

Circling the Square & my Mathematical Magic progressions

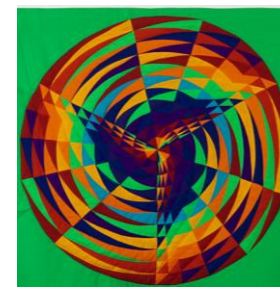
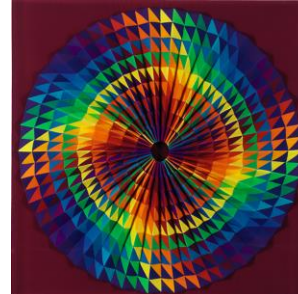
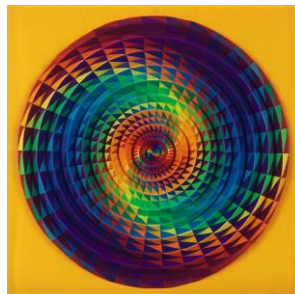
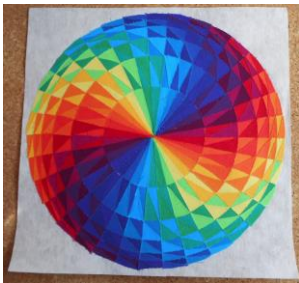


MathsJam National Gathering, Stone 01/12/19

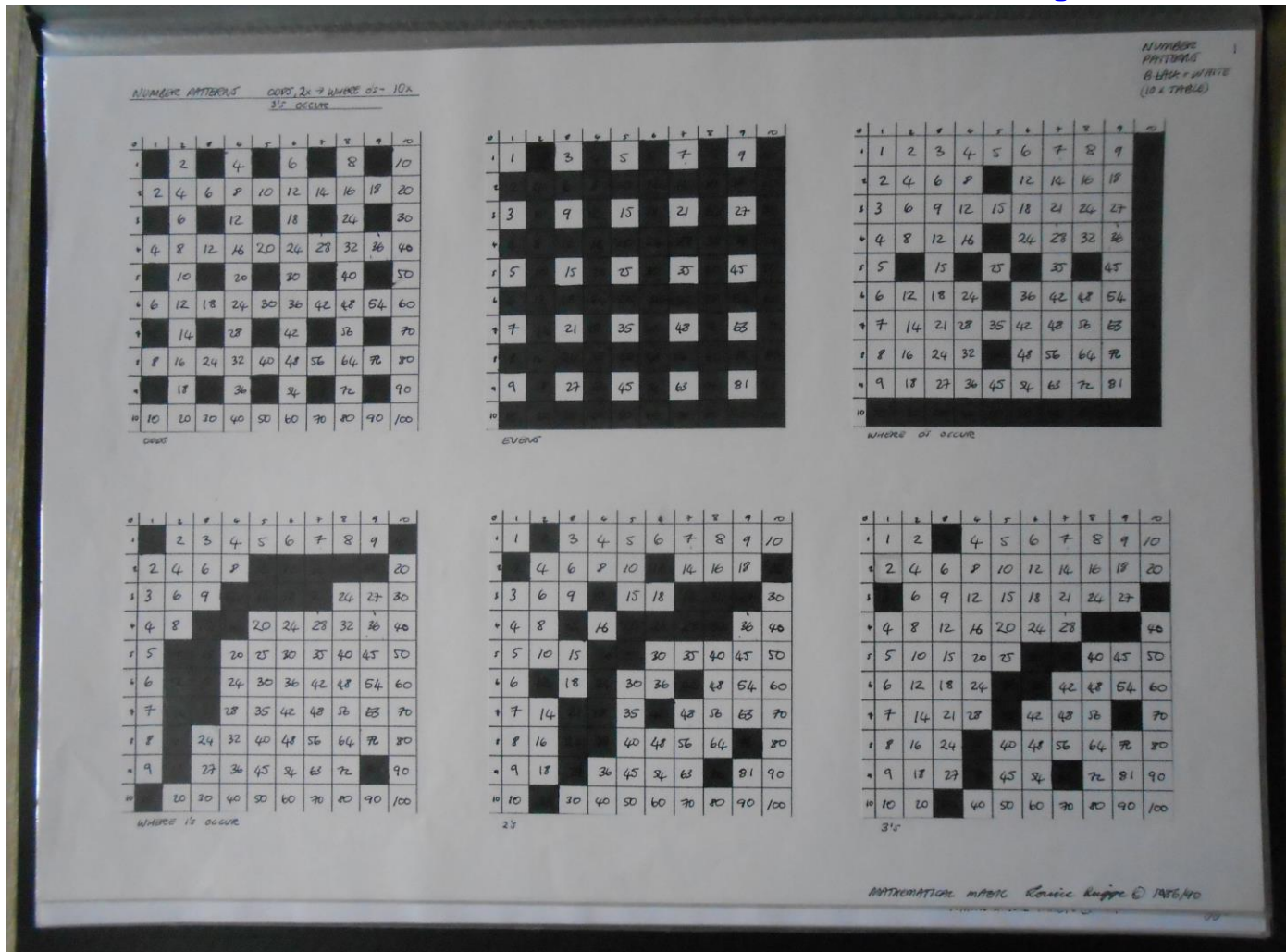
Louise Mabbs,

textile artist/teacher/writer/

commissions/artist in residencies



1986 – Remembering School Maths in the late 70's (SMP?)



I was asked to make a quilt for a exhibition called **Mathematical Magic**

Eventually I remembered how I learnt my time tables **by shading certain types of numbers in one colour** each time

Number Patterns-Odds/Evens/0's and 1-3's on 10x table

1986 - 0-99, 1-100 or 10x table grids?

MATHEMATICAL MAGIC
© LOUISE BRIGGS 1986/9

0	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	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Fig 1

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	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Fig 2

0-99

PATTERNS

- NOT BEGINNING IN 1, 2, ...
- NOT ENDING IN 1, 2, ...
- ODDS
- EVEN
- SAME NOS
- SEPARATING DIGITS
- CHANGING COLOUR SCHEMES
- CHANGING COLOUR ARRANGEMENTS
- CHANGING SHAPES eg
- CHANGING SCALE eg
- USING TEXTURES NOT COLOUR
- USING OBJECTS NOT COLOUR
- CHANGING UNIT SHAPES eg
- CHANGING TECHNIQUES

0	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	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Fig 3

"DECIMAL RAINBOWS"

EACH DIGIT (0-9) REPRESENTED BY A DIFFERENT COLOUR

1	2	3	2	5	2	7	2	3	2	5					
11	2	3	13	2	7	3	5	2	17	2	3	19	2	3	5
3	7	11	23	2	3	5	2	3	3	2	29	2	3	5	
31	2	3	11	17	5	7	2	3	37	2	19	13	2	3	5
41	2	43	2	11	3	5	2	23	47	2	3	7	2	5	
3	17	2	13	53	2	3	5	2	3	2	29	59	2	3	5
61	2	3	31	2	5	13	3	5	67	2	3	25	2	3	5
71	3	73	2	3	5	2	17	2	11	2	17	79	2	3	5
3	3	2	41	83	2	3	5	2	7	2	11	89	2	3	5
4	13	2	13	81	2	47	5	2	7	2	11	97	2	3	5

Fig 4

"PRIMARY FACTORS"

EACH PRIME NUMBER REPRESENTED BY A DIFFERENT COLOUR
LARGER NUMBERS SUBDIVIDED INTO FACTORS

NUMBER PATTERNS
Louise Briggs © 1986/9

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Fig 5

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Fig 6

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Fig 7

MATHEMATICAL MAGIC
Louise Briggs © 1986/9

Left – So I drew up the 3 basic grids for each type, and another with the prime factors

Right – Number Patterns 4-9 on 10x table filled in with black feltpen

Lateral thinking – What happens if I use a different colour for each digit (0-9)?

