Junior Cert Higher Maths Revision Checklist

Mr. Courtney

Chapter 1 Algebra I

1. I know how to add and subtract positive and negative numbers.

2. I know how to add and subtract positive and negative algebraic (like) terms with the same letter raised to the same power.

3. I know how to 'Simplify Algebraic Expressions' by gathering like terms together
   Q24 Q26 Q27 Page 2

4. I know how to multiply and divide positive and negative numbers and algebraic terms by

   Multiplying/Dividing the **sign by sign**
   Multiplying/Dividing the **number by number**
   Multiplying/dividing the **letter by letter** (adding the powers of the any same letters when multiplying/ subtracting them when dividing)

   Keeping in mind that **like signs give plus and unlike signs give negative**

5. I know that when removing brackets in an algebraic expression **a minus sign outside of brackets changes the sign of all the terms inside the brackets.**

   -(-3) = 3 and (-3) = -3 and -(x-2) = -x +2 and -(-y+2) = y-2

6. I know how to remove brackets to simplify an algebraic expression
   Q11 Q21 Page 4

7. I know how to evaluate expressions using **BIMDAS**.
   Q9 Page 6

8. I know I know that 'Solve' means find a numerical value for X (the variable)
9. I can solve linear equations
   Q15 Q33 Page 8

10. I know how to solve problems using linear equations
    Q11 (i) / Q14 Page 10

11. I know that the following rules apply when plotting number lines for linear inequalities

X Є N use Dots **X Є Z use Dots** **X Є R use hick Line**

If < > are in the inequality and X Є N or Z then **don't dot** the number in the answer

If ≤≥ are in the inequality and X Є N or Z then **do dot** the number in the answer

If < > are in the inequality and X Є R then **OPEN dot** the number in the answer

If ≤≥ are in the inequality and X Є R then **FULL dot** the number in the answer

12. I know how to solve linear inequalities by making sure that as good practice
    I keep or move x to the left of the inequality and the numbers to the right
    I make sure my answer has a positive x ... if x is negative I multiply (or divide) all terms by -1 **AND CHANGE THE DIRECTION OF THE INEQUALITY SIGN**
    Q24 Q25 Page 18

Chapter 2 Factors

1. I know that quadratic terms or expressions contain a variable with 2 as its highest power and I know that there are **4** methods to used to **FACTORISE** quadratic expressions.

   Highest Common Factor – find **HCF** in number and letter(s) common to the terms.. Write this HCF outside the brackets and divide each term in the expression by the HCF inside the brackets
   Q22 Page 22

   By Grouping - group the 4 terms given into 2 pairs of 2 terms and look for the HCF in each pair. This should give you a common expression inside both brackets (first factor) with the second factor made up of the terms outside of each bracket.
   Remember that you have to take care with the signs, you may have to try the pairings a second time and that some will need fixing!
   Q13 Q21 Page 24

   Using Difference of 2 Squares
   Q10 Q14 Page 26

   Factoring Quadratic Expressions using Guide Number Techniques (and then grouping)

   Remember +ve sign of constant in expression means factor signs will be the same – what same – same sing in middle of expression
   Remember –ve sign of constant in expression means factors signs will be different ... +ve and –ve
   Q2 Q10 Q48

2. I know how to use factors to simplify Algebraic expressions
   Q5 Q6 Q7 Q8 Q11 Page 29

Chapter 3 Sets

1. I know that 2 sets are **equal** if they contain **exactly the same** elements.
2. I know that **Union** of 2 sets **AUB** is found by listing all of a A and then listing any in B not already found in A
3. I know that the **Intersection** of 2 sets **AnB** is the set of elements common to A and B. I read the first element in A and check to see if it is in B and if it is I record it. I repeat for each element in A.
4. I know that set B is a **subset** of set A if all the elements of B are contained in A. **B C A**
5. I know that the **Universal** set **U** is the set from which all other sets being considered are taken from.
6. I know that the **Complement** of a set **A'** is the set of elements in the universal set not in **A**
7. I know that the **Cardinal Number #** of a set is the **number of elements** in the set.
8. I can list the elements of sets based on the above definitions.
   Q3 Q6 Page 33
9. I know that **Set Difference A\B (A less B) is the set of elements of A which are not in B**
   I know how to find the set A\B by placing A over B .. cancelling out above and below and just writing what is not crossed out on the top as my answer.

3 Set Venns

10. Given information, I can draw a **3 set venn** diagram by
    starting in the middle with #(AnBnC) then working out wards ,
    looking at and filling in #(AnB) , #(AnC) and #(BnC)
    then filling in the A only, B only and C only areas by subtracting the contents already worked out in A from A[ ] etc. Finally I can take all the values from #U to find #(AUBUC)'
11. **I can clearly identify the areas of a 3 set venn which when added give/denote**

    (1) ....the number of people who .... do 'All 3'
    (2) Do....'2 Only'
    (3) Do...'1 Only'
    (4) ....the number of people who...do 'at least 3'
    (5) do ... 'At least 2'
    (6) Do ... 'At least 1'

12. I can solve x variable type venn problems mindful of the areas mentioned in 11. above.
    Q6 Pg 44 and Q10 Page 45

13. **I know that the Union** of 2 sets **AUB** and the **Intersection** of 2 sets **AnB** are **commutative** (order of sets does not matter)
    i.e given 2 sets A and B

    If **(AUB) = (BUA)** then this proves/shows that **the union of sets is commutative**

    If **(AnB) = (BnA)** then this proves/shows that **the intersection of sets is commutative**

14. Set difference is not commutative ie For 2 sets A and B A\B ≠ B\A
    Q4 Page 36
15. I know that **Union and intersection of sets are associative...set difference is not.**

I know that questions dealing with the 'associative' property will contain 3 sets A, B and C AS WELL AS THE SAME SYMBOL BETWEEN THEM i.e.

An(BnC) = (AnB)nC OR AU(BUC) = (AUB)UC See Example 2 page 38.

16. I know that
    1. Union of sets **is distributive** over intersection
    2. Intersection of sets is **distributive** over union.

