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MATHEMATICS DEPARTMENT

FROM GCSE TO AS-MATHS

BRIDGING UNITS

CONTENTS

1. Introduction to AS Level Bridging Units

This pack is an essential start to your Maths A Level – it will help you to determine which areas of maths you will need to focus on in the weeks before you start the course.

There's no point leaving it 'til the night before your first lesson – you need time to practice and consolidate.

The course is split into several modules, all building on skills you will have learnt at GCSE – if you are not reasonably competent in these skills, you will very quickly get left behind. This document looks at the basic prerequisites for the main chapters in pure maths this term – each chapter is set out in the same way.

- The required skills are described with a reminder of the vocabulary
- For each skill, there are a series of questions, starting with simple questions, building up to the more complex ones
- There is a short set of questions at the end of most of the sub-topics – these are more complex than the build-up exercises ***"So you think you've got this sussed !!!"***
- At the end of the booklet there are a few questions of each type – these are more complex still ***"You think you don't need to revise any of this – are you sure?"***

You need to get used to planning your own work schedules, but a suggested approach could be:

1. Have a look at the last page - don't worry if you can't do these immediately – but you should have some idea how to tackle them. If you can do all of these, your work is (probably) done.
2. If it looks kind of familiar, but you need a bit of a hint, try the "*Sussed*" section for the sub-topics you find tricky. If you can manage these, you won't need to do any more.
3. If the "*Sussed*" section still looks like a foreign language, go back to the simpler examples – make sure you try at least three of each type. If you can manage these, it is probably good enough, but you might like to check out some of the websites below.
4. If the summer break was far too long and your brain has ceased to function in a mathematical capacity (but only in certain areas – like the dreaded Surds), you definitely need to invest a bit of time on the suggested websites, going through the teaching sections and trying some examples online.
5. Finally, if there is a particular area you need some major help with, make sure you identify it and tell your teacher within the first few lessons so that it can be resolved.

Websites:
http://www.mymaths.co.uk/
http://www.gcseguide.co.uk/indices.htm
http://www.bbc.co.uk/schools/gcsebitesize/maths
http://www.meiresources.org

2. An Overview of the Pure Conent

We will be following the OCR MEI Structured Mathematics syllabus see **www.ocr.org.uk** for more details. The maths areas we will study at AS are pure, statistics and mechanics. The pure maths look at topics such as algebra, shape and space, trigonometry, sequences etc. The statistics content is devoted to handling data topics including probability and looking at distributions. In this section we give a brief overview of the pure content for the first term and look at some of the pre-requisites.

Basic Algebra

Overview – In this chapter you will study the basic algebra skills required to complete an AS in mathematics. You will revise how to simplify algebraic expressions, look at different methods of solving quadratic equations, how to change the subject of a formula and look at solving linear and nonlinear simultaneous equations.

Pre-requisites - Students should:
- be able to simplify simple expressions involving a single unknown and numbers e.g. 2x+5+8x-9.
- be able to multiply out single brackets & simplify (including brackets with negative numbers).
- have a good knowledge of indices.
- be competent at manipulating fractions.

KEY WORDS: Index, indices, expressions, quadratics, exponents, factorising, completing the square, simultaneous equations.

Co-ordinate Geometry

Overview – In this chapter you will study geometry in the two-dimensional (x,y)-plane. In particular the chapter focuses on the geometry of straight lines and the geometry of circles.

Pre-requisites - Students should:
- be able to substitute values into an equation and plot linear graphs.
- be familiar with the equation of a straight line.
- be competent when rearranging formulae with two unknowns to change the subject e.g. 2y=5x-7, make x the subject.

KEY WORDS: Intercept, gradient, parallel, perpendicular, straight lines, collinear, centre of circle, radius, tangents, midpoints.

Polynomials

Overview – Despite the confusing name some polynomials are already well known to you. Both quadratic and linear expressions are examples of polynomials. In this chapter we will look at general polynomials including cubics (power of three) and quartics (power of four). We will learn how to divide polynomials and find the remainder if there is one. We will look at how the Binomial Theorem helps us expand objects such as, $(x+1)^{17}$.

Pre-requisites - Students should:
- be able to sketch graphs of quadratic functions.
- be able to manipulate quadratic expressions and factorise with ease.

KEY WORDS: Quadratics, factorise, completing the square, coefficient, binomial, factorial, remainder, translations.

Uncertainty

Overview – Lots of concepts in mathematics are uncertain e.g. think of estimating or rounding, what is the precise decimal expansion of π? In this chapter we will look at inequalities. We shall practice solving linear inequalities and then look at how we can solve quadratic inequalities from a graph.

Pre-requisites - Students should:
- be able to factorise and solve quadratics and use the basic inequality signs.
- have a good knowledge of how to solve linear equations which may involve brackets or have unknowns on both sides.
- be able to sketch the graph of a quadratic function.

KEY WORDS: Linear equations, quadratics, inequalities, solution set, absolute and relative errors.

Indices

Overview – Indices play an important role in many calculations. We will revise how to work with fractional and negative indices and how to manipulate surds (a number that is partly rational and partly irrational).

Pre-requisites – Students should:
- be familiar with some of the basic properties of indices.
- be able to recognise a square root and cube root in index form.
- be able to quickly spot powers of 2,3,4,5 and 6.

KEY WORDS: Index, indices, surds, rational numbers, irrational number, rationalising denominators.

3. Pure Maths Bridging Units

3.1 Brackets: - expand (multiply out) & simplify the following [try at least 3 from each section]

Single brackets

a) $2(x+3)=$ b) $4(3t-2)=$ c) $s(s-3)=$ d) $t(4t^2+7)=$ e) $-x(x-5)=$

Double brackets

a) $(x+2)(x+3)=$ b) $(t-4)(t+2)=$ c) $(s-6)(s-4)=$ d) $(x-5)(x-5)=$

e) $(2x+1)(x+3)=$ f) $(t-4)(2t+3)=$ g) $(5s-2)(s+4)=$ h) $(3-x)(x-4)=$

Squares

a) $(x+3)^2=$ b) $(t-9)^2=$ c) $(s-13)^2=$ d) $(3t+4)^2=$ e) $(2x-5)^2=$

So you think you've got this sussed !!!

a) $(x+1)(x-1)+x(x-1)=$ b) $(t-4)(t+5)+t(t-2)=$ c) $(s+5)(s-2)-s(s+3)=$

d) $(t+4)^2+(3t^2-5)=$ e) $(t+4)^2-(t-4)^2=$ f) $(3x-2)^2-x(x+5)=$

3.2 Factorising: - the inverse of expanding

a) $4a^2b-16ab^2=$ b) $5x^2y-4y^2-3xy=$ c) $3a^2-12b^2=$

d) $x^2+4x+3=(x+\quad)(x+\quad)$ e) $x^2-2x-3=(x+\quad)(x-\quad)$ f) $x^2-13x+30=(x-\quad)(x-\quad)$

g) $2x^2+3x+1=$ h) $2x^2+x-6=$ i) $3x^2-10x+3=$

3.3 Fractions: - manipulating/rationalising denominators

Simplify each expression as fully as possible:

a) $\frac{27x^4y^3}{9x^2y}$ b) $\frac{b^4}{4a}\times\frac{12a^2}{b^3}$ c) $\frac{2x}{3}+\frac{x}{4}$ d) $\frac{x+3}{2}-\frac{2x-1}{5}$

e) $\frac{x^2-5x+4}{x^2-16}$ f) $\frac{x^2-4}{2x-4}$ g) $\frac{6x^2+7x-3}{9x^2-6x+1}$ h) $\frac{4x+8}{x^2+2x}$

So you think you've got this sussed !!

Simplify each expression as fully as possible.