1986 – The Final Designs

MATHEMATICAL MAGIC

NOVEMBER 1986.
BRENT MILL & SCIENCE
CENTRE, NOTTINGHAM.

WORKING
SHEET

"PRIMARY FACTORS"

HOW THE NUMBERS BREAK DOWN

1	PRIME	51	3 x 17
2	P	52	2 x 2 x 13
3	P	53	P
4	2 x 2	54	2 x 3 x 3 x 3
5	P	55	5 x 11
6	2 x 3	56	2 x 2 x 2 x 7
7	P	57	3 x 19
8	2 x 2 x 2	58	2 x 29
9	3 x 3	59	P
10	2 x 5	60	2 x 2 x 3 x 5
11	P	61	P
12	2 x 2 x 3	62	2 x 31
13	P	63	3 x 3 x 7
14	2 x 7	64	2 x 2 x 2 x 2 x 2
15	3 x 5	65	5 x 13
16	2 x 2 x 2 x 2	66	2 x 3 x 11
17	P	67	P
18	2 x 3 x 3	68	2 x 2 x 17
19	P	69	3 x 23
20	2 x 2 x 5	70	2 x 5 x 7
21	3 x 7	71	P
22	2 x 11	72	2 x 2 x 2 x 3 x 3
23	P	73	P
24	2 x 2 x 2 x 3	74	2 x 37
25	5 x 5	75	3 x 5 x 5
26	2 x 13	76	2 x 2 x 19
27	P	77	7 x 11
28	2 x 2 x 7	78	2 x 3 x 13
29	P	79	P
30	2 x 3 x 5	80	2 x 2 x 2 x 2 x 5
31	P	81	3 x 3 x 3 x 3
32	2 x 2 x 2 x 2 x 2	82	2 x 41
33	3 x 11	83	P
34	2 x 17	84	2 x 2 x 3 x 7
35	5 x 7	85	5 x 17
36	2 x 2 x 3 x 3	86	2 x 43
37	P	87	3 x 29
38	2 x 19	88	2 x 2 x 2 x 11
39	3 x 13	89	P
40	2 x 2 x 2 x 5	90	2 x 3 x 3 x 5
41	P	91	7 x 13
42	2 x 3 x 7	92	2 x 2 x 23
43	P	93	3 x 31
44	2 x 2 x 11	94	2 x 47
45	3 x 3 x 5	95	5 x 19
46	2 x 23	96	2 x 2 x 2 x 2 x 2 x 2
47	P	97	P
48	2 x 2 x 2 x 2 x 3	98	2 x 7 x 7
49	7 x 7	99	3 x 3 x 11
50	2 x 5 x 5	100	2 x 2 x 5 x 5

I AM OFTEN
INTRIGUED BY THE **II**
WAY NUMBERS RELATE
TOGETHER, SO I DECIDED
TO BASE MY SUBJECT ON
THIS EXHIBITION'S TITLE.

THE COLOURS CHOSEN
REFLECT THE MOOD IN
WHICH I AM CURRENTLY
WORKING - STRONG
COLOURS ORBITATING THROUGH
THE SPECTRUM & INFLU-
ENCED BY THE BEAUTY
OF RAINBOWS (THESE
HAVE A SPECIAL 'MAGIC'
FOR ME, AS A WASHDAY,
- THE PROMISE OF BODS
UNFAILLING LOVE)

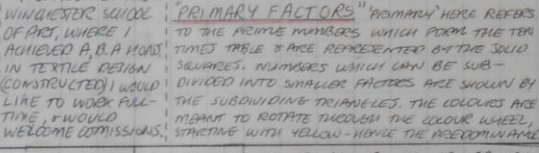
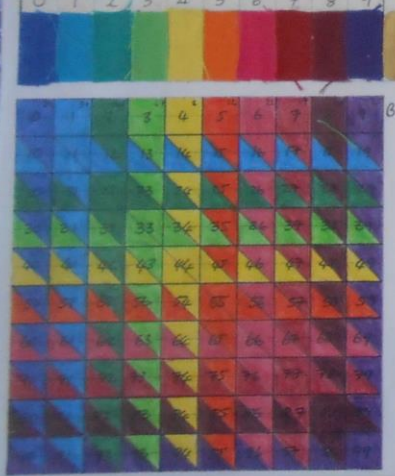
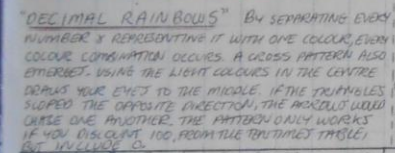
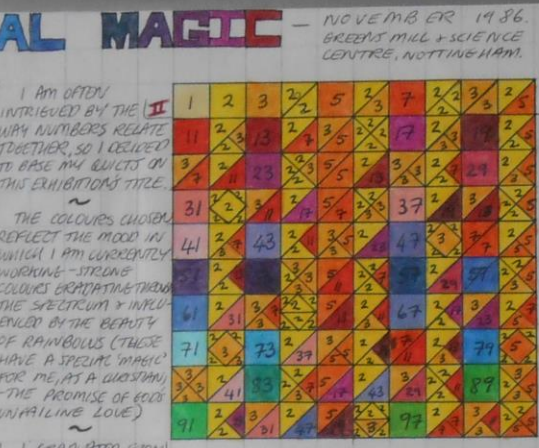
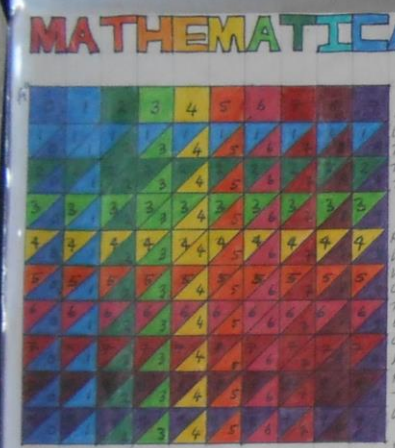
I GRADUATED FROM
WINGFLEET SCHOOL
OF ART, WHERE I
ACHIEVED A,B,A HONOR
IN TEXTILE DESIGN
(CONSTRUCTED) I WOULD
LIKE TO WORK FULL-
TIME, I WOULD
WELCOME COMMISSIONS.

"DECIMAL RAINBOWS" BY SEPARATING EVERY
NUMBER & REPRESENTING IT WITH ONE COLOUR, EVEN
COLOUR COMBINATION OCCURS. A CROSS PATTERN ALSO
EMERGES. USING THE LIGHT COLOURS IN THE CENTRE
DRAWS YOUR EYE TO THE MIDDLE. IF THE TRIANGLES
SLIDED THE OPPOSITE DIRECTION, THE PATTERNS WOULD
CHASE ONE ANOTHER. THE PATTERN ONLY WORKS
IF YOU DISCOUNT 100, FROM THE TENTH DIGIT TABLE,
BUT INCLUDE 0.

"PRIMARY FACTORS" "PRIMARY" HERE REFERS
TO THE PRIME NUMBERS WHICH FORM THE TEN
TIMES TABLE & ARE REPRESENTED BY THE SOLID
SQUARES. NUMBERS WHICH CAN BE SUB-
DIVIDED INTO SMALLER FACTORS ARE SHOWN BY
THE SUBDIVIDING TRIANGLES. THE COLOURS ARE
MEANT TO ROTATE THROUGH THE COLOUR WHEEL,
STARTING WITH YELLOW - HENCE THE PREDOMINANCE!

