, to create weapons that can affect people and animals. These weapons do not give people a chance to defend themselves but nor do they adversely affect the environment.

Redemption

We need to encourage a wholesome use of the materials God has given us to do what we can to make people safer and better able to use their environment.

Quotes on Sir Isaac Newton – great British Scientist

'Sir Isaac Newton was finally persuaded of the existence of a God, by which he understood not only an infinite, omnipotent and creating being, but moreover a master who has made a relation between Himself and His creatures.' Voltaire

Newton believed: 'It was a religious duty of the scientist, who was capable of unraveling the wonders of God's creation, to reveal them to mankind. If the scientist failed to acquit himself of this task, he was denying God one form of adoration.'

Science for him was a way of knowing his Father God was a Lord, a master to be obeyed, not simply a metaphysical entity or a principle arrived at by ransoming.

Extracts from 'A Portrait of Isaac Newton' by Frank E. Manuel

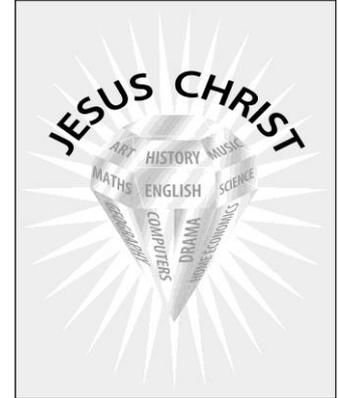
Resources

Refer to 'Towards a Christian Curriculum' by Barbara Lord

"Faith in Science" by Dr. Arthur Jones

'Guidelines to teaching Science from a Christian perspective' by Polly Bolton

A Christian Approach to Teaching National Curriculum Science in Primary Schools



Who is this for?

This document is designed for primary teachers or student teachers who wish to understand more about the National Curriculum for Science (2000). This should help the reader to acknowledge potential bias towards secular objectives, and also highlight opportunities for teaching Christian principles, in the National Curriculum. I hope that it will also provide a basis upon which planning can be supported for anyone seeking to involve Christian principles in their teaching of National Curriculum Science.

Science

I love Science. Why? Because the subject reveals so much about God. Simplistic, yes, but true nevertheless. Children can develop a love and worship of God through a love for Science.

On the introductory pages of the NC document for Science, is this quote by Colin Tudge:

‘Science does not tell us everything that we want to know about life. But it does provide us with the most robust information about the way the universe works that has so far become available to us.’

Here we find both a helpful admission and a profound omission of the ability that God has to inspire revelation and scientific thought. Science does not tell us everything, although some have deified science to a position of almost absolute authority. As Christians we must believe that understanding the ‘way the universe works’ is more than purely a scientific discipline, no matter how robust the information Science provides.

Johannes Kepler (1571-1630), who was one of the first to postulate laws that governed the motion of planets, stated:

‘Science is thinking God’s thoughts after Him.’

It is indeed the study of the lawfulness of creation and moreover of the Creator who faithfully upholds and governs His creation. He can and does ‘break the rules’ from time to time, with supernatural acts, to which cold Science can only offer a view of unbelief. Science can only ever be our best human effort to comprehend God’s creation and to articulate the current understanding in human language. Theories are always fallible and in need of correction. And yet we can, and do, engage with a real, knowable, universe, which can augment our worship, aid our ability to steward His creation and, hopefully, point us towards the Creator. A much fuller discussion of some of these issues can be found in Arthur Jones ‘Science and Faith’ and Bolton & Lord’s ‘Towards a Biblical Framework for Curriculum Development’ (Available from CST).

Worldviews

All human beings have a worldview. This has a profound effect upon their ability to apply knowledge, skills and understanding to everyday life and work. The National Curriculum is based upon a secular humanistic worldview, which has many elements that are contrary to Christian teaching.

To a humanist there is no God, and therefore the universe exists in isolation. Human beings and rationality is what we should put our faith in (and even worship). The material, observable world is the only reality we can depend on. The reason why we exist on planet Earth is because of random events and chance. Therefore, each person is of relative insignificance. Our purpose is to understand and explore the world and the universe for the sake of our own progress and evolution. The belief is that all the problems of the world could eventually be solved through Science and Technology. This view of the world has a subtle yet powerful effect that often enters our understanding unconsciously and militates against a full acceptance of the truths of Christianity.

To a Christian, God is the creator of the universe and is intimately involved in every aspect of nature, especially people who are all made in His image. Human beings can know and put their faith in God, by trusting in Jesus Christ, and giving their lives to serve Him and His purposes. The reason we exist is to further His glory, kingdom and work on this Earth. Each person is therefore of infinite value. Because human beings have chosen to live without God, the creation is corrupted, including the humans themselves. Jesus can give new life to individuals, giving them motivation and ability to steward this world in the present, and hope that God Himself will in the future make everything new, perfecting the creation He has made. This godly view of the world can be seen in contrast to the lies of secular thinking, and therefore should encourage the teacher to find opportunities to discover the distinctive nature of Christian education.

Distinctives for a Christian Approach to Science Teaching

Bolton and Lord have produced a comprehensive and well reasoned list of those aims which are distinctive from those of a secular education system. They have arrived at 14 areas for promotion and 10 areas to “combat, challenge or expose”. I would recommend a detailed study of their thought process before accepting these, but I do believe each one can be helpfully included in the teaching of the state NC and can help the Christian teacher to purify the aims of their Science lessons.

Fig. 1

Bolton and Lord's Distinctives

To Promote:

1. God as the **source** of all.
2. A sense of awe and **wonder**, which contributes to a **worship** of the Creator God.
3. An understanding of the **diversity** within the **unity** of creation.
4. An understanding of the **roles** of created things and their **interrelationships**.
5. An appreciation of the **order, design and purpose** in creation (including analogies).
6. An appreciation of the fact that scientific laws and theories are not human inventions but an expression of **God's faithfulness**.
7. A **top-down**, holistic approach to any topic studies (rather than a reductionist approach).
8. The role of humans as responsible **stewards** of God's creation.
9. Responsible technology and science which can be a means of **Christian service**.
10. An understanding that science can be performed in **obedience** or disobedience to God.
11. A **balanced use of faculties** in enquiry and response e.g. memory and intuition as well as rationality.
12. An awareness of how the **worldviews** of scientists affect their science.
13. Science that is **culturally sensitive** and relevant (this also affects question raising).
14. A **global** perspective on any given topic (e.g. relevance to the third world).

To Combat, Challenge or Expose:

15. The **autonomy** of science- the idea that science is unrelated to a creator God and to any other areas of life such as politics, law and the arts.
16. The **deification** of science- the idea that science is the only way to true knowledge.
17. The idea that, given enough time and money, science can **solve all our problems**.
18. The supposed moral and spiritual **neutrality** of science- the idea that science does not convey any values, only facts.
19. The supposed **superiority** of western culture and rational thought.
20. The **hidden values** and worldviews implicit in the national curriculum and text books.
21. **Stereotyping** of race, sex, age, class and status.
22. Any **denigration of other subjects** or areas of life.
23. **Evolutionary ideas** and language.
24. A bottom-up (**reductionist**) approach to any topic.

The National Curriculum

Produced by a long process of review and discussion among secular educationalists, the National Curriculum has improved the content, continuity and quality of teaching across the country. Many see it as a positive step forward from the wide range of approaches to curriculum adopted previously. Much of the content seems at first glance to be sound, however the worldview behind the document is one of training children to be productive members of society who are self-sufficient, well educated, citizens, who will improve the status of our market run economy by their contribution. I have deliberately phrased the preceding sentence to stir a question or two. My experience of state schools has demonstrated to me that much more than this really occurs and that a love for children, and God, does play a vital role in many state learning communities. However, without God at the centre of curriculum, the teacher will always lack the most valuable purpose and inspiration.

The National Curriculum (NC) Science section is separated into *Key Stage 1* (YR-Y2) and *Key Stage 2* (Y3-Y6), with each section divided into Sc1- *Scientific enquiry*, Sc2- *Life processes and living things*, Sc3- *Materials and their properties* and Sc4- *Physical processes*. There is a list of learning targets under each heading, with a closing statement about *Breadth of Study*. Finally, there are a list of level statements (from 1-6) for the purpose of assessment. These will each be dealt with separately.

One of the distinctives alluded to by Bolton and Lord is that a Christian view of education should be truly holistic. Science itself has become a segment of necessary learning, and each aspect of scientific study is further reduced to more manageable parts. However, this has arisen from a reductionist approach which says that the best learning comes through understanding the smaller parts first. The whole is merely the sum of its parts. A truly godly holistic view addresses the interrelated parts of a topic and holds them in balance together, through keeping God at the centre of the learning. Wider applications of learning, and relevant application to the learner's world are therefore an essential part of the teaching rather than an added extra.

An example could be seen in learning about the names of the parts of a flower. Learning which part of the stamen is the anther, is a small piece of information. Seen in the context of understanding how God's created world has plants which have wonderfully intricate processes of reproduction, can bring much more meaning and wider learning. The reduced level of merely learning scientific vocabulary can be broadened into greater understanding of God and His world.

The way that subjects themselves have been separated from one another is another example of how the reductionist approach has dissected learning into individual segments. Care should be taken to combine and integrate teaching across conventional subject areas, to ensure that broader more holistic learning takes place. Studies on 'water' for example can encompass far more than Science and Geography alone. Measuring water, writing about water, artistic uses of water and depicting water are all potential ways of making the study more holistic. Teaching of topics and themes should be encouraged, even if it can be harder to link together the targets which need to be taught, from a subject partitioned set of aims. Timetables, teachers and curriculum are usually divided into subjects for ease and manageability; however, awareness of the importance of holistic teaching can prevent us from falling into the dangers of reductionism.

Critiquing the National Curriculum

Every Christian who comes to look at how they can effectively teach about God, will see different opportunities in any given situation. Such is the richness of God's diverse family. As each teacher prayerfully looks at the subject matter of their teaching, a variety of methods and angles of approach will become apparent. I believe strongly that each teacher needs to prayerfully engage in planning before commencing teaching. Using many of the ideas shown in Figure 1. I will endeavour to highlight some opportunities for Christian content, and where there seem to be opportunities for the seeds of secular thinking to take root.

This is *by no means exhaustive* and is merely an initial attempt to stimulate thinking about how you could handle the NC objectives. Each teacher, class, school and Christian denomination has its own distinctive emphases, which are important to hold on to, and therefore each need to prayerfully consider how to use the document.

KS1 Sc1-Scientific Enquiry

Comment: The ability to think in a particular way is what is being taught through Sc1. It is important to recognize at the outset that this ability to think scientifically can be useful, however even if I, "can fathom all mysteries and knowledge" If I have not love I am nothing. (1 Corinthians 13 v 2). The book of Ecclesiastes is full of observations, tests and results, but its final conclusion is "Fear God" (Ecclesiastes 12 v 13).

Ideas and Evidence in Science

- 1) Pupils should be taught that it is important to collect evidence by making observations and measurements when trying to answer a question.

*Comment: For younger children, God's ability to help should be encouraged to avoid the independence and pride that could be engendered at an early stage. One could highlight the limitations of science against the unlimited God we worship e.g. We can't measure God's love for us. Passages that encourage people to look/observe the world can be used to keep a godly perspective on observation and evidence itself e.g. **Matthew 6 v 26; Proverbs 26 v 20***

Investigative Skills

- 2) Pupils should be taught to:

Planning

Comment: All planning should be subject to God and His wisdom. (Proverbs 16 v 9; 12 v 5) As we are created in His image we do have this ability ourselves, at a level greater than that of animals.

- a) Ask questions [for example, 'How?', 'Why?', 'What will happen if ... ?] and decide how they might find answers to them.

Comment: Children need to be encouraged to ask questions as part of the learning process as a disciple or student. Linking 'asking' with prayer and communication with God is helpful here, to avoid the emphasis on independence in finding answers. (Genesis 3 v 6)

b) Use firsthand experience and simple information sources to answer questions.

Comment: Testimony and experience help us answer questions, however the Word of God governs what is learnt through such experience. (2 Timothy 3 v 16)

c) Think about what might happen before deciding what to do.

Comment: Much of the Created world is predictable, but not all that exists! God is also mysterious, and infinitely so. (Isaiah 40 v 28) Consequential thinking is an aspect of wisdom and is godly, but decision making without God is ultimately relying on yourself.

d) Recognize when a test or comparison is unfair.

Comment: God is just and righteous. In scientific work children (and teachers) should be honest in testing fairly in seeking to answer a question. This can lead into considering good discernment.

Obtaining and Presenting Evidence

e) Follow simple instructions to control the risks to themselves and to others.

Comment: The concept of obedience is important here. Younger children will need to obey for reasons both understood and unknown, as they will have to in the Christian life in relationship to Father God. This is important for safety of themselves and others. (Deuteronomy 28)

f) Explore, using the senses of sight, hearing, smell, touch and taste as appropriate, and make and record observations and measurements.

Comment: We use our senses to 'know' however some things may not be wise to explore (the occult, human embryos, tasting bleach!). We are called to be innocent about some things. (Romans 16 v 19) All exploration should be with God and with godly motivation, therefore using our faculties in wise ways. Using our senses is an opportunity for developing gratitude, wonder and worship of God. (Psalm 139 v 14) Beyond this it is important to understand that some aspects of creation are mostly unobservable e.g. spiritual realms. (Revelation 4)

g) Communicate what happened in a variety of ways, including using ICT [for example, in speech and writing, by drawings, tables, block graphs and pictograms].

Comment: God wants to communicate with people in a variety of ways, and this target for children can reflect His desire.

