Keywords of
Numeracy

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Keywords of Numeracy

The Vocabulary and Language of Numeracy

To become numerate and to successfully engage with the numerical challenges of second level curricula and everyday life, students need to develop competencies and skills in decoding and making sense of the various forms and complexities of numerical graphics, text, vocabulary and language, which encapsulate and include:

- arithmetical signs: +, -, x, ÷
- numerical and mathematical symbols: $<, =, >, \leq, \geq, \neq, \sqrt{}, x^2, x^3, \pi, \%, €$ ....
- number symbols: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ½, ¼, ¾, 3·4, 2², 4³, N, Z, Q, R ….
- visual representations and stimuli: pictograms, bar charts, pie charts, line graphs, graphs, frequency distribution tables, geometric shapes, patterns, symmetries
- numerical (measurement) formulae
- generic text (i.e. written English register): keywords, key phrases, grammar, syntax, punctuation….
- oral communication and instruction
- symbols on calculator keys

DfES (2000) state that numerical vocabulary and language are essential to the development of thinking and cognition. If students do not possess the relevant vocabulary to talk about division, area or arithmetical difference, then they cannot advance their understanding of these domains of numeracy.

Van De Walle (2004) states that when students possess competencies and skills in the use of numerical and mathematical language and vocabulary they can:
- organise and consolidate numerical and mathematical thinking through communication
- communicate numerical and mathematical thinking clearly and coherently to peers, teachers and others
- analyse and evaluate the numerical and mathematical thinking of others
- use the language of numeracy to express numerical ideas precisely

This resource pack has been planned and developed to support the teaching and learning of numeracy and numerical literacy in JCSP schools and, in particular, the vocabulary, language and communication component of numerical literacy.

In order to provide teachers and students with concise and convenient checklists of the important keywords, key phrases, key symbols and key questions associated with each specific numerical theme, the substantive suite of numerical vocabulary and questions contained in this resource pack, has been arranged and sub-divided into the various strands and themes of numeracy namely:

Number:
- Place Value
- Order and the Number Line
- Number Properties
- Money and Money Transactions
- Number Systems (whole numbers, fractions, decimals, percentages)(N, Z, Q, R)
- Computation (addition, subtraction, multiplication, division)
- Using a Calculator

Measures and Measurement:
- Length
- Weight / Mass
- Capacity / Volume

- Area
- Time
- Angles
- Temperature
- Speed

Space and Shape
Data, Data Handling and Probability
Patterns, Symmetries and Basic Algebra

This resource pack also contains three additional lists of important generic keywords and key phrases, which underpin and support the teaching and learning of numerical literacy, namely:

* keywords that inform and script the process of Problem Solving in numeracy and mathematics
* keywords that support the development of Reasoning, Thinking and Reflection in numeracy and mathematics
* keywords that are frequently used in numeracy and mathematics Exams and Assessments

Please note that this suite of "Keywords of Numeracy" is not exhaustive and teachers may add to and extend the suite as required.

Introducing New Vocabulary to Students
* Always use a structured approach to the teaching of new vocabulary and terminology (e.g. Keyword Approach, Visual Verbal Squares, Word Wall). The use of JCSP Keyword Journals, JCSP Keyword Bookmarks, JCSP Keyword Wall Posters and JCSP A4 Keyword Folder-inserts can greatly enhance the teaching and learning of numeracy keywords and numerical literacy.
* Introduce only a small number of new words at any one time.
* Explain the meaning of each word carefully. Repeat, re-visit and consolidate the meaning several times. Referring to the meanings of new words only once will do little to promote comprehension, understanding and learning.
* Provide opportunities for the students to read, discuss and write the new words.
* Provide opportunities for the student to listen to the teacher and peers using the words correctly.
* Consolidate and enhance understanding and comprehension of new vocabulary through the provision of opportunities for students to engage with a range of relevant and appropriate multi-sensory stimuli: e.g.
    * the real object itself or a realistic facsimile
    * relevant maths apparatus, manipulatives and mobiles
    * representative graphics, visuals, diagrams and pictures
    * interactive ICT software
* Reinforce and enhance comprehension through the use of DART (Directed Activities Related to Text) activities e.g. using the KWL template.

The Appendix section contains a set of four templates and exemplars to support the teaching and learning of numeracy keywords: Keyword List template, Visual Verbal Square template, Word Wall template and KWL template.

Keywords:

- Big, bigger, biggest
- Currency, coin, note, euro, ten euros, hundred euros, thousand euros, ten thousand euros, cents, one cent, ten cents, dollar
- Cuisenaire rods
- Decimal point
- Dienes blocks
- Digit
- Equals, is, was, were, will be, gives, yields, is the same as, is equal to
- Higher, highest
- Lower, lowest
- Number
- Place value
- Place, position, location
- Small, smaller, smallest
- Unit, one/s
- Unit, tens, hundreds, thousands, ten thousands
- Unit, tenths, hundredths, thousandths, ten thousandths

€50·00

Key phrases:

- Represents ....
- Stands for
- Exchange for
- Round to the nearest whole number
- Correct to one place of decimal
- Correct to two places of decimal
- Immediately to the right of
- Immediately to the left of
- Adjacent to

Key symbols:

- € Euro
- $ Dollar
- £ Pound sterling
- • Decimal point
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- What is the value of the "5" in: €37·25?
- Which of these two number has the greater value: 123·4 or 12·34?
- What is the biggest four-digit number that can be made using each of these four digits: 4, 3, 7, 9?
- What is the smallest four-digit number that can be made using each of these four digits: 4, 3, 7, 9?
- Can you make an even four-digit number from these four digits 4, 3, 7, 9?
- Can you make an odd four-digit number from these four digits 4, 3, 7, 9?
- What is the value of the "zero" in: 127·8046?
- What is the value of the "two" in: 127·8046?

Keywords:

- After
- Ascending
- Before
- Big, bigger, biggest
- Between
- Close to
- Consecutive
- Decimal point
- Decimal numbers
- Decreasing
- Descending
- Different
- Directional arrows
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Even
- Fractions

- First, second, third, fourth, fifth, sixth, seventh, eight, ninth, tenth
- Hundred
- Increasing
- Integers
- Million
- Natural numbers
- Negative, minus
- Next
- Odd
- Order, ordered, in order
- One, two, three, four, five, six, seven, eight, nine
- Place
- Position
- Positive, plus
- Prediction

- Prime numbers, primes
- Negative
- Number
- Real numbers
- Sequence
- Shading
- Similar
- Small, smaller, smallest
- Square numbers
- Ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen
- Thousand
- Twenty, thirty, forty, fifty, sixty, seventy, eighty, ninety
- Whole number
- Zero

Key phrases:

- Is less than
- Is greater than
- Is the same as
- is less than or equal to
- is greater than or equal to
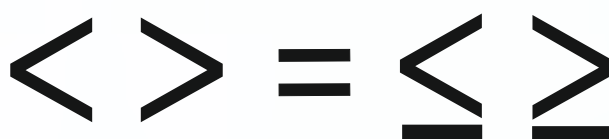
$$< \quad > \quad = \quad \leq \quad \geq$$

Key symbols:

- $<$ Is less than
- $>$ Is greater than
- $\leq$ Is less than or equal to
- $\geq$ Is greater than or equal to
- N Natural Numbers

- Z Integers
- Q Rational Numbers
- R Real Numbers
- • Decimal point
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- Which number comes next?
- By how much is …bigger than….?
- By how much is …smaller than….?
- What number is located half way between….and…?
- Can you shade the solution set on the Number Line: $2x + 5 > 17$ $x \in$ R?
- Can you shade the solution set on the Number Line: $3x + 2 \leq 17$ $x \in$ R?