!

a) $x^2-10x+24$ = b) $4x^2+10x+6$ = c) $8x^2+11x+3$ =

d) $\frac{4x^2-25}{4x^2-8x-5}$ e) $\frac{6x-30}{2x^2-50} \div \frac{21}{x^2+3x-10}$ f) $\frac{2x-4}{x^2-5x+6} + \frac{3x^2+9x}{x^2-9}$

3.4 Square/Cube numbers and roots, Indices & Surds [non-calculator]

Work out the value of these:

a) 3^4= b) 4^3= c) $\sqrt[3]{125}$ = d) 0.2^3= e) $\sqrt{1.69}$= f)$\sqrt[3]{1000}$=

Simplify, leaving as a power of 10:

a) $10^4\times10^3$= b) $10^3\times10^{-5}$= c) $(\sqrt{10})^4$ = d) $10^4\div10^3$= e) $(10^3)^2$=

Work out the value of the following:

a) 7^0= b) $64^{\frac{1}{2}}$= c) 8^{-2} = d) 3^{-3}= e) 36^0= f)10^{-6}=

g) 27^1= h)$9^{-\frac{1}{2}}$= i) $216^{⅓}$= j)$121^{\frac{1}{2}}$= k) $\frac{1}{2}^{-1}$= l) $32^{-1/5}$=

m) $25^{-\frac{1}{2}}$= n) $32^{0.2}$= o)$1.21^{\frac{1}{2}}$= p) 0.25^{-1}= q) $1000^{⅓}$= r) $4900^{0.5}$=

Find the value of x in these equations:

a) $2^x=32$ b) $5^x=1$ c) $3^x=81$ d) $9^x=⅓$ e) $16^x=8$ f) $7^x=\sqrt{7}$

Simplify (leaving your answer as accurately as possible):

a) $\sqrt{12}\times\sqrt{12}$= b) $\sqrt{125}\times\sqrt{5}$= c) $\sqrt{32}\times\sqrt{2}$ = d) $\sqrt{14}\div\sqrt{2}$= e) $\sqrt{2\times72}$ =

f) $\sqrt{36}\div\sqrt{4}$= g) $\sqrt{125}\div\sqrt{5}$= h) $\sqrt{32}\div\sqrt{2}$ = i) $\frac{\sqrt{35}}{\sqrt{7}}$= j) $\frac{\sqrt{44}}{2}$ =

So you think you've got this sussed !!!

a) $196^{0.5}$= b)$100^{-\frac{1}{2}}$= c) $0.49^{0.5}$= d)$121^{\frac{1}{2}}$= e) $0.25^{-0.5}$=

f)$1000^{2/3}$= g) $32^{0.4}$= h)$27^{4/3}$= i) $16^{5/4}$= j)$0.25^{-2.5}$=

Find the value of x in these equations:

a) $11^x=\sqrt{11}$ b) $7^x=1$ c) $3^x=243$ d) $2^x=128$ e) $64^x=4$ f) $27^x=⅓$

Simplify (leaving your answer as accurately as possible):

a) $\sqrt{17}\times\sqrt{17}$= b) $\sqrt{216}\times\sqrt{6}$= c) $\sqrt{16}\times\sqrt{2}$ = d) $\sqrt{24}\div\sqrt{2}$= e) $\sqrt{2\times18}$ =

f) $\sqrt{90}\div\sqrt{10}$= g) $\sqrt{343}\div\sqrt{7}$= h) $\sqrt{96}\div\sqrt{6}$ = i) $\frac{\sqrt{42}}{\sqrt{7}}$= j) $\frac{\sqrt{28}}{2}$ =

3.5 Formulae: - substitution/manipulation [try at least 3 from each line]

If a=6, b=-7, c=3, d=$\frac{1}{2}$, e= $-\frac{2}{7}$, find the values of:

A) ab= B) b^2= C) $ad-b$= D) $be-d$= E) $6a+b^2$=

F) $\frac{c}{a}$= G) $\frac{a}{d}$= H) $\frac{ad-b}{-2}$= I) $\frac{-b(e+d)}{a}$= J) $\frac{be^2}{c-a}$=

Rearrange these formulas so that the new letter is the subject:

A) $d=3a+4f$ $f=$ B) $v=u+at$ $a=$ C) $c=ad-b$ $d=$ D) $b=(e-d)^2$ $e=$

E) $s=\frac{d}{t}$ $d=$ F) $R=\frac{V}{I}$ $I=$ G) $p=\frac{4q^2}{t}$ $q=$ H) $a=\frac{b-c}{c-d}$ $c=$

So you think you've got this sussed !!!

If a=-5, b=$\frac{1}{4}$, c= $-\frac{7}{8}$, find the values of:

A) $3-ab$= B) $1-c^2$= C) $a^2-\frac{b}{c}$= D) $\frac{c}{b}-4c$= E) $a(b-2c)$=

Rearrange these formulas to make a the subject:

A) $s=\frac{1}{2}n(a+d)$ B) $v^2=u^2+2as$ C) $p=q\sqrt{a^2-x^2}$ D) $r=\sqrt{\frac{a}{\pi}}$ E) $b=(\frac{a}{2}+3)^2$

3.6 Equations:- Linear, quadratic and simultaneous [try at least 3 from each line]

Solve these equations to find x, factorising first if necessary:

a) $5x+4=39$ b) $4-3x=-5$ c) $4x+1=9x-6$ d) $6(x+2)=4x-5$ e) $7(x-3)=2(x+5)$

f) $\frac{4}{3x}=2$ g) $\frac{7}{2x}=5$ h) $\frac{6}{2x+3}=5$ i) $\frac{2x+7}{3x+5}=1$ j) $\frac{6x+11}{3x}=4$

k) $x^2+3x+2=0$ l) $x^2+4x+4=0$ m) $x^2+5x-14=0$

n) $x^2-4x+3=0$ o) $x^2-x=12$ p) $2x^2+3x+1=0$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Solve these equations to find x, using the quadratic formula:

a) $x^2-6x+8=0$ b) $x^2-4x-7=0$ c) $2x^2+7x+3=0$

d) $2x^2+x-1=0$ e) $4x^2+4x+1=0$ f) $3x^2+19x+20=0$

Find x and y:

a) $x+y=4$, $x+2y=9$ b) $3x+2y=-5$, $3x-4y=1$ c) $3x-y=-10$, $4x-y=-4$ d) $7x-3y=20$, $2x+4y=-4$ e) $6x-7y=25$, $7x+6y=15$

f) $2x+3y=12$ $5x+4y=23$ g) $6x+5y=9$ $4x+3y=6$ h) $3x-2y=-7$ $4x+3y=19$ i) $x-y=2$ $2y=x+1$ j) $2x+y=8$ $y=6-x$

So you think you've got this sussed!!!

Find the value(s) of x

a) $5x+8=7x+2$ b) $3(x-1)=4(x-7)-3$ c) $\frac{1}{x} + \frac{2x}{x+1}=2$ d) $\frac{1}{x} + \frac{3x}{x-1}=3$

e) $x^2-2x-8=0$ f) $2x^2+x=6$ g) $5x^2-7x+2=0$

h) $2x^2+5x+2=0$ i) $9x^2-12x+4=0$ j) $5x^2+9x+4=0$

Find the value of integers b and c where:

a) the sum is 27 & the difference is 15 b) the sum is 38 & the difference is 12

c) the product is 24 & the sum is 11 d) the quotient is 3 & the difference is 8

Find 2 nos. such that twice the 1st added to the 2nd is 26 and the 1st added to three times the 2nd is 28.