A PRIMARY PRESENCE
LOUISE BRIGGS
60 SUMMER CREST
SUMMER LANE
WICKS WORTH, LEICESTER
DE4 4EB (062 982) 2210

Which one is wrong?
MATHEMATICAL MAGIC Louise Briggs © 1986/90



97
91
83
74
73
71
67
64
57
53
51
49
43
41
37
33
31
29
27
23
21
19
17
13
11
7
5
3
2
1

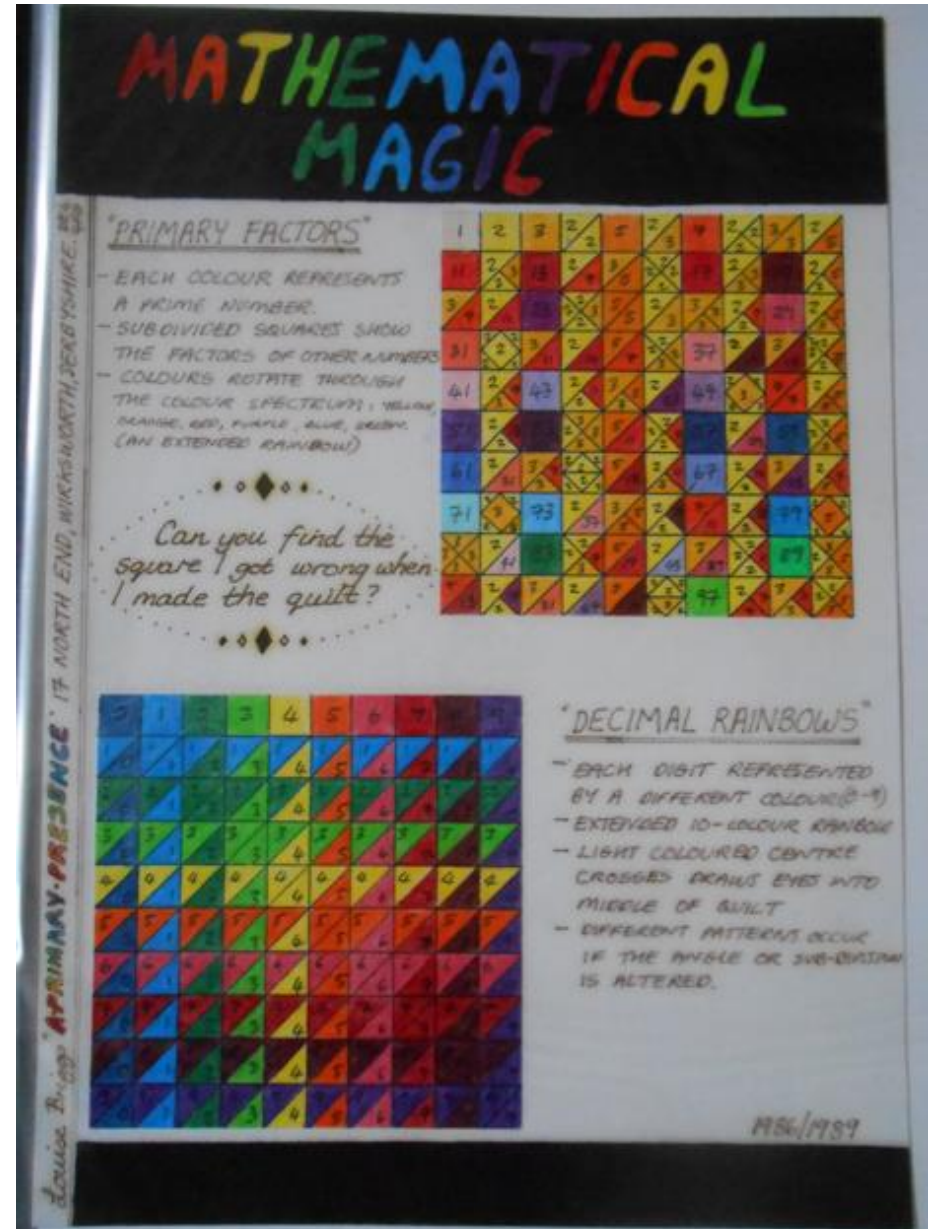
1986 - Decimal Rainbows



Left – 0-99 basic grid finished quilt

Right – Poster for the exhibition

Made for the 'Mathematical Magic' exhibition at Greens Mill, Sneinton, Nottingham



1986 - Prime Factors

- Dividing numbers into their factors
- Subdividing the squares into up to 6 sections
- Though I made two mistakes!
- Do you know where they are?
- There are 29 different colours when there should only be 27!



1990 - Developing the Mathematical Magic colouring sequence grids

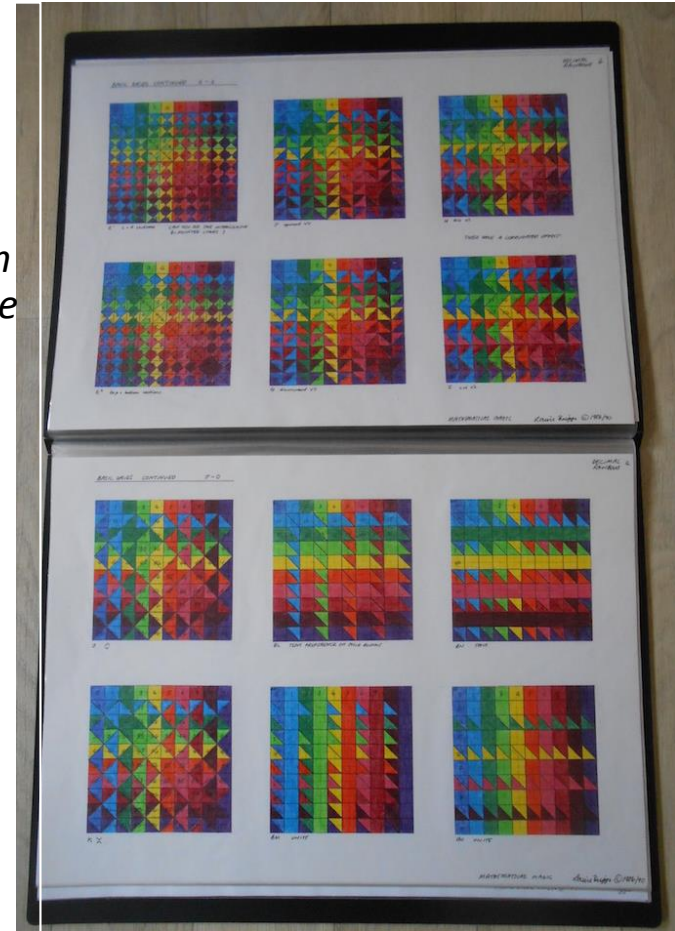


Left top half – Yellow on number 5, 6, 7:
Then on 8, 9, 0 on basic triangular division grids

Left bottom half – Yellow on 1, 2, 3: Then an alternative 3 colour order & 2 on rectangular division grids (C & D)

Right top half – Grid E, F, H:
Then E inverse, G, I (E = X & rest V shaped grids)

Right bottom half - Grid J (reflected triangles) Grid B with 10's preference:
Then J alternative & Grid B with units preferences