Considering Evidence and Evaluating

Comment: Evaluating should be encouraged as an important thinking and learning process as a disciple. Comparing the outcomes of activities can help children to be spiritually contemplative. (Hebrews 13 v 7)

h) Make simple comparisons [for example, hand span, shoe size] and identify simple patterns or associations.

Comment: Comparing is a godly thought process, an aspect of wisdom. It helps us not only to understand the lawfulness of Creation, but godly and ungodly actions. (Luke 13 v 20; Isaiah 40 v 18)

i) Compare what happened with what they expected would happen, and try to explain it, drawing on their knowledge and understanding.

Comment: The value of teachers and scientists who have already discovered scientific facts, and that we can trust others, could be included here so that reliance on self alone is not encouraged. Knowing that you can trust others even when what is observed seems to contradict a learning target is better than fudging experiments to prove a point. Finding reasons for mistakes and learning from them is also an important aspect of the discipling process.

j) Review their work and explain what they did to others.

Comment: As in other areas of the curriculum, the ability to communicate effectively with others, as God can, could be considered here. Reviewing is important with the purpose to remind children of what has been learnt, confirm facts to long-term memory and to find ways to improve testing. (Luke 10 v 17-21)

Sc2- Life Processes and Living Things

Life Processes

Comment: God is the source of life and this needs to be included for a fully Christian perspective to be brought to bear here. (Genesis 1 v1) The belief that there is also soul/spiritual life for humans and that this comes from God who is also alive and is Spirit. (2 Corinthians 3 v 17)

1) Pupils should be taught:

a) The differences between things that are living and things that have never been alive.

Comment: God's breath is what has given human beings life. (Genesis 2 v 7) There are also other spiritual beings that exist but are usually invisible. (Hebrews 12 v 22)

b) That animals, including humans, move, feed, grow, use their senses and reproduce.

Comment: The spiritual life that is invisible also has the opportunity to demonstrate that it is alive, with God's power, resulting in 'movement', 'growth', 'reproducing life in others' etc... (Romans 8 v10)

c) To relate life processes to animals and plants found in the local environment.

Comment: Younger children need to have this opportunity to wonder and worship in God's creation, and to see it where they are. (Jeremiah 1 v 11; Job 39)

Humans and Other Animals

2) Pupils should be taught:

a) To recognize and compare the main external parts of the bodies of humans and other animals.

Comment: The similarities between humans and other living things should not lead the child to a belief that we are the same as animals. Human beings have a higher role, ability to choose and opportunity to relate to God, as they are made in His image. The uniqueness of human beings may need to be covered as a separate topic. (Genesis 1 v 27-30)

b) That humans and other animals need food and water to stay alive.

Comment: There is a link here between the Word and the Spirit as food and water for our spiritual life. (John 6 v 51) Life for humans is more than just the body.

c) That taking exercise and eating the right types and amounts of food help humans to keep healthy.

Comment: Being a good steward involves us looking after our bodies and our spirit, so we are completely healthy. (1 Timothy 4 v 8) God is the one who allows us to be healed miraculously and has made our bodies in amazing ways so that it can heal itself.

d) About the role of drugs as medicines.

Comment: Wisdom in knowing what to explore, as seen in Sc1 (2e), comes in here, along with the wonder of God having given wisdom to those who have developed medicines.

e) How to treat animals with care and sensitivity.

Comment: Stewarding God's world well is important as part of God's plan for creation. (Genesis 2 v 15) The topic of pets can be integrated at this point. (Proverbs 12 v 10)

f) That humans and other animals can produce offspring and that these offspring grow into adults.

Comment: God's plan for creation has always been multiplication. (Genesis 1 v22) He also desires for us to mature in our spiritual growth. (Hebrews 5 v 12-14)

About the senses that enable humans and other animals to be aware of the world around them.

Comment: Using our senses is an opportunity for developing gratitude, wonder and worship of God. (Psalm 139 v 14) However, there is also more to the world than what we can sense with our body, i.e. the spiritual dimension.

Green Plants

3) Pupils should be taught:

a) To recognize that plants need light and water to grow.

Comment: God has made aspects of creation in interdependent relationships. The Sun is needed for life. Analogies with spiritual life can be made here. (Psalm 1)

b) To recognise and name the leaf, flower, stem and root of flowering plants.

Comment: Knowledge of language so we can communicate and understand, is part of God's plan for us to mature.

c) That seeds grow into flowering plants.

Comment: Many biblical passages use seeds to describe a Christian principle. (Mark 4; John 12 v 24; 1 Corinthians 9 v 11) Understanding and appreciating creation helps us to understand and worship God. (Romans 1 v 20)

Variation and Classification

4) Pupils should be taught to:

a) Recognise similarities and differences between themselves and others, and to treat others with sensitivity.

Comment: God has created a world of variety. Diversity and the interrelationship between the living things, is part of God's plan. This has many implications for classroom conduct. We need to learn to accept and value difference.

b) Group living things according to observable similarities and differences.

Comment: Being able to group and sort is a valuable skill that can be used to serve God and others and reflects God's original classification in creation. (1 Kings 4 v 33)

Living Things in Their Environment

5) Pupils should be taught to:

a) Find out about the different kinds of plants and animals in the local environment.

Comment: Younger children need to have this opportunity to wonder and worship in God's creation, and to see it where they live and learn. (Jeremiah 1 v 11; Job 39)

b) Identify similarities and differences between local environments and ways in which these affect animals and plants that are found there.

Comment: Here are the seeds of evolutionary thinking and that species can be changed due to the environmental conditions. The belief that God has designed creation, by whatever means, should be encouraged even at this early stage. The environment's effects must be seen as part of God's working. (Jeremiah 8 v 7)

c) Care for the environment.

Comment: Stewarding God's world well is important as part of God's plan for creation. (Genesis 2 v 15)

Sc3- Materials and Their Properties

Grouping Materials

1) Pupils should be taught to:

a) Use their senses to explore and recognise the similarities and differences between materials.

Comment: A clear opportunity to worship as a result of what we sense. The unity and diversity in non-living things can be highlighted.

b) Sort objects into groups on the basis of simple material properties [for example, roughness, hardness, shininess, ability to float, transparency and whether they are magnetic or nonmagnetic].

Comment: Being able to group and sort is a valuable skill that can be used to serve God and others (1 Kings 4 v 33)

c) Recognise and name common types of material [for example, metal, plastic, wood, paper, rock] and recognise that some of them are found naturally.

Comment: It is good to emphasize here that God is the provider, who has given all we need in His creation. (1 Timothy 6 v17)

d) Find out about the uses of a variety of materials [for example, glass, wood, wool] and how these are chosen for specific uses on the basis of their simple properties.

Comment: God uses the characteristics of creation to bring glory to Himself. Man can use the properties and characteristics of the created materials, to work as a craftsman/creator in His image. God guides us with His Spirit in the use of His materials. (Exodus 35 v 31-35) Understanding these materials help us to understand analogies e.g. the wise man built his house upon the rock!

Changing Materials

2) Pupils should be taught to:

a) Find out how the shapes of objects made from some materials can be changed by some processes, including squashing, bending, twisting and stretching.

b) Explore and describe the way some everyday materials [for example, water, chocolate, bread, clay] change when they are heated or cooled.

*Comment: As temperature and movement change materials, so can God change our lives as He wishes. (Jeremiah 18 v 5; Isaiah 64 v 8) **Emphasis should be given to the fact that God has given man the creative intelligence to make new materials (man-made).***

Sc4- Physical Processes

Electricity

1) Pupils should be taught:

- a) About everyday appliances that use electricity.
- b) About simple series circuits involving batteries, wires, bulbs and other components [for example, buzzers, motors].
- c) How a switch can be used to break a circuit.

Comment: The wonder of the power of electricity can be linked to the power of God (e.g. lightning). The ability to create light can be seen as a way to reflect our creator's creativity. Some materials are able to resist and some conduct the power; this can be used as an analogy for letting God's power work in us. (Job 38 v 35; Revelation 4 v 5; Luke 5 v 17)

Forces and Motion

2) Pupils should be taught:

- a) To find out about, and describe the movement of, familiar things [for example, cars going faster, slowing down, changing direction].
- b) That both pushes and pulls are examples of forces.
- c) To recognise that when things speed up, slow down or change direction, there is a cause [for example, a push or a pull].

Comment: The forces of good and evil in the world can be discussed here and the ability to overcome evil with good, as one force in nature overcomes another. The consequential thinking about cause and effect will develop children's thinking skills in ways that are helpful for future discipleship. The invisible forces of the wind, gravity and magnetism could be used to describe the invisible God. (Romans 12 v 21; Jonah 1 v 4)

Light and Sound

3) Pupils should be taught:

Light and Dark

- a) To identify different light sources, including the Sun.
- b) That darkness is the absence of light.

Comment: God created light in all its beauty. Many obvious scriptural analogies can be found to link in here, especially that light always overcomes darkness. (John 1; John 8 v 12) God creating the Sun should be introduced to young children (Genesis 1 v 14)

Making and Detecting Sounds

- c) That there are many kinds of sound and sources of sound.
- d) That sounds travel away from sources, getting fainter as they do so, and that they are heard when they enter the ear.

Comment: When we 'hear from' or 'listen to' God, there are a variety of ways for this to happen. Explanation that helps children avoid confusion about audibility of actually heard sounds, is helpful for younger children. God is the one who gives us the ability to make sounds and to listen. These abilities need to be governed with self-control. Classroom conduct can be discussed here. (Psalm 71 v 23; Ecclesiastes 9 v 17).

KS2

Sc1- Scientific Enquiry

Please read and consider the comments additional to the KS1 points for Sc1. This will help you see the progressive thinking in the NC, in teaching children towards a secular scientific thinking process as they mature.

Comment: The ability to think in a particular way is what is being taught through Sc1. It is important to recognise at the outset that this ability to think scientifically can be useful, however even if I, 'can fathom all mysteries and knowledge' If I have not love I am nothing. (1 Corinthians 13 v 2). The book of Ecclesiastes is full of observations, tests and results, but its final conclusion is 'Fear God' (Ecclesiastes 12 v 13).

Ideas and Evidence in Science

- 1) Pupils should be taught:
 - a) That science is about thinking creatively to try to explain how living and non-living things work, and to establish links between causes and effects [for example, Jenner's vaccination work].

Comment: It is good to make the link between creativity and scientific thinking. The Creator wants man to rule creation and man has creative ability because he is made in the image of the Creator. (Genesis 2 v 15) Seeking to understand cause and effect will help to develop consequential thinking. (Proverbs 6 v 6) God does inspire and give revelation through the Holy Spirit (John 16 v 13), and God-fearing scientists can be used as example here e.g. Newton. There are also worldviews that shape secular scientists' approaches e.g. the assumption that there is no God, and these should be recognised.

- b) That it is important to test ideas using evidence from observation and measurement.

Comment: A suitable scepticism and discernment of information, with the help of the Holy Spirit is key here. Honesty in looking at results and accuracy in measuring are godly principles (Deuteronomy 25 v 15). Without putting God 'to the test' we are still told to 'Test me in this,' with regards to tithing! (Malachi 3 v 10) Man's testing is of some value, but not every idea can be completely tested scientifically and responsible interpretation of scripture is of greater value for Christians. There is a place for faith! (Hebrews 11 v 6)

Investigative Skills

2) Pupils should be taught to:

Planning

Comment: All planning should be subject to God and His wisdom. (Proverbs 16 v 9; 12 v 5) As we are created in His image we do have this ability ourselves, at a level greater than that of animals. Planning is a godly activity! (Isaiah 46 v 10)

a) Ask questions that can be investigated scientifically and decide how to find answers.

Comment: The scientific investigator can discover much, but without God the answers have less meaning. Asking questions should be encouraged, but knowledge without God should not. (Genesis 3 v 6) Interest in creation and the wonder of it can be encouraged through questioning. This can then lead to worship.

b) Consider what sources of information, including first-hand experience and a range of other sources, they will use to answer questions.

Comment: As a source of information, the Bible is fundamental to a Christian. Faith in others as well as in God can be considered here. The thinking process in having a rational faith involves a range of sources (scripture, those we trust, faith) of which firsthand experience is important. (1 Timothy 3 v 16; 1 Timothy 2 v 7)

c) Think about what might happen or try things out when deciding what to do, what kind of evidence to collect, and what equipment and materials to use.

Comment: Children should be encouraged to investigate and experiment for themselves, so long as this does not lead to the assumption that everything can be tested and proved in this way. Many good thinking skills are included in this target which are good for discipling as well as good science. The use of personal gifting as part of their equipment is possible here, developing concepts of our interdependence. (1 Corinthians 12)

d) Make a fair test or comparison by changing one factor and observing or measuring the effect while keeping other factors the same.

Comment: The justice and fairness of God can be highlighted here, in considering the 'fair test'. Again, the ability to discover through fair testing, balanced with an understanding of the limitations of such discovery, can maintain an attitude of humility and wonder before the infinite God, rather than pride in the scientific process.

Obtaining and Presenting Evidence

e) Use simple equipment and materials appropriately and take action to control risks.

Comment: Responsible, faithful, careful use of equipment is part of good stewardship of what God has given us to use. Being faithful and safe with the small and simple equipment can be linked to the use of talents. (Matthew 25 v 21)

f) Make systematic observations and measurements, including the use of ICT for datalogging.

Comment: Again, it is important to do this without losing the wonder of the things being studied. Also, the teacher should counteract the belief that this work can result in all questions being answered. Using the best methods is about using the best tools for the job. (Ephesians 6 v 10-18) Also we can develop from this target the understanding that God purposefully records some things and others He 'forgets'. (Revelation 20 v 12) Furthermore, detailed observations can lead us to a greater understanding of God. (Psalm 37 v 25)

g) Check observations and measurements by repeating them where appropriate.

