

# Lesson Review

## *Learning Objectives*

Please list the learning objectives of this module that you have achieved:

I certified that I am able to:

- Compute the Prime Factorisation of Whole Numbers (Integers)
- Find the GCD of two numbers using Euclidean Algorithm
- Convert numbers between base representations
- Compute values of large powers of a number in modular arithmetic

## Learning Review

Please complete the table below (refer to the attached Learning Process table).

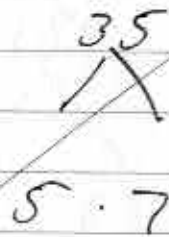
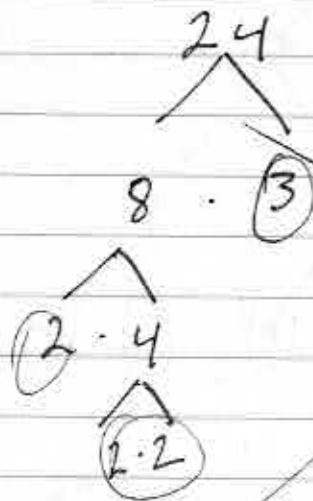
Learning Objective	Concept	Step	Strategy	Resource	Reflection	Learning
	What concept / key-word did you focus on?		What strategy did you apply? Why did you choose this? How did you apply it? Did it work well? How do you know?	What resource did you use? Why did you choose this? Did it work well?	In hindsight, was this strategy and resource <ul style="list-style-type: none"> <li>• appropriate? Why?</li> <li>• identify other options</li> <li>• was this the best option? Why?</li> </ul>	Generalise: what you learned that could be applied in the future in a different context
Prime Factorisation	Compute the Price Factorisation of Whole Numbers (Integers)	Identify	Identify Concepts and make a list of resources needed	Unit Site Content		
		Making Sense	Read Text and Site Content, watch lecture videos, watch and follow external videos	Prescribed Text Book		
				Recorded Lectures		
		Making Meaning	Attempt practical questions, verify answers against online tools to identify any mistakes and try again	External Videos		

Euclidean Algorithm	Find the GCD of two numbers using Euclidean Algorithm	Identify	Identify Concepts and make a list of resources needed	Unit Site content Prescribed Text Book Recorded Lectures External Videos		
		Making Sense	Read Text and Site Content, watch lecture videos, watch and follow external videos			
		Making Meaning	Attempt practical questions, verify answers against online tools to identify any mistakes and try again			
Base Representation	Convert numbers between base representations	Identify	Identify Concepts and make a list of resources needed	Unit Site content Prescribed Text Book Recorded Lectures External Videos		
		Making Sense	Read Text and Site Content, watch lecture videos, watch and follow external videos			
		Making Meaning	Attempt practical questions, verify answers against online tools to identify any mistakes and try again			

Modular Arithmetic	Compute values of large powers of a number in modular arithmetic	Identify	Identify Concepts and make a list of resources needed	Unit Site content Prescribed Text Book Recorded Lectures External Videos		
		Making Sense	Read Text and Site Content, watch lecture videos, watch and follow external videos			
		Making Meaning	Attempt practical questions, verify answers against online tools to identify any mistakes and try again			

## ***Learning Evidence***

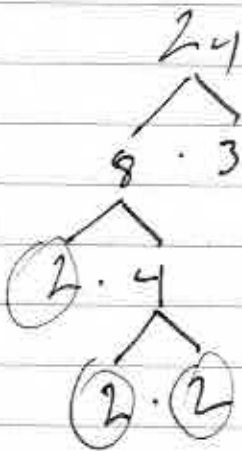
LCM



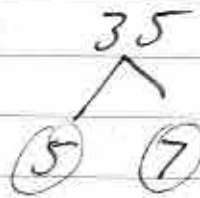
$$4 \times 35$$

$$40$$

①



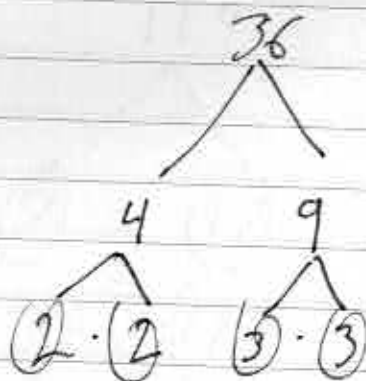
$$2^3 \times 3$$



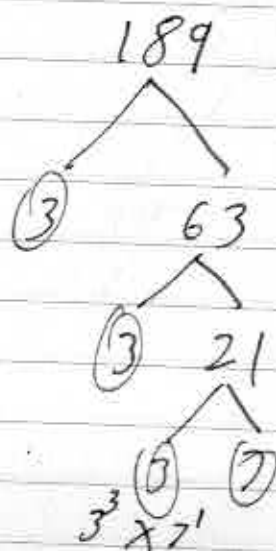
$$5 \times 7$$

$$\begin{aligned} &2 \times 2 \times 2 \times 3 \times 5 \\ &= 2^3 \times 3 \times 5 \\ &= 840 \end{aligned}$$