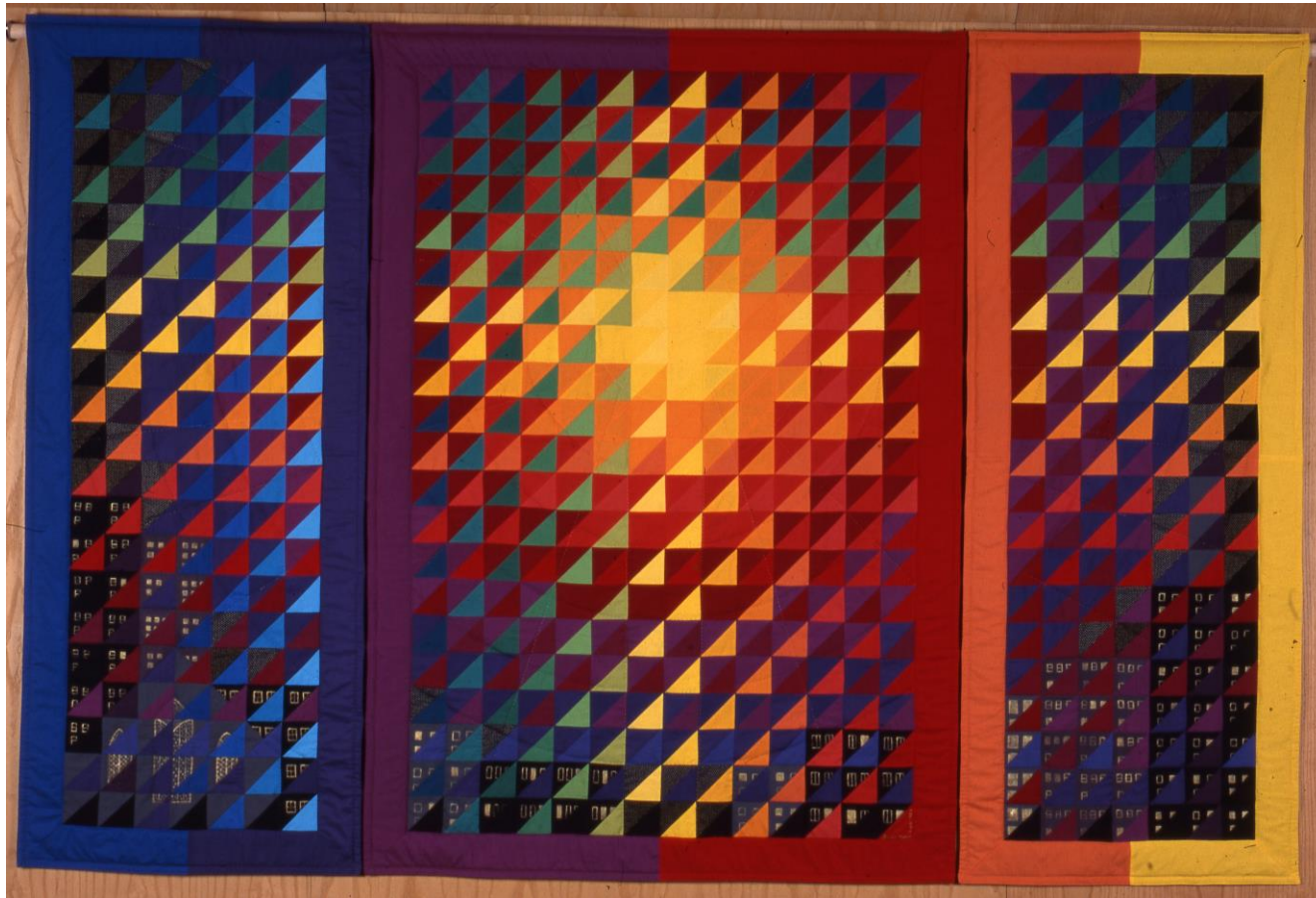
The 0-99 grid where 4 is the 5th square along becomes my preferred layout – because it creates a balanced but asymmetrical design with a central cross which becomes more relevant in my later pieces.....

1994 - Hands that Flung Stars Into Space

- This uses my Mathematical Magic colouring sequence in the bottom heavy triangles
- I interwove a split rainbow into the design on the top heavy triangles
- Words - *a line from Graham Kendrick's 'The Servant King'*
- *My first commission in Manchester - for the first Chaplain of our theology college (Northern)*



1995 – The Light Shines In The Darkness



The **Mathematical Magic** sequence occurs in the bottom heavy triangles

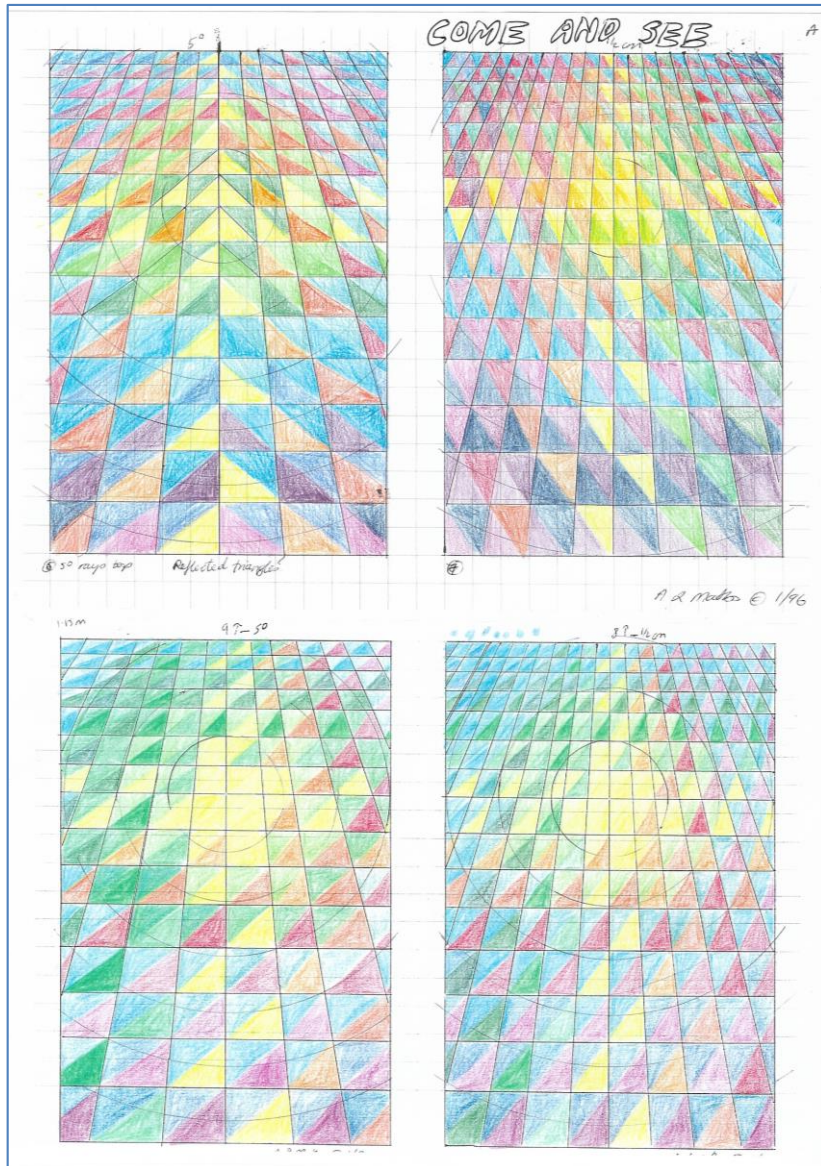
The sun, rainbow, sky, old church and city skyline feature in the top heavy triangles

Triptych - made in 3 pieces so it could be hung in different locations if required

Commissioned by an anonymous donor for the new St Brides, Old Trafford, church building