Comment: The lawful universe God has created does have predictability, which can lead us to understand His unchanging nature. However, in this fallen world there are flaws, as there can be in our own imperfect science work. Careful repetition can also be seen as part of learning good discipline.

h) Use a wide range of methods, including diagrams, drawings, tables, bar charts, line graphs and ICT, to communicate data in an appropriate and systematic manner.

Comment: God is a communicator and we too must learn to communicate effectively in a variety of ways (1 Corinthians 9 v 20). This can serve others well in their work and communicate to those with many different learning styles and preferences. (Matthew 23 v 11)

Considering Evidence and Evaluating

i) Make comparisons and identify simple patterns or associations in their own observations and measurements or other data.

Comment: Interpreting data can be a very subjective process even for the rational scientist and worldviews often give a bias to these interpretations. Involving honest, humble, prayerful consideration of data will help to reveal unbiased knowledge about Creation. (Colossians 2 v 3)

j) Use observations, measurements or other data to draw conclusions

Comment: Reaching conclusions is important to give practical use to knowledge, but some may be wrong. The limitations and value of human rationality can be highlighted here. (Ecclesiastes 12 v 13) Some conclusions about life and creation may come from unobservable truths.

k) Decide whether these conclusions agree with any prediction made and/or whether they enable further predictions to be made.

Comment: The value of teachers and scientists who have already discovered scientific facts, and that we can trust others, could be included here so that reliance on self alone is not encouraged. Knowing that you can trust others even when what is observed seems to contradict a learning target is better than fudging experiments to prove a point. Finding reasons for mistakes and learning from them is also an important aspect of the discipling process.

l) Use their scientific knowledge and understanding to explain observations, measurements or other data or conclusions.

Comment: Not everything is explainable through scientific knowledge, which can be deified in western society. The place of faith and revelation from the Holy Spirit, alongside rational thought is important in coming to any conclusions.

m) Review their work and the work of others and describe its significance and limitations.

Comment: The belief that all problems can be solved eventually through science is a myth. Science and rational thought is valuable but limited. The significance of any work in Science should be reviewed from a prayerfully godly perspective. Faith in others' findings is part of life as well as science and the review process may lead to asking further questions. This should be approached not with frustration, but with wonder and worship in the infinite Creator God.

Sc2- Life Processes and Living Things

Please read and consider the comments additional to the KS1 points for Sc2. This will help you see the progressive thinking in the NC, in teaching children towards a secular scientific thinking process as they mature.

Life Processes

Comment: In KS2 as well as KS1, it should be regularly highlighted that God is the source of all life (Genesis 1 v 1). There are many opportunities throughout this work for worship to be integrated.

1) Pupils should be taught:

a) That the life processes common to humans and other animals include nutrition, movement, growth and reproduction.

*Comment: All living things are God's creatures, but man's role is significantly different, as is his spiritual ability to relate to God. The practical outworking of this, need to be integrated, for this to be seen in reality for older children. Man is made in the image of God, and therefore has special worth (**Genesis 1 v 26**). The uniqueness of human beings may need to be covered as a separate topic.*

b) That the life processes common to plants include growth, nutrition and reproduction.

*Comment: Links between biblical principles taught through parables about plants can be included here, as with subsequent objectives. The similarities between plants, may have first been written down by Solomon. (**1 Kings 4 v 33**) There is unity in the diversity.*

c) To make links between life processes in familiar animals and plants and the environments in which they are found.

*Comment: Knowing your local area, helps man to steward it effectively. This can also help children to look and meditate on creation around them, leading them to worship. This can be included as part of planned worship opportunities. **Psalms 104** is a good example of such worship.*

Humans and Other Animals

2) Pupils should be taught:

Nutrition

- a) About the functions and care of teeth.
- b) About the need for food for activity and growth, and about the importance of an adequate and varied diet for health.

Comment: Being wise with our bodies is part of stewarding ourselves well. Good health is not a concept that can be rightly understood, without understanding that the purpose of our life is to serve, and therefore glorify God. God's glory, rather than our own bodily glory, is the focus. We will however, be given perfected bodies in eternity.

(1 Corinthians 15) The link between food and scripture can also be made here. (See KS1)

Circulation

- c) That the heart acts as a pump to circulate the blood through vessels around the body, including through the lungs.
- d) About the effect of exercise and rest on pulse rate.

Comment: The biblical use of the word 'heart' (a place of desire, a frequently used concept) should be contrasted with the physiological, to help avoid confusion. (Ezekiel 36 v 26; Romans 10 v 1) Helpful analogies can also be made, in line with health.

(Proverbs 4 v 23) The increase in pulse rate due to emotions as well as exercise is also worth integrating. **(Job 37 v 1; Jeremiah 4 v 19)**

Movement

- e) That humans and some other animals have skeletons and muscles to support and protect their bodies and to help them to move.

Comment: Links with the interdependence of parts of the body and the 'body of Christ' are apparent here. (Ephesians 4 v 16; Colossians 2 v 14; 1 Corinthians 12)

Growth and Reproduction

- f) About the main stages of the human life cycle.

Comment: The Christian belief that life is more than our observable existence, needs to be covered here. Development and maturity are God's plan for us, spiritually as well as bodily (Hebrews 5 v 12-14). Childlikeness, however, is to be commended!

(Matthew 18 v 3) God is also positively involved in our life right from conception, and even before. **(Psalm 139 v 13; Ephesians 1 v 4-5)**

Health

- g) About the effects on the human body of tobacco, alcohol and other drugs, and how these relate to their personal health.
- h) About the importance of exercise for good health.

*Comment: Good health is linked to good stewardship of our bodies. (1 Corinthians 6 v 19-20; 1 Timothy 4 v 8). This honours God. (Also see comments on **Nutrition**)*

Green Plants

- 3) Pupils should be taught:

Growth and Nutrition

- a) The effect of light, air, water and temperature on plant growth.
- b) The role of the leaf in producing new material for growth.

Comment: Factors that affect growth can be linked with spiritual growth easily. (Revelation 22 v 1-2) The interdependence of animals on plants is worth inclusion, to maintain a holistic perspective. (Genesis 1 v 29-30)

- c) That the root anchors the plant, and that water and minerals are taken in through the root and transported through the stem to other parts of the plant.

Comment: Roots are often spoken of symbolically, and are seen as a life source, in many passages. (Job 18 v 16; Hosea 14 v 5-6)

Reproduction

- d) About the parts of the flower [for example, stigma, stamen, petal, sepal] and their role in the life cycle of flowering plants, including pollination, seed formation, seed dispersal and germination.

Comment: The wonder and miracle of reproduction in plants and animals reflects God's desire for multiplication. (Genesis 1 v 11-12) Understanding the vocabulary helps us to communicate about the detail of God's creation. Human reproduction is not mentioned in Sc2, but KS2 children will already have some knowledge of this. Therefore, it is important to consider carefully who will address this and when during the KS2 years. (1 Timothy 4 v 7; Proverbs 22 v 6; Ephesians 6 v 4)

Variation and Classification

4) Pupils should be taught:

- a) To make and use keys.
- b) How locally occurring animals and plants can be identified and assigned to groups.
- c) That the variety of plants and animals makes it important to identify them and assign them to groups.

Comment: Being able to group and sort is a valuable skill that can be used to serve God and others. (1 Kings 4 v 33; Judges 7 v 4) God's mandate to rule over creation is supported through being able to name the various plants and animals. We are still attempting to name and discover species, and this truth can lead us toward humility, worship, and an appreciation of God's infinitely creative power.

Living Things in Their Environment

5) Pupils should be taught:

- a) About ways in which living things and the environment need protection.

Comment: Almost any aspect of stewardship, servanthood or interdependence can be covered through this objective. A local and global perspective is most beneficial.

Adaptation

- b) About the different plants and animals found in different habitats.
- c) How animals and plants in two different habitats are suited to their environment.

Comment: Here are the seeds of evolutionary thinking and that species can be changed due to the environmental conditions. The belief that God has designed creation, by whatever means, should be encouraged especially at KS2. The environment's effects must be seen as part of God's ordered, not random, working. (Jeremiah 8 v 7) God has assigned places for his creatures. (Acts 17 v 26) As the topic of dinosaurs is of such interest to KS2 children, is strongly present in contemporary culture, and as the existence of dinosaurs is used as an argument for refuting scripture, a full understanding of theories about this issue need to be considered by the teacher. The choice to avoid or deal with this should be made consciously. I would suggest it should be dealt with within Sc2 or history work in KS2.

Feeding Relationships

- d) To use food chains to show feeding relationships in a habitat.
- e) About how nearly all food chains start with a green plant.

Comment: The interdependence of God's creation as part of God's order could be covered here. The concept of the fall could be linked in where it is noted that the feeding relationships have resulted in death/extinction or pollution has resulted in take up of toxins by plants and animals.

Micro-organisms

- f) That micro-organisms are living organisms that are often too small to be seen, and that they may be beneficial [for example, in the breakdown of waste, in making bread] or harmful [for example, in causing disease, in causing food to go mouldy].

Comment: Some things are small but have great power! Analogies with faith, words and sin are all possible here. Biblical references to yeast are also valuable.

(Luke 12 v 1; Luke 13 v 18-20; 1 Corinthians 5 v 6-8)

Sc3- Materials and Their Properties

Please read and consider the comments additional to the KS1 points for Sc3. This will help you see the progressive thinking in the NC, in teaching children towards a secular scientific thinking process as they mature. Much of this work is best taught in KS2 through investigations.

Grouping and Classifying Materials

- 1) Pupils should be taught:
- To compare everyday materials and objects on the basis of their material properties, including hardness, strength, flexibility and magnetic behaviour, and to relate these properties to everyday uses of the materials.
 - That some materials are better thermal insulators than others.
 - That some materials are better electrical conductors than others.
 - To describe and group rocks and soils on the basis of their characteristics, including appearance, texture and permeability.
 - To recognise differences between solids, liquids and gases, in terms of ease of flow and maintenance of shape and volume.

Comment: This is basically sound knowledge teaching. Variety in properties and uses of materials, highlight the variety in God's creation and also His provision for us.

(1 Timothy 6 v 17) Understanding of conduction and insulation can help us to be good stewards of resources (heating) and conscious of safety (electrical dangers). A variety of soils are described in the parable of the sower, where the good soil is that which is fruitful. **(Luke 8)** Some have used the states of matter to help describe the Trinity.

Changing Materials

- 2) Pupils should be taught:
- To describe changes that occur when materials are mixed [for example, adding salt to water].

Comment: Links with God's desire to keep His people pure and the pollution that comes from 'the world' may be alluded to here. (Hosea 7 v8; James 1 v 27)

- To describe changes that occur when materials [for example, water, clay, dough] are heated or cooled.

- c) That temperature is a measure of how hot or cold things are.
- d) About reversible changes, including dissolving, melting, boiling, condensing, freezing and evaporating.

Comment: The fact that temperature causes changes is spoken of in scriptural analogies. (Psalm 66 v 10; Revelation 3 v 18; Psalm 97 v 5) The changing nature of creation glorifies God in its ordered processes, but God Himself is 'unchanging'.

- d) The part played by evaporation and condensation in the water cycle.

Comment: God's provision of water through this cycle can lead into worship. Around the world a lack of water is a problem contributed to by the greed of developed nations. Our love for our neighbour in being good stewards of world resources could be referred to. (Mark 12 v 31)

- f) That non-reversible changes [for example, vinegar reacting with bicarbonate of soda, plaster of Paris with water] result in the formation of new materials that may be useful.
- g) That burning materials [for example, wood, wax, natural gas] results in the formation of new materials and that this change is not usually reversible.

Comment: The fact that God's promises are non-reversible can be demonstrated here. Adoption into God's family, death and the new creation are also non-reversible changes. (Romans 8 v 23; Hebrews 9 v 27; Revelation 21 v 5)

Separating Mixtures of Materials

3) Pupils should be taught:

- a) How to separate solid particles of different sizes by sieving [for example, those in soil].
- b) That some solids [for example, salt, sugar] dissolve in water to give solutions but some [for example, sand, chalk] do not.
- c) How to separate insoluble solids from liquids by filtering.
- d) How to recover dissolved solids by evaporating the liquid from the solution.
- e) To use knowledge of solids, liquids and gases to decide how mixtures might be separated.

Comment: The skill and knowledge of how to separate can be both positive and negative. The motivation behind science can be discussed here along with issues related to investigating in Sc1. Separating can be linked to good stewardship and servanthood; cooking provides good practical opportunities for many of the aims to be addressed.

Sc4- Physical Processes

Electricity

1) Pupils should be taught:

Simple Circuits

- a) To construct circuits, incorporating a battery or power supply and a range of switches, to make electrical devices work [for example, buzzers, motors].
- b) How changing the number or type of components [for example, batteries, bulbs, wires] in a series circuit can make bulbs brighter or dimmer.
- c) How to represent series circuits by drawings and conventional symbols, and how to construct series circuits on the basis of drawings and diagrams using conventional symbols.

Comment: All energy, as well as all matter, originates in God. (Genesis 1 v 3) The responsible and safe use of such energy is part of good stewardship of creation. Analogies can be readily drawn from this topic, such as how we can allow God's power to flow through us. (1 Kings 18 v 46; Mark 5 v 30) Electricity can also be seen as a wonderful gift, leading us to worship. The ability to communicate through diagrams is part of investigative skills 2h.

Forces and Motion

2) Pupils should be taught:

Types of Force

- a) About the forces of attraction and repulsion between magnets, and about the forces of attraction between magnets and magnetic materials.