Keywords:

- Associative Law
- Cardinal number
- Commutative Law
- Consecutive
- Cubed
- Decimal point
- Decimal numbers
- Denominator
- Digit
- Distributive Law
- Domain
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Equation
- Equivalent, equivalence
- Even
- Fractions

- Graph
- Identity element (for addition / subtraction / multiplication / division)
- Improper fraction
- Inverse
- Multiple
- Negative, minus
- Number
- Number sentence
- Numerator
- Odd, odd number
- Operations
- Ordinal
- Part
- Percentage
- Positive integers
- Prime

- Problem solving
- Proper fraction
- Proportion, direct proportion, inverse proportion
- Range
- Ratio
- Recurring
- Prime numbers, primes
- Relationship
- Right, correct, wrong, incorrect
- Set
- Squared
- Sort, classify, arrange
- Subset
- Whole number

Key phrases:

- Is an even number
- Is a prime number
- Is commutative for….

2,4,6,8....

Key symbols:

- < Is less than
- > **Is greater than**
- ≤ Is less than or equal to
- ≥ **Is greater than or equal to**
- N Natural Numbers

- Z Integers
- Q Rational Numbers
- R Real Numbers
- • Decimal point
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- Which of the following numbers are even: 2, 5, 7, 10, 12?
- Which of the following numbers are odd: 2, 5, 7, 10?
- Which of the following numbers are prime: 2, 5, 7, 10, 13?
- Which of the following numbers are square numbers: 2, 5, 9, 10, 16?

Number: Money and Money Transactions

Keywords:

- Amount
- Annual
- Auctioneer
- Bank, banker
- Bank-card
- Bank-link
- Bills
- Buy, buyer
- Capital
- Cheque. Cheque-book
- Coins, notes
- Compound interest
- Conversions
- Cost price
- Counting
- Credit union
- Currency
- Discount
- Dollar
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as

- Euro
- Foreign exchange
- Free
- Gross income
- Gross tax
- Income tax
- Interest
- Investment
- Loss
- Lottery
- Money
- Net income
- On-line banking
- Per annum
- Percent
- Percentage profit
- Percentage loss
- Pound sterling
- Price
- Principal
- Profit
- Purchase

- Rate of interest
- Rate of tax
- Reduction
- Risk
- Salary
- Sales
- Sell
- Selling price
- Shopping
- Simple interest
- Standard rate
- Supermarket
- Tax
- Tax credits
- Time
- Transaction
- Unit price
- Value
- VAT (value added tax)
- Vendor
- Year, yearly

Key phrases:

- Exchange for
- Purchase for
- Invest in
- Make a profit

- Make a loss
- Calculate the % profit
- Calculate the % loss
- Increase by

- Decrease by
- VAT included, VAT inclusive

Key symbols:

- € Euro
- $ Dollar
- £ Pound sterling
- • Decimal point

- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- % Percentage

Key questions:

- I buy an article for …. and one year later I sell it for …, did I make a profit or a loss?
- I buy an article for …. and one year later I sell it for …. Can you calculate my % profit on the transaction?
- I invest €… in a bank for 3 years at a rate of 2% per annum. What is the value of my investment after the three years?

Number Systems: Whole Numbers, Fractions, Decimals, Percentages

Keywords:

- Addition
- Arithmetic
- Cancel down
- Composite number
- Computation
- Cuisenaire coloured rods
- Decimal
- Decimal point
- Decimal place
- Denominator
- Division
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Equivalent fractions, equivalence
- Fraction
- Highest common factor

- Improper
- Integers (Z)
- Least common multiple
- Mixed fraction
- Multiplication
- Natural numbers (N)
- Negative
- Negative integers
- Numerator
- One whole
- One half, two halves, three halves….
- One third, two thirds, three thirds….
- One quarter, two quarters, three quarters…
- One fifth, two fifths, three fifths….

- One sixth, two sixths, three sixths…..
- One seventh, two sevenths, three sevenths…
- One eight, two eights, three eights….
- One ninth, two ninths, three ninths….
- One tenth, two tenths, three tenths….
- Percentage (%)
- Positive
- Plus
- Rational numbers (Q)
- Real numbers (R)
- Subtraction
- Whole number

Key phrases:

- Calculate the answer to….
- Solve the following…
- Find the solution to…
- Add… to ….
- Subtract … from….

- Multiply…by…
- Divide.... by......
- Cancel down
- Reduce to its simplest form
- Is an element of the set of

Real Numbers
- Is a Natural Number

Key symbols:

- N   Natural Numbers
- Z   Integers
- Q   Rational Numbers
- R   Real Numbers

- %   Percentage
- •   Decimal point
- =   Equals, is, is equal to, was, were, will be, gives, yields, is the same as
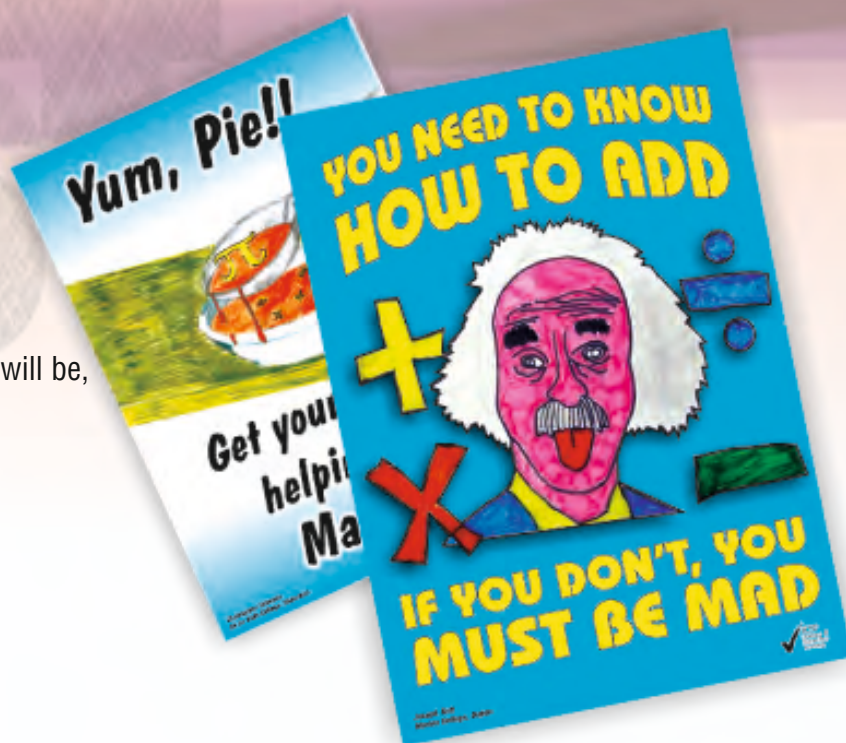
Key questions:

- What is the answer to $\frac{2}{6} + \frac{4}{5}$?
- Can you find the solution to: $\frac{4}{6} - \frac{1}{6}$?
- What is $\frac{1}{3}$ of €3600?
- Can you find sum of: 4·123 + 56 + 12·07?
- Can you find the solution to: 4·456 − 1·6234?
- What is $\frac{1}{3}$ of 2·784?
- Which is the greater: $\frac{2}{3}$ of 20·52 or $\frac{4}{5}$ of 22·55?
- Which is the greater: 25% of €450 or $\frac{3}{5}$ of €200?
- Can you add 2·456 + $\frac{4}{5}$ + 20% of 12?

