



HAMPSTEAD SCHOOL

Learning together Achieving together

Y12 – Y13

Summer Bridging Tasks

2023

A Level Maths

Name: _____

- You should spend some time during the summer holidays working on the activities in this booklet.
- You will be required to hand in this booklet in your first lesson at the start of Year 12 and the content will be used to form the basis of your first assessments.
- You should try your best and show commitment to your studies.

Maths - Year 12 into 13 Summer Bridging Work

Task 1:

Re-do the three topic assessments which you struggled with the most, on A4 square paper.

Mark all three topic assessments with a green pen.

Please make sure you title and date each sheet of paper, and make sure your work is presented neatly.

Tasks 2 to 5:

Complete the questions on A4 square paper.

Please make sure you title and date each sheet of paper, and make sure your work is presented neatly.

You must bring these in along with your other Summer tasks in our first lesson back in September. After we have seen and marked your work, they will go into your independent learning folders.

Best of luck and enjoy your Summer break :)

1

Complete the table

Question	$f(x) = \frac{1}{2}(1 - \frac{1}{\sqrt{x}})$	$f(x) = (\frac{1}{x} + 1)^2$	$f(x) = (\frac{1}{x} + x)^2$	$f(x) = \frac{1}{x}(x - \frac{1}{x})$	$f(x) = \frac{1}{\sqrt{x}}(x - \frac{1}{\sqrt{x}})$	$f(x) = (\frac{1}{\sqrt{x}} + \sqrt{x})^2$
Brackets Expanded	$f(x) = \frac{1}{2} - \frac{1}{2\sqrt{x}}$					
Prepared For Differentiation	$f(x) = \frac{1}{2} - \frac{1}{2}x^{-\frac{1}{2}}$					
Differentiated	$f'(x) = \frac{1}{4}x^{-\frac{3}{2}}$					
Tidied Up	$f'(x) = \frac{1}{4x^{\frac{3}{2}}}$ $f'(x) = \frac{1}{4\sqrt{x^3}}$					

2

Complete the table

Question	$f(x) = \frac{x^2 - 2x + 1}{\sqrt{x}}$	$f(x) = \frac{x^2 + 2x + 1}{x}$	$f(x) = \frac{3x^2 + 4x + 1}{4x^2}$	$f(x) = \frac{x + 1}{\sqrt{x}}$	$f(x) = \frac{(1 + 2x)^2}{\sqrt{x}}$	$f(x) = \frac{x^2 - 4x}{x\sqrt{x}}$
Fraction Broken Up	$f(x) = \frac{x^2}{\sqrt{x}} - \frac{2x}{\sqrt{x}} + \frac{1}{\sqrt{x}}$					
Prepared For Differentiation	$f(x) = \frac{x^2}{x^{\frac{1}{2}}} - \frac{2x}{x^{\frac{1}{2}}} + \frac{1}{x^{\frac{1}{2}}}$ $f(x) = x^{\frac{3}{2}} - 2x^{\frac{1}{2}} + x^{\frac{-1}{2}}$					
Differentiated	$f'(x) = \frac{3}{2}x^{\frac{1}{2}} - x^{\frac{-1}{2}} - \frac{1}{2}x^{\frac{-3}{2}}$					
Tidied Up	$f'(x) = \frac{3}{2}\sqrt{x} - \frac{1}{x^{\frac{1}{2}}} - \frac{1}{2x^{\frac{3}{2}}}$ $f'(x) = \frac{3}{2}\sqrt{x} - \frac{1}{\sqrt{x}} - \frac{1}{2\sqrt{x^3}}$					