Comment: This can demonstrate well the invisibility of some forces and can lead to worship and understanding of the invisible God. (Colossians 1 v 15-16; Romans 1 v 20) Spiritual analogies of attraction and repulsion can also be drawn on here e.g. temptation, spiritual 'sensing' etc...

- b) That objects are pulled downwards because of the gravitational attraction between them and the Earth.

Comment: The example of Isaac Newton's theories as a God-fearing scientist, fit in well here. Gravity is very hard to understand scientifically and so can be another opportunity to be in wonder at God's universe. (Job 11 v 7)

- c) About friction, including air resistance, as a force that slows moving objects and may prevent objects from starting to move.
- d) That when objects [for example, a spring, a table] are pushed or pulled, an opposing pull or push can be felt.

Comment: Overcoming forces in order to move, can lead to discussions and analogies of the hindering nature of sin, spiritual battle and the power of prayer. (Daniel 9, 10; Hebrews 12v 1)

f) How to measure forces and identify the direction in which they act.

*Comment: Honesty in measuring can be encouraged here (**Proverbs 12 v 17**) Detailed observations can lead us to a greater understanding of God and His leading (**Psalms 37 v 25**). Understanding the direction and strength of forces can help us to be good stewards of creation and to act safely e.g. safe carrying of weight.*

Light and Sound

3) Pupils should be taught:

Everyday Effects of Light

- a) That light travels from a source.
- b) That light cannot pass through some materials, and how this leads to the formation of shadows.
- c) That light is reflected from surfaces [for example, mirrors, polished metals].

*Comment: God created light in all its beauty, and He is the source of all energy. Many obvious scriptural analogies can be found to link in here, especially that light always overcomes darkness. (**John 1; John 8 v 12**) Shadows can be used as a spiritual analogy of places 'hidden' from God. (**1 Corinthians 3 v 13; Luke 1 v 79**) Our ability to reflect God's glory (**2 Corinthians 3 v 18**) and consideration of poor reflections (**1 Corinthians 13 v 12**) are other possible links to spiritual principles.*

Seeing

d) That we see things only when light from them enters our eyes.

Comment: The wonder of the eye, its structure and function, is an excellent opportunity to lead into worship and to expose problems with an evolutionary view of origins; namely intermediate steps for eyes would be unusable.

Vibration and Sound

- e) That sounds are made when objects [for example, strings on musical instruments] vibrate but that vibrations are not always directly visible.
- f) How to change the pitch and loudness of sounds produced by some vibrating objects [for example, a drum skin, a plucked string].
- g) That vibrations from sound sources require a medium [for example, metal, wood, glass, air] through which to travel to the ear.

*Comment: God's invisibility can be linked with the predominantly invisible transfer of sound through waves. God's love for and creation of music and a variety of sounds is evident from scripture. This leads us to desire to use our ability in making sounds to glorify Him, and also guides us into ruling the kinds of things we listen to so that they are edifying (**1 Samuel 10 v 5; Revelation 5; Zephaniah 3 v 17**). The wide range of sounds, audible to humans and inaudible, can lead to discussions of God's love of variety.*

The Earth and Beyond

4) Pupils should be taught:

The Sun, Earth and Moon

a) That the Sun, Earth and Moon are approximately spherical.

Periodic Changes

b) How the position of the Sun appears to change during the day, and how shadows change as this happens.

c) How day and night are related to the spin of the Earth on its own axis.

d) That the Earth orbits the Sun once each year, and that the Moon takes approximately 28 days to orbit the Earth.

*Comment: God as creator should be emphasised here (**Genesis 1 v 14-16; Job 9 v 8-10; Psalm 8 v3-4**). His sovereignty, faithfulness, power, provision and many other aspects of His character can be linked to this work. The patterns of time are ordained by God, yet He is able to overrule them (**Joshua 10 v 12-13**).*

Breadth of Study

The breadth of study statements for KS1 and KS2 are the same.

Breadth of study

1) During the key stage, pupils should be taught the **Knowledge, skills and understanding** through:

a) A range of domestic and environmental contexts that are familiar and of interest to them.

b) Looking at the part science has played in the development of many useful things.

c) Using a range of sources of information and data, including ICT based sources.

d) Using first hand and secondary data to carry out a range of scientific investigations, including complete investigations.

2) During the key stage, pupils should be taught to:

Communication

a) Use appropriate scientific language and terms, including SI units of measurement [for example, metre, newton] , to communicate ideas and explain the behaviour of living things, materials, phenomena and processes.

Health and Safety

- b) Recognise that there are hazards in living things, materials and physical processes, and assess risks and take action to reduce risks to themselves and others.

*Comment: All aspects of the breadth of study aims should be covered very naturally as part of the other areas of learning. This does attempt to bring more of a holistic view, yet without including the omnipresent God. Communication and the good stewardship considerations of health and safety are clearly applicable here, as has been mentioned in comments throughout. Using the knowledge, skills and understanding of Science in investigations, and environmental or domestic settings, is part of the Hebrew understanding of wisdom; godly knowledge, skills and understanding applied practically to life (**Proverbs 1-2**). However, Science has not only provided us with useful things (1b) but has also given us problems and side-effects due to the ungodliness of some of its application (pollution, global warming, abortion, money driven drug companies and health care, addictions). 'Knowledge apart from God' will often result in sinful, selfish actions.*

Science Levels

The levels given at the back of the NC document are an attempt to provide guidance for looking at how well children are attaining, in terms of meeting the objectives concerned. By the end of KS1 it would be expected that the average child should achieve level 2. Level 4 should be reached, by the end of KS2. There should be roughly 1 level improvement every 2 years. Optional and end of Key Stage tests help to determine the level at which a child is working. As a Christian teacher of the NC in a state school, although other aims should be at the heart of the teaching, one would still need to demonstrate that the basic learning had been accomplished alongside the more godly principles. In Christian schools teaching the NC, decisions should be made as to how children should be assessed given that adjustments have been made in line with teaching Christian principles. The assessment of whether or not this additional knowledge and understanding has been learnt, is also important. A place to begin would be to ask the question, what would we expect an average child at the end of KS1 or KS2 to understand from our Science teaching, beyond that expected by the NC? This would then help clarify the Christian distinctiveness of the teaching in the school and encourage agreement between staff as to what would be achievable by the majority of the children as they mature.

Ideas for planning

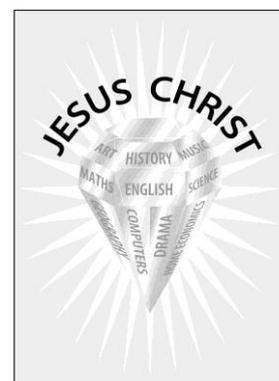
As a Christian teacher of the NC, any unit (group of lessons) of teaching on Science should be approached prayerfully and with biblical study. I would suggest some personal time reflecting on which aspects of godly wisdom the Holy Spirit would highlight to you. The next area would be to look at how these aims would be met progressively through the sequence of lessons, each lesson consolidating or building on the previous lesson. I would then decide how I, as the teacher, would be able to tell that the children had achieved these aims. Finally, the practicalities of the methods of teaching (investigation, demonstration, grouping, individual work, drama, story telling, resources) should be prayerfully chosen, in the expectancy that God will inspire creativity and life in what is planned. This would broadly follow the 'Way, Truth, Life' model; the Truth being the truth being taught (aims), the Life being the resulting achievement (target) and the Way being the methods chosen.

Each teacher needs to find an effective way of planning for themselves, that is easy to use by the teacher and clear enough for others to follow. All planning however should be subject to new inspiration from God and should never be seen as a rigid unchangeable structure.

Conclusion

A godly teaching of Science must involve the creativity of the Creator. Planning, with whatever curriculum material, must be done with Him. Setting the aims for learning must be done with Him. The act of teaching itself must be done with Him, in Him and through Him. An increasing understanding of the confusion in fallen men's minds, can help us recognize where the enemy has sown his lies. But more importantly an increasing biblical understanding with the help of the Holy Spirit, should keep Christian teachers in the truth, so that their teaching reflects the Creator, bringing Him glory and guiding our learners to do the same.

Stephen Beegoo 2004



Year 9 Biology

Introduction

These lessons are intended to work as a series of units following the general themes set out below which lead towards approximate coverage of the Programme of Study to KS3 in Sc2. Their planning is based on the Truth to Teach, Way to Work, Learning for Life model, opportunity being woven into the lessons to consider the application of the topic to Society, any relevant issues of citizenship, and how the Christian worldview affects the topic under consideration. Considering the Christian worldview requires the handling of scripture in such a way as to derive principles within the scientific context, and the handling of Science in making moral decisions.

Aims

- To cover KS3 Curriculum as outlined by the National Curriculum
- To consider the applications and implications of the curricular content
- To place this in a Christian context as constructed from Scriptural truth
- To inform worshipful and responsible life choices

Outline

Year 9		
Timing	Biological Curriculum	Wider Issues
Sept - Oct	Nutrition	Stewardship, Diet and Body Image
Oct-Nov	Circulation	Activity & Variation in God's Environment
Nov-Dec	Breathing	Health, Habits and Peer Choices
Jan	Respiration	Animal Experimentation
Jan-Feb	Moving	Sport, Performance and Status
Feb-Mar	Health and Disease	Compassion in a Suffering World
April	SATs preparation	
May	SATs	
June-July	Man and the Environment	Stewardship, Government and Purpose

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Detail

Lesson	Date (approx)	Lesson Content — TI pp. 8 to 34	Homework	Text & Worksheet refs
<p>Nutrition</p> <p><i>Truth:</i> God has given us bodies to steward, and cares for us enough to provide for our needs. The 'body beautiful' as represented by the media is not God's purpose for our lives.</p>				
<p>KS3 National Curriculum - Nutrition</p> <p>a. About the need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water, and about foods that are sources of these.</p> <p>b. The principles of digestion, including the role of enzymes in breaking down large molecules into smaller ones.</p> <p>c. That the products of digestion are absorbed into the bloodstream and transported throughout the body and that waste material is egested.</p> <p>d. That food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair.</p>				
1	10/9/03	<p>Use a title in their notes, e.g. 'Nutrition', a) Meals. Pupils list what they have eaten at which points during the day.</p> <p>Ask for any information they have about food types. Also, which need to be eaten in moderation. Use a colour code to shade in foods listed by types. If possible use words such as 'fat', 'protein', 'carbohydrate'.</p> <p>Investigation 1 – weigh themselves, and then divide this mass by the relevant percentages.</p> <p>Given a value, show how to convert a cost per mass of food into the value of that component of a body.</p>	Find cost per mass for protein-rich, fat-rich, and carbohydrate-rich foods. Calculate worth of the body.	Roberts pp.146-147
2	17/9/03	<p>Discuss 'value' as indicated by Investigation. The particular scripture to be considered at some point is Matthew 6:25-34.</p> <p>Carry out food tests either as a demo, or in groups. Record results for flour, sugar and protein – include solubility & responses to each test (Investigation 1 from p.156). These to be neatly presented.</p>	Neat presentation of results from class notes.	Roberts p.156
3	24/9/03	<p>Hand out 'Choosing What to Eat' sheets. Complete Food Test summary blanks.</p> <p>Allocate food types from the initial lists for groups to research. The info should be fed back to the whole class, notes then being taken by all.</p> <p>Hand out coloured paper and envelopes of some sort for the 'Big and Small Molecules' section. Homework to cut out the necessary numbers for the next lesson.</p>	Cut out and store paper shapes for the next lesson.	Roberts pp.150-155 'Choosing What to Eat'

Lesson	Date (approx)	Lesson Content — TI pp. 8 to 34	Homework	Text & Wsht ref.s
4	1/10/03	Use cartoon pig diagram to identify in- di- and egestion, absorption and use (assimilation). Title 'Digestion' A4, top third separated from the bottom $\frac{2}{3}$ by a dotted line labelled semi-permeable membranes. Top third labelled 'blood stream', bottom $\frac{2}{3}$ labelled contents of the intestine. Protein shapes in chains, pairs and singly below the line, singly above the line; fat shapes, glycerol and 3 fatty acids below, separated above; and, carbohydrate shapes in long chains, pairs and singles below, but only singles above the line. Label arrow across the line as 'absorption', and an arrow between macromolecules to monomers, etc as 'digestion'. Draw and label a sequence of diagrams leading to a villus used for absorption. Scale and location should be included.	Attempt the 'Guts' tasks.	
5	8/10/03	Complete villus diagram. If necessary, hand out 'Guts' sheets. Complete the flap task 'From Here to There'. Emphasize again the idea of insoluble - egestion, and soluble - absorbed. Complete a quiz, word search of structures & processes — words (peristalsis) in the grid, definitions as clues. Read extracts from 'Wasted Childhood' Telegraph Magazine, Oct 03.	Complete the 'Are you what you eat?' Sheet. Revise for a test.	'Wasted Childhood' 'Guts'
6	15/10/03	Consider some of the answers from homework to stimulate discussion, e.g. read one or two of the letters anonymously, and reprise the scriptures quoted with reasons. Set homework by reviewing work covered. Introduce next lesson's work by counting resting pulse rate and recording it on the board.	Revise for a test.	
<p>Circulation</p> <p>Truth: God created variation amongst us and created our bodies to be able to change in response to a changing environment. Somewhere in these lessons take time to list what varies and why, and then consider whether the Bible has anything to say about variation, perhaps in the context of racial differences.</p>				
7	22/10/03	Complete the test. Recount resting rate — perhaps calculate average from this and last week's lessons. Record in a frequency chart and draw a graph to represent these results.	Complete the graph of the data.	