    Distributive type questions will have 3 sets A, B and C **BUT will contain both the U and the n symbols ....**You might be asked to complete the identity AU(BnC) = ???

    Answer ... AU(BnC) = (AUB)n(AUC) .....'shows Union is distributive over Intersection'

    And .... An(BUC) = (AnB)U(AnC) .... 'shows Intersevtion is distributive over Union'

    Q10, Q11 and Q12 page 41

17. **Given #U, #(A) and #(B)**

I can find the **minimum/least value of #(AnB) by finding [#(A)+ #(B)] - #U (placing these onto a Venn will allow me to find the MAX #(AUB))**

I know that the **maximum/greatest value of #(AnB) = Smallest Set # (placing these onto a Venn will allow me to find the MIN #(AUB))**

See Q12 Page 34

18. Given #(A), #(B) and #(AUB)' I can find

The greatest value of #U => #(A) + #(B) + #(AUB)' (as disjoint sets)

The least value of #U => largest set # + #(AUB)' (as the smaller on becomes a subset of the large one)

Chapter 4 Applied Arithmetic

1. I know how to calculate VAT at given percentages i.e. 23%
2. I know how to calculate the cost/price of items before and after tax, price increase and price decreases.
   See Examples 1 and 2 Page 50

3. I know how to calculate percentage profit and loss.
   See Example 3 Page 51
   Q3 Q6 Q8 Q12 Q14

4. I can perform household bills calculations and know that the number of units used is found by 'Present Reading – Previous Reading'
5. I can also perform other real life calculations.
   Q7 Q8 Q10 Q11 Page 54

6. I can perform Income Tax calculations using the Salary chart which takes into account the standard and higher rates of tax and tax credits.
   Take Home Pay = Gross pay – (Net Tax Payable + Total USC + PRSI)
   % Rate PRSI = (Actual PRSI Amount /Gross Pay)*100
7. I know that **Net Income = Gross income – Tax Payable – USC – PRSI**
8. I know how to calculate the **Universal Social Charge (USC)**
9. I know that PRSI is a percentage of the gross salary.
   See Example 4 page 5

10. I know that when I perform **currency calculations** to put the currency required on the right-hand side of the 'equation'
    Example 1 Page 62
    Q4 Q5 Page 63

11. I know how to find **commission charges and percentage** rates for currency transactions.
    Commission charged = Full amount due – Amount Received

    %Commission = (Commission charged / Full amount Due) X 100
    Q10 Q11 Page 63

12. I know how to calculate **Interest Sum = principal sum X i** (the interest rate expresses as a decimal)
13. I can perform Compound Interest calculations using $F = P(1 + i)^t$

I know that when considering **Compound Interest** problems that

Interest Amount = Final amount (F) – Principal Amount (P)
Interest Rate = (Interest Amount / Principal Amount) X 100
$F=P(1+i)^t$ where i is the interest rate expressed as a decimal and t is time

I know that F can represent the amount due to me after giving the bank a principal amount P for a time t at an interest rate of i (as a form of saving)

I know that F can represent the amount I will have to pay the bank after giving me an initial principal amount P for a time t at an interest rate of i (in the form of a loan)
See Example 2 Page 65.

14. I can use **Rate i% = (Interest Sum/Principal Sum)*100** to find the rate of interest charged/accrued
15. I can perform **Depreciation** Calculations
    Q11 Q14 Q22 Q23 Q25 Page 67

Chapters 5 7 13 Statistics

1. I know that when we look for an average value for a given set of data that we are looking for a **single or typical value** that best represents the values given.

2. I know that there are 3 types of average:
   The Mode: The most common value...**good for most common dress size etc**.
   The Median: The middle number in an ordered (in ascending order) set of data values.....**good for data that may not be closely grouped (salary example Page 124)**
   The Mean: The sum of the numbers in the set / the number of numbers in the set .... **good for closely grouped data (no outliers)**

3. I can reorder a list of numbers (given as a set of data) into ascending order and find the **mode** (most common) and the **median** value.
   Q3 Q9 Page 119

4. I know how to find the **Mean** of a set of numbers
   Q2 Q10 Q15 Page 123

5. I know that **'outliers'** or **'extreme values'** can sometimes exist in a data set.
6. I know how to find the **mode, mean and median** for data displayed in a **Frequency Table**
   I know how to use the Mean = $\Sigma f(x) / \Sigma(f)$ formula to find the Mean
   Q2 Q6 Page 129

7. I know how to find the **mode, mean and median** for data displayed in a **Grouped Frequency Table** by finding and using the **'mid-interval value'** to **as my values for x to 'estimate'** the mean.
   Q8 Q9 Q11 Page 131

8. I know that the Range is found by subtracting the smallest value from the largest value in a given set of data values.
9. I know that the range shows how **'spread out'** a set of data is and is used to compare data where less spread out means more consistent data.
   Q3 Q4 Page 133

10. I know how to find the **lower quartile Q_1 and upper quartile Q_3** values for an ordered set of data values.

I know that an equal number of data values divide into 2 halves down the middle and that Q_1 can be found by finding the middle value of the first half of the data to the left and that Q3 can be found by finding the middle value of the second half of the data to the right.

I know that if I have an odd number of data I can cover the middle value and then find Q_1 by finding the middle value of the first half of the data to the left and Q_3 by finding the middle value of the second half of the data to the right.
I can use $Q_3 – Q_1$ to find the Inter Quartile Range of the data.
Q8 Q9 Q10 Page 134

11. I can interpret data presented in line plots and bar charts.
    Q10 page 251

12. I can generate a grouped frequency table and draw a histogram to represent the information.
    Q9 Page 251 Q3 Page 259

13. I can use the angle supplied to calculate the size of the share of a pie chart.
    Q2 Q3 Page 254

14. I can use the supplied sector share value to find the angle of the sector.
    Q6 Page 255

15. I know that **0-5** means **≥ 0 and < 5 (greater than or equal to 0 and less than 5**) in a grouped frequency table and can interpret data presented in histograms.
    Q7 Page 259

