**Transition to Sixth Form**

The following worksheets cover work that would usually be grade 9 – 7 at IGCSE. Students wishing to following Maths in the Sixth (A level or IB) should be able to access all the work in these worksheets

1. [Surds](#Surds)
2. [Indices](#Indices)
3. [Rearranging Formulae](#RearrangingFormulae)
4. [Algebraic Fractions](#AlgebraicFractions)
5. [Using Graphs](#UsingGraphs)
6. [Quadratic Equations](#QuadraticEquations)
7. [Simultaneous Equations](#SimultaneousEquations)
8. [Algebraic Proofs](#AlgebraicProof)
9. [Trigonometry](#Trigonometry) – for triangles which are not right-angled
10. [Tree Diagrams](#TreeDiagrams)
11. [Mixed Questions](#MixedQuestions)

**1. Surds**

 [i]

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[ii]

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**2. Indices**



**3. Rearranging Formulae**



**4. Algebraic Fractions**

(i)

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(ii)

******5. Using Graphs**

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******6. Quadratic Equations**

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** ****7. Simultaneous Equations**

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8. Algebraic Proofs

[i]

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[iii]

 (*a*) Write down an expression, in terms of *n*, for the *n*th multiple of 5.

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**(1)**

 (*b*) Hence or otherwise

 (i) prove that the sum of two consecutive multiples of 5 is always an odd number,

 (ii) prove that the product of two consecutive multiples of 5 is always an even number.

(**5)**

**(Total 6 marks)**

**9. Trigonometry**

[i]





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[iii]



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**10. Tree Diagrams**

[i]

 Joan has two boxes of chocolates.

The boxes are labelled **A** and **B**.

Box **A** contains 15 chocolates. There are 6 plain, 4 milk and 5 white chocolates.

Box **B** contains 12 chocolates. There are 4 plain, 3 milk and 5 white chocolates.

Joan takes one chocolate at random from each box.

Work out the probability that the two chocolates Joan takes are not of the same type.

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**(4)**



**11. Mixed Questions**

The depth, *D* metres, of the water at the end of a jetty in the afternoon can be modelled by this formula

*D* = 5.5 + *A* sin 30(*t* – *k*)°

 where

 *t* hours is the number of hours after midday,

 *A* and *k* are constants.

Yesterday the low tide was at 3 p.m.

The depth of water at low tide was 3.5 m.

Find the value of *A* and *k*.

*A* = ………………………

*k* = ………………………

**(4)**

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*y*

*x*

8

4

–4

–12

–8

–4

12

6

4

12

*O*

–8

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(*a*) On the grid above, draw the graphs of *x*2 + *y*2 = 100

 and 2*y* = 3*x* – 4 **(3)**

 (*b*) Use the graphs to estimate the solutions of the simultaneous equations *x*2 + *y*2 = 100

 and 2*y* = 3*x* – 4

............................. .

............................ **(2)**

 For all the values of *x, x*2 + 6*x* = (*x* + 3)2 – *q*

 (*c*) Find the value of *q*.

*q* = .............................

**(2)**

 One pair of integer values which satisfy the equation *x*2 + *y*2 = 100 is *x* = 6 and *y* = 8

 (*d*) Find one pair of integer values which satisfy *x*2 + 6*x* + *y*2 – 4*y* – 87 = 0

*x* = .............., *y* = ...............

**(3)**

**(Total 10 marks)**

 

  **(2)**

*y*

*x*

Graph **A**

*y*

*x*

Graph **B**

*y*

*x*

Graph **C**

*y*

*x*

Graph **D**

 The graphs of *y* against *x* represent four different types of proportionality.

 Write down the letter of the graph which represents the type of proportionality.

|  |  |
| --- | --- |
| **Type of proportionality** | **Graph letter** |
| *y* is directly proportional to *x* | ......................... |
| *y* is inversely proportional to *x* | ......................... |
| *y* is proportional to the square of *x* | ......................... |
| *y* is inversely proportional to the square of *x* | ......................... |

**(Total 2 marks)**