



# The Thomas Hardye School

## Summer Preparation Task

### Further Maths A Level

#### Purpose of task:

To recap the GCSE skills necessary for A Level Further Maths and to make you think a little; for some students this may be new work and they should seek help as soon as term starts.

#### Task:

Complete all the questions on the sheet. Hand in the work in your first lesson of the week commencing September 12<sup>th</sup>.

#### Recommended resources:

Websites:

[drfrostmaths.com](http://drfrostmaths.com)

[examsolutions.net](http://examsolutions.net)

[corbettmaths.com](http://corbettmaths.com)

Textbooks: any higher GCSE Maths book

### Thomas Hardye School Maths Summer Task

- Due in at the end of your first maths lesson during the week commencing Monday September 15<sup>th</sup>.
- **Do without a calculator.**
- Do all workings on paper, put the answers in the boxes on the sheet, and staple it all together, do not just hand in the answers.
- Please put your name on it.
- Remember this work is the first impression that you are giving your new maths teacher.

1) Factorise, and solve the following:

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

**Answer:**

b)  $x^2 - 16 = 0$

**Answer:**

**Deadline for Task:** First lesson in week commencing 15<sup>th</sup> September 2025

c)  $3x^2 + 17x = 6$

**Answer:**

2) Solve:

a)  $15x - 4 = x + 80$

**Answer:**

b)  $\frac{2x}{3} + 1 = 3$

**Answer:**

c)  $\frac{9(2x + 20)}{5} = 18$

**Answer:**

d)  $\frac{4x - 2}{5} = \frac{5x + 5}{7}$

**Answer:**

3) Complete the square for:  $x^2 + 4x - 2$

**Answer:**

4) Simplify the following:  $\sqrt{40}$

**Answer:**

5) Expand, and simplify:  $(5 + \sqrt{3})(5 - \sqrt{3})$

**Answer:**

6) Rationalise:  $\frac{6}{5\sqrt{3}}$

**Answer:**

7) Given the 2 coordinates P(2, 1) and Q(7, -11) find the following

- a) the length of the line PQ
- b) the gradient of the line PQ
- c) the midpoint of the line PQ

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|---|
| <p><b><u>Answers:</u></b></p> <p>a)</p> <p>b)</p> <p>c)</p> |
|---|

8) Find the gradient and the y intercept for the following equations:

a)  $y = 3x - 7$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
|------------------------------|

b)  $3x + 2y - 5 = 0$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
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9) Evaluate:

a)  $27^{2/3}$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
|------------------------------|

b)  $5^{-2}$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
|------------------------------|

c)  $16^{-3/4}$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
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10) Simplify the following:

a)  $12g^3 \times 2g^5$

|                              |
|------------------------------|
| <p><b><u>Answer:</u></b></p> |
|------------------------------|

b)  $\frac{(2\sqrt{x})^4}{8x}$

**Answer:**

11. Solve:

$$2x + 5y = 24$$

$$4x + 3y = 20$$

**Answer:**

12. Make the variable in the square brackets the subject of each of the following:

a)  $v = u + at,$  [a]

b)  $Ax + B = Cx + D$  [x]

**Answers:**

a)

b)

13. Use the quadratic formula to find the **exact** solution to:  $x^2 + 4x + 2 = 0,$

**Answer:**

14. Solve the simultaneous equations:

$$x^2 + y^2 = 20$$

$$y = x - 2$$

**Answer:**

15. Solve:  $11a = 5 - 8d$

$$a + 6d = 11$$

**Answer:**

16. A number like 1367 is called an aspirational number because each digit in the number is larger than the preceding one.

- (i) How many aspirational numbers are there between 1000 and 2000?
- (ii) How many aspirational numbers are there between 1000 and 10000?

|   |
|---|
| <p><b>Answers:</b></p> <p>i)</p> <p>ii)</p> |
|---|

17. How many different solutions are there to the letter sum on the right? Different letters stand for different digits, and no number begins with a zero.

$$\begin{array}{r} F U G \\ + F U N \\ \hline B L U B \end{array}$$

|                       |
|-----------------------|
| <p><b>Answer:</b></p> |
|-----------------------|

18. In his large wallet, Tim has 20 coins, with a total value of £5. There are three different types of coins, 10p, 20p and 50p, in his wallet and he has more 50p coins than 10p coins. How many of each type of coin does he have?

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| <p><b>Answer:</b></p> |
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19. The eight-digit number “ $BBBBAAAA$ ”, where  $A$  and  $B$  are digits, is a multiple of 45. What are the possible values of  $B$ ?

|                       |
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| <p><b>Answer:</b></p> |
|-----------------------|

|    |    |   |    |    |    |    |    |    |
|----|----|---|----|----|----|----|----|----|
| 1  |    | 2 |    | 3  | 4  |    | 5  |    |
|    |    | 6 |    |    |    |    | 7  | 8  |
|    |    |   |    | 9  |    |    |    |    |
| 10 | 11 |   | 12 |    | 13 |    | 14 |    |
|    | 15 |   |    |    | 16 |    |    |    |
| 17 |    |   | 18 | 19 |    |    | 20 | 21 |
|    |    |   |    |    |    | 22 |    |    |
| 23 | 24 |   | 25 |    | 26 |    |    |    |
|    | 27 |   |    |    |    | 28 |    |    |

### Across

- The mean of 12 Across, 12 Down and 1 Across (3)
- The square of one less than 9 Down (4)
- A factor of 8 Down (2)
- The solution to  $\frac{x+1}{3} + \frac{x-9}{5} = 30$  (2)
- The remainder when 8 Down is divided by 91 (2)
- $12^2 + 4^2 + 2^2 + 1^2$  (3)
- The sum of 9 Down and 25 Down (2)
- Half of 13 Down (3)
- Twice 19 Down (3)
- An interior angle of an isosceles triangle with one angle equal to 26 Across (2)
- A multiple of 11 (3)
- A consecutive prime to 19 Down (2)
- The sum of all its factors is 28 (2)
- The sum of 4 Down and 9 Down (2)
- The value of  $(x + 1)(2x + 1)$  when  $x = 49$  (4)
- The area of a triangle with base 24 Down and height 25 Down (3)

### Down

- The product of 5 Down and 6 Across (4)
- The sum of the digits of this number and the other digits in this column comes to 24 Down (3)
- A perfect number (that is, a number which is the sum of all its factors not including itself) (2)
- A Fibonacci number (2)
- The largest three digit square number (3)
- A square number that is also a triangular number (2)
- A quarter of 13 Down (3)
- Two more than 12 Across (3)
- A cube number (3)
- Twenty less than double the sum of 11 Down and 15 Across (3)
- An odd multiple of 12 Down (3)
- A prime number (2)
- The number of minutes in 12 Across hours (4)
- A square whose digits sum to a square (3)
- The value of  $\frac{10 \times 8 \times 6 \times 4 \times 2}{2 \times 2 \times 2 \times 2 \times 2 \times 5}$  (2)
- The square root of 3 Across (2)

**Additional information:** Don't forget to staple your answers to your workings.

**Deadline for Task:** First lesson in week commencing 15<sup>th</sup> September 2025

### **Required Stationery and Equipment for Mathematics and Further Mathematics A Level**

Pens, HB pencils and a ruler.

A4 Lever Arch Ring binder folder with file dividers

Either A4 Square paper or exercise books (available from THS)

### **Essential Resources**

Scientific calculator, £20.00 from maths office. This model is necessary for the A Level course.

### **Things to Consider Throughout the Year**

Maths office provides the majority of resources at cost price.

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