3.7 Inequalities: - work out the values of x. Can you draw the solutions on a number line?

a) $2x+3<4$ b) $7x+3\geq 4x-9$ c) $2x-1>7-2x$ d) $3x+1\leq 5x-7$ e) $3(x+2) \leq 2(2x-3)$

3.8 Equations of straight Lines: -

Write down the gradient and y-intercept of the following lines:

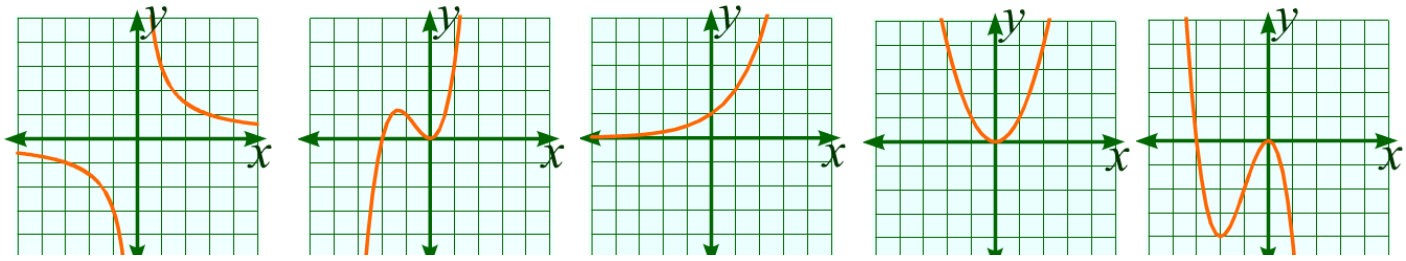
a) $y=4x+7$ b) $y=-2x+4$ c) $y=9$ d) $2y+3x=8$ e) $2y=4x+7$ f) $4x=3y$

Find the gradient and equation of the line joining each pair of points:

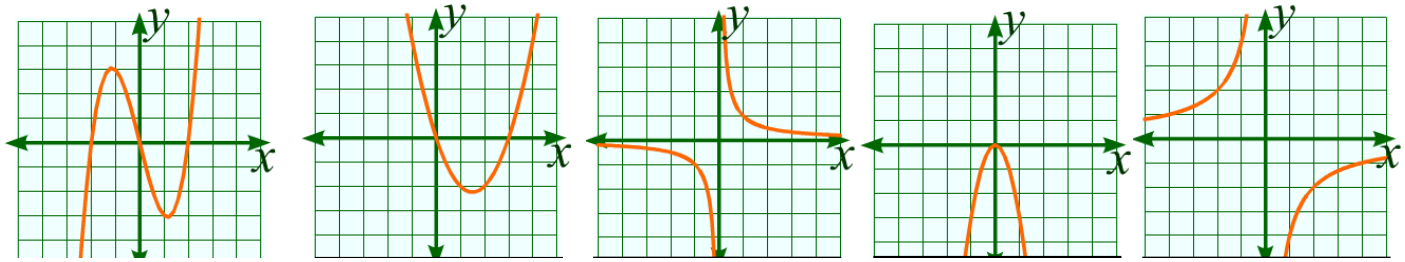
a) (3,2) & (7,10) b) (6,2) & (8,9) c) (3,7) & (9,7) d) (-2,9) & (3,-1)

3.9 Graphs: - match each of the lines on the graphs to one of the equations.

Can you label the line type? (quadratic, cubic, reciprocal, exponential)



$y=-3x^2$ $y=\frac{-4}{x}$ $y=x^3-4x$ $y=x^3+2x^2$ $y=2^x$ $y=\frac{1}{x}$ $y=-3x^2-x^3$ $y=x^2$ $y=x^2-3x$ $y=\frac{3}{x}$



Complete the tables and plot the following on axes x ? to ?, y ? to ?

X	-2	-1	0	1	2
$y=x^2+3$					

X	-2	-1	0	1	2
$y=3x^2$					

X	-2	-1	0	1	2
$y=x^2-3$					

X	-2	-1	0	1	2
$y=3-x^2$					

So you think you've got this sussed!!!

Work out the values of x and draw the solutions on a number line.

a) $2x+3<9$ b) $3(x+10)\geq 15$ c) $5x+3>13-2x$ d) $2x-7\leq 4x-9$ e) $3(x+5)\leq 2(4x-3)$

Write down the gradient and y-intercept of the following lines:

a) $y=3x-1$ b) $y=-6x+3$ c) $x=9$ d) $5y-7=x$ e) $2y-4x=7$ f) $2x=5y$

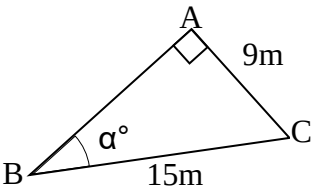
Sketch graphs of the above, indicating where they cross the axes and the approximate slope

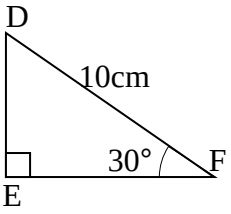
Find the gradient and equation of the line joining each pair of points:

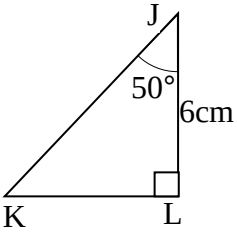
a) (4,8) & (8,4) b) (0,0) & (5,-10) c) (10,-5) & (0,0) d) (-9,2) & (-1,3)

3.10 Pythagoras & Trigonometry remember the formulae

Find all the missing sides and angles in the following triangles:







Trigonometrical ratios:

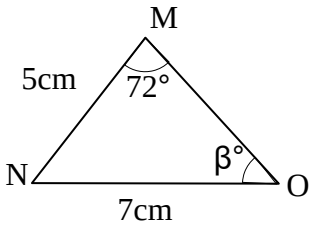
$\sin\alpha=\frac{opp}{hyp}$ $\cos\alpha=\frac{adj}{hyp}$ $\tan\alpha=\frac{opp}{adj}$

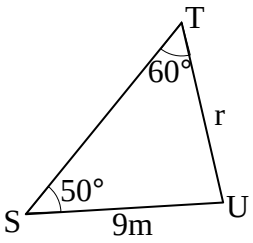
Pythagoras ($\angle\Delta$) $a^2=b^2+c^2$

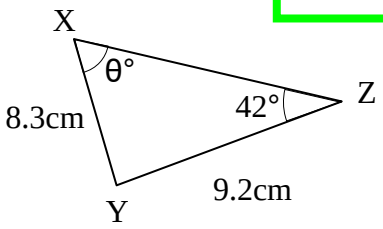
Cosine rule $a^2=b^2+c^2-2bc\cos A$

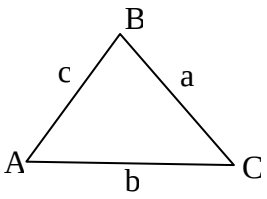
or $\cos A=\frac{b^2+c^2-a^2}{2bc}$

Sine rule $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$









In the triangle PQR, PQ=17cm, QR=15cm, PR=8cm. a) Show that the triangle is right angled.
b) Write down the values of sinQ, cosQ and tanQ, leaving your answers as fractions.
c) Use your answers to part b) to show that $(\cos Q)^2+(\sin Q)^2=1$ and $\tan Q=\frac{\sin Q}{\cos Q}$

Find the sizes of all the angles in the following triangles:
a) 3,4,6 cm b) 5,12,13 m c) 1,1,$\sqrt{2}$ mm d)2.9, 7.2, 8.1 cm

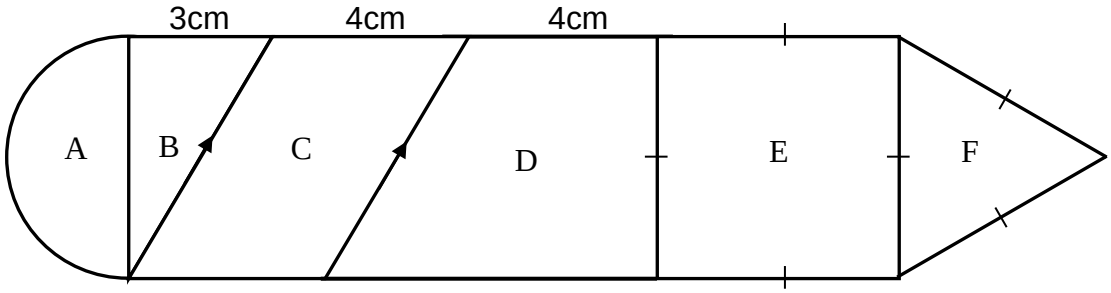
Area & Circle Formulae you should know:

Scalene triangle $A=\frac{1}{2}ab\sin C$ Trapezium $A=\frac{1}{2}b(a+b)h$ Parallelogram $A=bh$ Circle $A=\pi r^2$

Sector of a circle $A=\frac{\pi r^2\theta}{360}$ Arc of a circle $l=\frac{2\pi r\theta}{360}$ Circumference of a circle $C=2\pi r$

Find the area of each section in this shape. You will need to work out the missing lengths.

radius of semicircle is 2.5cm



Work out the angle, arc length and sector area of one fifth of a 40cm diameter pizza.