- What are the first three Natural Numbers?
- What is 5% of 230?

Keywords:

- Add, addition, and
- Altogether, all together makes…
- Associative Law
- Calculations
- Combine
- Commutative Law
- Computation
- Count on
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Estimate
- Identity
- Increase
- Inverse
- More, more than
- Operations
- Plus
- Put with…
- Sum, sum of
- Together
- Total

Key phrases:

- Add…to…
- Increase …by…
- Combine together
- Altogether
- Total of…
- Combine…with….

Key symbols:

- + Add / addition
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- What is the sum of ….   ?
- What is the total of ….   ?
- How many…?
- How much in total have I spent?

Keywords:

- Calculations
- Computation
- Decrease
- Difference
- Discount of
- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Estimate
- Fewer
- From…
- Gave away, give away
- Go back. Count back
- Identity
- Inverse
- Less than
- Loss
- Minus
- Money off
- Operations
- Reduction of
- Spent …amount
- Subtract, subtraction
- Take away

Key phrases:

- Subtract…from
- Take away…. from….
- Decrease by…
- Fewer than
- The difference between ...and...
- A difference of ...
- Reduction of….
- What has to be added to ….?

Key symbols:

- - Subtract / subtraction
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- What is the difference between …. and…?
- How many more …?
- By how much is ….bigger than….?
- After spending…. what change will I get from…?
- How many will be left, when I take away…?
- If I have…, how many more will I require to make…..?

Keywords:

- Associative Law
- Brackets e.g. (2)(5)
- By…
- Calculations
- Computation
- Commutative Law
- Cubed
- Direct proportion
- Double
- Each
- Estimate

- Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- Factors
- Identity
- Inverse
- Magnification
- Multiply, multiplication
- Multiple
- Number squares
- Operations

- Power, to the power of…
- Product
- Repeated addition
- Squared
- Times
- Treble
- Twice

Key phrases:

- ...times...
- Multiply by
- Double
- Square..., ...squared
- To the power of…

- Treble..., ...trebled
- Raise to the power of…
- Find the product of…and...
- Increase by a factor of….
- Product of

Key symbols:

- x   Multiply / multiplication
- ( )( )   Multiply together
- =   Equals, is, is equal to, was, were, will be, gives, yields, is the same

Key questions:

- What is 5 x 5?
- What is 2·57 x 56·9?
- What is "five times three"?
- What is the product of seven and eight?
- Mary picked 10 apples. John picked four times as many. How many apples did John pick?

Keywords:

- Calculations
- Computation
- Distribute equally between…
- Divide, division, dividend, divisor, quotient, divisible by
- Divide by / into…
- Equals, is, is equal to, was, were, will be, gives, yields,
- is the same as
- Estimate
- Equal groups of…, Equal sets of…, Equal bundles of….Groups of…, Sets of…
- Factor, factorise, prime factors
- Halve, half
- Identity
- Inverse
- Operations
- Over…
- Proportion
- Inverse proportion
- Ratio
- Remainder
- Repeated subtraction
- Shared equally between…

Key phrases:

- Divide equally between….
- Divide by…
- Divide ….into ….
- Share equally between….
- Subdivide into groups of two / three / etc.…
- One each, two each, three each...

Key symbols:

- $\div$ Divide / division
- $\frac{1}{2}$ One divided by two, a half
- $=$ Equals, is, is equal to, was, were, will be, gives, yields, is the same as

Key questions:

- Can you divide 7 into 49?
- How many times will 3 divide into 21?

Keywords:

- Addition, adding
- Battery
- Button
- Calculator
- Cancel
- Change sign key
- Clear
- Combined operations
- Constant key
- Cubed
- Decimals
- Display
- Division, dividing

- Enter, entry
- Fractions
- Functions
- Input
- Key
- Memory
- Multiplication, multiplying
- On / off button
- Operation key
- Output
- Panel
- Percentages
- Power

- Press the key
- Programming
- Raising to a power
- Reciprocals
- Recurring
- Sign
- Sign change
- Solar powered
- Square, squared
- Square root
- Subtraction, subtracting

Key phrases:

- Solve, using your calculator…
- Calculate
- Check your written calculations and answer by using your calculator

Key symbols:

- + Addition
- − Subtraction
- x Multiplication
- ÷ Division
- % Percentage
- √ Square root
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as

- x^2 Squared
- x^y To the power of
- $\sin^{-1}$ Inverse sine
- EXP The exponent key
- EE The exponent key
- E The exponent key

Key questions:

- Can you use your calculator to find the solution to: 1234 x 56·78?
- Can you use your calculator to find the solution to: 567·342 ÷ 2·4?
- Can you use your calculator to find $(2·45)^2$?
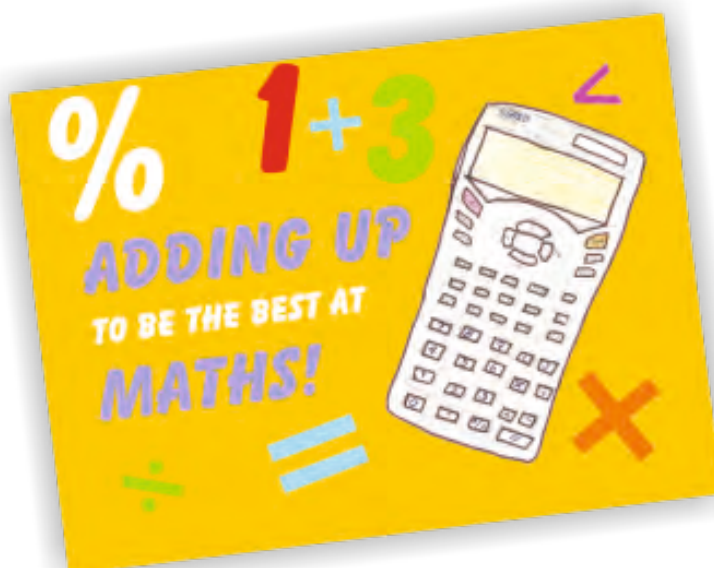
Keywords:

- Accurate
- Adjacent
- Altitude
- Amplitude
- Base
- Big, bigger, biggest
- Breadth
- Chord
- Circumference
- Collinear
- Coordinates
- Depth, deep
- Diagonal
- Diameter
- Dimensions
- Distance
- Distance formula
- Edges
- Formula, formulae
- Fractions frequently used in the measures and measurement of Length: half, quarter
- Graduated
- Height, high
- Length
- Line, linear
- Line segment
- Long, longer, longest
- Measurement
- Measuring equipment / apparatus: ruler, metre stick, tape measure, trundle wheel
- Middle
- Number Line
- Origin
- Perimeter
- Point
- Radius
- Ruler
- Set square
- Sides
- Small, smaller, smallest
- Short, shorter, shortest
- Straight
- Tall, taller, tallest
- Terminal point
- Units of Length: millimetre, centimetre, decimetre, metre, decametre, hectometre, kilometre
- Width, wide
- X-axis
- Y-axis

Key phrases:

- Measures...
- The length of …
- Spans…
- The distance between…and …
- The distance from ….. to…..