Lesson	Date (approx)	Lesson Content — TI pp. 8 to 34	Homework	Text & Wsht ref.s
8	5/11/03	Use the 'Pulse and Exercise' worksheet. Complete the following sequence: measure resting pulse; carry out two minutes of exercise; measure the pulse rate every minute for five consecutive minutes. Begin to consider the reason blood moves around the body: food from the gut, gases from the lungs, muscle involvement. Extra Task: calculate beats per lifetime, and volume pumped per lifetime.	Complete the graph for homework.	'Pulse and Exercise'
9	12/11/03	If necessary, complete the last section from the worksheet. Hand out 'The Heart Beat' sheet. Complete the labelling, and shade areas red or blue according to oxygenation. Shade cardiac muscles first. Draw a diagram of the circulation including heart, muscles, intestine and brain. Use the folder nets from the sheet as name boxes for the diagram. Cut out max 20 pieces of paper/card to fit in these folders. Label some 'oxygen', some 'carbon dioxide', etc; include sugar, hormones, amino acids, vitamins, water, etc. Discuss the kinds of chemical that should be included, and where they come from. Design a revision game using the folders, cards and circulation diagram.	Complete a list of rules for the Circulation Game.	'The Heart Beat' adapted (4 boxes and lists of chemicals.
10	19/11/03	Use groups to gather information about components of the blood. Prime them by giving a list of words to research, e.g. haemoglobin, red blood cell, plasma, white blood cell, antibodies, phagocytosis, ... Complete a data sheet: numbers of cells, etc. Extra Task: calculate number of each type of cell per person. Issue and explain 'Functions of the Blood' sheet for homework.	Complete sheet for homework.	Roberts pp.204-211 'Functions of the Blood'
11	26/11/03	Complete notes from the board on blood vessels. Designed as a mind map + diagrams. Complete this on A3 using a heart artery → capillary vein heart cycle at the centre. Relate this to the pulse work and review all the information.	Revise for a test.	
12		Complete Test. Include a question for discussion, e.g. Sport are unfair because people vary. Consider why variation is a good thing. Consider how this might be communicated, e.g. poster, pamphlet, etc	Creative worship poster, etc	

Breathing

Truth: God's good creation in a fallen world can go wrong. He has given us ways to correct these effects and can help us respond with compassion. (The Creation-Fall-Redemption model may also be applied here.)

Lesson	Date (approx)	Lesson Content — TI pp. 8 to 34	Homework	Text & Wsht ref.s
KS3 National Curriculum - Breathing				
i) The role of lung structure in gas exchange, including the effect of smoking.				
13	12/12/03	Return the test and discuss some of the answers to the discussion questions. Measure breathing rate and collect the data on the board. Ask the question "How do we breathe?" and point out the movement of the rib cage, linking the appropriate movement to the inhalation and exhalation. Hand out 'Breathing' worksheet and label the parts.	Complete the 'Keeping Lungs Healthy' table.	'Breathing'
14	14/1/04	Make a rib cage model with split pins and card. Colouring and labelling, and the attachment of rubber bands should be careful. Relate the finished product to the diagram on page 2 of 'Breathing'. Consider how the muscles might cause breathing to happen. Assemble the alveoli diagrams into a booklet and label the top diagram with parts. Name the processes involved with a sequence: oxygen in the air oxygen in the bronchi oxygen in the alveoli oxygen in the blood. Complete the 'Gas Exchange' sheet.	Complete the sheet for homework.	'Gas Exchange'
15	2 1/1/04	Dissect pluck to show the various systems and the nature of some of the tissue involved, e.g. buoyancy of lung tissue, inflatable lungs, and tubes of different kinds. When finished summarise arguments by discussion for and against animal experiments. Include relevant scriptures.	Present both sides of the argument appropriately.	
Respiration				
<i>Truth:</i> God has created us to be able to appreciate what science discovers, to use it wisely, and to respond appropriately to Him as a result.				
KS3 National Curriculum – Respiration				
<p>a. That aerobic respiration involves a reaction in cells between oxygen and food, in which glucose is broken down into carbon dioxide and water.</p> <p>b. To summarise aerobic respiration in a word equation.</p> <p>c. That the reactants and products of respiration are transported throughout the body in the bloodstream.</p>				
16	28/1/04	Read out some of the answers anonymously if necessary. Discuss any new issues. Recall what is needed to allow muscles to move. Link this to the process of respiration, and then the difficulty of using animal tissue. Carry out an investigation into how yeast causes dough to rise. Use the 'Respiration' sheet, completing any notes, etc.		Williams pp.65-78; 83-84 'Respiration'

Lesson	Date (approx)	Lesson Content — TI pp. 8 to 34	Homework	Text & Wsht ref.s
<p>Movement</p> <p><i>Truth:</i> The body is created to act in a coordinated and effective way in the environment. Sport requires this effectiveness. What is the basis for the status that comes from Sport?</p>				
<p>KS3 National Curriculum - Movement</p> <p>The role of the skeleton and joints and the principle of antagonistic muscle pairs [for example, biceps and triceps] in movement.</p>				
17	4/2/04	Look at a skeleton. Label the 'Skeleton' diagram appropriately. Group the class to allow each to complete the table of definitions on the sheet, sharing answers after 15 minutes. Look at a pig's trotter. Investigation 1 p.309 to illustrate answers from the previous task. Make a model of the forearm from a sheet of instructions	Complete the skeleton diagram or definitions.	Roberts pp.302-309 'Skeleton'
18	11/2/04	Lift an object using a bent arm; push an object away using a bent arm. Identify where the muscles are active. Discuss words to use to describe what's happening. Develop a chain of events, e.g. eyes see-brain-*nerves-*)muscles movement. Use p.307, Fig 4; p.308, Fig 6 and p.309 Qs 3 to 5 to describe the function. Include all the words in bold type referring back to last week's lesson.	Devise a test paper for the work so far. Q, A and marks.	
19	25/2/04	Group the class to find out what they can about breaks, healing bones, slipped disks, joints, arthritis, and muscle troubles. Feedback these answers to the whole class. Illustrate these with, e.g. x rays, or personal stories. Consider: (i) Why do these things happen? (ii) How does God help deal with them? (iii) How might we deal with them?	Revise.	Roberts pp.310-313
<p>Health & Disease</p> <p><i>Truth:</i> Living in the world is risky, but God is directly involved, understands suffering, and has enabled the body to live safely.</p>				
<p>KS3 National Curriculum - Health</p> <p>a. That the abuse of alcohol, solvents, and other drugs affects health.</p> <p>b. How the growth and reproduction of bacteria and the replication of viruses can affect health, and how the body's natural defences may be enhanced by immunisation and medicines.</p>				

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
20	3/3/04	Test on work so far – use SATs questions. Describe an accident. What does the body do to counteract this damage? Wbc, blood clotting, hormones, healing. Describe the course of an illness. Video. Create a flow chart to include these events in an appropriate way. Diagrams to add to this sequence. Hand out [TPG Year 9 immunity.doc] for homework task.	Complete the story of immunity using a given script but freedom to draw, write, cartoon, etc.	
21	10/3/04	Response of the body to infection. Case history to illustrate: infection, incubation, symptoms. Devise a resistance game. Include phagocytosis, antigens, antibodies and their function. Use: www.schoolscience.co.uk/content/biologi/abpi/diseases/index.html for homework. Use the worksheet on disease, transmission and defence to test understanding of these terms.	Find out about a bacterial, viral and another parasitic disease.	
22	17/3/04	Cancer – give a case history, perhaps using 'C' by John Diamond. Outline what happens to the cells and use a domino puzzle to match treatments with what they do. Per group produce a letter to someone with cancer. Use scripture, compassion and a knowledge of what cancer is. When written read out in class. Let discussion touch on suffering, euthanasia, hospice care, etc. Introduce the mind map: coloured branches choosing a title, areas to learn about. Produce one for fighting infection.	Organize the information from the two weeks into a mind map using colours.	
23	24/3/04	Mind map 'Drugs'. Develop branches towards useful, abuse, types of drugs in each area, reasons for using drugs. Demonstrate products from cigarette smoke. Show tar (revise alveoli/cotton wool), pH. Hand out summary sheet from revision guide.		
24	31/3/04	In support groups devise dominos, word cards, mind maps, etc. to others to revise. Make a pack. Give out areas from the NC to each group. of cards with Submit ideas to other groups, listening to instructions as to how to use them.	Make a pack of cards with words from Years 7 to 9	
26	28/4/04	Revision Lesson: Use the packs of words: (i) Deal five – then describe a biological link between them; (ii) Deal and ask for a definition, perhaps collecting points (possibly Smarties) – pupils judge the answers. (iii) Pelmitism – memory – turn up pairs that are related. Explain the link. Look at past papers as Support groups – devise answers. Compare between groups	Revision	
27	5/5/04	SATs		

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
<p>Stewardship and the Environment</p> <p><i>Truth:</i> We live in an environment that is designed to function interdependently, and in which the Bible indicates we should be stewards. This entails active understanding of how we should care, e.g. through conservation, not polluting, and ensuring the damage we cause is reparable through natural means.</p>				
28	12/5/04	Go through the answers from the paper. Use a video of a habitat. 'The Blue Planet'. Collect through observations: adaptations for survival, examples of food webs, environmental factors.	1 "Why should a species or a habitat be conserved?"	
29	19/5/04	<p>Devise a quiz on ecology from KS3 work. Either for points, or, assessing environmental consciousness (each question has three answers, 1 = least, 3 = most concerned: the total matching descriptors on the answer sheet.</p> <p>Adaptation and competition</p> <p>a) About ways in which living things and the environment can be protected, and the importance of sustainable development.</p> <p>b) That habitats support a diversity of plants and animals that are interdependent.</p> <p>c) How some organisms are adapted to survive daily and seasonal changes in their habitats.</p> <p>d) How predation and competition for resources affect the size of populations [for example, bacteria, growth of vegetation.</p> <p>Feeding relationships</p> <p>e) About food webs composed of several food chains, and how food chains can be quantified using pyramids of numbers.</p> <p>f) How toxic materials can accumulate in food chains.</p> <p>By July, a booklet per pupil. Last week's homework is the first entry.</p> <p>Explain plan for the rest of term, and thus the Contents of this project:</p> <ol style="list-style-type: none"> 1. Factors affecting growth — growth on tree bark. 2. Sampling in a habitat to detect damage. 3. A bigger picture. 4. Caring for the environment. 5. In Conclusion. <p>Read through the lichen worksheets and read through them ready for next week.</p>	Designing the title page. Perhaps typing last weeks hwk.	
30	26/5/04	1) Investigating growth on tree bark. Remind pupils of the worksheet handed out last week. Carry out the task following worksheet.	Complete data handling & conclusion.	TPG Year 9 lichen.doc
31	9/6/04	Review what the data shows about growth on tree bark. Complete a data question on air pollution? Read through water pollution worksheets for next week.		

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
32	16/6/04	2) Sample for water creatures with a view to assessing purity of the stream, and the idea of indicator species. Record creatures as collected. Discuss where pitfall traps should be set.	Complete data handling & conclusion.	TPG Year 9 pollution.doc
33	23/6/04	3) Identify pitfall contents (traps set up Tuesday after school.) Devise a key to identify invertebrates trapped. Devise a possible food web from organisms collected. Answer questions on a food web.	Research a habitat to arrive at a description.	
34	30/6/04	4) Work singly, then in pairs, then in groups. Value of the habitat investigated? Pressures on it. How to manage the habitat. Scriptural principles	Research and write environmental Debate.	
35	7/7/04	Ask pupils to read out their cases for and/or against the motion. Open the floor to question each other. Concluding vote. Write a summary report of the debate.	Finish report. Assemble the booklet.	.
36	14/7/04	Hand in the booklet.		

Biology Year 9 - Breathing

Context

Timing	Biological Curriculum	Wider Issues
Sept-Oct	Nutrition	Stewardship, Diet and Body Image
Oct-Nov	Circulation	Activity & Variation in God's Environment
Nov-Dec	Breathing	Health, Habits and Peer Choices
Jan	Respiration	Animal Experimentation
Jan-Feb	Moving	Sport, Performance and Status
Feb-Mar	Health and Disease	Compassion in a Suffering World
April	SATs preparation	
May	SATs	
June-July	Man and the Environment	Stewardship, Government and Purpose

Truth to Teach

1. God's good creation in a fallen world can go wrong.
2. He has given us ways to correct these effects, and can help us respond with compassion.
(The Creation-Fall-Redemption model may also be applied here.)
3. The structure and role of lung structure in gas exchange, including the effect of smoking.

Way to Work

This covers three lessons. The content, in summary, is:

- a. Measure breathing rate, and collect the data on the board. Ask the question "How do we breathe?" and point out the movement of the rib cage, linking the appropriate movement to the inhalation and exhalation.
- b. Hand out 'Breathing' worksheet and label the parts.
- c. Complete the 'Keeping Lungs Healthy' table for homework.
- d. Make a rib cage model with split pins and card. Colouring and labelling, and the attachment of rubber bands should be careful. Relate the finished product to the diagram on page 2 of 'Breathing'. Consider how the muscles might cause breathing to happen.
- e. Assemble the alveoli diagrams into a booklet and label the top diagram with parts. Name the processes involved with a sequence: oxygen in the air-oxygen in the bronchi-oxygen in the alveoli-oxygen in the blood.
- f. Complete the 'Gas Exchange' sheet for homework.
- g. Dissect pluck (trachea, lungs, heart and some blood vessels) to show the various systems and the nature of some of the tissue involved, e.g. buoyancy of lung tissue, inflatable lungs and tubes of different kinds. Those

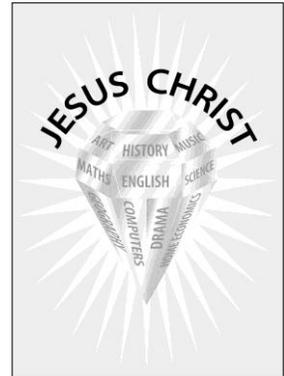
waiting to see can construct arguments for and against vivisection, dissection.