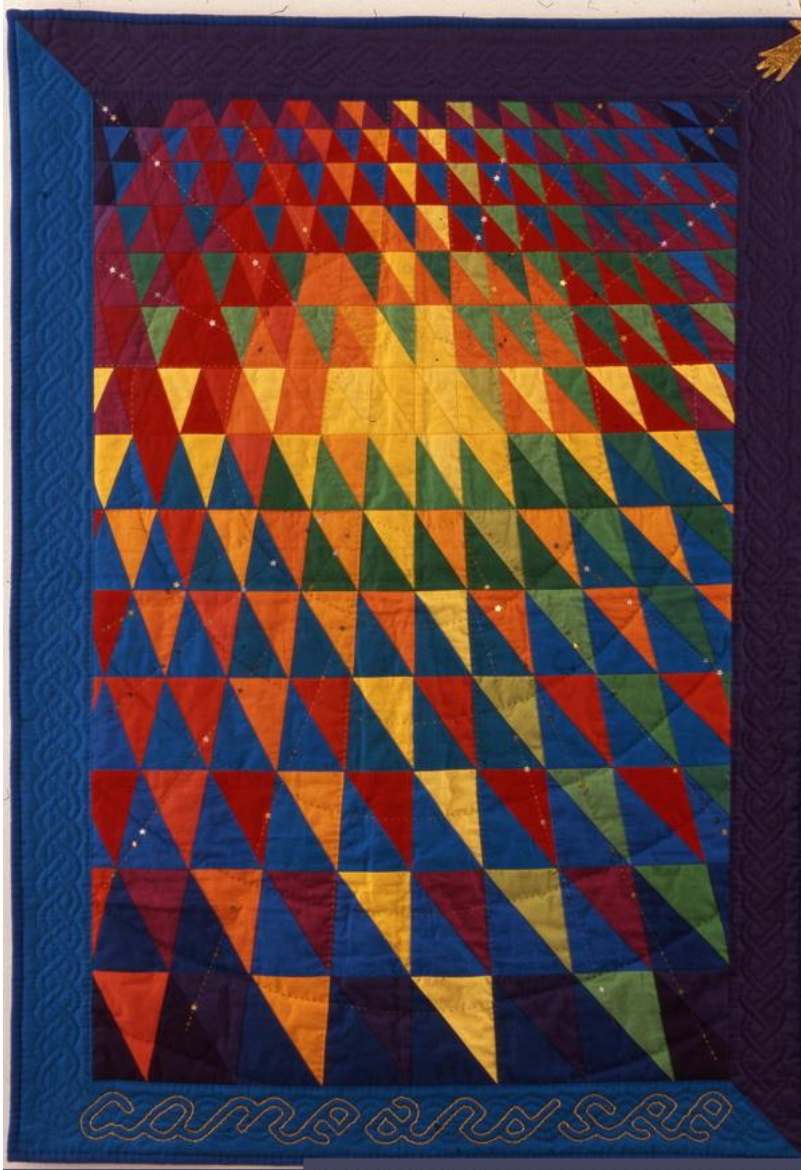
Black on the back for Good Friday

1997 - Taking a new perspective



- Commissioned by the new, chaplain at Northern College
- She asked me to combine the **Mathematical Magic** designs with another commission which used a false perspective
- The fixed points at top & bottom, with lines ruled between, distorts the image
- An effect I appreciate, so I wonder about using a circular grid
- *Designs – coloured crayon*

1997 - Come & See



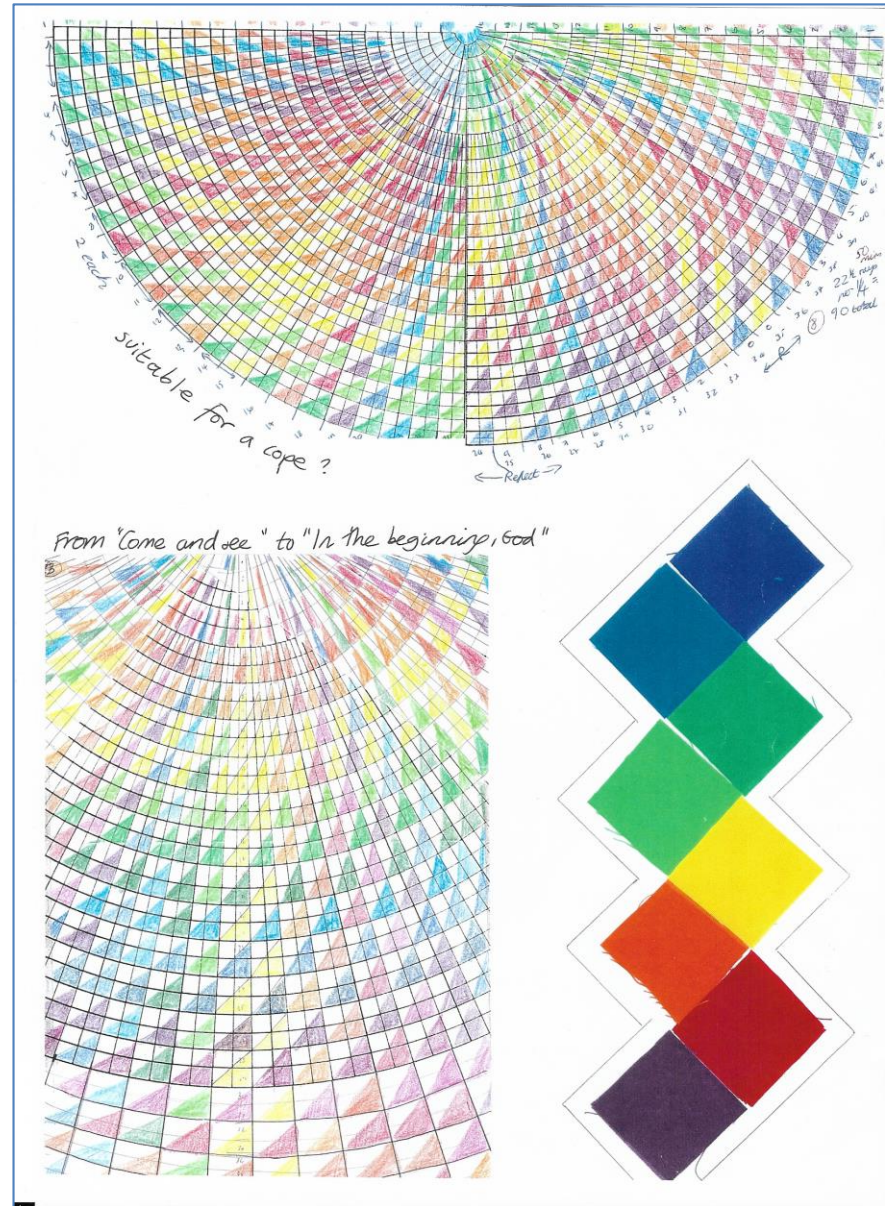
- The solid fabric gives the straight edges a more pronounced curved effect
- What if I use a circular grid next time?
- Year of Haley's Comet (but I'd just mis-cut the corner)

1997 - Discovering Polar Grids

- By chance I found some polar grids in an engineering book in my teaching course college library
- I wondered how my **MM** series would work on a circular grid
- I don't see a need for this design yet but it makes me think about circular designs
- I later discover it's what I need for my 3D pieces