A pie chart radius 5cm is split into 5 sectors in the ratio 1:2:3:4:5. Work out the angle, arc length and area of each sector.

3.11 Sequences and series

Write down the first 5 terms for the sequences given by each of the following general terms:

a) $3n+7$ b) $16-2n$ c) $3n^2-2$ d) $(n+1)^2$ e) $2n^3-3$ f) 2^n g) $\frac{(n-2)}{n}$

What is the n^{th} term for the following sequences?

a) 13, 11, 9, 7, 5… b) -5, -2, 1, 4, 7… c) 3, 6, 10, 15, 21… d) 6, 13, 32, 69, 130…

e) 3, 12, 27, 48, 75… f) 4, 18, 56, 130, 252… g) 1, 2, 4, 8, 16… h) 2, 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$…

4. You think you don't need to revise any of this – are you sure?

Expand (multiply out) & simplify the following

a) $(x+2)(x+3)+x(x-1)=$ b) $(t-4)(t+4)+t(t-4)=$ c) $(s-5)(s-2)-s(s-6)=$

d) $(t+4)^2-t(3t-7)=$ e) $(2t+3)^2-(2t-3)^2=$ f) $(2x-2)^2-2(x^2+2)=$

Evaluate *(leaving your answer as accurately as possible)*:

a) $81^{\frac{3}{4}}=$ b) $8^{\frac{2}{3}}=$ c) $32^{0.4}\div 4^0=$ d) $\sqrt{63}\times\sqrt{7}=$ e) $\frac{\sqrt{240}}{\sqrt{15}}=$ f) $\frac{\sqrt{96}}{\sqrt{12}}=$

Find x in the following equations:

a) $b^x=b^{\frac{1}{4}}\times b^{\frac{3}{4}}$ b) $3^x=\frac{(3^4)^2\times 3^5}{3^{11}}$ c) $d^x=\frac{(d^2)^4}{d\times d^5}$ d) $10^x=100^{\frac{2}{3}}\times 10^{\frac{2}{3}}$

Factorise *(put into brackets)*:

a) $6x^2y-9y^2-3xy=$ b) $9a^2b^2-16c^2=$ c) $2xy^2-8x^3=$

d) $4x^2-23x+15=(\ -\ )(\ -\ )$ e) $5x^2+13x+6=(\ +\ )(\ +\ )$ f) $12x^2-13x+3=(\ -\ )(\ -\ )$

Simplify each expression as fully as possible:

a) $\frac{x^2+6x+8}{x^2+4x}$ b) $\frac{4x+8}{4x^2-8x}\div\frac{x^2-4}{x^2+2x}$ c) $\frac{1}{x+1}-\frac{x-2}{x^2+3x+2}$ d) $\frac{x^2-5x+4}{x^2-16}+\frac{x^2+11x+18}{x^2+6x+8}$

Rearrange these formulas so that the new letter is the subject:

A) $s=ut+\frac{1}{2}at^2$ $a=$ B) $r=\frac{a^2}{b-c}$ $a=$ C) $d=\sqrt{\frac{c+b}{c}}$ $c=$ D) $y=\frac{1+x^2}{2-x^2}$ $x=$

Solve these equations to find x, factorising first or using the quadratic formula if necessary:

a) $5x+8=7x+2$ b) $4(x-2)=2(x+2)-3$ c) $\frac{2x+1}{3}=\frac{3+x}{4}$ d) $\frac{x+2}{2}+\frac{2x}{x-2}=7$

e) $x^2+7x+10=0$ f) $2x^2-7x=15$ g) $3x^2+19x+20=0$

h) $3x^2-5x-6=0$ i) $4x-x^2=4$ j) $2x^2+3x-3=0$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Find x and y:

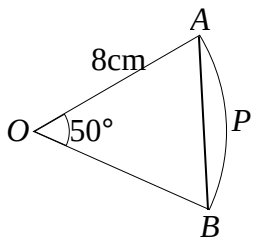
a) $x+y=6$, $x-y=1$ b) $3x+2y=-4$, $3x-4y=8$ c) $3x-5y=13$, $2x+5y=-8$ d) $2x+3y=0$, $3x+2y=5$ e) $10x+3y=12$, $3x+5y=20$

Find the value of numbers b and c where:

a) b=9+c & b=11-c b) b+4=c & c=10-2b c) b+c=12 & b=3+c d) b=4-c & b=6+c
e) the sum is 32 & the difference is 6 f) the sum is 10 & the difference is 11
g) the product is 30 & the sum is 11 h) the quotient is 5 & the difference is 10

A triangle has vertices *C* (1,5) *D* (4,7) *E* (5,2).
Find the equation, length and midpoint of each line (*CD*, *DE* & *CE*). What type of triangle is it?

For the sector of a circle *OAPB*, calculate
a) length of chord *AB* b) length of arc *APB*
c) area of sector *OAPB* d) area of segment *APB*
e) length of the bisecting line *OP*



Write down the first 5 terms for the sequences given by each of the following general terms:
a) $3n^2+7$ b) $(n-2)^2$ c) $\frac{1}{2}n(n+1)$ d) $\frac{n-1}{n+1}$ e) $(\frac{1}{2})^n$ f) 2^{-n} g) $\frac{2n+3}{3n+1}$

Core 1 Bridging Units – The Solutions

3. Core 1 Bridging Units

3.1 Brackets: - expand (multiply out) & simplify the following [try at least 3 from each section]

Single brackets

a) $2(x+3)=$ **$2x+6$** b) $4(3t-2)=$**$12t-8$** c) $s(s-3)=$ **s^2-3s** d) $t(4t^2+7)=$ **$4t^3+7t$** e) $-x(x-5)=$ **$5x-x^2$**

Double brackets

a) $(x+2)(x+3)=$**x^2+5x+6** b) $(t-4)(t+2)=$**t^2-2t-8** c) $(s-6)(s-4)=$**$s^2-10s+24$** d) $(x-5)(x-5)=$**$x^2-10x+25$**

e) $(2x+1)(x+3)=$**$2x^2+7x+3$** f) $(t-4)(2t+3)=$**$2t^2-5t-12$** g) $(5s-2)(s+4)=$**$5s^2+18s-8$** h) $(3-x)(x-4)=$**$-x^2+7x-12$**

Squares

a)$(x+3)^2=$**x^2+6x+9** b)$(t-9)^2=$**$t^2-18t-81$** c)$(s-13)^2=$**$s^2-26s-169$** d)$(3t+4)^2=$**$9t^2+24t+16$** e)$(2x-5)^2=$**$4x^2-20x+25$**

So you think you've got this sussed !!!

a) $(x+1)(x-1)+x(x-1)=$ **$2x^2-x-1$** b) $(t-4)(t+5)+t(t-2)=$ **$2t^2-t-20$** c) $(s+5)(s-2)-s(s+3)=$ **-10**

d) $(t+4)^2+(3t^2-5)=$ **$4t^2+8t+11$** e) $(t+4)^2-(t-4)^2=$ **$16t$** f) $(3x-2)^2-x(x+5)=$ **$8x^2-17x+4$**

3.2 Factorising: - the inverse of expanding

a) $4a^2b-16ab^2=$ **$4ab(a-4b)$** b) $5x^2y-4y^2-3xy=$ **$y(5x^2-4y-3x)$** c) $3a^2-12b^2=$ **$3(a+2b)(a-2b)$**

d) $x^2+4x+3=$ **$(x+3)(x+1)$** e) $x^2-2x-3=$ **$(x+1)(x-3)$** f) $x^2-13x+30=$ **$(x-10)(x-3)$**

g) $2x^2+3x+1=$ **$(2x+1)(x+1)$** h) $2x^2+x-6=$ **$(2x-3)(x+2)$** i) $3x^2-10x+3=$ **$(3x-1)(x-3)$**