- h. While considering the pluck discussion can include how artificial respiration can help people stay alive. This draws on prior work.
- i. When finished summarise arguments by discussion for and against animal experiments. Include relevant scriptures.
- j. Present both sides of the argument appropriately (written, pictorial, poster, etc) for homework.

Learning for Life

Pupils should be able to:

- Describe and name lung structures.
- Explain how gases are exchanged.
- Explain why gases need to be exchanged.
- Identify the detail of God's creation, and that understanding this can help us help others when things go wrong.
- Use the information gained in later discussions concerning health.



Science from 'The King's Senior School', Witney, Oxon.

For Key Stage Level 3 using Relevant Concepts from 21 Major Kingdom of God Concepts.

Foundational concepts on Creation are based on: -

Concept 1 – Man created in God's image and redeemed by Him (Genesis 1:27-28; 1 Peter: 18-19)

God has given dignity and value to men and women by making them in His own image and by redeeming them through the cross at the cost of His Son's life.

Concept 2 – Creator and Creation (Genesis 1: 1; John1: 1: Romans 1:20; Colossians 1:16)

God is the creator of the universe and His creation reflects His nature.

Concept 5 – Order (Genesis 1; Isaiah 9:7a; 1Corinthians 14:33)

God establishes a creation which is purposeful and reveals order; He proceeds in orderly ways to achieve His purpose though at times He intervenes miraculously to bring about purposes.

Human Biology module using: -

Concept 1 – Man created in God's image and redeemed by Him (as above)

Chemistry module using: -

Concept 4 – Unity and Diversity (1Corinthians 12 esp. V 12, 27; Romans 12: 3-8; Ephesians 4: 4-13)

There is a unity and diversity throughout God's creation; as people we are called to unity but can appreciate and learn from each other's differences.

Concept 11 – Stewardship and Servanthood (Genesis 1:26; Luke 19:11-27; John 13:2 17; 1Corinthians 4:1-2; Philippians 2)

God had made us in His own image to serve Him and one another by stewarding and developing the earth and its resources for His glory and for the good of our fellow man, just as Christ Himself did.

Concept 14 -Provision and Resources (Genesis 22:14; Psalm 104; 1Timothy 6:17)

One of God's names is Jehovah-Jireh: God provides resources for all that he has made and for all that He purposes to do.

Concept 6 -Wisdom (Proverbs 2:1-4; 4:7-8; Colossians 2:2-3; 1Corinthians:24, 30)

Scripture encourages us to value and pursue wisdom which is only found in God: God's wisdom is reflected in all that He is and does.

Man and Ecology using: -

Concept 1 – Man created in God's image and redeemed by Him (as above)

Concept 2 – Creator and Creation (as above)

Key Stage 3 Science

Summary of Underlying Concepts

Creation

1. The Triune God revealed in the Bible is the Creator of the Universe.
2. The universe is finite in time and had a beginning.
3. The creation is purposeful and shows design.
4. God is intimately involved with His creation and not separate from it.
5. Creation testifies to God's existence and reveals something of His character.
6. Mankind is unique and special in the created order.
7. The fall has affected the creation.

Human Biology: Our physical bodies are important to God.

1. 'Fearfully and wonderfully made' (**Psalm139:14**)

We are the product of a brilliant piece of design by a loving father (but we do bear the Marks of the fall: decay, sickness, death.)

2. 'Jesus was... found in appearance of as a man' (**Philippians 2:8**)

The Son of God inhabited a body just like ours.

3. 'May your.... body be kept blameless... He will do it.' (**1Thessalonians 5: 23,24**)

God is committed to sanctify us (sort out the effects of sin) as *whole* people.

4. 'Your body is a temple of the Holy Spirit.....honour God with your body' (**1Corinthians 6:19,20**)

What we do with our bodies is important to God.

5. 'Do not offer the parts of your body to sin' (**Romans 6:12,13**)

Our bodies can be misused by the choices we make.

Chemistry: Stewardship of the material world

God's creation of a material world shows:

1. A diversity of different materials, with special properties (design & purpose).
2. His loving provision to man of rich material resources to steward and develop.
 - Man is responsible and accountable for the earth's resources.
 - Sin has affected man's relationship with the creation and his ability to steward it wisely.
 - Godly wisdom and an understanding of His creation and His work of redemption in Christ can reverse some of the effects of the fall.

Concept 11 – Stewardship and Servanthood (as above)

Concept 5 - Order (as above)

Concept 19-Governing and Ruling (Genesis 1:28; Matthew 28:18-20; Romans 13:1-5; Ephesians 6:1-2; Hebrews 13:17)

Man is made in God's image to govern and rule His creation for Him using godly principles; God's rule through others is to be honoured.

Key Stage 3 Biology-Outline of Teaching Schedule

Year	Autumn	Spring	Summer
7	Introduction to Science What is Science? Observation and measurement Variables	Microbes	Reproduction & Life-Cycles Animal life-cycles Human Reproduction
	What are living things? Cells, Tissues and Organs	Cells, Tissues and Organs cont. Green Plants	Green plants Plant reproduction
8		Diversity of Life Classifying living things Variation Inheritance	Ecology Feeding relationships Adaptation & competition
9	Human Body Systems Nutrition Circulation Breathing and Respiration	Movement Health and Disease	Man and the Environment Project

Man and Ecology Project

The aim of this project is to research and produce an account of a case history of how human activity has had an effect on the environment. You can choose to study the impact of human activity on a whole **ecosystem**, a particular **habitat**, a **group of similar species** of organism, or a **single species**.

Remember- human activity has an impact on the environment in four basic ways:

Habitat alteration

Complete destruction-e.g. clear felling of tropical forest.

Modification-e.g. for agricultural use.

Species removal

Harvesting-regular removal of species of economic importance (e.g. fisheries)

Controlling pest species

Hunting-e.g. Tigers in Asia.

Extinction-e.g. Passenger Pigeon, Dodo.

Pollution-the release of toxic substances into the environment e.g. Oil spillage, greenhouses gases, pesticides.

Species introduction-the release of alien species into new locations:

e.g. – North American Mink escaping in the UK

- Grey Squirrels in the UK

- Cane Toad in Australia.

Try to structure your work along the following lines:

(You do not have to use these headings)

Creation

Who does the earth belong to? (**Look at Genesis 1, Psalm 24:1; Psalm 115:16**)

Describe your ecological example as unaffected by man.

What function or role might it have?

How does it reflect the character/nature of the Creator?

Fall

How has the result of human sin affected your example?

How are its relationships affected (particularly in man)?

What are the long-term consequences of human activity?

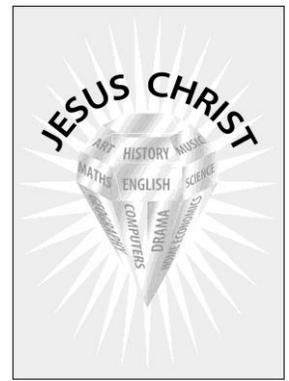
Redemption

What measures could be taken to remedy the situation?

What has or is being done? How successful has this been?

What limits its effectiveness?

How might the situation change in the future?



Special Educational Needs

Vision Statement

We begin with the premise that God intends all children to work towards an understanding of their destiny in Him.

We acknowledge that each child is unique and that the parents carry the ultimate responsibility before God for their children's development. The school will endeavour to work with the parents in seeking to provide the appropriate atmosphere, teaching and range of experiences: these should enable every child to develop physically, mentally and spiritually to reach their God-given potential at each stage of their life. This will involve strengthening weaknesses and developing specific talents.

Mission Statement

For children with special educational needs we will: -

- a) Assess
- b) Diagnose
- c) Write individual programmes, where necessary
- d) Provide support
- e) Supply differentiated learning materials

The Special Needs Co-ordinator will work with teachers and parents to: -

- a) Liaise
- b) Advise
- c) Support
- d) Co-ordinate contacts with outside agencies
- e) Keep an up-to-date Special Needs register

We will seek to provide in-service training for all staff involved in the teaching of special needs children.

We value the place of prayer, so will encourage children to seek God for themselves, recognising that God's power is made perfect in weakness and that He can give knowledge and understanding.

It is our desire to foster an attitude of appreciation in gifted children, so that they recognise that their gifts are God-given and are for the good of the whole community.

Special Needs Referral Policy

The aim of the Special Needs Referral Policy is to provide a clear procedure for dealing with specific areas of concern in individual pupils. Referral forms A and B are used to facilitate this policy.

Stage 1 – Form A

The first part of the form is filled in by the teacher, expressing concerns about a child's difficulties or specific gifting.

In the case of spelling, reading or maths difficulties, the Bangor Dyslexic test will be administered.

Depending on the results of this, it may be felt advisable for the Special Needs Co-ordinator to give the Aston Index test to further diagnose the problem. Other tests will be used where necessary. (See separate sheet on tests)

In the case of a child's special talent or gift being recognised, suitable tests will be given, where appropriate. It may be necessary to provide extension materials or to arrange other teaching or experiences.

Stage 2 – Form A

The Principal and/or the Head of Lower or Senior School will arrange a case conference (after any necessary consultation with other teachers) with the parents, the class teacher and Special Needs Co-ordinator to decide on further action. It will be decided how often to review the child's progress. The second part of the form is filled in by the class teacher. A copy of this form should be in the child's folder in the Special Needs department as well as in the class teacher's folder of profile cards.

Following these discussions, a child is often withdrawn for one-to-one help or classroom support/extension. In some cases, a child's timetable needs to be reviewed with special educational programmes being written.

Stage 3 – Form B

Occasionally it may be necessary to employ the expertise of outside agencies. Form B will be used to record consultations and recommendations. This form will be filled in by the Special Needs Co-ordinator.

It is the parents of children attending independent schools who must apply for any child to be 'statemented'. These statements are reviewed annually.

Further Parental Contact

In the Junior and Senior departments, termly reports are given to parents. In the Infant department, an annual report is written. Clearly, more frequent reporting may be required in some cases.

Termly interviews with parents may be important where children have severe problems.

Assessment of Pupil's Special Educational Needs

Name of child:			
Date of birth:			
Class:			
Teacher:		Special Needs Co-ordinator:	
Date when concern first noted:			
Concerns:			
Tests:			
Parent contact:			
Recommendations:			
Review:	Half-termly	Termly	Annually
Date of first review:			
Outcome of review:			
Further recommendations:			

Form B

Record of the Involvement of Outside Agencies

Name of child:	
Date of birth:	
Class:	
Teacher:	Special Needs Co-ordinator:
Parental contact:	
Outside agencies involved:	
Dates of contact:	
Results of consultations:	
Recommendations:	
Strategies:	

God's Heart for Children

Jesus clearly loves all children, regardless of their ability. We read in Scripture that God wants children: -

- a) To be brought up to love Him with all their heart, soul and strength (**Deuteronomy 6:5-7**)
- b) To learn to praise Him (**Psalm 8:2**)
- c) To obey their parents (**Ephesians 6:1**)
- d) To be part of His Kingdom (**Matthew 19:14**)

A teacher's attitude to less abled and gifted children should reflect Jesus' heart for them. These children should experience the same Kingdom atmosphere of righteousness, peace and joy not frustration, failure and loneliness.

In an academic world where so much emphasis is placed upon paper qualifications, we must, in our Christian schools, put a right emphasis on character and spirituality. There is a place for all children in the Kingdom, so each should be given a place and a function. The gifted should be encouraged to develop and use their gifts for the good of the whole community, while the less able should be supported and given respect and honour.

The Parable of the Talents

Matthew 25:14-30

This parable shows that different people will be given different gifts and talents, but each one should develop them to the full to give glory to God. Our challenge is to identify strengths and weaknesses in our pupils at an early age, so that we can train and encourage them to reach their full potential in every area of their lives. The role of the Holy Spirit in the lives of the children must not be overlooked or underestimated. Whilst all children should be prayed for regularly, the less able children should be prayed for concerning their learning disabilities.

God's Heart for the Weak

Dictionary definition of 'weak':

Feeble, frail, lacking strength, defenceless, fragile, often unwise, easily influenced, simple.

- | | |
|-----------------------|---|
| Psalm 41:1 | Blessed is he who has regard for the weak; the Lord delivers him in times of trouble. |
| Psalm 72:13-14 | He will take pity on the weak and needy and save the needy from death. He will rescue them from oppression and violence, for precious is their blood in His sight. |
| Psalm 82:3 | Defend the cause of the weak and fatherless: maintain the rights of the poor and oppressed. |
| Acts 20:35 | In everything I (Paul) did, I showed you that by this kind of hard work we must help the weak ... it is more blessed to give than to receive. |
| Romans 14:1 | Accept him whose faith is weak without passing judgments on disputable matters. |
| Romans 15:1-2 | We who are strong ought to bear with the failings of the weak and not to please ourselves. Each of us should look to please his neighbour for his good to build him up. |

- 1 Corinthians 1:27** God chose the foolish things of the world to shame the wise; God chose the weak things of the world to shame the strong.
- 1 Corinthians 8:9** Be careful, however, that the exercise of your freedom does not become a stumbling block to the weak.
- 1 Thessalonians 5:14** And we urge you, brothers, warn those who are idle, encourage the timid, help the weak, be patient with everyone.
- Romans 8:26** In the same way, the Spirit helps us in our weaknesses, we do not know what to pray for, but the Spirit intercedes for us ...
- 1 Corinthians 1:25** For the foolishness of God is wiser than man's wisdom, and the weakness of God is stronger than man's strength.
- 1 Corinthians 12:22-24** ... those parts of the body that seem to be weaker are indispensable, and the parts that we think are less honourable we treat with special honour. And the parts that are unpresentable are treated with special modesty, while our presentable parts need no special treatment.
- 2 Corinthians 11:30** If I must boast, I will boast of the things that show my weakness.
- 2 Corinthians 12:9-10** 'My grace is sufficient for you, for my power is made perfect in weakness'. Therefore, I will boast all the more gladly about my weaknesses so that Christ's power may rest on me. That is why for Christ's sake, I delight in weaknesses, in insults, in hardships, in persecutions, in difficulties. For when I am weak, then I am strong.
- 2 Corinthians 13:4** ... He was crucified in weakness, yet He lives by God's power. Likewise, we are weak in Him, yet by God's power we will live with Him to serve you.
- Hebrews 4:15** For we do not have a high priest who is unable to sympathize with our weaknesses, but we have one who has been tempted in every way, just as we are ...
- Hebrews 5:2** He (high priest) is able to deal gently with those who are ignorant and are going astray, since He Himself is subject to weakness.
- Hebrews 11:34** (Heroes of the past) whose weakness was turned to strength and who became powerful in battle.

