CONTENT STRANDS (SAMPLES OF MATHEMATICS TEACHING ACTIVITIES INCORPORATING CATHOLIC VALUES)

Measurement and Geometry

The Measurement and Geometry strand enables students to identify and quantify attributes of objects that have been both created by God in nature or human kind by the use of their God given intellect. Application of measurement also allows students to investigate the injustices of the poor, such as the lack of water consumption by the poor, and to remember God's call to 'rescue the poor and helpless' (Ps 82:4).

Example: Stage One (Two-Dimensional Space 1)

Students identify vertical and horizontal lines and identify and name two dimensional shapes from different sacred objects and icons in a Church/Chapel (God's presence in the world) [Critical and Creative Thinking]

Example: Stage 5.1 (Number of any magnitude)

Students explore the scale of the universe using the concept of scientific notation via the 'scale of the universe' website (God's presence in the World) [Information and Communication Technology Capability]

Website: Scale of the Universe

Number and Algebra

The Number and Algebra strand can help students in their use of numbers, to quantify the world they live in and explore the order in the world, which God has created. Students can also apply number skills to a variety of situations (such as local and global financial problems) to raise social justice issues and adhere to Christ's call to 'Love your neighbour as yourself' (Mt 22: 37-39)

Example: Stage 3 (Addition and Subtraction 1)

Constructing a household budget and compare what money can buy in developing countries (Freedom from Oppression/Positive view of Life) [Personal and Social Capability/Intercultural Understanding/Ethical Understanding]

Website: What your dollar can buy (Caritas Australia)

Example: Stage 4 (Fractions, Decimals and Percentages)

Investigate the percentage and fraction of refugees entering different countries (Positive view of life) [Ethical Understanding/Intercultural Understanding]

Website: Refugee Statistics

Statistics and Probability

The Statistics and Probability strand allows students to not only collect data but also understand, interpret and analyse information. These skills in Mathematics can help students appreciate the wonderful diversity God has infused in the world but also can highlight the inhuman conditions in the world, for example by analysing global poverty statistics.

Example: Stage 2 (Data 1)
Collect data based on important Catholic events in the students' life (e.g. Month of Baptism, Age for sacrament of reconciliation, Number of students who has a saint's name, favourite image of Jesus) and display data in different displays (lists, tables, picture graphs and column graphs)

(Search for Truth and Wisdom/Community) [Critical and Creative Thinking]

Example: Stage 4
(Data Collection and Representation)

Students can construct different data displays (sector graphs, divided bar graphs, line graphs) based on the lives lost during different wars
(Positive view of Life) [Ethical Understanding]

Website: Lives lost at war

CROSS CURRICULUM PRIORITIES - CATHOLIC PERSPECTIVE

Aboriginal and Torres Strait Islander Histories and Cultures

The Aboriginal and Torres Strait Islander people have lived on this land, called Australia, for thousands of years. The Catholic Church teaches that all people demand respect because all humans are created in the image and likeness of God (Genesis 1:26-27). All people, no matter what religion, are bonded because they are all from the one human race. Aboriginal and Torres Strait Islander people have a very deep respect for the land and this was one very important point that Pope John Paul II raised in his homily to the Aboriginal and Torres Strait Islander people when he visited Alice Springs in 1986;

"The rock paintings and the discovered evidence of your ancient tools and implements indicate the presence of your age-old culture and prove your ancient occupancy of this land.

Your culture, which shows the lasting genius and dignity of your race, must not be allowed to disappear. Do not think that your gifts are worth so little that you should no longer bother to maintain them. Share them with each other and teach them to your children. Your songs, your stories, your paintings, your dances, your languages, must never be lost."

(Address of Pope John Paul II to the Aboriginal and Torres Strait Islander people, Alice Springs, 1986)

Aboriginal and Torres Strait Islander people have a rich culture and have used their God given intellects to find ways to effectively use mathematics in a broad range of applications. Mathematics can also be used by a diversity of people to appreciate the beautiful Aboriginal and Torres Strait Islander culture, by investigating such things as geometry of Aboriginal artwork, reference systems used in Aboriginal maps and the understanding of informal time units used by Aboriginal and Torres Strait Islander people.