3.3 Fractions: - manipulating/rationalising denominators

Simplify each expression as fully as possible:

a) $\frac{27x^4y^3}{9x^2y}=$ **$3x^2y^2$** b) $\frac{b^4}{4a}\times\frac{12a^2}{b^3}=$ **$3ab$** c) $\frac{2x}{3}+\frac{x}{4}=$ **$\frac{11x}{12}$** d) $\frac{x+3}{2}-\frac{2x-1}{5}=$ **$\frac{x+17}{10}$**

e) $\frac{x^2-5x+4}{x^2-16}=$ **$\frac{x-1}{x+4}$** f) $\frac{x^2-4}{2x-4}=$ **$\frac{x+2}{2}$** g) $\frac{6x^2+7x-3}{9x^2-6x+1}=$ **$\frac{2x-3}{3x-1}$** h) $\frac{4x+8}{x^2+2x}=$ **$\frac{4}{x}$**

So you think you've got this sussed !!!

a) $x^2-10x+24=$ **$(x-4)(x-6)$** b) $4x^2+10x+6=$ **$2(2x+3)(x+1)$**
not **$(4x+6)(x+1)$ or $(2x+3)(2x+2)$**

c) $8x^2+11x+3=$ **$(8x+3)(x+1)$**

a) $\frac{4x^2-25}{4x^2-8x-5} = \mathbf{\frac{2x+5}{2x+1}}$

b) $\frac{6x-30}{2x^2-50} \div \frac{21}{x^2+3x-10} = \mathbf{\frac{x-2}{7}}$

c) $\frac{2x-4}{x^2-5x+6} + \frac{3x^2+9x}{x^2-9} = \mathbf{\frac{3x+2}{x-3}}$

3.4 Square/Cube numbers and roots, Indices & Surds [non-calculator]

Work out the value of these:

a) 3^4= **81** b) 4^3= **64** c) $\sqrt[3]{125}$ = **5** d) 0.2^3= **0.008** e) $\sqrt{1.69}$= **1.3** f) $\sqrt[3]{1000}$= **10**

Simplify, leaving as a power of 10:

a) $10^4\times10^3$= **10^7** b) $10^3\times10^{-5}$= **10^{-2}** c) $(\sqrt{10})^4$ = **10^2** d) $10^4\div10^3$= **10^1** e) $(10^3)^2$= **10^6**

Work out the value of the following:

a) 7^0= **1** b) $64^{\frac{1}{2}}$= **8** c) 8^{-2} = $\frac{1}{64}$ d) 3^{-3}= $\frac{1}{27}$ e) 36^0= **1** f) 10^{-6}= **0.000001**

g) 27^1= **27** h) $9^{-\frac{1}{2}}$= $\frac{1}{3}$ i) $216^{⅓}$= **6** j) $121^{\frac{1}{2}}$= **11** k) $\frac{1}{2}^{-1}$= **2** l) $32^{-1/5}$= **0.5**

m) $25^{-\frac{1}{2}}$= **0.2** n) $32^{0.2}$= **2** o) $1.21^{\frac{1}{2}}$= **1.1** p) 0.25^{-1}= **4** q) $1000^{⅓}$= **10** r) $4900^{0.5}$= **70**

Find the value of x in these equations:

a) $2^x=32$ **$x=5$** b) $5^x=1$ **$x=0$** c) $3^x=81$ **$x=4$** d) $9^x=⅓$ **$x=-\frac{1}{2}$** e) $16^x=8$ **$x=\frac{3}{4}$** f) $7^x=\sqrt{7}$ **$x=\frac{1}{2}$**

Simplify (leaving your answer as accurately as possible):

a) $\sqrt{12}\times\sqrt{12}$=**12** b) $\sqrt{125}\times\sqrt{5}$=**25** c) $\sqrt{32}\times\sqrt{2}$ =**8** d) $\sqrt{14}\div\sqrt{2}$=**$\sqrt{7}$** e) $\sqrt{2\times72}$ =**12**

f) $\sqrt{36}\div\sqrt{4}$=**3** g) $\sqrt{125}\div\sqrt{5}$=**5** h) $\sqrt{32}\div\sqrt{2}$ =**4** i) $\frac{\sqrt{35}}{\sqrt{7}}$=**$\sqrt{5}$** j) $\frac{\sqrt{44}}{2}$ =**$\sqrt{11}$**

So you think you've got this sussed !!!

a) $196^{0.5}$= **14** b) $100^{-\frac{1}{2}}$= **0.1** c) $0.49^{0.5}$= **0.7** d) $121^{\frac{1}{2}}$= **11** e) $0.25^{-0.5}$= **2**

f) $1000^{2/3}$= **100** g) $32^{0.4}$= **4** h) $27^{4/3}$= **81** i) $16^{5/4}$= **32** j) $0.25^{-2.5}$= **32**

Find the value of x in these equations:

a) $11^x=\sqrt{11}$ **$x=\frac{1}{2}$** b) $7^x=1$ **$x=0$** c) $3^x=243$ **$x=5$** d) $2^x=128$ **$x=7$** e) $64^x=4$ **$x=⅓$** f) $27^x=⅓$ **$x=-⅓$**

Simplify (leaving your answer as accurately as possible):

a) $\sqrt{17}\times\sqrt{17}$= **17** b) $\sqrt{216}\times\sqrt{6}$= **36** c) $\sqrt{16}\times\sqrt{2}$ = **$4\sqrt{2}$** d) $\sqrt{24}\div\sqrt{2}$= **$2\sqrt{3}$** e) $\sqrt{2\times18}$ = **6**

f) $\sqrt{90}\div\sqrt{10}$= **3** g) $\sqrt{343}\div\sqrt{7}$= **7** h) $\sqrt{96}\div\sqrt{6}$ = **4** i) $\frac{\sqrt{42}}{\sqrt{7}}$= **$\sqrt{6}$** j) $\frac{\sqrt{28}}{2}$ = **$\sqrt{7}$**

3.5 Formulae: - substitution/manipulation [try at least 3 from each line]

If a=6, b=-7, c=3, d=$\frac{1}{2}$, e= $-^2/_7$, find the values of:

A) ab= **-42** B) b^2= **49** C) $ad-b$= **10** D) $be-d$= **$1\frac{1}{2}$** E) $6a+b^2$= **85**

F) $\frac{c}{a}$= $\frac{1}{2}$ G) $\frac{a}{d}$= **12** H) $\frac{ad-b}{-2}$= **-5** I) $\frac{-b(e+d)}{a}$= $\frac{1}{4}$ J) $\frac{be^2}{c-a}$= **$\frac{4}{21}$**

Rearrange these formulas so that the new letter is the subject:

A) $d=3a+4f$ $f=\frac{d-3a}{4}$ B) $v=u+at$ $a=\frac{v-u}{t}$ C) $c=ad-b$ $d=\frac{b+c}{a}$ D) $b=(e-d)^2$ $e=d+\sqrt{b}$

E) $s=\frac{d}{t}$ $d=st$ F) $R=\frac{V}{I}$ $I=\frac{V}{R}$ G) $p=\frac{4q^2}{t}$ $q=\frac{\sqrt{pt}}{2}$ H) $a=\frac{b-c}{c-d}$ $c=\frac{ad+b}{1+a}$

So you think you've got this sussed !!!

If $a=-5$, $b=\frac{1}{4}$, $c=-\frac{7}{8}$, find the values of:

A) $3-ab=\frac{17}{4}=4\frac{1}{4}$ B) $1-c^2=\frac{15}{64}$ C) $a^2-\frac{b}{c}=25\frac{2}{7}$ D) $\frac{c}{b}-4c=0$ E) $a(b-2c)=-10$

Rearrange these formulas to make a the subject:

A) $s=\frac{1}{2}n(a+d)$ B) $v^2=u^2+2as$ C) $p=q\sqrt{a^2-x^2}$ D) $r=\sqrt{\frac{a}{\pi}}$ E) $b=(\frac{a}{2}+3)^2$

$a=\frac{2s}{n}-d$ $a=\frac{v^2-u^2}{2s}$ $a=\sqrt{\left(\frac{p}{q}\right)^2+x^2}$ $a=\pi r^2$ $a=2(\sqrt{b}-3)$