Key symbols:

- cm   Centimetre
- m   Metre

Key questions:

- How long?
- How wide?
- What is the length of…?
- What is the distance between…and….?
- What is the distance from…to….?
- How far would I have travelled if…?
- How far is Cork from Dublin?
- Can you find the distance between…and…?

Keywords:

- Amount
- Big, bigger, biggest
- Different, difference
- Fractions frequently used in the measures and measurement of Weight / Mass: half, quarter
- Heavy, heavier, heaviest
- Less
- Light, lighter, lightest
- Load
- Lot
- Mass
- More
- Much
- Same
- Scales
- Small, smaller, smallest
- Units of Weight / Mass: milligram, centigram, decigram, gram, decagram, hectogram, kilogram, Tonne
- Weighing
- Weighing equipment / apparatus: weighing scales, balance
- Weight

Key phrases:

- Has a weight of …
- Has a mass of…

Key symbols:

- kg   Kilogram
- g   Gram

Key questions:

- How heavy?
- What is the weight of….?
- What is the mass of….?
- Can you find the weight of…?

Measures and Measurement: Capacity / Volume

Keywords:

- Amount
- Beaker
- Big, bigger, biggest
- Capacity
- Container
- Cubic capacity
- Cylindrical
- Different
- Difference
- Displaced liquid
- Small, smaller, smallest
- Empty
- Formula, formulae
- Float, floating
- Fractions frequently used in the measures and measurement of Capacity / Volume: half, quarter
- Full, fuller, fullest
- Graduated cylinder
- Less
- Lot
- Measuring equipment / apparatus: graduated cylinder, pipette
- More
- Much
- Round
- Same
- Spherical
- Submerged
- Units of Capacity / Volume: millilitre, centilitre, decilitre, litre, decalitre, hectolitre, kilolitre
- Volume

Key phrases:

- Contains...
- Holds....
- Fills....
- There are 1000 cubic centimetres (cm³) in 1 litre.

Key symbols:

- ml   Millilitre
- cl   Centilitre
- l   Litre
- m³   Cubic metre
- cm³   Cubic centimetre

Key questions:

- What is the capacity of…?
- What is the volume of…?
- Can you find the capacity of…?
- Can you find the volume of…?

Keywords:

- Accurate
- Area
- Big, bigger, biggest
- Boundary, boundaries
- Breadth
- Cylinder
- Cube, cuboid
- Dimensions
- Disc
- Edge/s
- Formula/ formulae
- Fractions frequently used in the measures and measurement of Area: half, quarter
- Irregular
- Length
- Long, longer, longest
- Measurement
- Measuring equipment / apparatus: ruler, graph paper, metre stick, set square
- Parallelogram
- Rectangle
- Regular
- Sector
- Segment
- Side
- Small, smaller, smallest
- Space, covers
- Square
- Surface area
- Total surface area
- Total surface area of rectangular room (floor + ceiling + four walls...less area of window/s and door/s)
- Triangle
- Units of Area: millimetre^2, centimetre^2, decimetre^2, metre^2, decametre^2, hectometre^2, kilometre^2
- Wide, wider, widest
- Width

Key phrases:

- Measure the area of…
- Calculate the area of…
- Covers an area of…

Key symbols:

- cm^2 Square centimetre
- m^2 Square metre

Key questions:

- A rectangle is 24cm long and 12cm wide. What is the area of this rectangle?
- Can you find the area of a triangle with a base of 34cm and a perpendicular height of 12cm?
- A cylinder is 24cm high and has a radius of 14cm. What is the total surface area of this cylinder?
- A cylinder is 14cm high and has a radius of 14cm. What is the curved surface area of this cylinder?

Measures and Measurement: Time

Keywords:

- Accurate
- Alarm
- Analogue
- Arrive
- Before, after, next, last, soon
- Begin
- Big Ben
- Calendar
- Depart
- Diary
- Digital
- Duration
- Early
- End
- Evening, morning, midday, midnight, noon
- Face of the clock
- Fast, faster, fastest
- Fractions frequently used in the measures and measurement of Time: half, quarter
- Frequently, always, often, sometimes, rarely, seldom
- Future, past
- Greenwich Mean Time
- Holidays, birthday, anniversaries, mid-term breaks

- Hour-hand, minute-hand, second-hand
- International Date Line
- January, February, March, April, May, June, July, August, September, October, November, December
- Late
- Long, longer, longest
- Measuring equipment / apparatus: clock, watch, stopwatch, mobile phone, sundial, hourglass, egg-timer, oventimer, microwave oven timer, calendar, diary
- Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
- New, newer, newest
- Never
- Night
- O'clock
- Old, older, oldest
- Overtime
- Punctual
- Quick, quicker, quickest
- Quickly
- Read the time

- Short, shorter, shortest
- Slow, slower, slowest
- Sometime
- Soon
- Spring, Summer, Autumn, Winter
- Start, end, beginning, middle
- Time
- Timetables, TV schedules, cinema schedules, flight schedules, rail schedules
- Time-span
- Time zones
- Today, yesterday, tomorrow
- Tonight
- Travel
- Units of Time: second, minute, hour, day, week, fortnight, month, year, leap year, century, millennium
- Weekend
- 12-hour clock, 24-hour clock

Key phrases:

- Measures the time
- Calculate the time taken ….
- Arrives at…. , departs at….
- Start of journey….., ….. end of journey
- Start of film….., ….. end of film

Key symbols:

- min   Minute
- sec   Second
- am   Ante-meridiem
- pm   Post- meridiem
- 2:45   a quarter to three
- 1:30   half past one
- 5:15   a quarter past five

Key questions:

- How long?
- What time elapsed?
- What was the duration of….?
- How long will it take to travel from ….to…..?

Keywords:

- Acute angle
- Alternate angles
- Angle
- Angle of depression
- Angle of elevation
- Complementary angles
- Corresponding angles
- Exterior angles
- Interior angles
- Fractions frequently used in the measures and measurement of Angles: half, quarter
- Measuring equipment / apparatus: protractor, set square/s (30°, 60°, 90°)(45°, 45°, 90°)

- Measurement Units for Angles: Degree
  Minute (there are 60 minutes in one degree)
- Obtuse angle
- Parallel
- Perpendicular
- Protractor
- Reflex angle
- Right angle
- Straight angle
- Supplementary angles
- Vertically opposite angles

Key phrases:

- The number of degrees in the angle….
- Measure the size of the angle ….
- There are 180° in a straight line.
- There are 180° in a triangle.
- There are 360° in a circle.

