WEST COVENTRY ACADEMY

SIXTH FORM

West Coventry

Academy

**Mathematics Department –
the department that counts!**

SUBJECT TRANSITION BOOK

Summer 2019

Mathematics

STUDENT NAME:

FORM:

This booklet has been prepared by maths staff for you to read and the work contained in it will ensure that you get off to the best possible start in this subject area. It is very important that you read this booklet carefully and have a thorough attempt to complete the work and submit it to your subject teacher in the very first lesson. This will be the first impression you create and is a real indicator of how seriously you are prepared to be in your studies.

A-Level Mathematics

The key staff:

Mrs Woodward – Curriculum Leader of Maths, staffjaw@westcoventryacademy.org

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Course Details

Course Title: A level Mathematics
Exam board: Edexcel
Exam Code: For AS Mathematics 8MA0   For A Level Mathematics 9MA0

Exam Board web site: qualifications.pearson.com

Assessment method:

The Mathematics AS level is assessed by two final exams in year 12.

The Mathematics A level is assessed by three final exams in year 13.

Minimum requirement:
Standard entry requirements of five A*-C grades (or equivalent 9-1 grades) including English language, along with Mathematics at Grade 7 or above.

About the course
This course will hopefully extend your mathematical thinking and enjoyment of the subject. The course builds strongly upon GCSE Maths, particularly the aspects of algebra, so you must be confident in these skills. You must also be prepared to think! You will have to solve problems by drawing on a number of mathematical topics and be prepared to persevere with some lengthy solutions.

AS Level Mathematics

Pure Mathematics – One 2-hour Exam paper. Topics included are: Algebra and functions, Coordinate geometry, Trigonometry, Vectors, Exponentials and logarithms, Differentiation and Integration.

Mechanics and Statistics- One 1¼ hour Exam paper. Topics included in the statistics module are: Statistical sampling, Data presentation and interpretation, Probability, Statistical distributions, Statistical hypothesis testing.
Topics included in the mechanics module are: Quantities and units in mechanics, Kinematics and Forces and Newton's laws.

A Level Mathematics

Pure Maths – Two 2-hour Exam papers. Topics included are:
Algebra and functions, Coordinate geometry, Trigonometry, 2D Vectors, Exponentials and logarithms, Differentiation and Integration. Proof, Algebraic & partial fractions, Functions and modelling, Series & sequences, Binomial theorem, Trigonometry, Parametric equations, Differentiation, Numerical methods, Integration and 3DVectors.

Mechanics and Statistics - One 2-hour Exam paper. Topics included in the statistics module are: Statistical sampling, Data presentation and interpretation, Probability, Statistical distributions, Statistical hypothesis testing, Regression and correlation, Normal distribution
Topics included in the mechanics module are: Quantities and units in mechanics, Kinematics, Forces & Newton's laws, Moments and Forces at any angle.

Academic and Career Pathways
Apart from further study of Mathematics itself, many university courses depend on the subject. For example, Science, Computing and Engineering based courses use a great deal of mathematics. Subjects such as Geography, Psychology, Economics and Business make use of Statistics. Mathematics is also a requirement for Finance and Accountancy training. It is reported that people with A Level Mathematics are earning an average of 10% more.

What equipment will be needed for the subject?

An A4 ring binder, with dividers

Lined paper

Pens, pencils, ruler

A scientific calculator, capable of dealing with data analysis of a large data set. We recommend the new Casio Classwiz fx-991EX.

PLEASE CONSULT WITH THE MATHS DEPARTMENT BEFORE BUYING ANY OTHER MODEL.

Text Books

Students are required to hand in a refundable deposit of £10 for each of the two text books needed for AS Maths and £10 deposit for the two AL books. The deposit will be returned to the students on return of the text books in a reusable condition.

Please complete the following assignment ready to hand in on the very first lesson in this subject:

1. Find the value of:

a) $4^{1/2}$

b) $27^{1/3}$

c) $\left(\frac{1}{9}\right)^{1/2}$

d) 5^{-2}

e) 18^0

f) 7^{-1}

g) $27^{2/3}$

h) $\left(\frac{2}{3}\right)^{-2}$

i) $8^{-2/3}$

j) $(0.04)^{1/2}$

k) $\left(\frac{8}{27}\right)^{2/3}$

l) $\left(\frac{1}{16}\right)^{-3/2}$

2. Simplify as far as possible:

(a) $m^{-3} \times m^8$

(b) $r^9 \div r^2$

(c) $(s^3)^4$

(d) $2g^4 \times 3g^3$

(e) $2xy^3 \times x^6 \times 7y$

3. Multiply out the brackets:

(a) $-2p(5p - 3q)$

(b) $5x(x^2 + 3x - 2)$

4. Fully factorise:

(a) $6x^4 - 18x^3$

(b) $10u^2v^2 - 5uv^2 + 30u^2v^2$

5. Plot the quadratic curve $y = \frac{1}{2}x^2 - 4x + 6$ **for** $x = 0$ to 6 (graph paper enclosed at end) **and use it to identify the solutions of** $\frac{1}{2}x^2 - 4x + 6 = 0$