Asia and Australia's Engagement with Asia

The Asian region has a rich culture with many of its unique values embedded in Asian society. Pope John Paul II recognised this richness of culture and pride in its strong values and way of life. He writes in his Apostolic Exhortation "Ecclesia in Asia" in 1999:

"The people of Asia take pride in their religious and cultural values, such as love of silence and contemplation, simplicity, harmony, detachment, non-violence, the spirit of hard work, discipline, frugal living, the thirst for learning and philosophical enquiry.10 They hold dear the values of respect for life, compassion for all beings, closeness to nature, filial piety towards parents, elders and ancestors, and a highly developed sense of community.11 In particular, they hold the family to be a vital source of strength, a closely knit community with a powerful sense of solidarity.12 Asian peoples are known for their spirit of religious tolerance and peaceful co-existence”

(Pope John Paul II, Ecclesia in Asia, Apostolic Exhortation on Jesus Christ the Saviour and his mission of love and service in Asia, 1999)

Individuals from the community of Asia, have used God's gift of human intellect, to apply mathematical concepts to enhance life in Asia. To appreciate aspects of Asian culture and life, mathematics can be used, such as geometry in Asian artwork and architecture, measurement in Asian calendars, use of data in understanding weather and environmental conditions in Asia.

Sustainability
God’s presence in the world (Principle of Stewardship)

In the beginning God entrusted the earth and its resources to the common stewardship of mankind to take care of them, master them by labour, and enjoy their fruits. The goods of creation are destined for the whole human race (CCC 2402).

The dominion granted by the Creator over the mineral, vegetable, and animal resources of the universe cannot be separated from respect for moral obligations, including those toward generations to come (CCC 2456).

Mathematics can be used to better understand sustainability related issues such as; the rate of natural gas exploited per year, volume of water lost from a dripping tap, area of forest cut down each year. It is crucial that mathematics can be used to help the call from God to be good ‘stewards’ and ensure that all of mankind have access to these valuable resources.

**Teacher Formation Video/Classroom Resource Video**
Description: This video focuses on Pope Francis’ encyclical ‘Laudato Si’ and its connection to Australia.

Try watching this video on www.youtube.com, or enable JavaScript if it is disabled in your browser.

**Teacher Formation Video/Classroom Resource Video**
Description: This video emphasises humanities obligation to be good stewards of all Earthly resources, as these are a gift from God to humanity.

Try watching this video on www.youtube.com, or enable JavaScript if it is disabled in your browser.

**GENERAL CAPABILITIES - CATHOLIC PERSPECTIVE**

**Critical and Creative Thinking**

Humans are created in God's image and likeness (Gen 1:26-27). God has gifted humans the ability to attain knowledge and ultimately to serve and love God and to offer all creation back to him (CCC 356, 358). Through the gift of human intellect, all human beings have the ability to be critical and creative in their thinking.

Critical and creative thinking activities in mathematics allows student's to explore many important themes, such as Love of God and Love of neighbour.
Ethical Understanding

Moral Decision Making

Human acts can be morally evaluated as good or bad. A good human act must satisfy three conditions.

1. The Act itself (CCC 1755)
   A bad act can never be morally good, no matter how good the intention is. Some acts are wrong no matter what, such as murder, stealing, lying and cheating.

2. The Person’s intention (CCC 1752, 1753)
   The intention for the act is important. A good act, can be considered bad, if the intention is not good.

3. The Circumstances (CCC 1754)
   The circumstances, which includes the consequences of the act, can make an act better or worse. However, the circumstances cannot change an act from good to bad or bad to good.

Teacher formation Video/Classroom resource video
Description: This video explains the Catholic Church’s teaching on the morality of human acts

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Try watching this video on www.youtube.com, or enable JavaScript if it is disabled in your browser.

God has given humans the moral law. Humans have the ability through reason to understand and discern. The moral law is for the good of human beings and its origins come from God (CCC 1950-1951). It is crucial to look for guidance to the Catholic Church, as God’s truth is preserved through the gift of infallibility given to the Magisterium (teaching office) of the Catholic Church.