Key symbols:

- ^{o} Degree
- 5° Five degrees
- $\angle ABC$ The angle ABC

Key questions:

- What type of angle is the angle ABC?
- Can you measure the size of the angle CBA?

Measures and Measurement: Temperature

Keywords:

- Bake, baking
- Bunsen burner
- Celsius
- Centigrade
- Cook, cooking, cooker
- Cool, cooler, coolest
- Fahrenheit
- Formula, formulae
- Fuel
- Gas, oil, electricity

- Heat, heating
- Hot, hotter, hottest
- Measuring equipment / apparatus: thermometer
- Oven
- Solar, wave energy, wind turbine, wind farm, battery
- Temperature
- Thermometer
- Thermostat

- Units used in measures and measurement of Temperature: degree Centigrade, degree Fahrenheit

Key phrases:

- Measure the temperature of ….
- What is the difference in temperature between….and …..?
- A rise in temperature of….
- A fall in temperature of…..

Key symbols:

- ^{o} C   Degree Centigrade
- ^{o} F   Degree Fahrenheit

Key questions:

- Can you convert 12° C to degrees Fahrenheit?
- Can you convert 36° F to degrees Centigrade?
- What is the temperature of….?

Keywords:

- Aeroplane
- Arrival
- Average speed
- Bicycle
- Car
- Departure
- Destination
- Distance
- Duration
- Formula, formulae
- Journey
- Measuring equipment / apparatus: odometer, speedometer
- Motorbike
- Motorway
- Per
- Rate
- Road
- Speed
- Speed limit
- Time of journey
- Train
- Traffic
- Travel
- Units used in the measures and measurement of Speed:
  KPH: Kilometres per hour
  MPH: Miles per hour

Key phrases:

- Average speed
- The average speed required for a car to travel a distance of…..in …. hours
- The time taken to travel a journey of….at an average speed of….

Key symbols:

- KPH   Kilometres per hour
- MPH   Miles per hour

Key questions:

- At what average speed will I need to travel in my car to cover a distance of 300km in 5 hours?
- What distance will I have travelled if I travel continuously for 5 hours at an average speed of 55 kph?

Keywords:

- Above
- Adjacent
- Angle
- Anti-clockwise
- Apart
- Ascending
- Axis, axes
- Backwards
- Beginning
- Behind
- Below
- Beside
- Between
- Bottom
- Boundary
- Circumscribed
- Clockwise
- Close, closed
- Compass points
- Concentric
- Concave
- Convex
- Congruent
- Co-ordinate, co-ordinate geometry
- Descending
- Dimensions
- Direction
- Distance formula
- Domain
- Down
- Downwards
- First, second, third, fourth, fifth, sixth, seventh, eight, ninth
- Tenth, eleventh, twelfth, thirteenth, fourteenth, fifteenth, sixteenth, seventeenth, eighteenth, nineteenth
- Twentieth, thirtieth, fortieth, fiftieth, sixtieth, seventieth, eightieth, ninetieth
- Hundredth
- East
- Edge
- Ending, end
- Equilateral
- External
- Face
- Flat
- Forward, forwards
- Front
- Hollow
- Horizontal
- In
- Inscribed
- Inside
- Internal
- Intersecting
- Intersection
- In the direction of
- Left,
- Linear
- Mapping
- Maximum value
- Minimum value
- Mid-point
- Middle
- Near
- Next, next to
- North
- Open
- Opposite
- Order
- Outside
- Over
- Parallel
- Perpendicular
- Place
- Plane
- Plotting
- Points
- Quadrant
- Range
- Right
- Rotate,
- Rotation
- Ruler
- Scale
- Separate
- Side
- Sideways
- Similar
- Slope
- Slope formula
- Space, spacial
- Solid
- South
- Tessellations
- Top
- To the left of
- To the right of
- Touching
- Towards
- Transformation
- Translation
- Turn
- Vertical
- Under
- Underneath
- Up
- Upwards
- Vertex, vertices
- West
- X-axis
- Y-axis
- 1D (one-dimensional)
- 2D (two-dimensional)
- 3D (three-dimensional)

Key phrases:

- Covers....
- Extends from…to…

Key symbols:

- ‖   Is parallel to
- ⊥ Is perpendicular to

Key questions:

- Can you plot the graph of $y = 3x + 4$ ($-2 \leq x \leq +3$) on the coordinated plane?
- Can you locate the coordinate (-3, +3) on the coordinated plane?

Keywords:

- Circle, circular
- Circumcentre
- Cube, cuboid
- Curved
- Cylinder
- Disc
- Drawing / Geometry equipment: protractor, graph paper, compass, set square, ruler, pencil
- Equilateral triangle
- Figure
- Formula / formulae
- Hemisphere
- Hexagon
- Irregular
- Isosceles triangle
- Octagon
- Parallelogram
- Pentagon
- Polygon
- Pyramid
- Shape
- Square
- Recasting (of a shape into another shape)
- Rectangle
- Rectangular solid
- Regular
- Right angle triangle
- Rhombus
- Round
- Scalene triangle
- Sphere
- Tangram
- Triangle
- Sector
- Segment
- Semicircle
- Smooth curve
- Solid
- Surfaces
- 2D shapes (two-dimensional)
- 3D shapes (three-dimensional)

Key phrases:

- Draw a triangle / rectangle / square / parallelogram…(given the dimensions of sides / angles)
- Make....
- Construct....
- Draw....
- Sketch....

Key symbols:

- π pi ($\frac{22}{7}$ or 3·1429)
- r The length of the radius
- d The length of the diameter
- r^2 The length of the radius multiplied by itself
- h Height

Key questions:

- Can you draw a 5cm square?
- How many axes of symmetry does a square have?
- How many axes of symmetry does a rectangle have?
- Can you draw a triangle of base 24cm and perpendicular height 12cm?
- Can you construct a disc with a diameter of 7 cm?

Keywords:

- Arithmetic mean
- Array
- Average
- Axis, axes
- Bar chart
- Catalogue
- Classifying
- Coordinates
- Count, counting
- Data, primary data, secondary data
- Database
- Discrete
- Distribution
- Domain
- Elements
- Frequency
- Frequency distribution table
- Graph
- Grouping

- Histogram
- Label
- List
- Line graph
- Maximum value
- Mean
- Median
- Mid-point
- Minimum value
- Mode
- Multiple line graphs
- Origin
- Pictogram
- Pie chart
- Portion
- Plotting
- Questionnaire
- Random
- Random sample
- Recording

- Represent
- Range
- Scale
- Set
- Shaded
- Sort, sorting
- Standard deviation
- Statistics
- Summation
- Survey
- Table
- Tally, tally chart
- Time lines
- Values
- Variables
- Venn diagram
- X-axis
- Y-axis

Key phrases:

- Is the average score
- Is the median value
- Is the mode

Key symbols:

- $\sum$ Add, addition, total
- x The value of each item of data
- f The frequency
- $\sum f$ Sum of all the frequencies
- $\sum fx$ Sum of all the "fx" values

Key questions:

- Can you find the mode in this frequency distribution table?
- Can you find the mean value in this frequency distribution table?

