Survival Guide

# Techniques

-get attention via lights or a clap that expands like “the wave” etc.

Quick poles to see if students are done group work or ready to move on with course material ex.: thumbs up/down

-biggest challenge is finding different ways to explain, and knowing the “why”

“Random” group assignments can be done strategically to play to students strengths/weaknesses and also avoid “bad pairings”

A level 4 question as far as marking is concerned is where the student must take what we learned and take it to another level, ex: doing surface area of cylinders, regular would be level 3, doing a cylinder with a hollow cylinder in the middle.

Manipulatives

If you are missing any a whole lot are available online to be printed out and

<http://lrt.ednet.ns.ca/pd/blm/table_of_contents.htm>

# Curriculum

Overall expectations – absolutely must be covered

Specific expectations are a means to get there and don’t all have to be covered

5 strands of math in elementary:

* Number sense and numeration
* Measurement
* Geometry and special sense
* Patterning and algebra
* Data management and probability

Process expectations

Representing:

* Modelling different math ideas
* Talking, writing, graphing, explaining, etc
* Ex: algebraic vs. graphical

Connecting:

* Math -> real life

Communication:

Terminology etc

Patterning and Algebra:

* Represent patterns and relationships (linear )
* Algebraic representation of patterns
* Surface area
* Use of variables
* Real life linear relationships (car speed etc)

Grade 8

Linear growing patterns sing graphs and equations

Model real life relationship[s using inspection, guess and check, “balance” model

Translate math relationships into algebraic expressions

Solve and verify linear equations

Number sense and numeration

7

Order and represent integers

Add and subtract fractions

Problem solve w/ whole numbers and decimals

Understand %, ratio and rate

8

Equiv representation of numbers i.e. ¼ = 0.25 etc

Whole numbers, decimals, fractions and integers

Ratios and percents

Measurement:

Metric units

Convert and explain

Real life application

2d shapes

7 -> irregular shapes, trapezoids parallelograms, calculate and estimate areas using different methods

8 -> circles, ellipses, knowledge and use of PI

3d shapes

7 -> breaking down prisms into 2d shapes, same volume different shapes

8 -> more advanced shapes, real world appl.

Geometry and Spatial Sense

7

Identifying shapes

Transformations and coordinate planes

Characteristics of line segments

8

Real works app of grade 7

-Activities

Find someone who....

Each student picks a topic/question and teaches it to other students

Good for review before a test, or survey of base knowledge.

Make sure to post answers afterwards

Think pair share

-think about it solo, then talk with your neighbour, then discuss it as a class

Encourages student s to participate that might not otherwise

Jug problem:

You have: 5L jug and 3L jug, free flowing water to fill either jug as many times as needed. We need to get exactly 4l in one jug.

Placemats

Individuals provide info in their own sections alone, then as a group take the best parts and place them in the middle.

# TIPS Lessons

* TIPS lesson - [Targeted Implementation and Planning Supports for Revised Mathematics (TIPS4RM)](http://www.edu.gov.on.ca/eng/studentsuccess/lms/library.html#TIPS4RM)

0-minds on/hook

* Mentally engage at start
* Make connections between different math strands
* Gets them in the mind set for a specific topic

Examples: review of previous days concepts

Why you are learning a topic

Clicker question

Challenge question

Game

Short video

Pictures

Brainstorming a topic

Real world applications

A story

Demonstration or a prop

### Frayer model

Often used at the beginning of a unit get student to think about terms that will be used

Students can use: prior knowledge, textbooks, dictionary, etc to fill in the model.

Contains:

* definition
* Facts/characteristics
* Examples
* Non-examples (related, possibly often confused with the given topic

Can be used to introduce a topic, or review one after.