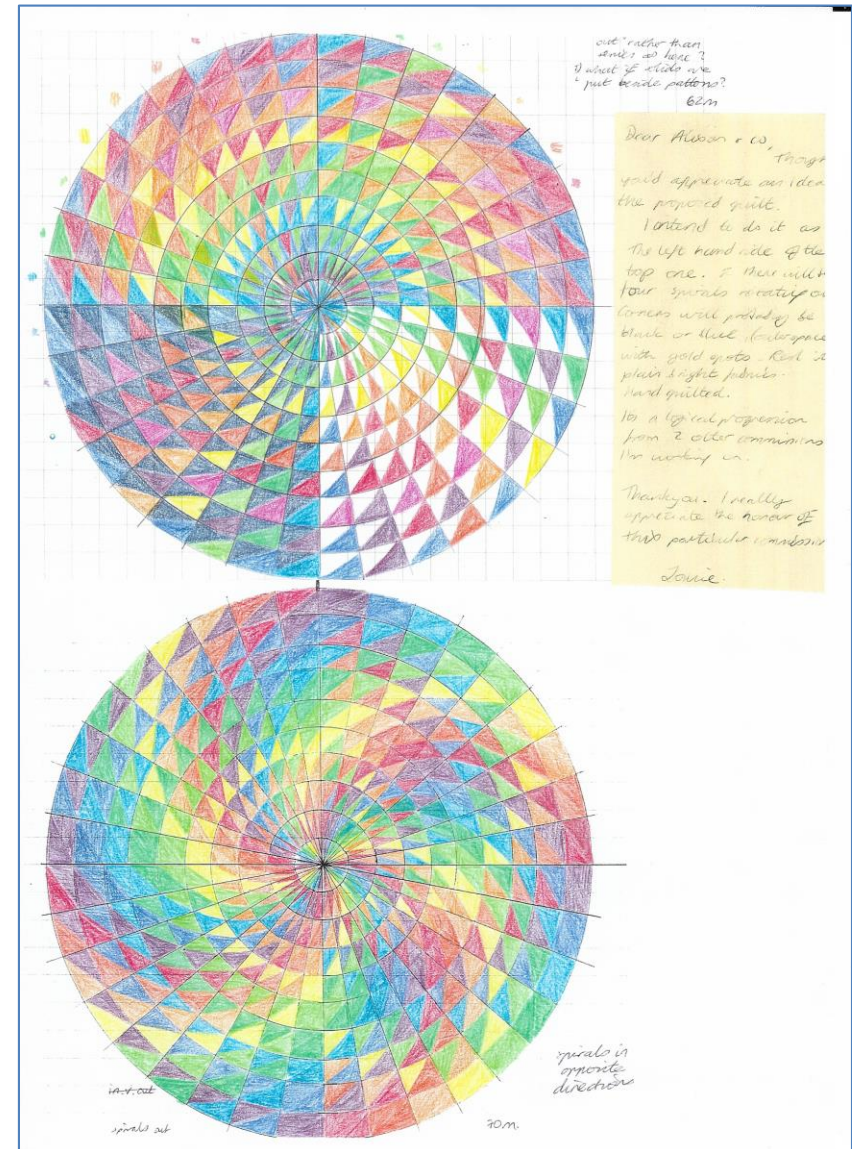
Top – **Do I Cope or Not?** - *design for 2 quarters of a polar grid*

Bottom – **Come and See** - *redrafted curves - the false perspective on the previous piece*

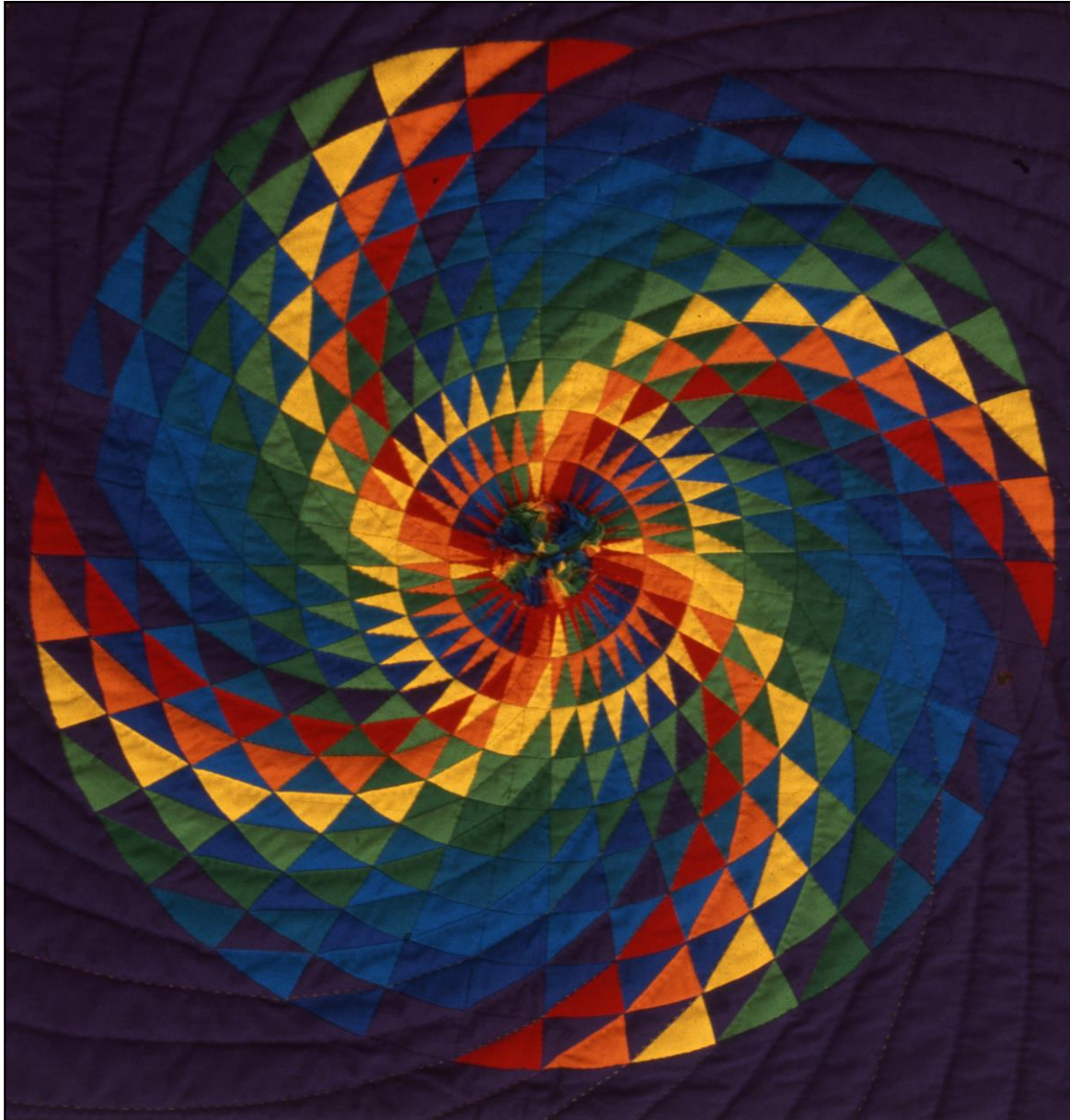


1997 - Moving into circles and spirals

- Moved to London
- Asked to make a 24" square piece for the **Quilter's Guild 90's Collection** – showcasing contemporary quiltmakers
- Circles fit best onto squares – so it's an obvious choice
- Trying different layouts for **In The Beginning, God**, I realise the central cross has created a series of spirals



1997 - In The Beginnning, God



- 5th piece in my Mathematical Magic series
- Note the 4 crosses spiralling out
- The ragged centre is chaos becoming form in Creation with a hidden golden lurex core
- *Commission for the Quilter's Guild 90's collection by the London region*
- *Resides in York now*