16. I know what a **'positively skewed'**, **'negatively skewed'** and **'normal distributions'** look like and the type of data they represent. (age of learning to ride a bike / age of people entering nursing homes / height of basketball players)
17. I can plot a stem and leaf / back to back stem and leaf diagrams (with appropriate keys) and can find **Q_1, Q_3 and the Inter Quartile Range using $Q_3 – Q_1$** from the data.
    Q6 Page 266

18. I can interpret stem and leaf diagrams and calculate **Q_1, Q_3 and the Inter Quartile Range.**
    Q7 Page 266

19. I know that all graphs should have vertically labelled axis starting from 0 and should use the same width columns to represent data.
    Q4 Page 270

Chapter 6 Perimeter – Area - Volume

1. I know how to calculate the perimeter and area of a square, rectangle and triangle
   (Area Triangle =1/2base X perpendicular height
   Q 7 Q8 Q11 Q13 Page 87

2. I know how to find the area of a parallelogram and the values of sides of a parallelogram.
   Area = base X perpendicular height
   Q4 Q9 Page 90

3. For circles I know the meaning of the terms: radius, diameter, semicircle, segment, sector, quadrant and tangent.
4. For circles I can find the area, circumference, the length/perimeter of a sector and the area of a sector of a circle.
   Length/perimeter of sector = $(\theta/360°)X2\prod r$
   Area of Sector = $(\theta/360°)X\prod r^2$

   Q5 Q8 Q13 Q17 Q20 Q22 Page 95

5. I know that rectangular solids are also known as **cuboids** and that the space occupied by them is called its volume.
   Volume of Rectangular solid = length x bredth x height
   Surface Area of a rectangular solid = 2lb + 2lh + 2bh
   Volume of a cube = l^3
   Surface Area of a cube = $6l^2$

6. I can **draw nets of rectangular solids** and use these to calculate total surface areas.
   See Example 4 Page 101.

7. I know to convert cubic centimetres(cm^3) to litres I DIVIDE by 1000
   i.e. 100 cm^3 = 1 litre
   Q3 Q5 Q9 Q11 Q14 Q18 Q20 page 102

8. I know that a **Prism** is a solid figure with the same cross section along its length and that
   Volume of Prism = area of cross section X length
9. I can **draw nets of triangular prisms** and use these to calculate total surface areas.
   See Example 1 and 2 Page 106
   Q4 Q9 Q11 Q15 Page 108

10. I know that scale drawing is **length of drawing : real length**
    See example 1 and 2 Page 111
    Q1 Q4 A6 Q7 Q8 Q9 Q10

Chapter 8 Quadratic Equations

1. I know that equations include an **'='** sign
2. I know that solving a quadratic equation involves the following steps:
   Finding the factors of the quadratic expression using the Guide Number Technique
   Letting each factor = 0 to find the values for x (i.e. x will have 2 values)
   Q2 Q4 Q24 Q38 Q40 Page 140

3. I know that a plot of a quadratic expression gives a parabola shape and that the values for x found when the expression is = 0 are the point on the x –axis where a plot of the quad expression cuts the x-axis!
4. I know how to set up my calculator to use the **Quadratic Formula** to solve Quadratic equations.
5. I know that I can solve any quadratic equation using the quad formula.
   Q1 Q3 Q6 Q9 Q 12 Q15 Page 142

6. I can generate quadratic expressions to solve various problems.
   Q1 Q10 Page 144

7. I know how to form an equation given its roots by letting 'x = to each root' and rewriting to get (X +/- the root) = 0 for both roots. Multiplying these to get the equation.
   Q2 Q10 Q14 Page 147

Chapter 9 Geometry 1 Triangle and Quadrilaterals

1. I know that that a **right angle is 90°,** a **straight line angle is 180°,** an **acute angle is between 0° and 90°**, an **obtuse angle between 90° and 180°** and a r**eflex angle is between 180° and 360°**.
2. I know that the **sum of angles on a straight line add to 180°, the sum of angle meeting at a point add to 360°** and that **vertically opposite angles formed when 2 straight lines cross at a point are equal.**
3. I know that angles formed when a **straight line crosses a pair of parallel lines** have the following properties: **corresponding angles are equal**, **alternate angles are equ**al and that the **sum of interior angles adds up to 180°.**
   Q2 Q4 Q6 Q8 Q9 page 153

4. I know **that an equilateral triangle has 3 equal sides and 3 equal angles (60**°)
5. I know that an **isosceles triangle has 2 sides equal in length and that the angles opposite the equal sides are equal** (very important rule).
6. A **right angled triangle has 1 angle of 90°** and that **Pythagoras** rule can be used in these triangles to find the length of any 3rd side if I know the length of the other 2. $\mathbf{a^2 = b^2 + c^2}$
7. I know that t**riangles without any of the above properties are known as scalene triangles.**
8. I know that the **sum of angles in a triangle is 180°.**
9. I know that the **exterior angle in a triangle is equal to the sum of the interior opposite angles.**
   See example 1 Page 154
   Q1 Q3 Q5 Q9 Q11 Q13 Page 154

10. I know that a **Quadrilateral** is a figure with **4 sides** whose interior angles add up to **360°**:
    A square – all 4 sides same length, opp sides ||, all 4 angles are 90°, the **diagonals** are equal and bisect (divide into 2 equal parts) each other at right angles
    A Rectangle – each pair opp sides || and equal in length, all 4 angles are 90°, the **diagonals** are equal and bisect each other at right angles
    A Parallelogram – opp sides ||, opp sides equal in length, opp angles are equal, the **diagonals** of a parallelogram bisect each other, **consecutive angles** (going from one to its neighbour) are 's**upplementary**' (add to 180°)
    A Rhombus (a leaning square pushed sideways) - 4 equal angles, opp sides are ||, opp angles are equal, **diagonals** bisect each other at right angles
    Example 1 Page 159
    Q1 Q3 Q5 Q9 Q10 Page 159

11. I know **congruent triangles are the same size and shape** (they are the same). Triangles can be shown to be congruent if they have 3 pairs of sides the same length **'SSS'**, 2 pairs of side lengths are the same length and the angle between the 2 sides is the same **'SAS'**, two pairs of angles are equal and the sides between the 2 equal angles are equal in length **'ASA'** or both triangles have a right angle, the hypotenuses are equal and one pair of corresponding sides are equal in length **'RHS'**.
    Example 1 page 163

12. I know that given 2 triangles with the same angles that a side opposite an angle in one triangle '**corresponds**' to the side opposite the same size angle in the second triangle.
    Example 2 Page 163
    Q1, Q2, Q4, Q7 Q10 Q12 Q14 Page 167

13. I know of and how to apply the theorem of Pythagoras for right angled triangles.
    Example 1 and 2 Page 168
    Q2 Q4 Q7 Q11 Q14 Q16 Q17 Page 169

Chapter 10 Probability

1. I know that probability uses numbers to tell us how likely something is to happen on a probability scale of 0 (impossible) to 1 (certain) expressed as a fraction or decimal and that ½ or 0.5 represents and **'evens chance'** of something happening.