6. Expand the brackets and simplify:

(a) $(x + 5)(x - 7)$

(b) $(3x - 5)(4x - 1)$
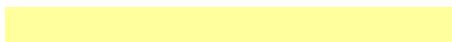
7. Factorise completely:

(a) $x^2 + 10x + 9$

(b) $x^2 - 7x - 30$

(c) $2x^2 + 7x + 5$

(d) $20x^2 - 117x - 50$

(e) $9x^2 - 1$

(f) $20x - 12x^2$

8. Solve by factorising:

(a) $x^2 - x - 20 = 0$

(b) $16x^2 - 9 = 0$

(c) $4x^2 - 24x + 36 = 0$

9. Solve these quadratic equations using the formula:

(a) $x^2 + 8x + 7 = 0$

(b) $3x^2 - 4x + 2 = 0$

(c) $20x^2 - 9x + 1 = 0$

10. Solve by completing the square, leaving your answer in surd form

a) $x^2 + 6x + 9 = 0$

b) $x^2 - 3x + 18 = 0$

c) $6 + 3x = 8x^2$

d) $3x^2 - x - 7 = 0$

11. Solve these simultaneous equations using the elimination method:

(a) $4x = 10 - y$ (b) $3x - 5y = 4$
     $8x - 3y = 0$ $3y - 4x = 2$

12. Solve these simultaneous equations using the substitution method:

(a) $4x = 10 - y$ (b) $x = 5 + y$
    $8x - 3y = 0$ $y = 6 - x$

(c) $y = 2x+5$
    (d) $x^2 + y^2 = 25$
    $x + y = 2$
         $x^2 + 4x + 4 = y$

13. Represent these inequalities on a number line:

(a) $x < 4$ (b) $2 \le x < 7$

14. State the inequalities represented by these number lines:

(a) 0 1 2 3 4 5 6 7 8 9   (b) 0 1 2 3 4 5 6 7 8 9
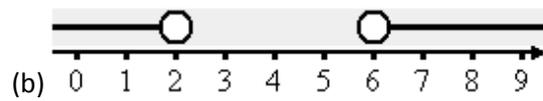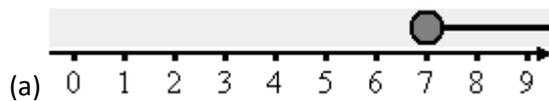
15. Solve these inequalities and represent the solution on a number line:

(a) $4(x - 3) \le 2(x + 2)$ (c) $2 < 3x - 7 \le 8$
(b) $x^2 \ge 9$ (d) $x^2 + x < 12$

16. State the values for which both the inequalities in the question are true:

(a) $x < 7$ (b) $x \le 5$
    $x > 3$ $x < 3$ or $x > 6$

17.   (a)   Show that the equation

$$\frac{5}{x+2} = \frac{4-3x}{x-1}$$

rearranges to give $3x^2 + 7x - 13 = 0$

(b)   Solve $3x^2 + 7x - 13 = 0$
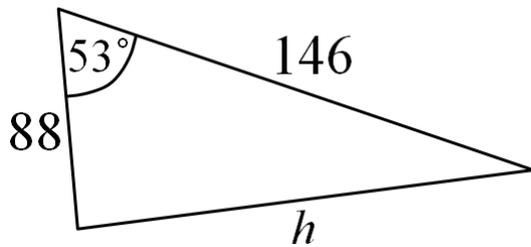Give your solutions correct to 2 decimal places.

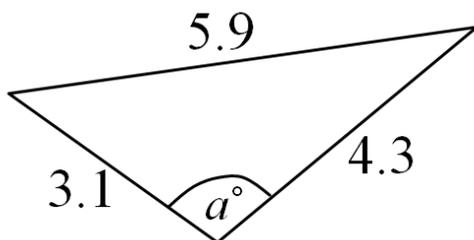**18. (a)** Find the missing side in the diagram below:

95°

p

32°

21

(b) Find the missing angle in the diagram below:

5.1

b°

3.6

100°
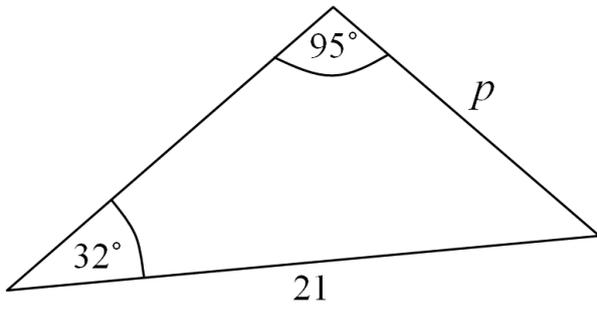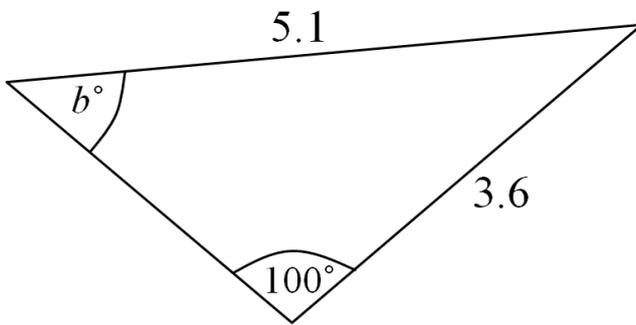
(c) Find the missing side in the diagram below:

53°

146

88

h

(d) Find the missing angle in the diagram below:

5.9

4.3

3.1

a°

19. Solve the following surd questions:

a) Write √63 in the form $k\sqrt{7}$ where k is an integer.

b) Write √45 in the form $k\sqrt{5}$ where k is an integer.
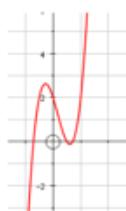
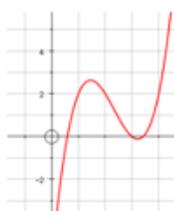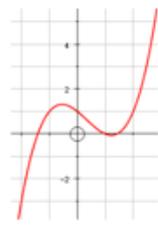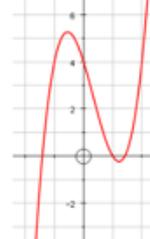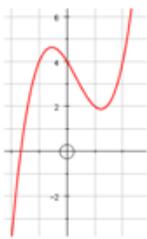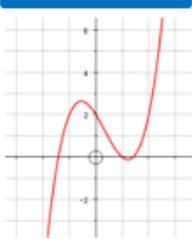c) Rationalise the denominator: $\dfrac{6}{\sqrt{3}}$

d) Rationalise the denominator: $\dfrac{3}{\sqrt{5}}$

e) Simplify: $\dfrac{3}{\sqrt{5}+1}$

20.

Transformations of Graphs
Using your knowledge of transformations of graphs match up the transformations of the function with the graph. The first one is done for you.

Y = f(x)
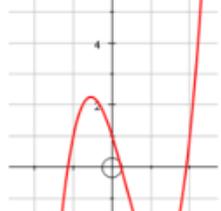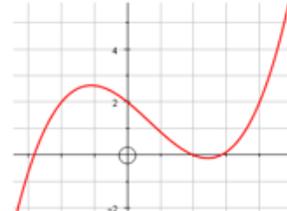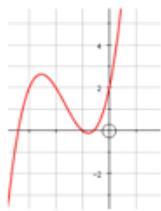
| Y = f(x) + 2 | Y = 2f(x) | Y = f(x+2) | Y = f(2x) |

| Y = f(x) - 2 | Y = ½ f(x) | Y = f(x-2) | Y = f(½ x) |

Y = 2f(x) – 3

This doubles in size and then moves down 3

Extension: The original graph has a peak at (-0.5, 2.5) Write the new location of this peak after the transformations for each graph. How has the peak moved and why has this happened?

21. $f(x) = 2x^2$ and $g(x) = 4 - 2x$

(a)   Find formulae for $f(g(x))$ and $g(f(x))$.

(b)   Hence calculate: (i) $g(f(0))$ (ii) $f(g(3))$ (iii) $g(g(-2))$.

22.

Find formulae for the inverses of these functions:

(a) $f(x) = \dfrac{1}{2}x - 2$

(b) $g(x) = \dfrac{2}{x-1}, x \neq 1.$

23)   (a) Find 3 consecutive even numbers so that their sum is 108.

(b) The perimeter of a rectangle is 79 cm. One side is three times the length of the other. Form an equation and hence find the length of each side.

(c) Two girls have 72 photographs of celebrities between them. One gives 11 to the other and finds that she now has half the number her friend has.

Form an equation, letting n be the number of photographs one girl had at the **beginning**.

Hence find how many each has **now**.

24)   On the same graph sketch the inequalities $y > x$, $x > 1$ and $x + y < 7$ and shade the region satisfied by all three inequalities.

25)   Draw the following lines on the same axes, $y = 2x - 1$ $3x + 2y = 6$ and $y = -1$
        Write down the points of intersection
26)   Sketch the curve $y = 2x^2 - x - 3$
27)   Sketch the curve $y = 2x^2 - x - 3$
28)   Sketch the curve $y = x^3 + 2x - 1$
29)   Sketch the curve $x^2 + y^2 = 9$
30)   On the same axes sketch $y = x - 1$ and $y = 2^x$

31)   a) Find the gradient of line ST where, S (1,3) and T(4, -2)
        b) Find the equation of a line through points S and T

32)   What is the product of the gradient of 2 lines which are perpendicular to each other?