Keywords of Numeracy
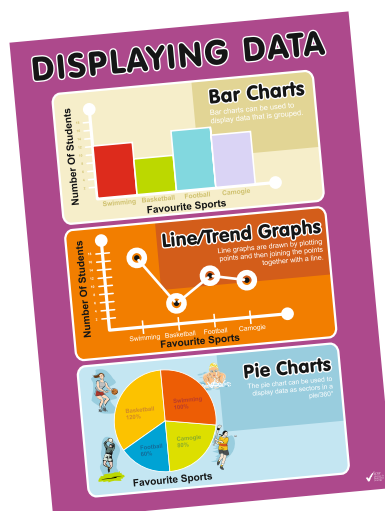
Keywords

- Betting, favourite, outsider
- Bias, biased
- Certain, uncertain
- Chance, poor chance, no chance, good chance, even chance, 50:50 chance
- Decimal
- Die, dice, spinner
- Event
- Fair, unfair
- Formula
- Independent event
- Likelihood, likely, unlikely
- Lottery, lotto
- Observed, observation
- Odds
- Outcome, outcomes, favourable outcomes, possible outcomes
- Percentage
- Prediction
- Probable, improbable
- Probability
- Probability scale
- Possible, impossible
- Random
- Ratio
- Risk
- Sample space
- Sampling
- Scale
- Simulation
- Tree diagram
- Weather forecasting
- Trial

Key phrases:

- Certain to happen
- Extremely likely
- Extremely unlikely
- Equally likely
- Might happen
- Likely to happen
- Unlikely to happen
- Impossible…could not happen
- The number of trials
- Toss a coin
- Roll a dice
- Spin a spinner
- Heads / tails
- Relative frequency

Key symbols:

- 50:50 Fifty-fifty
- % Percentage
- • Decimal point
- $\frac{1}{2}, \frac{1}{4}$ Fractions frequently used in probability

Key questions:

- What is the likelihood that …. ?
- What is the measure of chance that …. ?
- How likely is it that…. ?

Keywords:

- Arithmetic progression
- Ascending
- Big, bigger, biggest
- Combination
- Common
- Decreasing
- Descending
- Dot cards
- Dominoes
- Fibonacci sequence
- First, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth
- Geometric progression
- Increasing
- Last
- Missing
- Omitted
- Pattern
- Polynomial
- Prediction
- Progression
- Repetition, repeated
- Sequence
- Series
- Subsequent
- Term
- Variable
- 100 square

Key phrases:

- The sequence beginning with…
- In between….and....
- Describe the pattern….

Key symbols:

- A.P. Arithmetic progression
- G.P. Geometric progression

Key questions:

- Can you identify the missing number in this sequence : 7, 10, 13, --, 19?
- What number comes next in the sequence : 5, 7, 9, ?

Keywords:

- Axial (line) symmetry
- Centre of symmetry
- Dot (central) symmetry
- Fold
- Image
- Line (axis) of symmetry
- Matching

- Mirror line
- Reflection, reflect
- Rotation
- Symmetry, symmetrical
- Transformation
- Translation

Key phrases:

- Folding onto…
- The figure is symmetrical around the line….
- The line of symmetry

Key symbols:

- S_C Central symmetry
- S_a Axial symmetry

- $\overrightarrow{AB}$ Translation

Key questions:

- How many lines of symmetry are there in a 2cm x 6cm rectangle?
- How many lines of symmetry are there in a square?

Keywords:

- Addition, add
- Algebra, algebraic
- Bracket, backets
- Coefficient
- Constant
- Difference of two squares
- Division, divide
- Expression
- Equation
- Formula

- Function
- Grouping
- Index, indices
- Inequality
- Like terms
- Linear equation
- Multiplication, multiply
- Order of operations
- Power of….
- Quadratic

- Quadratic equation
- Simultaneous equation
- Solving, solve
- Subtraction, subtract
- Substitution
- Term
- Trinomial
- Variable
- Word problems

Key phrases:

- Solving an algebraic equation
- Grouping like terms together

Key symbols:

- $+$ Add /addition
- $-$ Subtract / subtraction
- $\times$ Multiply / multiplication
- $\div$ Divide / division
- $(\ )(\ )$ Multiply / multiplication
- $=$ Equals, is, was, were, will be, gives, yields, is the same as, is equal to
- $f(x)$ Function x

Key questions:

- Can you solve the equation: $3x + 8 = 1x + 20$?
- Can you find the solution set to the equation: $3x + 8 = 1x + 24$?
- Can you solve the equation: $2x + 2 = 10$ ($x \in$ Natural Numbers)?
- Can you shade the solution set on the Number Line: $2x + 5 > 17$ $x \in$ R?
- Can you shade the solution set on the Number Line: $3x + 2 \geq 17$ $x \in$ N?

LUVE 2C U

Use the "LUVE 2C U" strategy as a lens to focus on, and decode, all the clues and details that are presented in the maths question or problem and to provide an ordered sequence to the steps and operations, that need to be undertaken, to arrive at a solution:

- L: look at the question or problem. Read the question carefully. Now read the question again a second time.

- U: underline and identify the important keywords. Identify all the other important information and data: key phrases / key signs / key symbols / diagrams, visuals and graphics.

- V: visualise the problem. Look for a pattern. Make a sketch. Draw a diagram. Make an organised list / table / chart of the information presented. Made a model. Use manipulatives and mobiles to simulate / demonstrate the problem. Write a number sentence. Write an equation. Describe the problem in your own words. What did you do the last time? What is different this time? Is there something that you already know that might help? Can you place things in order? Identify the sequence of the operations to be carried out. Can you create a flow chart to illustrate and itemise the steps you need to take and the sequence you need to follow?

- E: estimate an answer. Use approximations. Use a trial and improvement approach. Predict your answer. Guess and check. Simplify the problem. Substitute in smaller / easier values. Practise solving a similar problem, which is smaller, simpler and less complex. Use logic and reasoning.

- C: choose the numbers to use. Identify the computational operation/s to be used. Calculate the answer (mentally, using written work, using a calculator, using the Number Line). Solve. Carry out relevant calculations. Jot down all your rough-work. Work out carefully and accurately. Display all your calculations. Use measurement and mathematical instruments, where required. Work with a peer. Identify and use alternative strategies and approaches. (can be a useful way of checking your answer)

- C: check your answer against your estimate. Is your answer reasonable? Does your answer make sense?

- U: you have completed your task. Well done! Congrats!