②



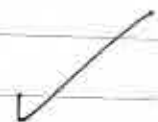
$$2^2 \times 3^2$$



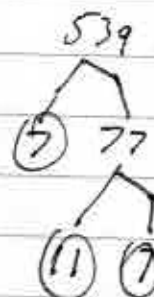
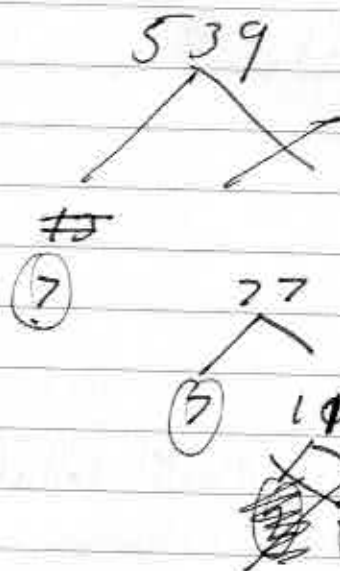
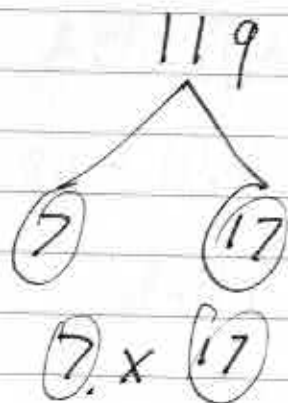
~~$$\begin{aligned} &= 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 7 \\ &= 2^2 \times 3^5 \times 7 \\ &= 20412 \end{aligned}$$~~



$$\begin{aligned} &= 2^2 \times 3^3 \times 7 \\ &= 756 \end{aligned}$$



(3)



~~119 = 7 x 17~~  
~~539 = 7 x 7 x 2 x 5~~

~~= 2 x 5 x 7^2 x 17~~  
~~= 8330~~

119 = 7 x 17  
539 = 7^2 x 11

= 7 x 7 x 11 x 17  
= 9163





GCD

1

24: ①, 2, 3, 4, 6, 8, 12, 24

35: ①, 5, 7

$$\text{gcd}(24, 35) = 1$$

36: 1, 2, 3, 4, 6, ⑨, 12, 18, 36

189: 1, 3, 7, ⑨

21, 27, 63, 189

$$\text{gcd}(24, 35) = 9$$

119: 1, ⑦

539: 1, ⑦, 11

17, 119  
49, 77, 539

$$\text{gcd}(119, 539) = 7$$

Base conversion

192 to base 3

$\boxed{0, 1, 2}$

(4)

$$\begin{array}{r} 3^5 \\ 243 \end{array} \quad \begin{array}{r} 3^4 \\ 81 \end{array} \quad \begin{array}{r} 3^3 \\ 27 \end{array} \quad \begin{array}{r} 3^2 \\ 9 \end{array} \quad \begin{array}{r} 3^1 \\ 3 \end{array} \quad \begin{array}{r} 3^0 \\ 1 \end{array}$$

0   2

$$\begin{array}{r} 192 \\ -162 \\ \hline 30 \end{array}$$

$$\begin{array}{r} 1 \\ 30 \\ -27 \\ \hline 3 \end{array}$$

0 1 0

~~192~~

$$192_{10} = 21010_3$$

5

192 TO base 7

0, 1, 2, 3, 4, 5, 6

$$\begin{array}{r} \cancel{8}^5 \quad \cancel{4}^4 \quad 7^3 \quad 7^2 \quad 7^1 \quad 7^0 \\ \hline 7 \overline{) 192} \end{array}$$
$$\begin{array}{r} 343 \quad 49 \quad 7 \quad 1 \end{array}$$