3.6 Equations:- Linear, quadratic and simultaneous [try at least 3 from each line]

Solve these equations to find x, factorising first if necessary:

a) $5x+4=39$ **7** b) $4-3x=-5$ **3** c) $4x+1=9x-6$ $\frac{7}{5}$ d) $6(x+2)=4x-5$ **-8.5** e) $7(x-3)=2(x+5)$ **6.2**

f) $\frac{4}{3x}=2$ $\frac{2}{3}$ g) $\frac{7}{2x}=5$ **0.7** h) $\frac{6}{2x+3}=5$ **-0.9** i) $\frac{2x+7}{3x+5}=1$ **2** j) $\frac{6x+11}{3x}=4$ $\frac{-11}{3}=-3\frac{2}{3}$

k) $x^2+3x+2=0$ $x=-1,-2$ l) $x^2+4x+4=0$ $x=-2$ m) $x^2+5x-14=0$ $x=2,-7$

n) $x^2-4x+3=0$ $x=1,3$ o) $x^2-x=12$ $x=4,-3$ p) $2x^2+3x+1=0$ $x=-1,-\frac{1}{2}$

Solve these equations to find x, using the quadratic formula:

a) $x^2-6x+8=0$ $x=2,4$ b) $x^2-4x-7=0$ $x=2\pm\sqrt{11}$ c) $2x^2+7x+3=0$ $x=-3,-\frac{1}{2}$

d) $2x^2+x-1=0$ $x=-1,\frac{1}{2}$ e) $4x^2+4x+1=0$ $x=-\frac{1}{2}$ f) $3x^2+19x+20=0$ $x=-5,-1\frac{1}{3}$

Find x and y:

a) $x+y=4$, $x+2y=9$ $\boxed{x=-1,\ y=5}$ b) $3x+2y=-5$, $3x-4y=1$ $\boxed{x=-1,\ y=-1}$ c) $3x-y=-10$, $4x-y=-4$ $\boxed{x=6,\ y=28}$ d) $7x-3y=20$, $2x+4y=-4$ $\boxed{x=2,\ y=-2}$ e) $6x-7y=25$, $7x+6y=15$ $\boxed{x=3,\ y=-1}$

f) $2x+3y=12$, $5x+4y=23$ $\boxed{x=3,\ y=2}$ g) $6x+5y=9$, $4x+3y=6$ $\boxed{x=1.5,\ y=0}$ h) $3x-2y=-7$, $4x+3y=19$ $\boxed{x=1,\ y=5}$ i) $x-y=2$, $2y=x+1$ $\boxed{x=5,\ y=3}$ j) $2x+y=8$, $y=6-x$ $\boxed{x=2,\ y=4}$

So you think you've got this sussed!!!

Find the value(s) of x

a) $5x+8=7x+2$ **$x=3$** b) $3(x-1)=4(x-7)-3$ **$x=28$** c) $\frac{1}{x}+\frac{2x}{x+1}=2$ **$x=1$** d) $\frac{1}{x}+\frac{3x}{x-1}=3$ **$x=\frac{1}{4}$**

e) $x^2-2x-8=0$ **$x=-2,4$** f) $2x^2+x=6$ **$x=-2,1.5$** g) $5x^2-7x+2=0$ **$x=1,0.4$**

h) $2x^2+5x+2=0$ **$x=-2,-\frac{1}{2}$** i) $9x^2-12x+4=0$ **$x=\frac{2}{3}$** j) $5x^2+9x+4=0$ **$x=-1,-0.8$**

Find the value of integers b and c where:

a) the sum is 27 & the difference is 15 **$b=21,c=6$** b) the sum is 38 & the difference is 12 **$b=25,c=13$**

c) the product is 24 & the sum is 11 **$b=8,c=3$** d) the quotient is 3 & the difference is 8 **$b=12,c=4$**

Find 2 nos. such that twice the 1st added to the 2nd is 26 and the 1st added to three times the 2nd is 28. **$b=10,c=6$**

3.7 Inequalities: - work out the values of x. Can you draw the solutions on a number line?

a) $2x+3<4$ **$x<0.5$** b) $7x+3\geq 4x-9$ **$x\geq -4$** c) $2x-1>7-2x$ **$x>2$** d) $3x+1\leq 5x-7$ **$x\geq 4$** e) $3(x+2)\leq 2(2x-3)$ **$x\geq 12$**

3.8 Equations of straight Lines: -

Write down the gradient and y-intercept of the following lines:

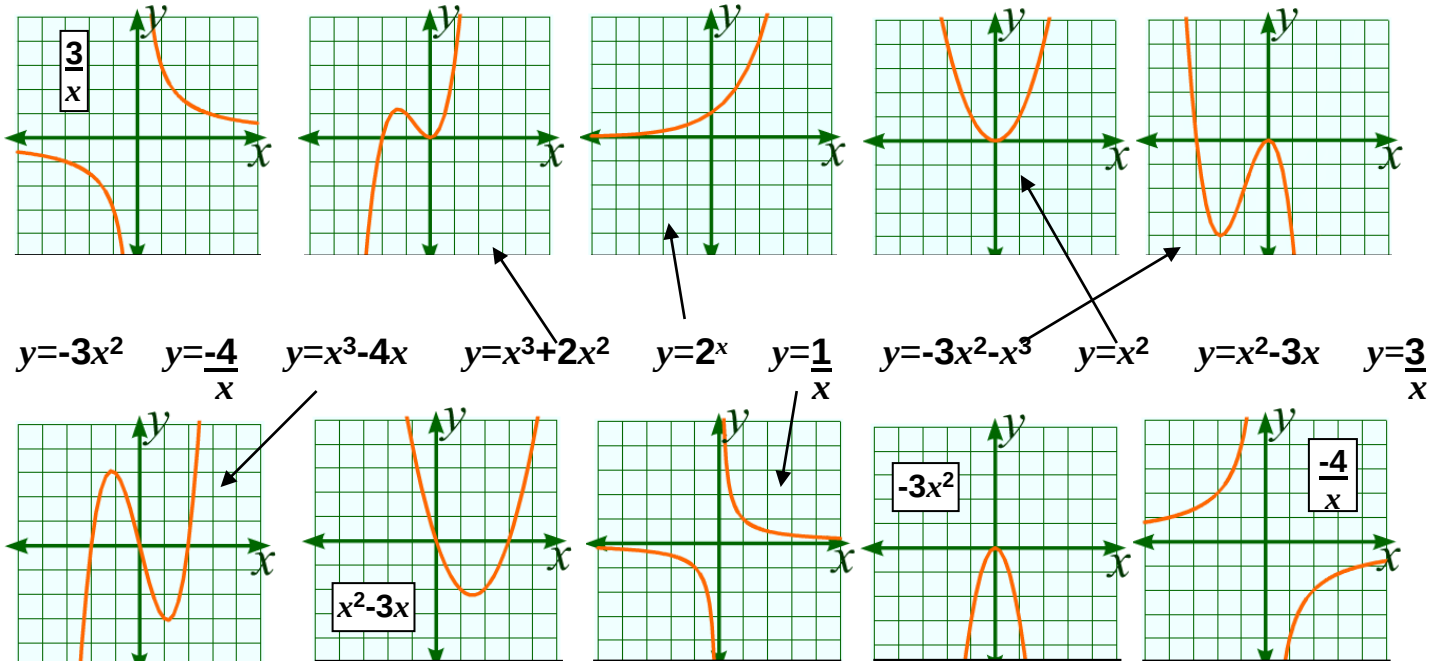
a) $y=4x+7$ **m=4, c=7** b) $y=-2x+4$ **m=-2, c=4** c) $y=9$ **m=0, c=9** d) $2y+3x=8$ **m=-1.5, c=4** e) $2y=4x+7$ **m=2, c=3.5** f) $4x=3y$ **m=1⅓, c=0**

Find the gradient and equation of the line joining each pair of points:

a) (3,2) & (7,10) **m=2** **$y=2x-4$** b) (6,2) & (8,9) **m=3.5** **$2y=7x-38$** c) (3,7) & (9,7) **m=0** **$y=7$** d) (-2,9) & (3,-1) **m=-2** **$y=-2x+5$**

3.9 Graphs: - match each of the lines on the graphs to one of the equations.

Can you label the line type? (quadratic, cubic, reciprocal, exponential)

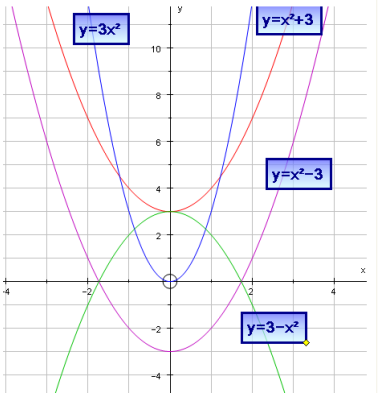


$y=-3x^2$ **$y=\frac{-4}{x}$** **$y=x^3-4x$** **$y=x^3+2x^2$** **$y=2^x$** **$y=\frac{1}{x}$** **$y=-3x^2-x^3$** **$y=x^2$** **$y=x^2-3x$** **$y=\frac{3}{x}$**

Complete the tables and plot the following on axes $x \rightarrow \pm 4$, $y \rightarrow \pm 12$

X	-2	-1	0	1	2
$y=x^2+3$	**7**	**4**	**3**	**4**	**7**

x	-2	-1	0	1	2
$y=3x^2$	**12**	**3**	**0**	**3**	**12**



x	-2	-1	0	1	2
$y=x^2-3$	**1**	**-2**	**-3**	**-2**	**1**

x	-2	-1	0	1	2
$y=3-x^2$	**-1**	**2**	**3**	**2**	**-1**

So you think you've got this sussed!!!