Conclusion

Everyone at some time in their life experiences weakness of some kind whether in work, ability, character or faith. It is clear that God has grace, patience and love for the weak; He exhorts His people to look on weakness in a similar way.

We are collectively the body of Christ so therefore the weak are very much a part of us. We should be seeking to strengthen and support them. Our attitude to them is very important as we should be reflectors of God's image. The weak may fail at times but God does not call us to success but to faithfulness and obedience to Him.

GOD'S HEART FOR THE GIFTED

Dictionary definition of 'gifted':

Exceptionally clever, possessing natural talent.

'Gifted children may benefit from an outside volunteer mentor who provides enrichment activities. We must teach such students that their special gifts must be used for the benefit of the community. Use them to teach other students or to take on special leadership roles.'

Harro Van Brummelen

- Daniel 1:4-5** The king called for ... young men without any physical defect, handsome, showing aptitude for every kind of learning, well-informed, quick to understand and qualified to serve in the king's palace. He (Ashpenaz) was to teach them the language and literature of the Babylonians.... They were to be trained for three years, and after that they were to enter the king's service.
- Daniel 1:17** To these four young men God gave knowledge and understanding all kinds of literature and learning. And Daniel could understand visions and dreams of all kinds.
- Deuteronomy 8:18** Remember the Lord your God, for it is He who gives you the ability to produce wealth ...
- Exodus 35:35** He has filled them with skill to do all kinds of work as craftsmen, designers, embroiders in blue, purple and scarlet yarn and fine linen, and weavers – all of them master craftsmen and designers.
- Exodus 36:1-2** So Bezalel, Oholiab and every skilled person to whom the Lord has given skill and ability to know how to carry out all the work of constructing the sanctuary are to do the work just as the Lord has commanded. Then Moses summoned Bezalel and Oholiab and every skilled person to whom the Lord had given ability and who was willing to come and do the work.
- Philippians 2:3-4** Do nothing out of selfish ambition or vain conceit, but in humility consider others better than yourselves. Each of you should look not only to your own interests, but also to the interests of others.

Conclusion

It is clear from Scripture that God gives some people special gifts, and these should be recognised and used for the good of the whole body. Just as Daniel and his friends were set aside for special training, so we should look to identify special gifts in the children we teach; then, where possible, to give these children extra training to develop their God-given talents.

IDENTIFYING SPECIAL EDUCATIONAL NEEDS

One of the most common problems we identify nowadays relates to Dyslexia.

A. DYSLEXIA

Dyslexia is a neurological dysfunction causing an inability to accurately process spoken, written or symbolic language. It is in no way related to intelligence. Whatever the cause or nature of the condition, the degree of difficulty should be revealed by assessment.

Symptoms and Patterns in Dyslexia

1. Co-ordination difficulties
 - Gross motor movements e.g. walking, skipping, balancing
 - Fine motor movements e.g. fastening buttons, tying laces
 - Hand/eye co-ordination e.g. catching a ball, pencil control
2. Behavioural problems
 - Tiredness
 - Shyness, slow reaction, withdrawal
 - Poor concentration and attention
 - Confusion and frustration, even anger
 - Inferiority, sense of failure, low self-esteem
 - Over-activity, restlessness
3. Perceptual difficulties
 - Auditory -
 - Incorrect sequencing of sounds
 - Spoonerisms, e.g. par-cark
 - Difficulty in distinguishing vowel sounds
 - Forgets what he/she is going to say
 - Struggles to learn times tables
 - Struggles to repeat a sequence of letters as in spelling words
 - Visual -
 - Inability to form a visual picture of a word
 - Loses place when reading
 - Poor conception of space so bumps into things
 - Confusion of letters e.g. b d p
 - Reverses words e.g. saw, was
 - Omits or inserts letters
 - Confuses small words, e.g. of, for, from
 - Difficulty in reading line to line
 - Capital letters used wrongly

Omits punctuation
Difficulty in reading line to line
Capital letters used wrongly
Omits punctuation
Struggles to write neatly, especially from the board

4. Other indicators

Confuses left and right
Finds concepts such as up/under east/west hard
Struggles to learn to tell the time
Struggles to recite, days, months, seasons, alphabet, etc

Teaching Dyslexic Children

Despite the above struggles, dyslexic children are often gifted in some specific area, e.g. sport, artistic talent. Try to identify these strengths to build the child's self-esteem. Repeatedly tell them how much God values them for who they are as people.

Pray:

- For hearing, understanding, sight, perception
- Against confusion and fear
- For healing and wholeness
- For determination and perseverance to overcome

Practical help:

- Sit the child in front of the class
- Use different coloured chalks/pens on the board
- Write on paper rather than expect them to copy from the board a lot
- Give more time to complete tasks
- Give less but clearly defined homework written in a book for parents to see
- Mark work for content and not always for spelling and neatness
- Use bookmarkers for reading, possibly coloured glasses or sheets over the print
- Let the child read aloud for understanding
- Teach phonic skills
- Give systematic teaching
- Set realistic goals
- Encourage, encourage and encourage
- Provide tools such as calculators, charts, tables for certain tasks

- Give as much individual help as needed but encourage the child to develop their own strategies to overcome their difficulties
- Repeat new information and instructions
- Give one or two instructions at a time

Remember:

- A dyslexic child tires quickly because of the extra effort involved in learning
- Whilst being able to read something, the child may not understand it
- Learning foreign languages are often a challenge
- A dyslexic child's performance is inconsistent
- The child often lives with a nagging uncertainty
- A dyslexic child finds it hard to listen and take notes at the same time
- Reading music or interpreting symbols present a challenge
- When feeling unwell, learning is particularly difficult for a dyslexic child

Every child matters to God and we should reflect that in our teaching. God has no favourites, but He does treat us all differently. This needs to be communicated clearly to children as their perception of the way in which they are taught, disciplined, etc in school may be different. Our curriculum and activities should be continually under review to ensure that every child's needs are being met to the best of our ability. We, as teachers, will never be perfect but we can often improve our practice.

B. ATTENTION DEFICIT / HYPERACTIVITY DISORDER

AD/HD is a condition first described in 1902 to describe children (and adults) whose level of attention, impulsiveness and/or hyperactive behaviour is such as to interfere with their daily functioning; it is probably due to a complex interplay of biological, psychological and social factors.

Symptoms

1. Inattention — not listening, no attention to detail, easily distracted, lack of organisation, does not follow through on instructions, reluctant to apply themselves to tasks requiring sustained effort, forgetful, loses things, get sensory overload, short-term memory weak, easily bored
2. Hyperactivity — fidgeting, excessive running about, talks excessively, continually 'on the go', difficulty in playing quietly
3. Impulsiveness — cannot wait their turn, blurts out answers, wants things now, intrudes on others

Teaching AD/HD Children

- a) Positive engagement — make tasks stimulating and achievable, hands-on experience
- b) Positive atmosphere — lots of encouragement
- c) Positive interactions — warmth, friendliness, empathy, unconditional love, humour
- d) Positive attention - reinforce good behaviour
- e) Communication — clear, short instructions, train children to ask if they are unclear
- f) Differentiation — in content, expectations, speed, multi-sensory teaching
- g) Self-esteem — design tasks for success
- h) Routine — can be over-stimulated so calm, predictable routine

Book: 'Managing Attention Deficit / Hyperactivity Disorder in the Inclusive Classroom' by John Alban-Metcalfe and Juliette Alban-Metcalfe ISBN 1-85345-749-9

C. ASPERGER SYNDROME

Asperger Syndrome is a form of autism, a condition that affects the way a person communicates and relates to others. It is a developmental condition affecting the way the brain processes information. People suffering from it are usually average or above average in intelligence.

Symptoms

1. Difficulty in communicating — they may speak fluently but they may not take much notice of the reactions of people listening to them; they may continue to talk regardless of the listener's interest so may appear insensitive.
They can be over-precise or over-literal so jokes often are challenging.
2. Difficulty in social relationships — they may want to be sociable and enjoy human contact but they find it hard to understand non-verbal signals, including facial expressions.
3. A lack of imagination and creative play — they may excel at learning facts and figures but find it hard to think in abstract ways. Literature or RE can present problems.
4. Special interests or obsessions. They like to arrange or memorise facts about a certain subject, e.g. train timetables, dolphins. These interests can be strengths too.
5. Love of routines — change can be upsetting. They can become anxious or upset if the normal routine changes.

Life Skills for Children with SEN

- Communications skills
- Social skills
- Decision making
- Daily living skills
- Numeracy and reading
- Practical and vocational skills, creativity
- Developing autonomy and self reliance
- Physical fitness

For all the children in our care, God has a plan for their future.

Left-Handed Children

The majority of children are right handed so often left-handed children find themselves to be at a disadvantage when learning joined writing, craft work, etc. Apart from this they are as able as any other child.

Ways to help a left-handed child:

Position a left-handed child so that they have room to write, i.e. sit a left-handed child to the left of a right-handed child.

- Let a child slant his paper to the right.
- Model movements for the left-handed child.
- Check that from an early age a child is forming his letters correctly.
- Pencils and pens are preferable to biros.
- Arrange for the computer mouse to be on the left.
- Buy left handed scissors.
- Let the children begin from the opposite side of material when sewing, weaving, etc.

Jeremiah 29:11 “For I know the plans I have for you,” declares the LORD, “plans to prosper you and not to harm you, plans to give you hope and a future.”



Year 9 Biology

2003 - 2004

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Introduction

These lessons are intended to work as a series of units following the general themes set out below which lead towards approximate coverage of the Programme of Study to KS3 in Sc2. Their planning is based on the Truth, Way, Life model, opportunity being woven into the lessons to consider the application of the topic to Society, any relevant issues of citizenship, and how the Christian worldview affects the topic under consideration. Considering the Christian worldview requires the handling of scripture in such a way as to derive principles within the scientific context, and the handling of Science in making moral decisions.

Aims

- To cover KS3 Curriculum as outlined by the National Curriculum
- To consider the applications and implications of the curricular content
- To place this in a Christian context as constructed from Scriptural truth
- To inform worshipful and responsible life choices

Outline

Year 9		
Timing	Biological Curriculum	Wider Issues
Sept-Oct	Nutrition	Stewardship, Diet and Body Image
Oct-Nov	Circulation	Activity & Variation in God's Environment
Nov-Dec	Breathing	Health, Habits and Peer Choices
Jan	Respiration	Animal Experimentation
Jan-Feb	Moving	Sport, Performance and Status
Feb-Mar	Health and Disease	Compassion in a Suffering World
April	SATs preparation	
May	SATs	
June-July	Man and the Environment	Stewardship, Government and Purpose

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www.who.int/docstore/water_sanitation_health/wqmonitor/ch13.htm

Detail

Less on	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
Nutrition				
, and cares for us enough to provide for our needs. The 'body beautiful' as represented by the media is not God's purpose for our lives.				
KS3 National Curriculum - Nutrition				
a) about the need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water, and about foods that are sources of these				
b) the principles of digestion, including the role of enzymes in breaking down large molecules into smaller ones				
c) that the products of digestion are absorbed into the bloodstream and transported throughout the body, and that waste material is egested				
d) that food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair				
1	10/9/03	Use a title in their notes, e.g. 'Nutrition'. a) Meals. Pupils list what they have eaten at which points during the day. Ask for any information they have w.r.t. food types. Also, which need to be eaten in moderation. Use a colour code to shade in foods listed by types. If possible use words such as 'fat', 'protein', 'carbohydrate'. Investigation 1 – weigh themselves, and then divide this mass by the relevant percentages. Given a value, show how to convert a cost per mass of food into the value of that component of a body.	Find cost per mass for protein-rich, fat-rich, and carbohydrate-rich foods. Calculate worth of the body.	Roberts pp.146-147
2	17/9/03	Discuss 'value' as indicated by Investigation. The particular scripture to be considered at some point is Matthew 6:25-34. Carry out food tests either as a demo, or in groups. Record results for flour, sugar and protein – include solubility, & responses to each test (Investigation 1 from p.156). These to be neatly presented	Neat presentation of results from class notes.	Roberts p.156
3	24/9/03	Hand out 'Choosing What to Eat' sheets. Complete Food Test summary blanks. Allocate food types from the initial lists for groups to research. The info should be fed back to the whole class, notes then being taken by all. Hand out coloured paper and envelopes of some sort for the 'Big and Small Molecules' section. Homework to cut out the necessary numbers for the next lesson.	Cut out and store paper shapes for the next lesson.	Roberts pp.150-155 'Choosing What to Eat'

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s	
4	1/10/03	Use cartoon pig diagram to identify in-di- and egestion, absorption and use (assimilation). Title 'Digestion' A4, top third separated from the bottom $\frac{2}{3}$ rds by a dotted line labelled semi-permeable membranes. Top third labelled 'blood stream', bottom $\frac{2}{3}$ rds labelled contents of the intestine. Protein shapes in chains, pairs and singly below the line, singly above the line; fat shapes, glycerol and 3 fatty acids below, separated above; and, carbohydrate shapes in long chains, pairs and singles below, but only singles above the line. Label arrow across the line as 'absorption', and an arrow between macromolecules to monomers, etc as 'digestion'. Draw and label a sequence of diagrams leading to a villus used for absorption. Scale and location should be included.	Attempt the 'Guts' tasks.		
5	8/10/03	Complete villus diagram. If necessary, hand out 'Guts' sheets. Complete the flap task 'From Here to There'. Emphasise again the idea of insoluble → egestion, and soluble → absorbed. Complete a quiz, word search of structures & processes – words (peristalsis) in the grid, definitions as clues. Read extracts from 'Wasted Childhood' Telegraph Magazine, Oct 03	Complete the 'Are you what you eat?' Sheet.	'Wasted Childhood' 'Guts'	
6	15/10/03	Consider some of the answers from homework to stimulate discussion, e.g. read one or two of the letters anonymously, and reprise the scriptures quoted with reasons. Set homework by reviewing work covered. Introduce next lesson's work by counting resting pulse rate and recording it on the board.	Revise for a test.		
<p>Circulation</p> <p>Truth: God created variation amongst us and created our bodies to be able to change in response to a changing environment.</p> <p>Somewhere in these lessons take time to list what varies and why, and then consider whether the Bible has anything to say about variation, perhaps in the context of racial differences.</p>					
7	22/10/03	Complete test. Recount resting rate – perhaps calculate average from this and last week's lessons. Record in a frequency chart and draw a graph to represent these results.	Complete the graph of the data.		

