

College Taster Pack

Digital Technologies



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Welcome

Welcome to the Faculty of Technology and the Digital Technology Curriculum.

This is such an exciting time to be studying digital technologies – our courses here at College are full of different activities and experiences including coding, cyber security, artificial intelligence, robotics and so much more.

This activity taster pack aims to support your transition to College and give you a sneak peak into the sorts of things you will be learning and discovering when you join us. As a key part of your course we ask all learners to find a one-week work placement during the year – now is a great time to start thinking about where you might want to undertake your placement and putting some feelers out to make some key contacts.



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College Taster Activities:

Challenge 1 – Artificial Intelligence



Watch this YouTube documentary on Artificial Intelligence (skip the ads!!):

<https://www.youtube.com/watch?v=f2aocKWrPG8>

Reflect on those tasks that are more suited to artificial intelligence applications. Think about some everyday problems that you experience. How could artificial intelligence help you to solve these problems and make your life easier?

Put together a model, video or PowerPoint outlining your solution to AI – what are the potential barriers that you can foresee in taking this forward to implementation?



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Challenge 2 – Cryptarithmic

Cryptarithmic is the oldest form of Encryption there is. All encryption today works on the same principles as this. Cryptarithms, or alphametic puzzles, are arithmetic formulas where the digits have been replaced by letters or sometimes other symbols.

Study the rules and try and complete the tasks – don't worry if you get stuck – there are lots of Cryptarithmic calculators online.

Rules:

- Each different letter corresponds to a different number and all instances of a particular letter corresponds to a particular number.
- There should be only one possible solution to each cryptarithm.
- The left most digit in each line is never a zero.

Example:

Here is a popular cryptarithm. See if you can solve it on your own, or follow along below to see the solution.

$$\begin{array}{r} \text{S E N D} \\ + \text{M O R E} \\ \hline \text{M O N E Y} \end{array}$$

STEP 1:

When adding just two numbers together, the most you will ever carry is 1, so we can reason that M must be a 1.

$$\begin{array}{r} \text{S E N D} \\ + \text{M O R E} \\ \hline \text{M O N E Y} \end{array} \quad \rightarrow \quad \begin{array}{r} \text{S E N D} \\ + \text{1 O R E} \\ \hline \text{1 O N E Y} \end{array}$$





STEP 2:

The O is the next letter to consider. It can not be 1, because we have already used that number. If it were 2, S would be either 10 or 11 (since in the thousands column we have either $S+1 = O+10$, or $S+1+1 = O+10$ - in the case where a 1 is carried from the hundreds column), which is not allowed since these are two digit numbers. If O were greater than 2, S would be even larger. Therefore, the O is 0.

$$\begin{array}{r}
 \text{S E N D} \\
 + \text{1 O R E} \\
 \hline
 \text{1 O N E Y}
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 \text{S E N D} \\
 + \text{1 0 R E} \\
 \hline
 \text{1 0 N E Y}
 \end{array}$$

STEP 3:

In order for the 1 to be carried from the thousands column, the S now needs to be 8 or 9. If it is an 8, we would have to carry 1 from the hundreds column, so let's look at the hundreds column. We know that E cannot equal N, so we know there is 1 carried from the tens column. So for the hundreds column we have $1 + E + 0 = N(+10?)$. We know the N has to be at least 2 (because 0 and 1 are taken), so in order for something to be carried $1 + E + 0$ would need to be 12 or more. This would mean E would need to be 11 or more, which of course is not allowed, so nothing can be carried from the hundreds column, and thus S must be 9 rather than 8. Whew!

$$\begin{array}{r}
 \text{S E N D} \\
 + \text{1 0 R E} \\
 \hline
 \text{1 0 N E Y}
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 \text{9 E N D} \\
 + \text{1 0 R E} \\
 \hline
 \text{1 0 N E Y}
 \end{array}$$





STEP 4:

Next we solve for the letter R. We already know that $E+1=N$ and that 1 is carried from the tens column to the hundreds column. So we can substitute $E+1$ for N in the tens column to form two possible equations: $E+1 + R = E+10$ OR $E+1 + 1 + R = E+10$ (the second equation includes carrying 1 from the ones column). The first equation give $R=9$, which is not possible because 9 is already accounted for. The second equation gives $R=8$, so R is 8.

$$\begin{array}{r}
 9 \text{ E N D} \\
 + 1 \text{ 0 R E} \\
 \hline
 1 \text{ 0 N E Y}
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 9 \text{ E N D} \\
 + 1 \text{ 0 8 E} \\
 \hline
 1 \text{ 0 N E Y}
 \end{array}$$

STEP 5:

Consider the D and E. We know they must total 12 or more (a 1 is carried from the tens column and Y must be 2 or more since the 0 and 1 are taken). What digits are left that total 12 or more? We can not use 3 because 9 is taken, and we cannot use 4 because 8 is taken. We are left with 5,6, and 7. Since D and E need to be different numbers they must be 5 and 7, or 6 and 7. Now recall that $E+1=N$. If E were 7, N would be 8 which is already taken. If E were 6, N would be 7 and there is only 5 left for D, which is not enough ($E + D$ would be less than 12). Therefore E is 5 and D is 7.

$$\begin{array}{r}
 9 \text{ E N D} \\
 + 1 \text{ 0 8 E} \\
 \hline
 1 \text{ 0 N E Y}
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{r}
 9 \text{ 5 N 7} \\
 + 1 \text{ 0 8 5} \\
 \hline
 1 \text{ 0 N 5 Y}
 \end{array}$$





STEP 6:

Since we know that E is 5 and $N=E+1$, we know $N=6$. From here it is a simple matter of replacing the N with 6 and doing the addition.

$$\begin{array}{r} 95N7 \\ + 1085 \\ \hline 10N5Y \end{array} \quad \rightarrow \quad \begin{array}{r} 9567 \\ + 1085 \\ \hline 10652 \end{array}$$

If you liked that puzzle, here are some others for you to try:



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1
S H I R T
+ T S H I R T
C L O T H E S

4
B A T
H I T
+ I N N I N G
B A T T E R

2
F A N
F A N
+ S O F A
H O U S E

5
R U B Y
P E A R
+ B R A S S
A U B U R N

3
G H A N A
G A B O N
+ B H U T A N
A L B A N I A

6
O D E R
+ C O N G O
M E K O N G

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Solutions – how well did you do?



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1

$$\begin{array}{r} 84729 \\ + 984729 \\ \hline 1069458 \end{array}$$

4

$$\begin{array}{r} 801 \\ 571 \\ + 799792 \\ \hline 801164 \end{array}$$

2

$$\begin{array}{r} 854 \\ 854 \\ + 9085 \\ \hline 10793 \end{array}$$

5

$$\begin{array}{r} 7092 \\ 4817 \\ + 97166 \\ \hline 109075 \end{array}$$

3

$$\begin{array}{r} 82151 \\ 81965 \\ + 927415 \\ \hline 1091531 \end{array}$$

6

$$\begin{array}{r} 8504 \\ + 98328 \\ \hline 106832 \end{array}$$

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Challenge 3:

Take this online quiz about computer programming – how much do you really know?

<https://www.brainpop.com/technology/computerscience/computerprogramming/quiz/>

Challenge 4:

Watch the film 'The Imitation Game'. Based on the real life story of legendary cryptanalyst Alan Turing, the film portrays the nail-biting race against time by Turing and his brilliant team of code-breakers at Bletchley Park during the darkest days of World War II. Watch a trailer here:

<https://www.youtube.com/watch?v=j2jRs4EAvWM>

Find out as much as you can about the work of the code breakers at Bletchley Park.

Challenge 5:



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- Identify 3 potential Work Experience Placements as part of your course.

Names:	Contact:

(Please note, you will not be required to contact them at this time)

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