LUVE 2C U

L Look at the question or problem
U Underline the important keywords
V Visualise the question or problem (e.g. sketch the problem or use a Flow Chart)
E Estimate an answer
C Choose the numbers and Calculate the answer (pen and paper, calculator or in your head)
C Check your answer against the estimate
U You have completed your task.
WELL DONE!
✔ JCSP Literacy & Numeracy Strategy

Keywords of Numeracy

Reasoning, Thinking and Reflection

Keywords:

- Alternative
- Analyse, analysis
- Argument
- Arrange, re-arrange
- Brain-storm
- Check
- Compare, contrast
- Comprehend
- Consider
- Continue
- Convince
- Create
- Deduce
- Demonstrate
- Describe
- Discuss
- Expand
- Explain, explanation
- Explore
- Express
- Extend
- Evaluate
- Figure out
- Hypothesis
- Illustrate
- Infer
- Intellect
- Interpret, interpretation
- Judge, judgement
- Justify
- Logic
- Mind
- Organise
- Persuade
- Postulate
- Predict
- Prove
- Question
- Reason
- Reflect
- Show
- State
- Tell
- Think
- Understand
- Verify
- Work out

Key phrases:

- Brainstorm …. with a peer / in a group / with the entire class
- Carry on, continue…., extend…
- Check your calculations. Confirm your result.
- Convince the teacher and your classmates…
- Describe the problem in your own words.
- Describe and interpret your findings / result.
- Discuss…
- Explain your approach / method / how you got your answer / your reasoning…
- Find similar methods and approaches.
- Give other examples of…
- Identify and describe the sequence, pattern, rule.
- Investigate further…
- Justify your answer…
- Listen carefully
- Look at….
- Make a number sentence.
- Make a presentation, present your findings
- Memorise
- Perform the inverse operation.
- Plan…
- Point to….
- Predict…..
- Prove that….
- Use a calculator.
- Work with a peer.
- Questions still to be answered
- Read, write, record, illustrate, recall.
- Repeat your calculations.
- Remember….
- Show all your working including all rough work.
- Tell, describe, discuss, name, explain, state, say.
- Use the KWL format (What I Already Know, What I Want to Find Out, What I Have Learned)
- Use mental arithmetic.

Key questions:

- Can you explain what you have done so far? What could you try next? What did you do the last time? What is different this time?
- Can you explain why your approach worked?
- Can you place things in order?
- Can you think of another method that might work? Find and use a different / alternative approach/es. Have you thought of all the possibilities? How can you be sure?
- Did you use any new vocabulary today? Use your dictionary to find / confirm the meanings of these new words.
- How do you know that…?
- How are you going to tackle this? What is the first step that you will take?
- Is there a quicker way of doing this?
- Is there something that you already know that might help?
- What do you already know about……?
- What formula did you use…and why?
- What information do you have? What do you need to do?
- What is the evidence for….?
- What mathematical equipment will you require?
- What do you think the answer will be?
- What approach did you use …and why?
- What are the key points you need to remember for your next lesson or problem?
- What notes do you need to write for future reference?
- Why did you organise your results like that?

Keywords:

- Addition
- Alternative
- Answer
- Area
- Associative Law
- Calculator
- Capacity
- Cardinal number
- Commutative Law
- Cosine
- Decimals
- Distributive Law
- Division
- Equation
- Explanation
- Exploration
- Expression
- Focus
- Formula, formulae
- Fractions
- Geometry
- Geometry equipment
- Graph
- Graph paper
- Identity element
- Indices
- Inequality
- Inverse
- Intersection
- Investigation
- Length
- Mathematics
- Measurement
- Multiplication
- Null set
- Operation
- Percentage
- Period
- Prediction
- Probability
- Proof
- Proportion
- Quadratic
- Quantity
- Quotient
- Ratio
- Reciprocal
- Repeated
- Representation
- Scientific notation
- Set
- Sine
- Subset
- Subtraction
- Solution
- Tangent
- Term
- Theorem
- Timetable
- Trigonometry
- Triple
- Unit
- Value
- Volume
- Word problems
- Whole, whole number

Key phases:

- Give your answer correct to the nearest whole number…
- Give your answer correct to two places of decimals….
- If and only if
- One to one
- Is perpendicular to
- Is parallel to
- Q.E.D.: Proof provided! ("quod erat demonstrandum)

Numeracy Examinations and Assessments

Key symbols :

- + Addition
- - Subtraction
- x Multiplication
- ÷ Division
- N Natural Numbers
- Z Integers
- Q Rational Numbers
- R Real Numbers

- % Percentage
- = Equals, is, is equal to, was, were, will be, gives, yields, is the same as
- < Is less than
- > Is greater than
- ≥ Is greater than or equal to
- ≤ Is less than or equal to

Key question stems:

- Add
- Answer
- Cancel down
- Calculate
- Check
- Circumscribe
- Compare
- Construct
- Convert
- Copy
- Create
- Decrease
- Develop
- Discover
- Divide
- Draw
- Estimate
- Evaluate
- Expand
- Explore
- Express as….
- Fill in….
- Find the solution set to…
- Find the length / area / volume / capacity / mass / weight / temperature / size / duration / speed / time of…
- Factorise
- How often?
- How frequently?
- How long?
- How many?

- How much?
- Increase
- Inscribe
- Investigate
- Make a chart / sketch / graph….
- Measure
- Multiply
- Predict
- Prove
- Reduce to its simplest form
- Remove the brackets…
- Represent
- Round off
- Show the increase / decrease in …..
- Simplify
- Sketch
- Solve
- State the theorem
- Subtract
- Use
- Use the appropriate formula to find the length / area / volume of…
- Use a calculator to…
- Verify
- What is…?
- What time?
- Write
- Write as a (fraction / decimal number / percentage….)
- Write down

Appendix

Keyword List

Topic: Geometric Shapes

Circle	Triangle
Square	Disc
Rectangle	Polygon
Cylinder	Hexagon
Sphere	Pentagon

Junior Certificate School Programme
Keyword List

Topic:

Visual Verbal Square

Related words

Tripod

The word looks like this

Triangle

Definition

A triangle is an important geometric shape.

The word in a sentence

A triangle has three sides and three angles.

Junior
Certificate
School
Programme
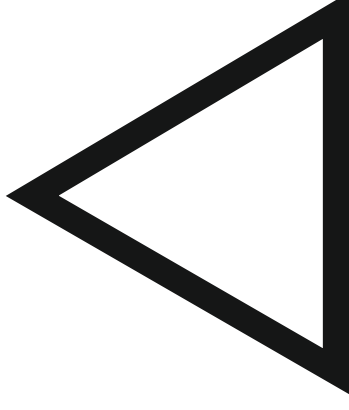
Visual Verbal Square

Related words

The word looks like this

Definition

The word in a sentence

Word Wall - Geometric Shapes

Square	Circle	Rectangle
Cylinder	Sphere	Triangle
Disc	Polygon	Hexagon
Semi-circle	Pentagon	Pyramid