① $\int x dx$

② $\int 3 dx$

③ $\int 3x dx$

④ $\int dx$

⑤ $\int \frac{x^4}{4} dx$

⑥ $\int \frac{2x^3}{7} dx$

⑦ $\int \frac{1}{x^2} dx$

⑧ $\int \frac{3}{x^2} dx$

⑨ $\int \frac{1}{3x^2} dx$

⑩ $\int \frac{dx}{2x^5}$

⑪ $\int \frac{4}{3x^5} dx$

⑫ $\int \sqrt{x} dx$

⑬ $\int 3\sqrt{x} dx$

⑭ $\int \sqrt[3]{x} dx$

⑮ $\int 4\sqrt[5]{x^2} dx$

⑯ $\int \frac{\sqrt[6]{x}}{2} dx$

⑰ $\int \frac{2}{\sqrt[3]{x}} dx$

⑱ $\int \frac{dx}{2\sqrt[4]{x^3}}$

⑲ $\int (5 - 3x)^2 dx$

⑳ $\int (1 + \frac{1}{x^2})^2 dx$

㉑ $\int 3\sqrt{x}(1 - \sqrt{x}) dx$

㉒ $\int \frac{4 + x^4}{x^3} dx$

㉓ $\int \frac{4 + x^3}{x^5} dx$

㉔ $\int \frac{x + 5x^7}{x^3} dx$

㉕ $\int \frac{2 + \sqrt{x}}{\sqrt{x}} dx$

㉖ $\int \frac{6x^2 + x - 7}{\sqrt{x}} dx$

㉗ $\int \frac{6x^2 + x - 7}{x\sqrt{x}} dx$

㉘ This exercise did not include: $\int \frac{1}{x} dx$ Investigate this integral.

Do not Google the answer! Desmos, however, might be useful in your investigating.

㉙ Create another 3 integration problems of your own. One which is similar to the questions you found easy, one which is similar to the problems you found to be of medium difficulty and one which is similar to the ones you found hard!

Now create a visual guide on how to calculate each of the three types of integral.

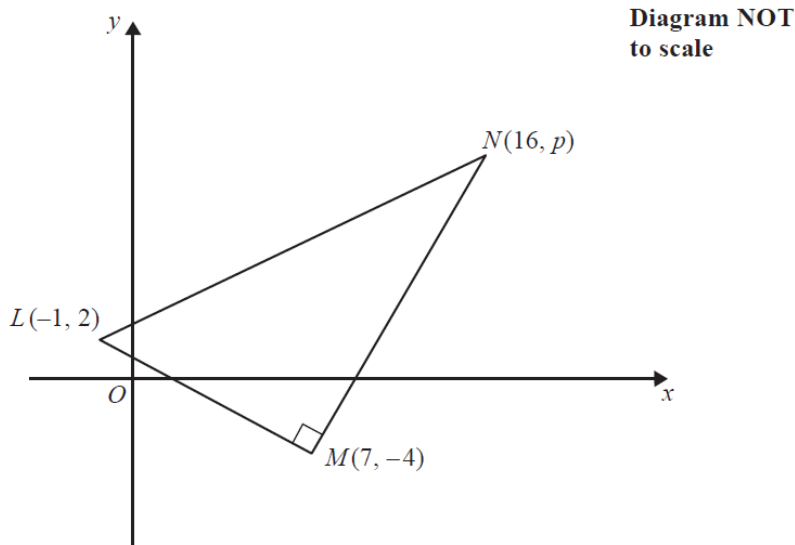
Year 13 – AS Revision Sheet 1

Section A

- 1) Find the value of $125^{\frac{-2}{3}}$ 2
- 2) Simplify $x^7(16x^{20})^{\frac{1}{4}}$ 2
- 3) Given that $(2 + \sqrt{5})(a + b\sqrt{5}) = (4 + 3\sqrt{5})$ calculate the values of a and b . 4
- 4) Solve $3^{3x-4} = 9^x$ 3
- 5) Given that $x^2 - 10x - 3 \equiv (x + a)^2 + b$ find the values of a and b .
Hence, or otherwise, solve $x^2 - 10x - 3 = 0$ 4
- 6) a) On a coordinate grid (x and y axes running from -6 to 6), shade the region comprising all points whose coordinates satisfy the inequalities
 $y \leq 2x + 5$, $2y + x \leq 6$ and $y \geq 2$ 3
b) Work out the area of the shaded region. 5
- 7) Write $\frac{4\sqrt{x}+5}{x}$ in the form $4x^m + 5x^n$ clearly stating the values of m and n . 2
- 8) The circle C has equation $x^2 + y^2 + 4x - 2y - 11 = 0$. Find
a) the coordinates of the centre of C , 2
b) the radius of C , 2
c) the coordinates of the points where C crosses the y -axis, giving your answers as simplified surds. 4

Year 13 – AS Revision Sheet 1

Section A



9) The diagram above shows a right angled triangle LMN .