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
8	5/11/03	Use the 'Pulse and Exercise' worksheet. Complete the following sequence: measure resting pulse; carry out two minutes of exercise; measure the pulse rate every minute for five consecutive minutes. Begin to consider the reason blood moves around the body: food from the gut, gases from the lungs, muscle involvement. Extra Task: calculate beats per lifetime, and volume pumped per lifetime.	Complete the graph for homework.	'Pulse and Exercise'
9	12/11/03	If necessary, complete the last section from the worksheet. Hand out 'The Heart Beat' sheet. Complete the labelling, and shade areas red or blue according to oxygenation. Shade cardiac muscles first. Draw a diagram of the circulation including heart, muscles, intestine and brain. Use the folder nets from the sheet as name boxes for the diagram. Cut out max 20 pieces of paper/card to fit in these folders. Label some 'oxygen', some 'carbon dioxide', etc, include sugar, hormones, amino acids, vitamins, water, etc. Discuss the kinds of chemical that should be included, and where they come from. Design a revision game using the folders, cards and circulation diagram.	Complete a list of rules for the Circulation Game.	'The Heart Beat' adapted (4 boxes and lists of chemicals)
10	19/11/03	Use groups to gather information about components of the blood. Prime them by giving a list of words to research, e.g. haemoglobin, red blood cell, plasma, white blood cell, antibodies, phagocytosis, ... Complete a data sheet: numbers of cells, etc. Extra Task: calculate number of each type of cell per person. Issue and explain 'Functions of the Blood' sheet for homework.	Complete sheet for homework.	Roberts pp.204-211 'Functions of the Blood'
11	26/11/03	Complete notes from the board on blood vessels. Designed as a mind map + diagrams. Complete this on A3 using a heart → artery → capillary → vein → heart cycle at the centre. Relate this to the pulse work and review all the information.	Revise for a test.	
12	3/12/03	Complete Test. Include a question for discussion, e.g. Sport is unfair because people vary. Consider why variation is a good thing. Consider how this might be communicated, e.g. poster, pamphlet, etc	Creative worship poster, etc.	

Breathing

Truth: God's good creation in a fallen world can go wrong. He has given us ways to correct these effects and can help us respond with compassion. (The 'Creation-Fall-Redemption' model may also be applied here.)

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
KS3 National Curriculum - Breathing				
i) The role of lung structure in gas exchange, including the effect of smoking.				
13	12/12/03	Return the test and discuss some of the answers to the discussion questions. Measure breathing rate and collect the data on the board. Ask the question “How do we breathe?” and point out the movement of the rib cage, linking the appropriate movement to the inhalation and exhalation. Hand out ‘Breathing’ worksheet and label the parts.	Complete the ‘Keeping Lungs Healthy’ table.	‘Breathing’
14	14/1/04	Make a rib cage model with split pins and card. Colouring and labelling, and the attachment of rubber bands should be careful. Relate the finished product to the diagram on page 2 of ‘Breathing’. Consider how the muscles might cause breathing to happen. Assemble the alveoli diagrams into a booklet and label the top diagram with parts. Name the processes involved with a sequence: oxygen in the air → oxygen in the bronchi → oxygen in the alveoli → oxygen in the blood. Complete the ‘Gas Exchange’ sheet.	Complete the sheet for homework.	‘Gas Exchange’
15	21/1/04	Dissect pluck to show the various systems and the nature of some of the tissue involved, e.g. buoyancy of lung tissue, inflatable lungs, and tubes of different kinds. When finished summarise arguments by discussion for and against animal experiments. Include relevant scriptures.	Present both sides of the argument appropriately.	
Respiration				
Truth: God has created us to be able to appreciate what Science discovers, to use it wisely, and to respond appropriately to Him as a result.				
KS3 National Curriculum - Respiration				
j) that aerobic respiration involves a reaction in cells between oxygen and food, in which glucose is broken down into carbon dioxide and water				
k) to summarise aerobic respiration in a word equation				
l) that the reactants and products of respiration are transported throughout the body in the bloodstream				
16	28/1/04	Read out some of the answers anonymously if necessary. Discuss any new issues. Recall what is needed to allow muscles to move. Link this to the process of respiration, and then the difficulty of using animal tissue. Carry out an investigation into how yeast causes dough to rise. Use the ‘Respiration’ sheet, completing any notes, etc.		Williams pp.65-78;83-84 ‘Respiration’

Less on	Date (approx)	Lesson Content – T1 pp. 8 to 34	Homework	Text & Wsht ref.s
Movement				
Truth: The body is created to act in a coordinated and effective way in the environment. Sport requires this effectiveness. What is the basis for the status that comes from Sport?				
KS3 National Curriculum - Movement				
e) the role of the skeleton and joints and the principle of antagonistic muscle pairs [for example, biceps and triceps] in movement				
17	4/2/04	Look at a skeleton. Label the 'Skeleton' diagram appropriately. Group the class to allow each to complete the table of definitions on the sheet, sharing answers after 15 minutes. Look at a pig's trotter. Investigation 1 p.309 to illustrate answers from the previous task. Make a model of the forearm from a sheet of instructions.	Complete the skeleton diagram or definitions.	Roberts pp.302-309 'Skeleton'
18	11/2/04	Lift an object using a bent arm, push an object away using a bent arm. Identify where the muscles are active. Discuss words to use to describe what is happening. Develop a chain of events, e.g. eyes→nerves→brain→nerves→muscles→movement. Use p.307, Fig 4 ;p.308, Fig 6 and p.309 Qs 3 to 5 to describe the function. Include all the words in bold type referring back to last week's lesson.	Devise a test paper for the work so far. Q, A and marks.	
19	25/2/04	Group the class to find out what they can about breaks, healing bones, slipped disks, joints, arthritis, and muscle troubles. Feedback these answers to the whole class. Illustrate these with, e.g. x rays, or personal stories Consider: (i) Why do these things happen?, (ii) How does God help deal with them?, (iii) How might we deal with them?	Revise.	Roberts pp.310-313
Health & Disease				
Truth: Living in the world is risky, but God is directly involved, understands suffering, and has enabled the body to live safely. He has enabled us to.				
KS3 National Curriculum - Health				
m) That the abuse of alcohol, solvents, and other drugs affects health. n) How the growth and reproduction of bacteria and the replication of viruses can affect health, and how the body's natural defences may be enhanced by immunisation and medicines.				

Less on	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s	
20	3/3/04	<p>Test on work so far – use SATs questions.</p> <p>Describe an accident. What does the body do to counteract this damage? Wbc, blood clotting, hormones, healing.</p> <p>Describe the course of an illness. Video.</p> <p>Create a flow chart to include these events in an appropriate way.</p> <p>Diagrams to add to this sequence.</p> <p>Hand out [TPG Year 9 immunity.doc] for homework task.</p>	Complete the story of immunity using a given script but freedom to draw, write, cartoon, etc.		
21	10/3/04	<p>Response of the body to infection. Case history to illustrate: infection, incubation, symptoms.</p> <p>Devise a resistance game. Include phagocytosis, antigens, antibodies and their function.</p> <p>Use www.schoolscience.co.uk/content/4/biology/abpi/diseases/index.html for homework.</p> <p>Use the worksheet on disease, transmission and defence to test understanding of these terms.</p>	Find out about a bacterial, viral and another parasitic disease.		
22	17/3/04	<p>Cancer – give a case history, perhaps using ‘C’ by John Diamond.</p> <p>Outline what happens to the cells and use a domino puzzle to match treatments with what they do.</p> <p>Per group produce a letter to someone with cancer. Use scripture, compassion and a knowledge of what cancer is. When written read out in class. Let discussion touch on suffering, euthanasia, hospice care, etc.</p> <p>Introduce the mind map: coloured branches choosing a title, areas to learn about. Produce one for fighting infection.</p>	Organise the information from the two weeks into a mind map using colours.		
23	24/3/04	<p>Mind map ‘Drugs’. Develop branches towards useful, abuse, types of drugs in each area, reasons for using drugs.</p> <p>Demonstrate products from cigarette smoke. Show tar (revise alveoli/cotton wool), pH</p> <p>Hand out summary sheet from Revision guide.</p>			
24	31/3/04	<p>In support groups devise dominos, word cards, mind maps, etc to others to revise. Give out areas from the NC to each group.</p> <p>Submit ideas to other groups, listening to instructions as to how to use them.</p>	Make a pack of cards with words from Years 7 to 9.		

Lesson	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s
26	28/4/04	Revision Lesson: Use the packs of words: (i) deal five – then describe a biological link between them; (ii) deal and ask for a definition, perhaps collecting points (possibly smarties) – pupils judge the answers. (iii) Pelmitism – memory – turn up pairs that are related. Explain the link. Look at past papers as Support groups – devise answers. Compare between groups.	Revision	
27	5/5/04	SATs		
<p>Stewardship and the Environment</p> <p>Truth: We live in an environment that is designed to function interdependently, and in which the Bible indicates we should be stewards. This entails active understanding of how we should care, e.g, through conservation, not polluting, and ensuring the damage we cause is reparable through natural means,</p>				
28	12/5/04	Go through the answers from the paper. Use a video of a habitat. ‘The Blue Planet’. Collect through observations: adaptations for survival, examples of food webs, environmental factors.	“Why should a species or a habitat be conserved?”	
29	19/5/04	<p>Devise a quiz on ecology from KS3 work. Either for points, or, assessing environmental consciousness (each q. has three answers, 1 least, 3 most concerned: the total matching descriptors on the answer sheet.</p> <p>Adaptation and Competition</p> <p>a) About ways in which living things and the environment can be protected, and the importance of sustainable development</p> <p>b) That habitats support a diversity of plants and animals that are interdependent</p> <p>c) How some organisms are adapted to survive daily and seasonal changes in their habitats</p> <p>d) How predation and competition for resources affect the size of populations [for example, bacteria, growth of vegetation]</p> <p>Feeding relationships</p> <p>e) About food webs composed of several food chains, and how food chains can be quantified using pyramids of numbers</p> <p>f) How toxic materials can accumulate in food chains.</p> <p>By July, a booklet per pupil. Last week’s homework is the first entry</p> <p>Explain plan for the rest of term, and thus the Contents of this project:</p> <ol style="list-style-type: none"> 1. Factors affecting growth – growth on tree bark. 2. Sampling in a habitat to detect damage 3. A bigger picture 4. Caring for the environment 5. In Conclusion <p>Read through the lichen worksheets and read through them ready for next week.</p>	Designing the title page. Perhaps typing last weeks hwk.	

Less on	Date (approx)	Lesson Content – TI pp. 8 to 34	Homework	Text & Wsht ref.s	
30	26/5/04	1) Investigating growth on tree bark. Remind pupils of the worksheet handed out last week. Carry out the task following worksheet.	Complete data handling & Conclusion	TPG Year 9 lichen.doc	
31	9/6/04	Review what the data shows about growth on tree bark. Complete a data question on air pollution? Read through the water pollution worksheets for next week.			
32	16/6/04	2) sample for water creatures with a view to assessing purity of the stream, and the idea of indicator species Record creatures as collected. Discuss where pitfall traps should be set.	Complete data handling & Conclusion.	TPG Year 9 Pollution doc	
33	23/6/04	3) Identify pitfall contents (traps set up Tuesday after school). Devise a key to identify invertebrates trapped. Devise a possible food web from organisms collected. Answer questions on a food web.	Research a habitat to arrive at a description.		
34	30/6/04	4) Work singly, then in pairs, then in groups. Value of the habitat investigated? Pressures on it. How to manage the habitat. Scriptural principles.	Research and write environmental Debate.		
35	7/7/04	Ask pupils to read out their cases for and/or against the motion. Open the floor to question each other. Concluding vote. Write a summary report of the debate.	Finish report. Assemble the booklet.		
36	14/7/04	Hand in the booklet.			