Mathematics can be used as a tool to explore many ethical issues in the world today.

Information and Communication Technology Capability

Information and communication technology (ICT) is a very valuable tool for students to engage with in the area of Mathematics. ICT offers many benefits and Pope Benedict XVI reiterates this important point in his message for the 43rd World Communication day.

"These technologies are truly a gift to humanity and we must endeavour to ensure that the benefits they offer are put at the service of all human individuals and communities, especially those who are most disadvantaged and vulnerable”

"Many benefits flow from this new culture of communication: families are able to maintain contact across great distances; students and researchers have more immediate and easier access to documents, sources and scientific discoveries, hence they can work collaboratively from different locations; moreover, the interactive nature of many of the new media facilitates more dynamic forms of learning and communication, thereby contributing to social progress."


Pope Benedict makes the point in his message for the 43rd World Communication day, that the dignity of the human person has to be upheld in all endeavours and technologies should aim for social progress.
Intercultural Understanding

All humans form a unity with each other, as they originate from the one God (CCC 360). All people are created unique, which makes cultures very diverse.

The Congregation for Catholic Education, stress the importance for schools to allow opportunities for students to encounter and understand other cultures:

“Schools are entrusted with great responsibility for intercultural education. During their formation, students find themselves interacting with different cultures, and need necessary tools for understanding them and relating them to their own culture. Schools are to be open to encountering other cultures. They have the task of supporting individuals so that each person develops his or her own identity in an awareness of its richness and cultural tradition.”

(Congregation for Catholic Education, Educating to Intercultural Dialogue in Catholic Schools Living in Harmony for a Civilisation of Love, Vatican City, 2013)

Mathematics can be used to appreciate and learn more about different cultures around the world.

Literacy

Literacy is a very important skill and is essential for humans to function successfully in society. Pope Paul VI emphasises the importance of literacy, in his encyclical letter on the development of peoples "Populorum Progressio", stating;

"literacy is the first and most basic tool for personal enrichment and social integration; and it is society's most valuable tool for furthering development and economic progress."


Literacy is very important in mathematics, as understanding written problems and interpreting mathematical texts in graphs, tables and other representations, is crucial and common to many mathematical problems and contexts. Mathematics should be ordered towards the progress of society and therefore literacy cannot be ignored if human beings are to flourish.

Numeracy

Numeracy is the ability to apply mathematics in the world. Pope Benedict XVI points out in his address to young people of the diocese of Rome in 2006:

- Mathematics helps us understand God's creation (nature).
- We can discover that nature was designed in mathematical ways.
- Our human minds are wondrous gifts from God. Doing mathematics uses our minds every day to help us understand our world.
- Technology could not work without mathematics

(Benedict XVI, Address to young people of the Diocese of Rome, 6 April 2006).

Personal and Social Capability

God has inscribed on every human heart, a law which can be discovered, deep within one's conscience and this law must be obeyed by every person. (CCC 1776). In all interactions and choices made, God calls everyone to do good and avoid evil. God has gifted to everyone, free will, and people have a choice how to use the mathematical knowledge they have acquired, to meet their own needs and societal needs.

God does call everyone to follow the voice of their conscience but the education of one's conscience is fundamental (CCC 1783). Scripture is essential in the formation of one's conscience as are the gifts of the Holy Spirit and the guidance of Catholic Church teachings (CCC 1785).

All of humanity are called to God and the call of love of neighbour is inseparable from love for God (CCC 1878). All interactions with people, have to be grounded in 'love of neighbour' which would foster positive relationships and benefit society.

OTHER AREAS-CATHOLIC PERSPECTIVE

Work and Enterprise

Humans are created in the image of God and are called to prolong the work of creation by subduing the earth and hence work is a duty not an option (CCC 2427). Work does honour the gifts and talents freely given by God and also does allow for providing financially for each family as well as serving the human community (CCC 2427, 2428).

Mathematics can be used to develop skills for the workplace and be used as a tool to explore many work related issues.

Teacher Formation Video

Description: This video focuses on the dignity of work. Pope Francis emphasises the importance of creating opportunities for people to work and always put the dignity of human persons before economic value.