Name	Class

MATHS TEACHER HUB

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Completing the square

(9 – 1) Topic booklet

HIGHER

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

•Use **black** ink or ball-point pen.
•**Fill in the boxes** at the top of this page with your name, centre number and candidate number.
•Answer **all** questions.
•Answer the questions in the spaces provided
– *there may be more space than you need*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1F** question you are not allowed to use a calculator.
•If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information

•The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question*.

Advice

•Read each question carefully before you start to answer it.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

11 Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$
where m and n are integers.

.....

Specimen 1 – Paper 3H **(Total for Question 11 is 2 marks)**

13 Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

.....

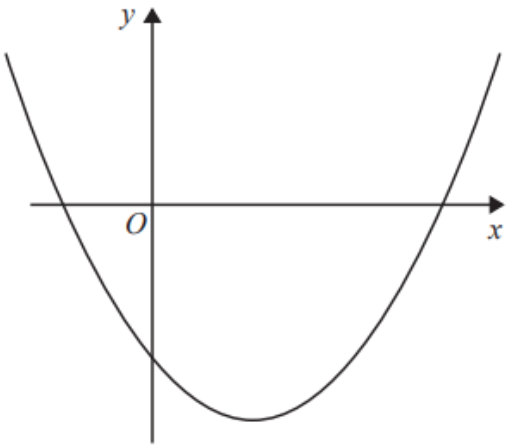
November 2017 – Paper 3H **(Total for Question 13 is 2 marks)**

17 Write down the coordinates of the turning point on the graph of $y = (x + 12)^2 - 7$

(..... , ...)

November 2020 – Paper 2H **(Total for Question 17 is 1 mark)**

17 Here is a sketch of a curve.



The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

The points $(0, -5)$ and $(5, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

(..... , ...)

(Total for Question 17 is 4 marks)

19 Given that $x^2 - 6x + 1 = (x - a)^2 - b$ for all values of x,

(i) find the value of a and the value of b.

$a =$ .....

$b =$ .....

(2)

(ii) Hence write down the coordinates of the turning point on the graph of $y = x^2 - 6x + 1$

(..... , ...)

(1)

June 2019 – Paper 1H **(Total for Question 19 is 3 marks)**

21 The equation of a curve is $y = 4x^2 - 56x$
The curve has one turning point.

By completing the square, show that the coordinates of the turning point are $(7, -196)$
You must show all your working.

(Total for Question 21 is 3 marks)

22 Find the coordinates of the turning point on the curve with equation $y = 9 + 18x - 3x^2$
You must show all your working.

(..... , ...)

(Total for Question 22 is 4 marks)

23 (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.

(3)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

(1)

(Total for Question 23 is 4 marks)