Word Wall
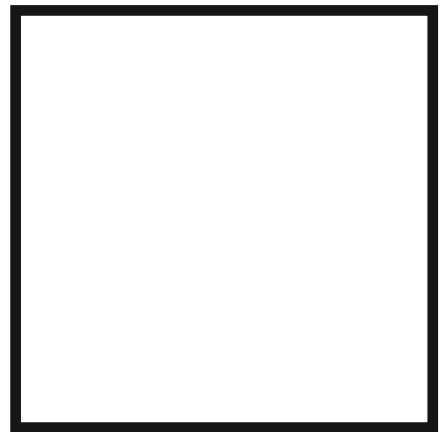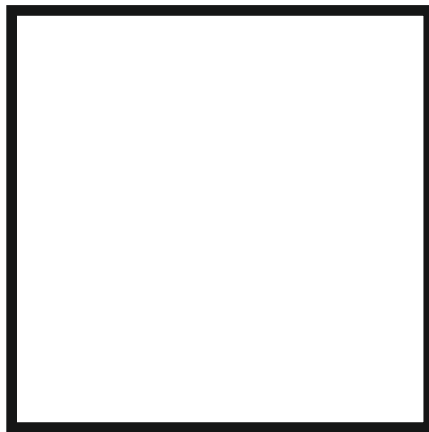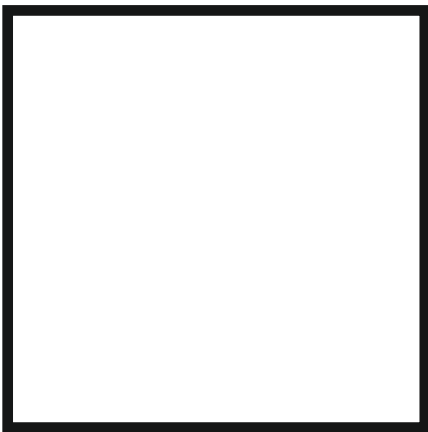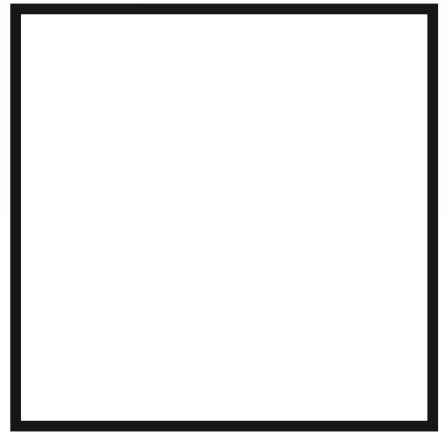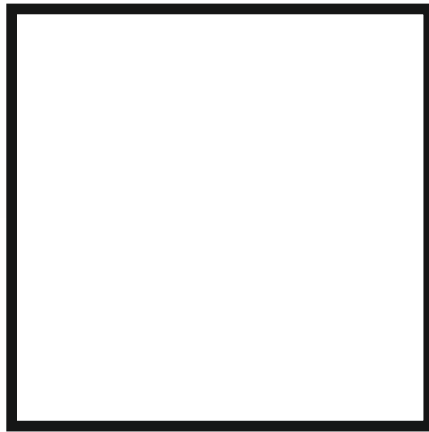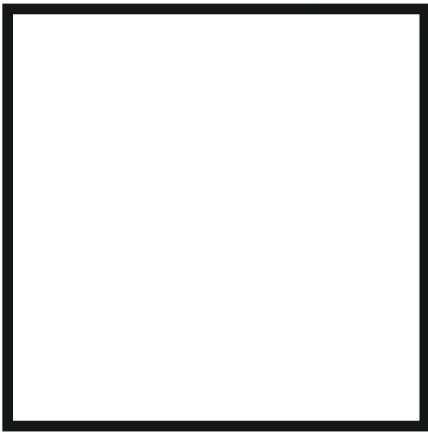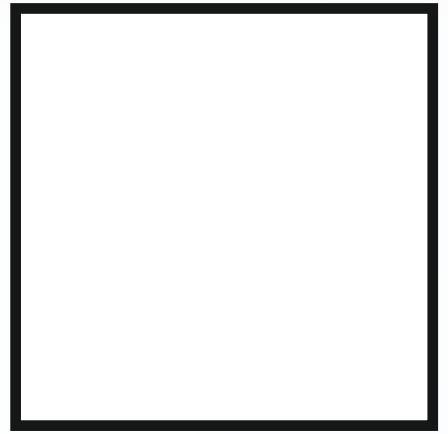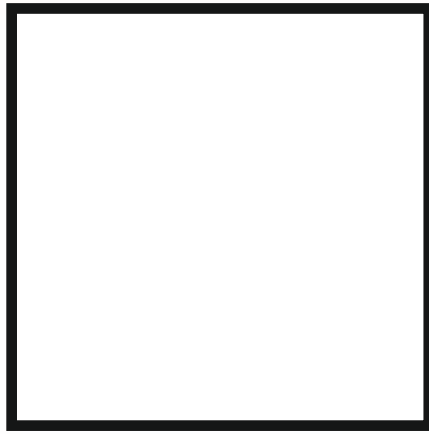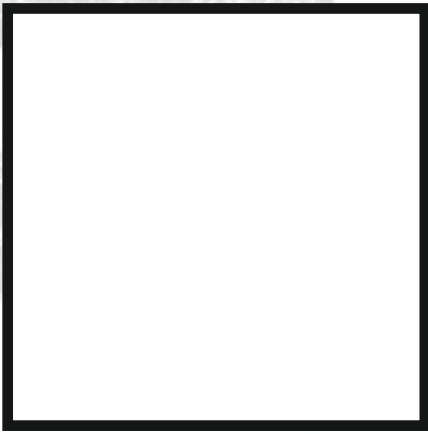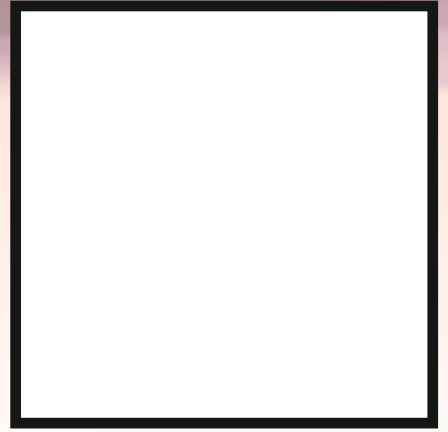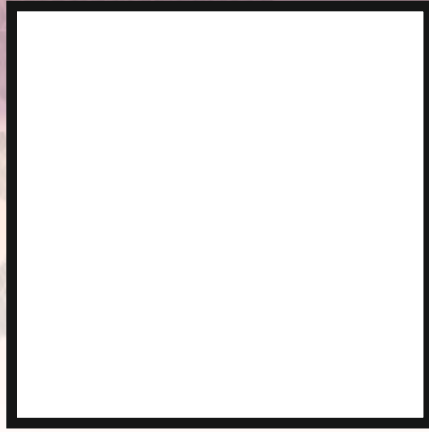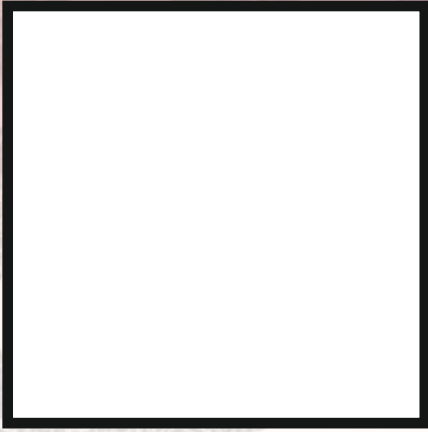
KWL
Triangle

What I Know	What I Want to Find Out	What I Have Learned
I know that a triangle has three sides and three angles.	What is an equilateral triangle?	An equilateral triangle has three equal sides and three equal angles.

KWL

What I Know	What I Want to Find Out	What I Have Learned

Keywords of
Numeracy

Junior
Certificate
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