   I can count the number of sections on a probability scale and note the probability scale value accordingly for each graduation on the scale = 1/number of sections

   Q2 Q4 Q6 Page 178

2. I know that 'throwing a dice' is a **TRIAL**

   That the required favourable result is an **EVENT**. i.e throwing a 6

   That the numbers 1,2,3,4,5,6 all have an **'EQUALLY LIKELY'** chance of happening and represent the **list of 'possible outcomes'** also known as the **'sample space'** In this case, the 'equally likely' chance expressed as a probability is 1/6

   For equally likely outcomes, the probability of Event E occurring is:

   P(Event)=number of successful(favourable) outcomes of event/number of all possible outcomes

   Also If A is an Event then P(A happening)=1-P(A not happening)

   I know that the probabilities of equally likely events add up to 1.
   Example 1 Page 181

3. I know that the **Fundamental Principle of Counting** states that if one event has **m** possible outcomes and a second event has **n** possible outcomes, the two events have **m x n possible outcomes** in the sample space.

   i.e if a boy can choose a shirt, a jacket and a tie from 5 shirts, 3 ties and 4 jackets he has 5x4x3 choices

4. I know how to generate **sample spaces** on a grid (2 way table) resulting from 2 events like tossing a coin and throwing a dice. I can find required probabilities from the generated sample space.
   Q2 Q4 Q6 Q8 Page 176
   Q2 to Q22 Even numbers Page 181
   Q2 to Q8 Even numbers Page 186

5. I know how to find the '**EXPERIMENTAL PROBABILITY or RELATIVE FREQUENCY = Number of successful Trials / Total Number of Trials'**

   I know that the experimental probability value approaches the theoretical probability value with increased trials if the coin etc is not biased.

   Example 1 Page 189

6. I know how to find the '**EXPECTED FREQUENCY**' = 'probability of the event happens' X 'number of trials' and know that the sum of probabilities adds up to 1.
   Example 2 Page 190
   Q2 to Q16 Page 191

7. I know how fill in, complete and read the cardinal numbers (#) for 2 and 3 topic **Venn Diagrams.**

   I know how to find the probabilities of events happening using **Venn Diagrams** starting out with the 'And One(only) Or technique.
   Example 1 Page 194
   Q2 to Q8 even numbers Page 195

8. I know how to generate a **TREE DIAGRAM** listing outcomes and associated probabilities for various trials and how to calculate the probability of all outcomes in the sample space.
   Example 1 page 198
   Q1 to Q9 Page199

Chapter 11 Coordinate Geometry – The Line

1. I know that the line formulae are on page 18 of my log book
2. I know how find the **distance** |AB| between 2 given points A and B (the length of the line between the 2 points)
   Q6 Page 206

3. I know how to find the **midpoint M** of a line given between 2 points.
   Q11 Page 206

4. I know that the slope of a line can be found by dividing the **RISE** by the **RUN**
5. I know how to determine the slope of a line plotted on a graph.
   Q2 Page 210 Q9 Page 211

6. I know that the slope of a line tells us how much Y changes for 1 unit change in X
   i.e. a slope of '6' means that the Y co-ordinate increases by 6 units every time we increase the X by 1 unit
   i.e. a slope of '-6' means that the Y co-ordinate decreases by 6 units every time we increase the X by 1 unit.

7. I know how to find the **slope m** of a line given 2 points on the line using the slope formula.
   Q5 Page 201

8. I know that parallel lines have equal slopes.

9. I know that the product of 2 lines that are perpendicular to each other is = -1
   i.e. $\mathbf{m_1 \times m_2 = -1}$

10. I know that I am given the slope of a line that I can find the **slope any line perpendicular** to it by simply **changing its sign and finding its inverse using the x-1 key on my calculator.**
    Q6 Page 211

11. I know how to find the value of a variable given points and slopes.
    Q14 and Q15 Page 211

12. I know that the equation of the line can take 2 forms **ax+by+c = 0 and y = mx + c**

13. Given **1 point (x_1,y_1)** and the **slope m** of a line I can use the equation **$y - y_1 = m(x - x_1)$** to find an equation of a line in the form **ax + by + c = 0**
    (If given 2 points I know that I can use these 2 points to find the **slope m** and then use this slope with one of the 2 points find the equation of the line using **y – y1 = m(x – x1)**
    I know to always provide my line equation answer so that it begins with a positive x value.
    i.e. If my answer is **3y-6x = 7**
    I rewrite by multiplying all terms by -1 to make the x term positive to give
    -3y+6x= -7
    And then rearrange to get
    6x-3y = -7
    And remember to take the -7 over to get...
    6x-3y+7 = 0

    Q1 and Q7 Page 214

14. I can rewrite an equation of a line given to me in the form **ax + by + c = 0 into the form y = mx + c** where **m is the slope** of the line and **c is the point on the y axis where the line intercepts the y axis.**

    This will allow me to find the slope m of the given line as well as the y axis intercept.