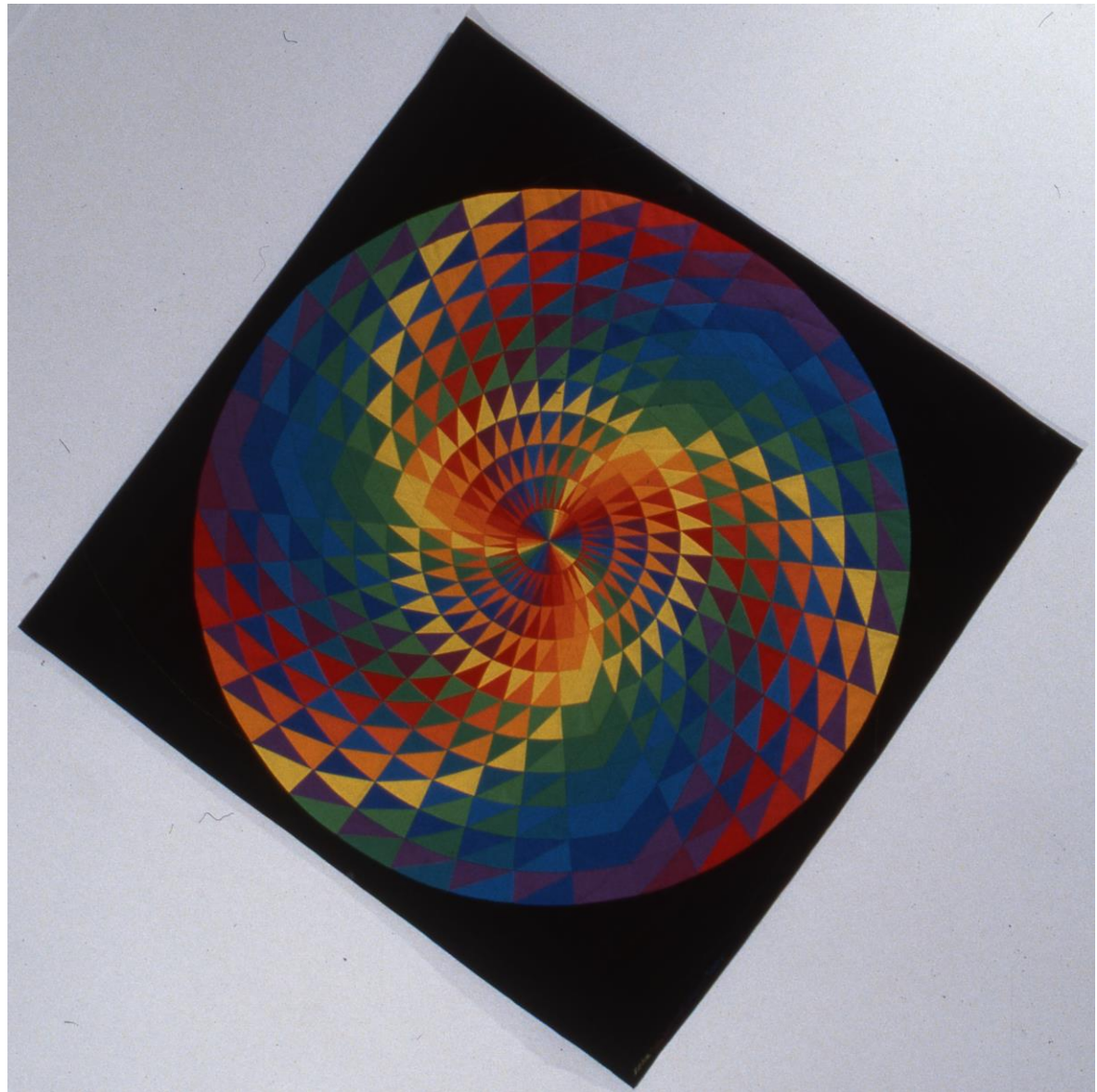
Changing the scale and number of spirals



The number of rays creates a very different effect -

1997 - In The Beginning, God
– 4 spirals - like a windmill/pinwheel (2 ft)

1997 - Blesséd Trinity
– 3 spirals like a triskele (4 ft)



Changing the number of circles



1999 – Blesséd Trinity

Originally loaned to Clapham URC, London to cover diamond shaped wall panels

2000 – Infinity

The colours on the inside and outside of the LH rings swap over on the RH side

Also for Clapham URC but it went on an exhibition tour & the church then closed



2004 - Introducing Fibonacci To The Spirals



2004 - Fibonacci Rings

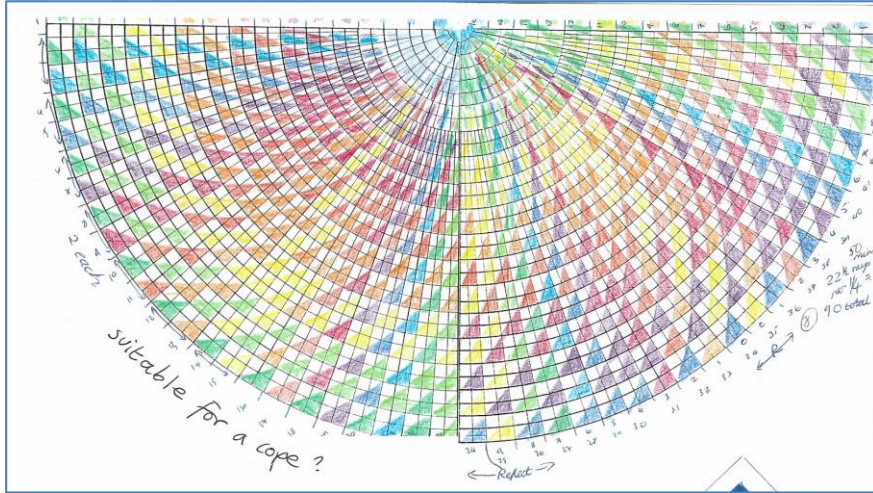
- *34 rays – it's the nearest Fibonacci number to the earlier 36 rays I used*
- *Changing width rings - in Fibonacci proportions 1, 1, 2, 3, 5, 8"*



2004 - Fibonacci Rays

- *3 ray sequence repeats – in 1, 1, 2, 3, 5, 8 proportions*
- *Regular width rings – 11 rows*

Going 3D – remember this grid?

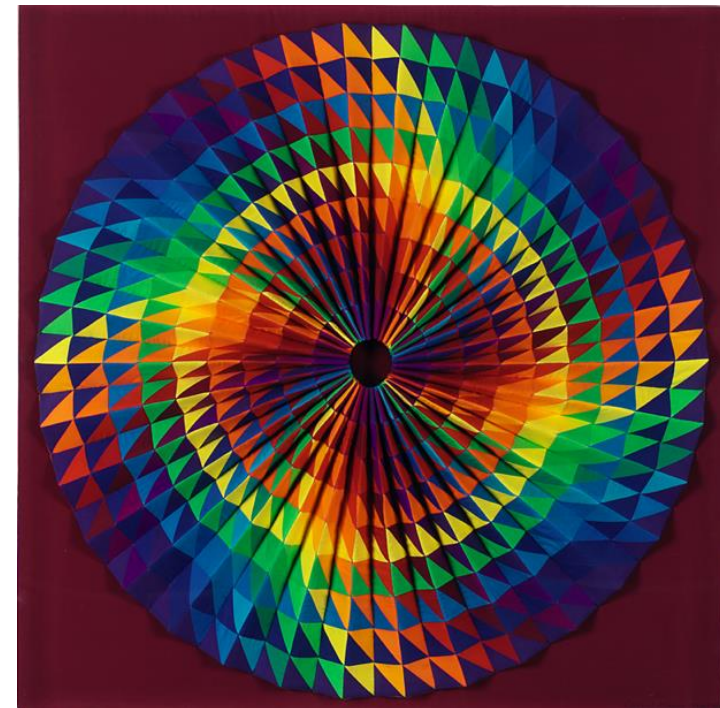


1997 - Do I Cope or Not?