0 3 \*

$$\begin{array}{r} 192 \\ - 147 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 6 \\ \hline 45 \\ - 42 \\ \hline 3 \end{array}$$

3

$$192_{10} = 363_7$$

6

$122_3$  to base 10

$$\begin{array}{rcl} 1 \times 3^2 & = & 9 \\ 2 \times 3^1 & = & 6 \\ 2 \times 3^0 & = & 2 \end{array}$$

$122_3$

$$\begin{array}{rcl} 1 \times 3^2 & = & 9 \\ 2 \times 3^1 & = & 6 \\ 2 \times 3^0 & = & 2 \end{array}$$

$$\begin{aligned} &= 9 + 6 + 2 \\ &= 17 \end{aligned}$$

$$122_3 = 17_{10}$$

7

$162_7$  to base 10

$$\begin{array}{rcl} 1 \times 7^2 & = & 49 \\ 6 \times 7^1 & = & 42 \\ 2 \times 7^0 & = & 2 \end{array}$$

$$\begin{aligned} &= 49 + 42 + 2 \\ &= 93 \end{aligned}$$

$$162_7 = 93_{10}$$

1506 to base 11

(8)

(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A)

$$\begin{array}{r} 11^4 \\ 14641 \end{array}$$

$$\begin{array}{r} 11^3 \\ 1331 \end{array}$$

$$\begin{array}{r} 11^2 \\ 121 \end{array}$$

$$\begin{array}{r} 11^1 \\ 11 \end{array}$$

$$\begin{array}{r} 11^0 \\ 1 \end{array}$$

$$\begin{array}{r} 0 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \hline \end{array}$$

1506

$$\begin{array}{r} -1331 \\ \hline 175 \end{array}$$

$$\begin{array}{r} 1 \\ \hline 175 \\ -121 \\ \hline 54 \end{array}$$

$$\begin{array}{r} 4 \\ \hline 54 \\ -44 \\ \hline 10 \end{array}$$

A

$$1506_{10} = 114A_{11}$$

(9)

3995 to base 12

(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B)

$$\begin{array}{r} 12^4 \\ 20736 \end{array}$$

$$\begin{array}{r} 12^3 \\ 1728 \end{array}$$

$$\begin{array}{r} 12^2 \\ 144 \end{array}$$

$$\begin{array}{r} 12^1 \\ 12 \end{array}$$

$$\begin{array}{r} 12^0 \\ 1 \end{array}$$

02

3995

- 1728x2

539~~38~~

3456

3

539

- 432

1078

107

- 96

111

$$3995_{10} = 238B_{12}$$

gcd 192, 281

$$\begin{array}{r} 1 \\ 192 \overline{) 281} \end{array}$$

$$\begin{array}{r} 0 \\ 28 \\ \hline 0 \\ 281 \\ - 192 \\ \hline 89 \end{array}$$

$$281 = 192(1) + 89$$

$$\begin{array}{r} 2 \\ 89 \overline{) 192} \end{array}$$

$$\begin{array}{r} 0 \\ 19 \end{array}$$

$$192 = 89(2) + 14$$

$$\begin{array}{r} 0 \\ 192 \\ - 178 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 6 \\ 14 \overline{) 89} \end{array}$$

$$89 = 14(6) + 5$$

$$\begin{array}{r} -0 \\ 89 \\ - 84 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 2 \\ 5 \overline{) 14} \end{array}$$

$$14 = 5(2) + 4$$

$$\begin{array}{r} 0 \\ 14 \\ - 10 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 1 \\ 4 \overline{) 5} \end{array} \quad 5 = 4(1) + 1$$

$$\begin{array}{r} -4 \\ 1 \\ 1 \overline{) 4} \\ -4 \\ \hline 0 \end{array} \quad 4 = 4(1) + 0$$

$$\text{gcd}(192, 281) = 1$$

### Self-Assessment evidence

Modular Arithmetic			
1	1	/	1
2	1	/	1
3	1	/	1
4	1	/	1
Euclidean Algorithm			
5	3	/	3
6	3	/	3
Factorisation			
7	4	/	4
8	3	/	4
Total	17	/	18 (94%)

## Performance Summary

Exam Name:	Number Theory (Self-Assessment)
Session ID:	12949283515
Student's Name:	BLAND, JUSTIN MICHAEL WILLIAM (218478549)
Exam Start:	Wed Mar 11 2020 14:36:06
Exam Stop:	Wed Mar 11 2020 14:57:46
Time Spent:	0:21:38