    As a quick trick I can find the slope using the formula m = -(a/b)

    Q1 and Q3 Page 216 Q4 Page 217 Q8 Page 217 Q14 Pages 218

15. I can quickly graph a line by using the **'intercept method'** where
    I let x = 0 and find the corresponding y coordinate to find the first point (0,y)
    I let y = 0 and find the corresponding x coordinate to find the first point (x,0)
    I can plot/draw a perpendicular line to a line through a given point

    Q4 Page 223 Q6 Page 223 Q9 Page 223 Q11 Page 223

16. I know how to find the equation of a line which goes through a point and is parallel or perpendicular to another given line.
    Q1 Q4 Q5 Q9 Q10 Page219 220

17. I know that lines in the form x = a are parallel to the y axis
18. I know that lines in the form y = b are parallel to the x axis
    Q2 Page 222

19. I know that lines with no independent term (c) go through the origin.
20. I know that I can verify if a point is on a line by substituting the x and y coordinate values into the equation.
    Q14 Page 224

21. I know that the point of intersection of 2 lines can be found by solving their equations simultaneously.
    Q1 Q2 Q12 Page 225 Q14 Page 226
22. I know how to find, by inspection, the other point on a line given 1 point and the mid - point of the line. i.e Given (2,3) and midpoint (5,9) the 3rd point is found by adding 3 to 5 for the x and by adding 6 to 9 for the y to give (8, 15) i.e. the differences
    Q16 and Q17 Page 2017

23. I know how to interpret slopes from graphs.
    Q6 Page 229 Q7 and Q8 Page 230

Chapter 12 Ratio Time Speed

1. I know that Ratios are usually expressed in their simplest form in whole numbers and know how to convert ratios expressed with fractions into ratios expressed using whole numbers.
2. I know that ratios are used to compare one part to another part.
3. I know how to solve ratio problems by adding the total number of parts or shares and equating them to the total value to find the value of each share using the **'unitary method'**.
   See Example 1 Page 234.

4. I know that a proportion compares a part to the total and is usually expressed as a fraction, decimal or percentage.
5. I can solve direct proportion problems like Example 2 on page 235.
6. I can solve inverse proportion problems (man days) like Example 3 page 235.
   Q1 Q2 Q5 Q7 Q8 Q12 Q14 Q15 Q16 Q18 Q19 Q21 Q23 Page 236

7. I can perform addition and subtraction hours and minutes calculations.
8. I can convert hours and mins to hours and understand am and pm
9. I understand Example 1 and 2 page 242
10. I can rewrite times in 12 hour and 24 hour clock formats.
    Q2 Q5 Q7 Q10 Q13 Q14 Page 239

11. I can perform speed – distance – time calculations using the correct units.
    Q1 Q3 Q5 Q7 Q9 Q11 Q13 Q15 Q17 Q19 Page 242

Chapter 14 Simultaneous Equations

1. I know how to solve **Simultaneous Equations by:**
   Focussing on eliminating the Y term
   Ensuring that the signs of the Y term are different and that the coefficient of the Y Terms is the same before cancelling to find X
   I know to sub my value of X into the first equation to find Y and that I can check my answer by subbing both values into the 2nd equation.
   Q8 Q12 Q20 Q24 Page 278

2. I know that I can use simultaneous equations to find the intersection point of graphed lines.
   Q2 Page 281

3. I know that I can use simultaneous equations to solve problems involving tickets etc.
   See example 2 Page 280
4. I know that I can use simultaneous equations to solve problems with stories
   Q11 Q12 Page 282

5. know that I can use simultaneous equations to solve shapes or difference of numbers
   Q7 Q10 Q17 Page 283

Chapter 15 Indices – Scientific Notation – Surds

Laws of Indices

1. I know that **Power** is another word for **index.**
2. I know to **multiply** powers of the same number, **add** the indices
   $(X^2)(X^2) = X^{2+2} = X^4$
3. I know to **divide** powers of the same number, subtract the indices
   $3^5 / 3^2 = 3^3$
4. I know to **raise** a power to a further power, multiply the indices
   $(x^2)^3 = X^2 \times X^2 \times X^2 = X^{2x3} = X^6$
5. I know that any number to the power of zero is 1 i.e. $2^0 = 1$
   $2^3 / 2^3 = 8 / 8 = 1$
   $2^3 / 23 = 2^{3-3} = 2^0 = 1$
6. I know that negative indices can be written as
   $a^{-n} = 1/a^n$

   i.e. $4^{-3} = 1/4^3$

7. I know that

   $(ab)n = a^n b^n$

   $(a/b)^n = a^n/b^n$

   See Example 1 Page 288
   Q2 – Q16 Even numbers Page 289

8. I know that for Fractional Indices

   $X^{m/n} = (\sqrt[n]{X})^m$

   See Example 1 Page Page 291
   Q2 – Q16 Even numbers Page 291
9. I know that for equations involving indices that I have to rewrite the base numbers/letters so that they are the same before I can proceed to solve the equation.
   i.e. If $a^x = a^y$ then x=y

See Example 1 and 2 Page 293
Q2 – Q14 Even numbers page 293

Irrational numbers - Surds

10. I know that Rational numbers are any numbers which can be expressed as a ratio in the form **a/b (in the form of a fraction) where a and b are integers**
    And that the **decimal equivalent of the rational number** either **TERMINATES** or **RECURS**
    Q denotes Rational Numbers

11. I know that dot notation (1 dot or 2) can be used in recurring decimals
    Use your **calculator to familiarise** yourself with Dot Notation

Try	**7/8=**	**1/3=**	**3/11=**	**7/12=**
Try	**4/1=**	**2/3=**	**- 7/8=**	**0.45=**

I know that I can type a number into my calculator, press = and if it displays a fraction then that number is a rational number and that I can use the SD button to switch the display from rational to decimal.