Work out the values of x and draw the solutions on a number line.

a) $2x+3<9$ **$x<3$** b) $3(x+10)\geq 15$ **$x\geq -5$** c) $5x+3>13-2x$ **$x> {}^{10}/_{7}$** d) $2x-7\leq 4x-9$ **$x\geq 1$** e) $3(x+5)\leq 2(4x-3)$ **$x\geq {}^{21}/_{5}$** **(4.2)**

Write down the gradient and y-intercept of the following lines:

a) $y=3x-1$ **m=3, c=-1** b) $y=-6x+3$ **m=-6, c=3** c) $x=9$ **m=∞, c=0** d) $5y-7=x$ **m=0.2, c=1.4** e) $2y-4x=7$ **m=2, c=3.5** f) $2x=5y$ **m=0.4, c=0**

Sketch graphs of the above, indicating where they cross the axes and the approximate slope

Find the gradient and equation of the line joining each pair of points:

a) (4,8) & (8,4) **m=-1** **$x+y=12$**

b) (0,0) & (5,-10) **m=-2** **$y=-2x$**

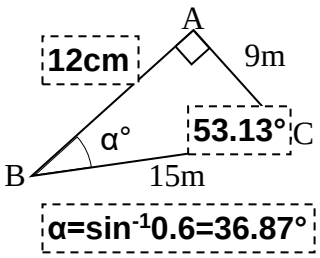
c) (10,-5) & (0,0) **m=$-\frac{1}{2}$** **$y=-0.5x$**

d) (-9,2) & (-1,3) **m=$-{}^{1}/_{8}$** **$8y=x+25$**

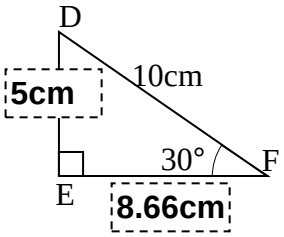
3.10 Pythagoras & Trigonometry

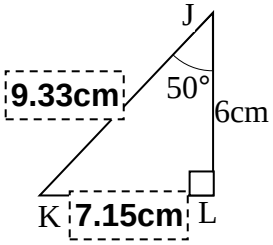
remember the formulae:

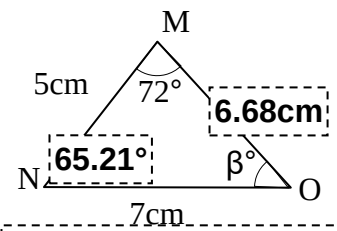
Find all the missing sides and angles in the following triangles:

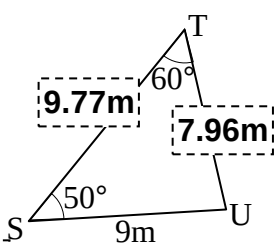


α=sin^{-1}0.6=36.87°

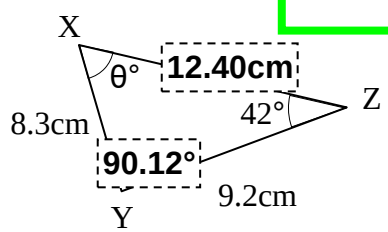




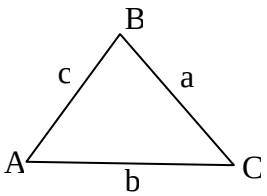




β=sin^{-1}($^{5}/_{7}$sin72).6=42.79°



θ=sin^{-1}(1.11sin42)=47.88°



Trigonometrical ratios:

$\sin\alpha=\frac{opp}{hyp}$ $\cos\alpha=\frac{adj}{hyp}$ $\tan\alpha=\frac{opp}{adj}$

Pythagoras ($\angle\Delta$) $a^2=b^2+c^2$

Cosine rule $a^2=b^2+c^2-2bc\cos A$

or $\cos A=\frac{b^2+c^2-a^2}{2bc}$

Sine rule $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$

In the triangle PQR, PQ=17cm, QR=15cm, PR=8cm. a) Show that the triangle is right angled. **$225+64=289=17^2$**
b) Write down the values of sinQ, cosQ and tanQ, leaving your answers as fractions.
c) Use your answers to part b) to show that $(\sin Q)^2+(\cos Q)^2=1$ and $\tan Q=\frac{\sin Q}{\cos Q}$ **$\sin Q=\frac{8}{17}$, $\cos Q=\frac{15}{17}$, $\tan Q=\frac{8}{15}$**

Find the sizes of all the angles in the following triangles:

a) 3,4,6 cm **117.28°,26.38°,35.33°**

b) 5,12,13 m **90°, 22.62°, 67.38°**

c) 1,1,√2 mm **90°, 45°, 45°**

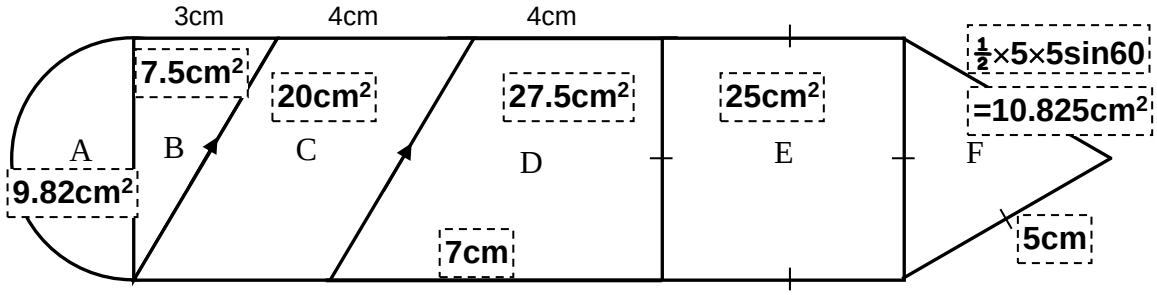
d)2.9, 7.2, 8.1 cm **97.37°,20.79°,61.83°**

Area & Circle Formulae you should know:

Scalene triangle $A=\frac{1}{2}ab\sin C$ Trapezium $A=\frac{1}{2}b(a+b)h$ Parallelogram $A=bh$ Circle $A=\pi r^2$

Sector of a circle $A=\frac{\pi r^2\theta}{360}$ Arc of a circle $l=\frac{2\pi r\theta}{360}$ Circumference of a circle $C=2\pi r$

Find the area of each section in this shape. You will need to work out the missing lengths.



