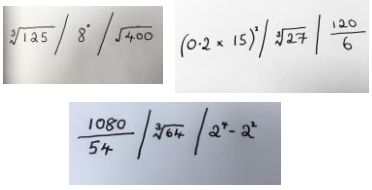
Slide 1	Advanced Mathematics Support Programme	
Slide 2	amsp MEI **Primed for action!**	
Slide 3	amsp MEI What are these? 	With the first task, pupils are asked to make sense of these pictures. They are not told these pictures are of a date, expressed in day/month/year.
Slide 4	amsp MEI Make your own date… ▪ Can you write any date using sums? ▪ What about tomorrow's date? ▪ What about your birthday? You could send your birthday to your teacher	
Slide 5	amsp MEI Prime Numbers On a piece of paper, write down the first 8 prime numbers	
Slide 6	amsp MEI Prime Numbers ▪ The first 8 prime numbers are 2, 3, 5, 7, 11, 13, 17, and 19 ▪ Prime numbers have their own ordered code: P_1 2, P_2 3, P_3 5, P_4 7, P_5 11, P_6 13, P_7 17, P_8 19	The first prime number is P_1, the second P_2 and so on. Understanding the ordinal code is important because pupils will be asked to write a date in prime number form. Thus, the 16th January 2019 would be written (P_1)^4 / $P_8{}^0$ / 3(P_{122}).

Slide 7	**Dates with Prime Numbers** Can you work out the date below? Prime numbers are used to express the date. A tip... $P_{122} = 673$ $P_{123} = 677$ ▪ $P_8 - P_1$ / $(P_2)^2$/ $3P_{122}$	For working with dates use of P_{122} can be helpful. This is because the 122nd prime number is 673, which when multiplied by 3 is 2019. P_{26} is 101, so 2020 is $20P_{26}$ 2021 is P_{14} x P_{15} Answers are on the next slide for students to self-mark
Slide 8	**Dates with Prime Numbers - Answer** Here is the solution to the last slide… A tip... $P_{122} = 673$ $P_{123} = 677$ ▪ $P_8 - P_1$ / $(P_2)^2$/ $3P_{122}$ ▪ $(19 - 2) / 3^2 / (673 \times 3) \rightarrow 17 / 9 / 2019$ ▪ 17th September 2019	And this slide gives the answer A common error is where pupils mistake P_2 for the number 2 and thus think $P_2{}^2 = 2^2 = 4$ when they should have calculated $(P_2)^2 = 3^2$
Slide 9	**Dates with Prime Numbers 2** Can you work out this date? ▪ $(P_1)^3 - P_4$ / $\sqrt{(P_4{}^2 - P_6)}$ / $3P_{123} - P_5$ What about this date? ▪ $(P_2)^3$ / $\sqrt[3]{(2P_4)^2 - P_6{}^2}$ / $3P_{122}$ A tip... $P_{122} = 673$ $P_{123} = 677$ **Extension:** Using P_1 to P_8 and P_{122} P_{123} as code, please try and create any date as a prime number. Be inventive, creative and use your initiative!	Answers are on the next slide for students to self-mark
Slide 10	**Dates with Primes Numbers 2 - Answers** ▪ $(P_1)^3 - P_4$ / $\sqrt{(P_4{}^2 - P_6)}$ / $3P_{123} - P_5$ ▪ 8 - 7 / $\sqrt{7^2 - 13}$ / 2031−13 → 1st June 2020 A tip... $P_{122} = 673$ $P_{123} = 677$ ▪ $(P_2)^3$ / $\sqrt[3]{(2P_4)^2 - P_6{}^2}$ / $3P_{122}$ ▪ 3^3 / $\sqrt[3]{14^2 - 13^2}$ / 2019 → 27th March 2019	
Slide 11	**Nearly ready for a YouTube Clip?** ▪ It is almost time to watch a YouTube video about gaps between prime numbers. ▪ Before the video try this short task first… ▪ There are 25 prime numbers between 1 and 100. Can you find an easy way of listing them? Remember to use the Prime Number code P_n…Give it a go!	Pupils who are able to find out the 25 prime numbers between 1 and 100 should be able to use their knowledge of the divisibility rules. They know that there will be no even numbers that are prime numbers other than 2. Therefore, all of the other prime numbers up to 100 will be odd.

Slide 12	**Enjoy the video**
	▪ Numberphile 'Sexy Primes' (please click on the word Numberphile)
	▪ Just for fun, using the prime numbers between 0 and 100 that you listed before watching the video, you might want to list all of
	  ▪ the cousin primes
	  ▪ As well as the twin primes
	  ▪ Maybe too, the sexy primes & any triplets?
	  ▪ How about Octomus Primes?
		The video is less than seven minutes in length.
		Please note that the reference to 'sexy prime numbers' is a play on the latin for the word 'six' which is 'sex.' This phrases linked to primes in this video date back in history at least over 100 years according to a reliable source at the University of Lancaster mathematics department.

Slide 13	amsp **Investigation 1** ▪ Three Panda Bears are given 51 bamboo shoots to share. ▪ Each Panda may only receive an odd number of bamboo shoots. How many different combinations of sharing these bamboo shoots can you find? ▪ How many different combinations can you find using prime numbers only? (Yes, you can use P_1). Start by sharing as many bamboo shoots as you can amongst the 3 Pandas. You cannot use the same prime number twice! ▪ Send your teacher your solution!	The task has been adapted from White Rose Maths Hub (2016), 'Mastery Overview: Autumn Term' Trinity Academy Publication: Halifax
Slide 14	amsp **Investigation 1 continued…** ▪ Exhausted yet? – try using the same prime number twice or three times, e.g. 17. ▪ Then, try sharing a prime number of bamboo shoots across 4 Pandas. ▪ Now, can you find any cousin, twin or sexy primes in your list? Adapted from White Rose Maths	The task has been adapted from White Rose Maths Hub (2016), 'Mastery Overview: Autumn Term' Trinity Academy Publication: Halifax Many excellent resources are freely available on the White Rose maths website: https://whiterosemaths.com/resources/schemes-of-learning/secondary-sols/
Slide 15	amsp **Investigation 2** ▪ Both 4 and 8 can be written as the sum of two prime numbers (4 = 2+2, 8 = 5+3). How many numbers less than 20 cannot be written as the sum of two prime numbers? ▪ How many of these are twin or cousin primes? ▪ Why is there never a gap of 7 between 2 prime numbers? Adapted from: https://nrich.maths.org/6239	The task is taken from https://nrich.maths.org/6239 1, 2, 3, 11 and 17 do not have a sum of two prime numbers. And the following can have a sum of two prime numbers. 4 = 2 + 2 9 = 7 + 2 15 = 13 + 2 5 = 2 + 3 10 = 7 + 3 16 = 13 + 3 or 11 + 5 6 = 3 + 3 12 = 7 + 5 18 = 13 + 5 7 = 5 + 2 13 = 2 + 11 19 = 17 + 2 8 = 5 + 3 14 = 7 +7 or 3 + 11 20 = 17 + 3
Slide 16	amsp **Contact the AMSP** 01225 716 492 *admin@amsp.org.uk* *amsp.org.uk* Advanced_Maths	