12. I know that **Irrational numbers cannot** be expressed in the form a/b (i.e. in rational or fraction form), are **never ending** and **non-repeating**
13. I know that the **square root of any number that does not have an exact square root** is an irrational number i.e. √2 √3 √5 √11 √15 are examples of irrational numbers

    NB the above irrational numbers are said to be expressed in **Surd** Form

14. I know that **∏** = 3.14159265 ... is an **irrational number (never ending non recurring)**
15. I know that combining rational and irrational numbers gives us the set of **Real Numbers R and that the set of irrational numbers is denoted as R\Q (set of real numbers less the set of rational numbers)**
16. I know that a **number which has an exact square root** is known as **a perfect square.** i.e 4, 9, 16
17. **I know that for Surds**

    √ab = √a√b and √a/b = √a/√b

18. I know that for surds **2√2** is said to be the **simplest form** of **√8**

19. I can add and subtract surds knowing that they can only be added or subtracted when they have the same irrational parts. If they are not the same we reduce each surd to its simplest form.
    Example 1 Page 296

20. I know that when multiplying surds that I must multiply separately the rational factors and the irrational factors.
    Example 2 Page 297
    Q1 – Q19 Odd numbers Page 297

Standard From – Scientific Notation

21. I know that a number in the form a x 10^n where 1 < a < 10, with n as an integer is said to be expressed in **scientific notation or standard form**
    i.e 6.8 x 10^4

    5000 = 5 x 10^3 **0.037 = 3.7 x 10^{-2}**

22. I know how to use the **x10^x** key on my calculator to perfume calculations involving standard form numbers.

23. I know how to add, subtract, multiply and divide numbers in standard form using my calculator.
    Example 1 and 2 Page 300
    Q2 to 16 Even numbers page 301

24. I know how to give answers correct to a set number of **decimal places**. Correct ot a number of decimal places means giving an answer up the number of places after the decimal point.

25. I know who to re write numbers correct to a given number of **significant figures** (rounding numbers to nearest to 10's, 100's, 1000's or 1/10ths, 1/100ths, 1/1000ths for deciamls) by looking at the next number to the right of the sig figure ... if it i2 0,1,2,3 or 4 then leave sig number as is and put in trailing zeros. If number to right of sig fig is 5,6,7,8 or 9 then add 1 to the sig fig and put in trailing zeros.

26. I know not to count 0's immediately after a decimal place if the number is less than 1 when rewriting to sig figures.

27. I know how to **make an estimate** by rounding numbers greater than 1 to one sig fig and numbers less than 1 to one decimal place before performing a calculation.

28. I know what the reciprocal of a number is and how to use my calculator to find the reciprocal of a number.

29. I know that a number multiplied by its reciprocal gives 1.

30. I can use my calculator to perform calculations with powers and root.

31. I have watched the 'How to use my calculator' on xequals.weebly.com

Q2 to 12 Even numbers Page 307

Chapter 16 Geometry 2 Similar Triangles – Circles - Theorems

1. I know that similar triangles are '**equiangular**' in that have 2 angles in one triangle are equal to 2 angles the other.

2. I know that in similar triangles...the corresponding sides are those sides opposite the same angles.

   And that ..

   Theorem If two triangles are similar then their corresponding sides are proportional. And its converse: if 2 sides of a triangle are proportional, in order, then the triangles are similar.

   SEE Formula Page 311 and Example 1 and Example 2 Page 311

3. I know that similar triangles are not necessarily the SAME size.
   Q2 Q5 Q7 Q10 Q12 Q14 Q16 Q18 Q20 Q21 Page 311

4. I know that **for transversals....**

   Theorem If three parallel lines cut off 2 equal segments on some transversal line, they will cut off 2 equal segments on any other transversal.

   Note: that the RATIO of the 2 segments cut on the first transversal will be the same as the RATIO of the 2 segments cut off on the second transversal
   Example 1 Page 317

5. I know that
   Theorem A line drawn parallel to one side of a triangle divides the other two sides in the same ratio.
   Note diagram and equations Page 318 and converse of this theorem which states that 'if a line cuts two sides of a triangle in the same ratio, then that line is parallel to the third side of the triangle'.
   Example 2 Page 318
   Q2 Q4 Q6 Q8 Q13 Q15 Q16 Page 319

   Circles

6. I know the meanings of all terms associated with circles: centre, diameter, radius semicircle, chord, tangent, sector and segment.

7. I know that the angle in a semicircle is a right angle...
   Example 1 Page 324

8. **I know that many of the problems dealing with angles in circles involves identifying isosceles triangles. These isosceles triangles occur when two equal sides consist of radii.**
9. **Theorem: The angle subtended at the centre of a circle is twice the angle at the circumference. (note both angles are 'standing on the arc')**

   Corollary 1
   I know that angles in the same segment are equal.

10. **Corollary2:** I know that a cyclic quadrilateral has all 4 vertices touching the circle and that the opposite angles in a cyclic quad add up to 180°

11. **Corollary 3:** I know that the angle in a semicircle is a right angle.

12. Corollary 4: If the angle standing on a chord [BC] at some point of the circle is a right angle, then [BC] is a diameter.
    See Examples 2,3,4 page 327
    Q2 Q4 Q6 Q8 Q10 Q12 Q14 Q18

13. I know how to prove Theorems 4, 6, 9, 14 and 19.
14. I know that an **AXIOM** is a statement accepted without proof. (i.e. the angles in a straight line add up to 180°)
15. I know that a **THEOREM** is a statement that can be shown to be true through the use of axioms and logical argument.
16. I know that a **COROLLARY** is a statement attached to a theorem which has been proven and follows obviously from it.
17. I know that the **CONVERSE** of a theorem is the opposite or reverse of the theorem.
18. I know that in maths, the word IMPLIES means that when one result is established, another result follows logically from it.