Work out the angle, arc length and sector area of one fifth of a 40cm diameter pizza.
angle: $^{360}/_5=72°$, arc length $=\frac{1}{5}\times\pi\times40=8\pi=$**25.133cm, area** $=\frac{1}{5}\times\pi\times400=80\pi=$**251.33cm²**

A pie chart radius 5cm is split into 5 sectors in the ratio 1:2:3:4:5. Work out angle, arc length & area of each sector.

total=15
$^{360}/_{15}=24°$

angles= 24°: 48°: 72°: 96°: 120°

arc lengths= $^2/_3\pi$: $^4/_3\pi$: 2π : $^8/_3\pi$: $^{10}/_3\pi$
areas= $^5/_3\pi$: $^{10}/_3\pi$: 5π : $^{20}/_3\pi$: $^{25}/_3\pi$

3.11 Sequences and series

Write down the first 5 terms for the sequences given by each of the following general terms:

a) 3n+7 **10,13,16,18,22**

b) 16-2n **14,12,10,8,6**

c) $3n^2-2$ **1,10,16,46,73**

d) $(n+1)^2$ **4,9,16,25,36**

e) $2n^3-3$ **-1,13,51,125,247**

f) 2^n **2,4,8,16,32**

g) $\frac{(n-2)}{n}$ **-1,0,⅓,½, ⅗**

What is the n^{th} term for the following sequences?

a) 13, 11, 9, 7, 5 **15-2n**

b) -5, -2, 1, 4, 7 **3n-8**

c) 3, 6, 10, 15, 21 **$\frac{1}{2}(n+1)(n+2)$**

d) 6, 13, 32, 69, 130 **n^3+5**

e) 3, 12, 27, 48, 75 **$3n^2$**

f) 4, 18, 56, 130, 252 **$2n^3+2$**

g) 1, 2, 4, 8, 16 **2^{n-1}**

h) 2, 1, ½, ¼, ⅛ **$2^{2-n}=4\times2^{-n}$**

4. You think you don't need to revise any of this – are you sure?

Expand (multiply out) & simplify the following

a) $(x+2)(x+3)+x(x-1)=$ **$2x^2+4x+6$** b) $(t-4)(t+4)+t(t-4)=$ **$2t^2-4t-16$** c) $(s-5)(s-2)-s(s-6)=$ **$10-s$**

d) $(t+4)^2-t(3t-7)=$ **$-2t^2+15t+16$** e) $(2t+3)^2-(2t-3)^2=$ **$24t$** f) $(2x-2)^2-2(x^2+2)=$ **$2x^2-8x$**

Evaluate *(leaving your answer as accurately as possible)*:

a) $81^{\frac{3}{4}}=$ **27** b) $8^{\frac{2}{3}}=$ **4** c) $32^{0.4}\div 4^0=$ **4** d) $\sqrt{63}\times\sqrt{7}=$ **21** e) $\frac{\sqrt{240}}{\sqrt{15}}=$ **4** f) $\frac{\sqrt{96}}{\sqrt{12}}=$ **$2\sqrt{2}$**

Find x in the following equations:

a) $b^x=b^{\frac{1}{4}}\times b^{\frac{3}{4}}$ **1** b) $3^x=\frac{(3^4)^2\times 3^5}{3^{11}}$ **2** c) $d^x=\frac{(d^2)^4}{d\times d^5}$ **2** d) $10^x=100^{\frac{2}{3}}\times 10^{\frac{2}{3}}$ **2**

Factorise *(put into brackets)*:

a) $6x^2y-9y^2-3xy=$ **$3y(2x^2-3y-x)$** b) $9a^2b^2-16c^2=$ **$(3ab-4c)(3ab+4c)$** c) $2xy^2-8x^3=$ **$2x(y-2x)(y+2x)$**

d) $4x^2-23x+15=$ **$(4x-3)(x-5)$** e) $5x^2+13x+6=$ **$(5x+3)(x+2)$** f) $12x^2-13x+3=$ **$(4x-3)(3x-1)$**

Simplify each expression as fully as possible:

a) $\frac{x^2+6x+8}{x^2+4x}=$ **$\frac{x+2}{x}$** b) $\frac{4x+8}{4x^2-8x}\div\frac{x^2-4}{x^2+2x}=$ **$\frac{x+2}{(x-2)^2}$** c) $\frac{1}{x+1}-\frac{x-2}{x^2+3x+2}=$ **$\frac{4}{x+1}$** d) $\frac{x^2-5x+4}{x^2-16}+\frac{x^2+11x+18}{x^2+6x+8}=$ **2**

Rearrange these formulas so that the new letter is the subject:

A) $s=ut+\frac{1}{2}at^2$ $a=$ **$\frac{2(s-ut)}{t^2}$** B) $r=\frac{a^2}{b-c}$ $a=$ **$\sqrt{r(b-c)}$** C) $d=\sqrt{\frac{c+b}{c}}$ $c=$ **$\frac{b}{d^2-1}$** D) $y=\frac{1+x^2}{2-x^2}$ $x=$ **$\sqrt{\frac{1-2y}{1-y}}$**

Solve these equations to find x, factorising first or using the quadratic formula if necessary:

a) $5x+8=7x+2$ **3** b) $4(x-2)=2(x+2)-3$ **4.5** c) $\frac{2x+1}{3}=\frac{3+x}{4}$ **1** d) $\frac{x+2}{2}+\frac{2x}{x-2}=7$ **4,6**

e) $x^2+7x+10=0$ **-2,-5** f) $2x^2-7x=15$ **5,-1.5** g) $3x^2+19x+20=0$ **$-5,-\frac{5}{3}$**

h) $3x^2-5x-6=0$ **$\frac{5\pm\sqrt{97}}{6}$** i) $4x-x^2=4$ **2** j) $2x^2+3x-3=0$ **$\frac{-3\pm\sqrt{33}}{4}$**

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Find x and y:

a) $x+y=6$, $x-y=1$ **$x=3.5$, $y=2.5$** b) $3x+2y=-4$, $3x-4y=8$ **$x=0$, $y=-2$** c) $3x-5y=13$, $2x+5y=-8$ **$x=1$, $y=-2$** d) $2x+3y=0$, $3x+2y=5$ **$x=3$, $y=-2$** e) $10x+3y=12$, $3x+5y=20$ **$x=0$, $y=4$**

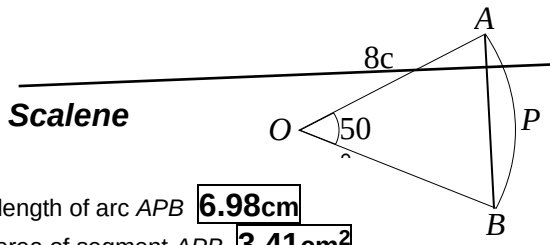
Find the value of numbers b and c where:

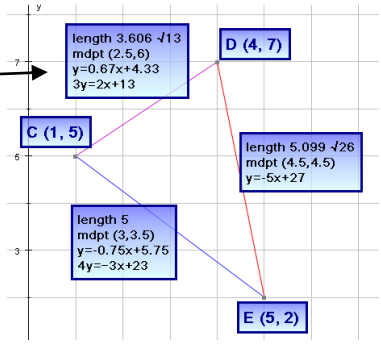
a) b=9+c & b=11-c **$b=10, c=1$** b) b+4=c & c=10-2b **$b=2, c=6$** c) b+c=12 & b=3+c **$b=7.5, c=4.5$** d) b=4-c & b=6+c **$b=5, c=-1$**

e) the sum is 32 & the difference is 6 **$b=19, c=13$** f) the sum is 10 & the difference is 11 **$b=10.5, c=-0.5$**

g) the product is 30 & the sum is 11 **$b=5, c=6$** h) the quotient is 5 & the difference is 10 **$b=10, c=6$**

A triangle has vertices C (1,5) D (4,7) E (5,2).
Find the equation, length and midpoint of each line (CD, DE & CE). What type of triangle is it? ***Scalene***





For the sector of a circle $OAPB$, calculate

a) length of chord AB **6.76cm** b) length of arc APB **6.98cm**

c) area of sector $OAPB$ **27.93cm^2** d) area of segment APB **3.41cm^2**

e) length of the bisecting line OP **8cm**

Write down the first 5 terms for the sequences given by each of the following general terms:

10,19,34,55,82

a) $3n^2+7$

b) $(n-2)^2$

-1,0,1,4,9

1,3,6,10,15

c) $\frac{1}{2}n(n+1)$

0,⅓,½, 3/5, ⅔

d) $\frac{n-1}{n+1}$

e) $(\frac{1}{2})^n$

f) 2^{-n}

½, ¼, ⅛, 1/16, 1/32

5/4, 7/7, 9/10, 11/13, 13/16

g) $\frac{2n+3}{}$

1.25,1,0.9,0.85,0.81