## THE DUST ${ }^{19}$ Stiod Knowledge Organiser Maths Year 11 Term 3 High

| Name: | Class: |
| :--- | :--- |
| Homework | Due date |
|  |  |
|  |  |

## Year 11 High Term 2 Overview

## Number

| Laws of indices (fractional and <br> negative, overlap to algebra) | HCF and LCM, Product of primes | Estimates |
| :---: | :---: | :---: |
| Standard form | Surds | Bounds |

## Algebra

| Solving linear <br>  <br> Deriving <br> equations from <br> words | Solve linear <br> simultaneous <br> equations | Factorise and <br> solve <br> quadratics | Algebra shape <br> problems | nth term | Sketching <br> straight line <br> graphs | Sketching <br> quadratic and <br> cubic graphs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Rearrange <br> formulae | Solve nonlinear <br> simultaneous <br> equations | quadratics $\mathrm{a}>1$ | Factorise <br> solve <br> algebraic | Quadratic nth <br>  <br> Geometric | $\mathrm{y}=\mathrm{mx}+\mathrm{c}$ | Parallel and <br> perpendicular <br> equations |

## Shape and data

| Area problems |  | Compound <br> measures | Stem and leaf <br> \& Scatter <br> graphs | Cumulative <br> frequency and <br> box plots |  <br> Sampling |  <br> relative <br> frequency | Sample space <br> diagrams |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Volume of <br>  <br> problem <br> solving | Vectors | Velocity-time <br> graphs | Averages from <br>  <br> Frequency <br> polygons | Histograms | Time Series | Probability <br> trees | Set theory <br> (with Venn <br> diagrams) |

Ratio and proportion

| Simplify/scale up/divide <br> ratio | Recipes and best value | Exchange rates | Calculating with <br> fractions | Percentages of <br> amounts, increasing and |
| :---: | :---: | :---: | :---: | :---: |
| Tricky ratio problems | Tricky ratio problems | Direct \& inverse <br> proportion | Exponential \& other <br> non-linear graphs |  <br> Reverse percentages |

## Useful Websites—Resources, Past Papers, Video Tutorials and Solutions

- https://corbettmaths.com/contents/
- https://vle.mathswatch.co.uk/vle/

USERNAME: namesurname@dustonschool
PASSWORD: berrywood

- https://www.methodmaths.com/

CENTRE ID: duston
USERNAME: firstnamesurname PASSWORD: berrywood

Solve each quadratic inequality.

1) $-x^{2}-5 x+6>0$
2) $-x^{2}-12 x-11 \leq 0$
3) $x^{2}-1<0$
4) $x^{2}-2 x-3 \geq 0$
5) $x^{2}+4 x-5>0$
6) $x^{2}-5 x-6<0$
7) $-x^{2}+3 x+10 \leq 0$
8) $x^{2}+8 x-9 \geq 0$

On each grid, $y=f(x)$ is drawn.
Sketch the graph of the transformation indicated.


$y=-f(x)$
$y=f(x+3)$



$y=f(-x)$



$y=f(x-3)-4$
$y=f(x-3)+4$
$y=-f(x-5)$

|  | Completing the Square |  |
| :---: | :---: | :---: |
| Express the following expressions in the form $(x+a)^{2}+b$, where $a$ and $b$ are constants. <br> a) $x^{2}+4 x+9$ <br> b) $x^{2}+8 x-12$ | The point $(-2,-3)$ is the turning point of $y=x^{2}+a x+b$, where $a$ and $b$ are integers. Find the values of $a$ and $b$. | $3 x^{2}+12 x+7$ can be written in the form $a(x+b)^{2}+c$ where $a, b$ and $c$ are constants. <br> a) Find the values of $a, b$ and $c$. |
|  |  | b) Using your answer to part (a) solve$3 x^{2}+12 x+7=7$ |
| a) Write down the coordinates of the turning point of the graph $y=x^{2}-6 x+4$ | $x^{2}+10 x-8=(x+p)^{2}-q$ where $p$ and $q$ are constants. <br> a) Find the values of $p$ and $q$. <br> b) Hence Solve $x^{2}+10 x-8=0$ |  |
| b) Is this a maximum or a minimum? <br> Maximum $\square$ Minimum $\square$ Bronze | Silver |  |

## Equations of a Tangent to a Circle

1. Find the equation of the tangents to each of the circles shown below
a)


$$
\begin{gathered}
x^{2}+y^{2}=18 \\
\text { at }(-3,3)
\end{gathered}
$$

b)


$$
\begin{gathered}
x^{2}+y^{2}=13 \\
\text { at }(2,3)
\end{gathered}
$$



Centre $(2,1)$ at the point $(4,3)$
f)


Centre $(4,0)$ at the point $(8,1)$

Find the equation of the tangent passing through the following points on the circles below:
a) $x^{2}+y^{2}=17 \quad$ at the point $(4,-1)$
b) $x^{2}+y^{2}=164$
at the point $(8,10)$
c) $x^{2}+y^{2}=80$ at the point $(-4,-8)$

## Advanced simultaneous equations

Question 2: Solve the following simultaneous equations

## 圈

(a) $x+y=4$ $y=x^{2}+3 x-1$
(b) $x+y=7$
$x y=10$
(c) $x^{2}+y^{2}=13$
$x+y=5$
(d) $2 \mathrm{x}^{2}+\mathrm{y}^{2}=10$
(e) $\mathrm{y}=\mathrm{x}^{2}+\mathrm{x}-7$
$2 x-y=5$
$4 x+2 y+1=0$
(f) $\quad \begin{aligned} & y=x-2 \\ & 2 x^{2}-x y=11\end{aligned}$

|  | Algebraic Fractions |  |
| :---: | :---: | :---: |
| Simplify Fully $\frac{2 x+6}{x^{2}+5 x+6}$ | Simplify fully $\frac{x+2}{3}+\frac{x-3}{4}$ | Show that $\frac{4 x+12}{x^{2}-x-12} \div \frac{x+4}{x^{3}-16 x}$ <br> Simplifies to $a x$ where a is an integer. |
| Simplify Fully $\frac{x^{2}-4}{x^{2}+4 x-12}$ | Write $\frac{2}{x+5}+\frac{3}{x-2}$ <br> as a single fraction in its simplest form. |  |
| Bronze | Silver | Gold |