Chapter 17 Cylinder Sphere Cone

1. I can find the Volume, Curved surface area and total surface area of a cylinder.
2. I can find any dimension of a cylinder given its volume and one other dimension.
3. I can use these formulae for 1 and 2 above from are in the log tables
   a. **Volume Cylinder = $\pi r^2 h$**
   b. **Curved Surface Area = $2\pi rh$**
   c. **Total Surface Area = $2\pi rh + 2\pi r^2$**

   Q6 Q9 Q14 Q16 Page 342

4. I know that the 'volume of a sphere is equal to 2/3 of the volume of the smallest cyclinder which encloses it' Archimedes (born 287 BC)
5. I know how to use the following formulae with Spheres and Hemispheres
   Volume sphere = $4/3\ \pi r^3$
   Surface Area Sphere = $4\ \pi r^2$
   Volume Hemisphere = $2/3\ \pi r^3$
   Surface Area of solid Hemisphere = $3\ \pi r^2$

6. I have looked at and understand Example 2 Page 345 which equates the (cylindrical) volume of water displaced in a cylinder with the volume of the ball displacing it.
   Q1 Q3 Q7 Q 10 Q11 Q12 Q15 Q17 Page 346

7. I can use the following formulae for (right circular i.e. vertex is directly above centre of base)) Cone calculations
   Volume of a cone = $1/3\ \pi r^2 h$
   Curved surface area = πrl
   Total surface area of a solid cone = $\pi rl + \pi r^2$

   See Example 1 and Example 2 Page 349

   Q1 Q3 Q5 Q10 Q11 Q13 Q16 Q17 Q18

Chapter 18 Patterns and Sequences

1. I know how to find the xth term in a repeating pattern by dividing x by the block size and numbering the remainder values 1,2,3,4,0 (for block size of 5) under the pattern to note which values equate to which remainder.
   Q2 Page 361

2. I know that a linear sequence is also known as an arithmetic sequence.
3. Given the nth Term Rule for a sequence I can find the first 4 terms of the sequence by subbing in n=1, n=2 etc into the nth Term Rule formula.
   Q3 Page 363

4. I can find the nth term rule for an arithmetic sequence using the formula $\mathbf{T_n = a + (n-1)d}$ where a = First term value and d = difference between each term.
   Q3 Q5 Page 366

5. I can solve problems involving sequences formed from shapes.
   Q5 Q7 Page 368

6. I can find the 1st and 2nd difference of a sequence and know that if the 2nd difference is constant then the sequence is QUADRATIC and not Linear.
   Q3 Q4 Page 371

7. I can find the nth Term Rule for a Quadratic sequence by finding the coefficients of the rule $\mathbf{T_n=an^2 + bn + c}$ where **a = ½ the 2nd difference** and I find b and c by generating 2 simultaneous equations using/taking 2 corresponding Tn and n values in the sequence as in **Example 1 Page 360**
   Q6 Q7 Page 371

8. I can graph sequence by plotting T_1, T_2, T_3 along the x axis and their corresponding values on the y axis.
   Q6 Page 376

Chapter 19 Functions

1. I know that the set of x **in**put values into a function are known as the Doma**in**
2. I know that the set of corresponding y output values are known as the Range.
3. I know that the input and output values can be put together in as (x,y) 'couples' or 'ordered pairs' and that these ordered pairs can be plotted to graph the function.
4. I know that real functions have no 2 input values the same.
5. I know that there are 3 ways to write a function

   f(x) = x +1 (f of x = x + 1)
   f:x-> x + 1 (f is the function such that x maps to x + 1)
   y = x + 1

6. I know that f(1) means 'find the output value y when the input value x is = 1'
   Q2 P389

7. I know that 'If f(x)=2x-3 , solve f(x)=7' means I have to let 7=2x-3 and solve for x. i.e. This means...find the input value x given when the output value y is 7.
   Q9 Page 390

8. I know how to find the coeffecients of linear and quadratic functions using points/couples/ordered pairs from the graph/function and generating simultaneous eqns . see Example 1 and 2 Page 392
   Q5 Q9, 10, 11 page 393

Chapter 20 Drawing and Interpreting Real Life Graphs

1. I can read distance time graphs and know that
    a. A change in steepness represents a change in speed
    b. The steeper the line the faster the speed
    c. The flatter the line the slower the speed
    d. A horizontal line indicates that the body has stopped.

    Q3 Q4 Page 399

2. I know that a graph of 2 quantities said to be in direct proportion must me a 'straight line' through the origin point (0,0)
    Q1 page 403

3. I can find the value of one quantity in relation to another (extrapolate data) from graphs.
    Q2 Q6 Page 405

4. I can match real life graphs with vessel flow rates like Example 1 Page 407
    Q2 Q3 Q5 Page 408

Chapter 21 Algebraic Fraction - Formulae

1. I know how to work with **Algebraic Fraction** and that there are 2 types of problems i might be asked to work on:

   Express as a single fraction (or simplest form) – can solve this like any fraction using the LCM technique using 'containers'
   Q5 Q20 Page 415

   Solving Equations (i.e. with an '=' sign) involving fractions – Flat Pack Technique
   We balance by placing a 1 under any terms with no denominator
   We look for the LCM of all the denominators)
   We write this LCM beside ALL terms
   We look for any cancellations and multiply through to get a FLAT linear equation which we can then solve.
   Q2 Q16 Q30 Page 416

2. I know how to solve problems involving fractions
   Q4 Q10 Page 419

3. I know to do **Algebraic Division**
   Q4 Q14 Q24 Page 421

4. I know how to **Rearrange a Formula** to make any letter the subject of the formula

   I know that I must consider what is happening to the letter..
   If any term is being added or subtracted to the term with the letter then I will add/subtract (the opposite to what is in the formula) to both sides before I look for any cancellations
   If the term with the letter in it is being multiplied/divided by a number then I will multiply/divide (the opposite to what is in the formula) all terms in the formula by that number

   I will take care to:

   Factorise out the letter if it appears in more than 1 term.
   Flat pack any formulas with fractions in them before rearranging them

   Q2 Q6 Q8 Q10 Q14 Page 423

5. I know how **to Evaluate Formulae** by substituting in the variable values and solving.

6. I know how **to write Formulae**
   Q6 Q9 Q12 Page 425

7. I know how to **work with Formulae**
   Q7 Q8 Page 425

8. I know how to **write and work with formulae**

Q10 Q11 Q14 Page 425 Q13 Q15 Page 426

Chapter 22 Trigonometry

1. I know that the Theorem of Pythagoras states that "**in a right angled triangle, the area of the square drawn on the hypotenuse is equal to the sum of the squares drawn on the other 2 sides**" and can solve problems using this theorem.
   Q1 Q3 Q5 Q7 Q9 Q11 Q13 Q15 Q17 Page 430