- Designed but never made up
- Essentially it makes a cone – which is what I needed for Toblercone Rings

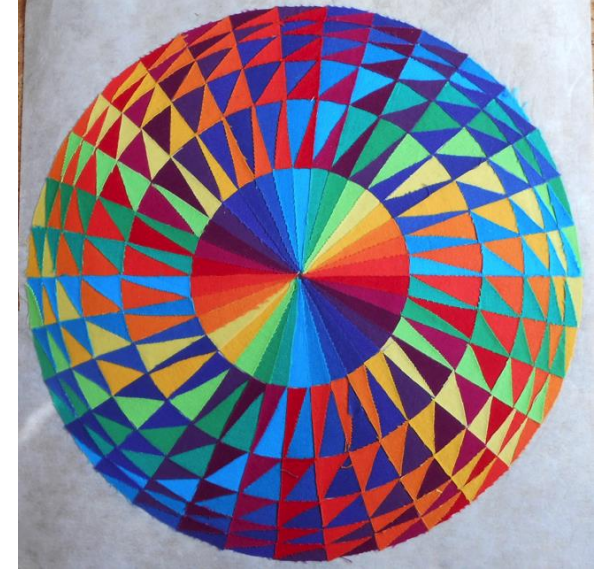
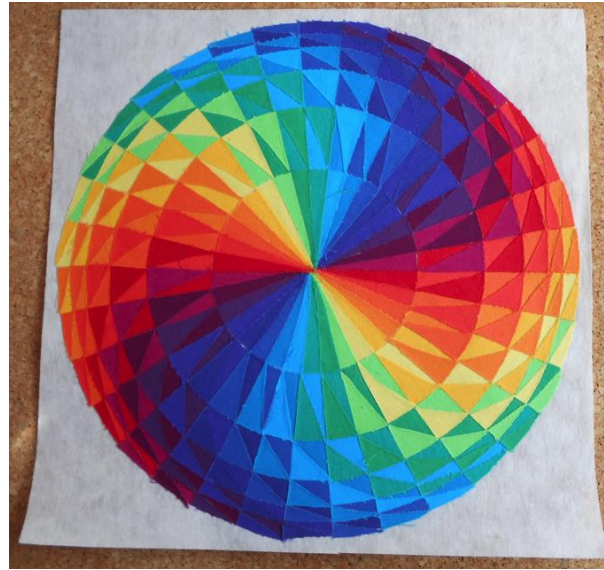
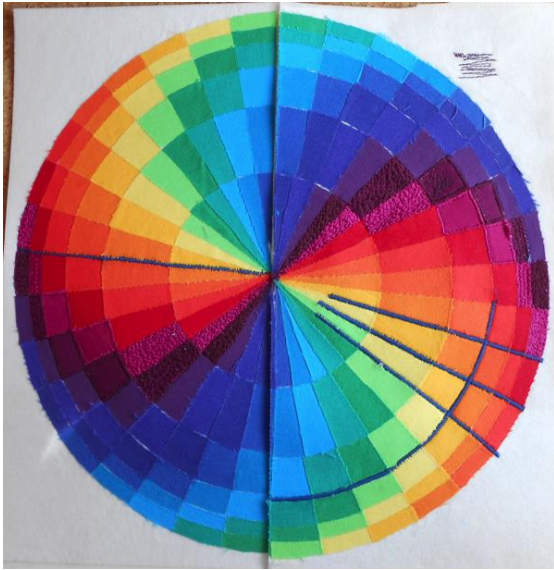


Left –
2004 - Toblercone Rings - 34 rays - a Fibonacci number, & same width rings



Right –
2004 - Toblercone Rays - 34 x regular 3D rays (68 strips) & regular width rings

2014 - Circular grids – more layouts



Mini bonded blocks based on 2004 Fibonacci Rings for Festival Of Quilts

Left – first stage -whole segments to understand the technique and learning how to place the colours so the design rotates

Centre – second stage - the spirals go anti clockwise, but the bottom heavy & top heavy triangle spirals are fairly close to each other

Right – second stage – the top heavy triangles rotate clockwise, bottom heavy triangles radiate from the centre in straight rays **There are 100's of permutations**

2003 & 2019 – Trinity Three



- I'd made the red spiral panel in 2003 and pinned the layers together, but I was unhappy with the colours in the triangular area in the centre between the circle
- The logical **Mathematical Magic** progression meant there was too much orange at the centre, and, the red background was a bit meagre (I'd run out of the fabric)
- So I put it aside to do other work, until a last minute decision to enter it in a competition at the Festival Of Quilts in 2019, when I added on the dramatic border

2006 & 2019 - Trinity Three

- My quilt on display in **The Festival of Quilts' Art Quilt** competition category
- **The solution to the centre triangle** – reintroduce some red backing fabric to pull the orange and other colours together



TRINITY FOUR
3 SPIRALLING RAYS ON 4 CIRCLES
JOINED ON EDGES OF SEGMENTS

© AR Madan 28/11/19

JOINS PUSHING IN REFLECTED DIRECTION
LIKE BREAST STROKE
2 CLOCKWISE & 2 ANTICLOCKWISE CIRCLES
12 COLOURS X 3 RAYS

4x9 cols

4x9 cols

What next? Quads?

- What if I use four spirals?
- What possibilities will that provide?
- How many ways can I link the circular grids to one another?

QUAD 4-1
4 SPIRALLING RAYS ON 4 CIRCLES

© AR Madan 28/11/19

4 SPIRALS JOINED SEGMENT TO SEGMENT ON LIGHT RED

4x9 cols

JOINS PUSHING IN (SAME) DIRECTION
LIKE A BREAST STROKE
2 CLOCKWISE & 2 ANTICLOCKWISE (SPIRALS) CIRCLES

4x9 cols

- Left top – Trinity Four – 3 spirals on 4 rings
- Left bottom – Quad Four v 1 – 4 spirals - 2 each anti/clockwise circles
- Right top – Quad 4 Four v 2 - 4 clockwise
- Right bottom – Quad 4 Four v 3 - 4 anti clockwise circles

QUAD 4-2
4 SPIRALLING RAYS ON 4 CIRCLES

© AR Madan 28/11/19

GROUPS OF FOUR TETRAID, QUINQUEFOID, SEXTA, OUBLET, SEPTA, OCTA, NONA, DECA, UNDECA, DODECA (4 STARS)

4 SPIRALS JOINED SEGMENT TO SEGMENT ON LIGHT RED

4x9 cols

JOINS PUSHING IN OPPOSITE DIRECTIONS
4 CLOCKWISE SPIRALS/CIRCLES

QUAD 4-3
4 SPIRALLING RAYS ON 4 CIRCLES

© AR Madan 28/11/19

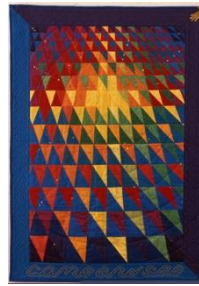
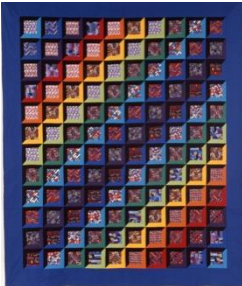
4 SPIRALS JOINED ON SEGMENT EDGES ON YELLOW

4x9 cols

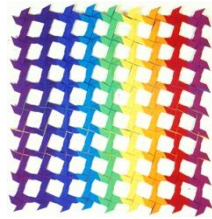
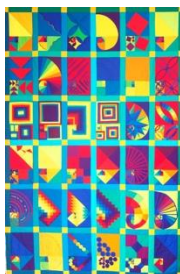
JOINS PUSHING TOGETHER
4 ANTICLOCKWISE SPIRALS

Even more spirals- where can it go?

- In the future – what about five circles?
- Or six, or seven.....
- How many spirals – the rays within the circle?
- Other colourways – or a more monotone approach?
- Other 3D shapes – **Infinity** as a 3D mobius piece?
- I want to re-explore my colouring system, do a book, have an exhibition on it so much to discover!



Starts above - 1976 ...
and
... ends below - 2017



Thank you for coming

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