The points L and M have coordinates $(-1, 2)$ and $(7, -4)$ respectively.

(a) Find an equation for the straight line passing through the points L and M .

Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. (4)

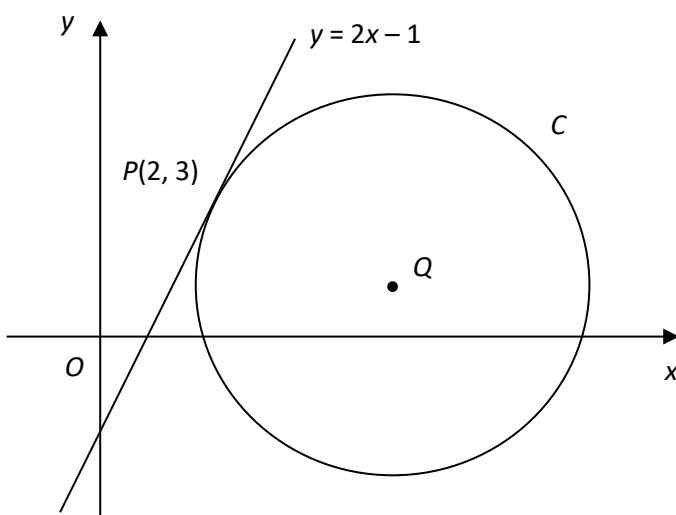
Given that the coordinates of point N are $(16, p)$, where p is a constant, and angle $LMN = 90^\circ$,

(b) find the value of p . (3)

Given that there is a point K such that the points L , M , N , and K form a rectangle,

(c) find the y coordinate of K . (2)

10) The line $y = 2x - 1$ is a tangent to the circle C , touching C at the point $P(2, 3)$ as shown. Point Q is the centre of the circle.



a) Find the equation of the line joining point P to the point Q .

(3)

b) If the x -coordinate of point Q is 6 find the equation of the circle C .

(5)

Year 13 – AS Revision Sheet 2

Section A

1) Find the set of values of x for which

(a) $3(x - 2) < 8 - 2x$, (2)

(b) $(2x - 7)(1 + x) < 0$, (3)

(c) both $3(x - 2) < 8 - 2x$ **and** $(2x - 7)(1 + x) < 0$. (1)

2) The point $P(1, a)$ lies on the curve with equation $y = (x + 1)^2(2 - x)$.

(a) Find the value of a . (1)

(b) Sketch the curves with the following equations:

(i) $y = (x + 1)^2(2 - x)$,

(ii) $y = \frac{2}{x}$.

On your diagram show clearly the coordinates of any points at which the curves meet the axes. (5)

(c) With reference to your diagram in part (b), state the number of real solutions to the equation

$$(x + 1)^2(2 - x) = \frac{2}{x}. \quad (1)$$

3) The curve C has equation $y = kx^3 - x^2 + x - 5$, where k is a constant.

(a) Find $\frac{dy}{dx}$. (2)

The point A with x -coordinate $-\frac{1}{2}$ lies on C . The tangent to C at A is parallel to the line with equation $2y - 7x + 1 = 0$.

Find

(b) the value of k , (4)

(c) the value of the y -coordinate of A . (2)

Year 13 – AS Revision Sheet 2

Section A

- 4) (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$(3 + bx)^5$$

where b is a non-zero constant. Give each term in its simplest form. **(4)**

Given that, in this expansion, the coefficient of x^2 is twice the coefficient of x ,

- (b) find the value of b . **(2)**

- 5) (a) Find the positive value of x such that

$$\log_x 64 = 2. \quad \mathbf{(2)}$$

- (b) Solve for x

$$\log_2 (11 - 6x) = 2 \log_2 (x - 1) + 3. \quad \mathbf{(6)}$$

- 6) (a) Find, to 3 significant figures, the value of x for which $5^x = 7$. **(2)**

- (b) Solve the equation $5^{2x} - 12(5^x) + 35 = 0$. **(4)**