2. I can use the Sine, Cosine and Tangent ratios to solve Right angled triangles.
3. I know that $\sin^2 A$ is the same as (sin A)(sin A)
4. I know to set my calculator to DEG mode by 'SHIFT SETUP 3'
5. I can sketch right angled triangles and find the sin b and cos b given tan b
   Example 1 Page 434
   Q1 Q2 Q4 Q6 Q8 Q9 Q10

6. I can use my calculator to find the sin, cos and tan of angles
7. I can use my calculator to find the $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$ inverse of angles
   i.e if tan A = 35° => A = $\tan^{-1}$ 35° etc.
8. I know that angles can measured in Degrees, Minutes and Seconds **(DMS)** and that this is represented on my calculator by the **°'"** button.
9. I can convert from ° to °'" and from °'" to decimal form

   i.e. 76.7° °'" = 76° 42' 0"

   i.e. 35° 54' => 35 °'" 54 °'" = SHIFT °'" 35.9°

   See Examples 1,2 and 3 Page 436
   Q1 Q3 Q5 Q7 Q9 Q11 Q13 Q15 Q17 Q18 Page 437

10. I can solve Right Angled Triangles
    Q1 Q3 Q5 Q7 Q9 Q11 Q13 Page 441

11. I know that the **angle of elevation** is the angle between the horizontal up to the line of sight to an object
12. I know that the **angle of depression** is the angle between the horizontal down to the line of sight and that these can be measured with a **clinometers**
    See Example 1 Page 444

13. I can use trigonometry to solve problems

Q1 – Q18 Page 444

14. I know that the sin, cos and tan of the angles 30°, 45° and 60° are generally expressed as SURDS (a square root number like √2 which is irrational..i.e. never ending and non repeating) and that these values can be found on Page 13 of the Log Tables and Page 449 of Text and Tests.
15. I can solve problems involving the angles 30°, 45° and 60° without using a calculator.
    Example 1 Page 449
    Q's 1 to 16 Page 450

Chapter 23 Graphing Functions

1. Given the equation of a line I can use the intercept method to find 2 points on the line and plots these to graph the line. Page 456
   Q11 page 458

2. I can graph a given linear or quadratic function for a given domain manually or by using the 'Table' command on my calculator.
   Q5 Page 457

3. Given a graph I can find **f(3)** by drawing a **VERTICAL** line **through X=3** and finding the corresponding y value where the x=3 line cuts the graph.
   I know that I can be asked this in **several ways** including
   Find f(x) when x=3
   The value of f(3)
   f(3)
   the value of y when x=3

4. Given a graph I can find **f(x)=0** by drawing a HORIZONTAL line through y=0 and finding the corresponding x values where the line y=0 cuts the graph.

   I know that I can be asked this in **several ways** including

   The values of x when f(x)=0
   The values of x for which f(x)=0
   The values of x when y=0
   The roots of the equation f(x)=0
   f(x)=0
   Solve the equation x^2-3x-4=0

   I also know that the I can be asked for all of the above for other numerical values like f(x)=3 etc.

5. I know that 'the values of x for which **f(x)<0** or the 'range of values for which f(x) is negative' are both asking me for the range of x values where the curve or line is BELOW the x axis i.e where the corresponding y values are negative (opposite applies to positive)

6. I know how to **find the coordinates (x,y) of the maximum or minimum turning point** of a quadratic curve.

   I know that the x values gives me the **'equation of the axis of symmetry i.e. x=2'**

I know that the y value is known as **'the minimum value of f(x)'**

7. I know how to find the range of **values of x for which f(x) is increasing** by simply looking for the part of the graph where the y values are increasing looking from left to right.

   All of the above Q3 Q5 Page 467

8. **Intersecting Graphs:**

   I know that a graph of f(x) intersects a graph of g(x) at f(x)=g(x)

   I know how to find the **intersection of 2 graphs** by solving their equations simultaneously or by equating the functions and solving for the x value(s) which I then sub into either of the original functions to find the corresponding y value(s)

   I know that **'Find f(x)<g(x)'** is asking for the range of x values for which the graph of the function f(x) is below the graph of the function g(x)
   Q11 and Q12 Page 469

9. I can **plot a graph of an exponential** function.

10. Maximum and Minimum Graphs.
    I can plot quadratic graphs from real life situations and can answer real life questions in relation to the graph.
    Q2 Q4 Q5 Q7 Page 472

Chapter 24 Geometry 3 Transformations – Constructions

1. I know that a **TRANSLATION** is a movement (slide) in a straight line and can construct translations of point A to image A' (A prime)
   Q3 Q5 Q8 Page 483

2. I know that a figure will have an axis of symmetry if it can be reflected exactly in that line.
3. I can draw images of objects through **AXIAL** symmetry by marking lines at 90° from each point on the image through the axial symmetry line and then measuring from each point to the axial line and following through.
4. I can draw images of objects through **central symmetry in (a point) X**
   Q1 Q3 Q6 Q10 Q11 Q13 Q14 Q17 Q20 Page 486

   Constructions

5. I can construct **the bisector of an angle using only a compass and straight edge.**
6. I can construct **the perpendicular bisector of a line segment.**
7. I can construct **a line perpendicular to a given line l, passing through a given point on l**
8. I can construct **a line perpendicular to a given line l, passing through a given point not on l**
9. I know how to **draw a line parallel to a given line, through a given point**
10. I can construct **the division of a line segment into three equal parts**
11. I can construct **the division of a line segment into any number of equal segments, without measuring it**
12. I can construct **the line segment of a given length on a given ray**
13. I can construct **an angle of a given number of degrees with a given ray as one arm.**
    Q2 Q4 Q6 Q8 Q10 Q12 Q14 Q16 Q17 Page 496

14. I can construct a **triangle given the lengths of the three sides**
15. I can construct a **triangle given side, angle and side measurements**.
16. I can construct a **triangle given angle, side and angle measures**.
17. I can construct a **right angled triangle given the length of the hypotenuse and one other side**
18. I can construct a right angled **triangle given one side and one of the acute angles**
19. I can construct rectangles
    Q1 Q3 Q5 Q7 Q9 Q11 Q13 Page 501