Cylinder problem, sheet of paper in a wide cylinder and tall cylinder shape, which has greater volume

Separate into 4 groups, even, bigger, smaller, not sure – show how (sans math)

Action

Consolidate debrief

Home activity

Talking about circles – measure various circles, fill in following chart

Learn what PI is and where it comes from, how it can be used.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Object | Circumference | diameter | c-d | C+d | C/d | C\*d |
| CD | 38cm | 12cm | 26cm | 50cm | 3.16666cm | 456cm |
| Coffee lid | 28.2 | 8.5 | 19.7 | 36.7 | 3.31 | 239.7 |
| tp | 13 | 3.6 | 9.4 | 16.6 | 3.61 | 46.8 |
| floppy | 20.1 | 9.7 | 10.4 | 29.8 |  |  |

## Consolidate/debrief

“Pulls out” the math of the activities and investigations

Prepares students for home/further classroom consolidation

## Home Activity

Meaningful and appropriate to follow up the lesson (only 1-5 questions

Move away from “drill and kill”

Make it realistic

Ex.: journal entry, 5 questions related to the work done in class, 1 challenge question related to the work done in class (ie for the circle problem, one very large object and prove that PI still holds)

When using one challenge question make sure there is an easier option for students that may not be able to handle the hard one so that they don’t get discouraged

Four fours, using 4 fours in an equation represent all of the integers from 0 – 20. Using addition, subtraction, parenthesis etc

Ex: 0 = 4+4-4-4

(4! – 4 )/4 + 4 = 9, if factorials are allowed

Full TIPS lesson:

Minds on – build triangle ½ green and ½ blue

Action – build a bunch of shapes with a variety of fractional area colour restrictions

I.e.: build a parallelogram with an area that is 1/3 green, 1/3 red, 1/3 blue

## Fermi problem

A multi-step problem where the answer is not important, but rather how that conclusion was reached.

Initial impression may very well be, “I need more information to solve this”

There are many different solutions. Use any tools necessary.

Work in teams

Example:

How many bottles of pop will Canadians drink in a year?

How many jelly beans would fill a 1L BOTTLE?

What if Lake Ontario was a giant cup of hot chocolate? How many regular sized marshmallows would it take to cover the surface area?

### New Ways to think about math

#### Addition

Students learning to add may find it more logical to begin adding from left to right, similar to reading. Using this you can compare methods; make students aware that both methods are valid. Show examples of both, discuss advantages and disadvantages.

Standard: 6 + 7

#### Subtraction:

Normal method, counting method

Normal method -> break it down from right to left, digit by digit and “borrow” 10 from the number to the left if needed.

Counting -> 125 – 39 (similar to counting out change)

Start at 39, +1 = 40, +60 = 100, +25 more = 125, therefore 1+60+25 = 86 = the answer

#### Multiplication

Standard method: break it down into

Lattice method:

Place one number on the top, the other on the right, divide the

|  |  |
| --- | --- |
|  |  |
|  |  |

#### Division

Standard:

Partial quotients:

# Technology in Math

### Smart board software

The smart board softwareVery interactive, not only useful for making interactive lessons, but students can also make “mathcast” presentations to demonstrate to you that they grasp the given concepts.

Interactive attendance sheet, students click their names to show that they are there.

Lots of templates freely available online, partially built, just add content, or full activities.

### Geometer’s Sketchpad

This software can be used to find Interactive calculations for various shapes. Widely used in high schools for solving geometry problems.

### Census at school

Having students fill out surveys online to gather data that interests you. You can also view results from previous years and even different colleges.

## Homework assignment

Homework: choose a concept from grade 7 or 8 curriculum and create a Fermi problem that requires students to use that concept.

Type up your question and a possible solution and make it relevant to the lives of a grade 7 or 8 student.

How many times does a wheel on a bike spin if the cyclist rides 5 km?

Curriculum covered:

* Conversion between metric units
* Calculation of circumference

Possible Solution:

* Assume the diameter of a bicycle wheel is 50 cm
* Calculate the circumference:
* Convert the circumference of the wheel and the given distance traveled to the same unit of measurement.
  + 157cm = 1.57m
  + 5km = 5000m
* Find how many revolutions the wheel must complete given the assumed values to cover the specified distance.

Possible Variation:

* Add more ambiguity by replacing the given distance with something familiar to the student such as the distance of riding a path around the school.