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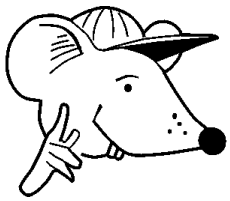
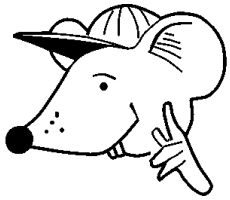


MATHEMATICS



N.S. Yr. 5 P.79

Solve problems, recognise patterns, generalise and predict.

Equipment

Paper, pencil, card, ruler, scissors, (cubes, squared paper).

MathSphere

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Concepts

This module is concerned with investigating a whole range of problems of increasing complexity involving number and shape and being able to recognise and explain patterns. Children should then be able to extend the ideas presented and use these to make predictions and ask 'What if....?' questions.

Problems may appear in many forms such as the following:

Choose from a set of numbers the numbers that satisfy a certain condition.

Arrange a given number of 2-D and 3-D objects in pre-defined patterns such as squares into certain shaped rectangles.

Filling in missing digits in a sum.

Sorting numbers using their properties.

Dividing up shapes according to a given rule.

Children should increasingly be able to extend the ideas of a particular problem by adding their own ideas. They should not think of these problems as closed (i.e. with only one possible answer), but should be prepared to spend time on each one, developing possibilities within it.

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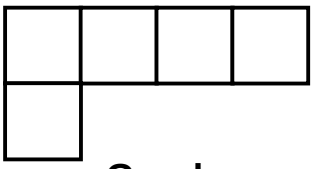
Think about these problems as 'starters'. Once you have solved the problem in the question, see if you can find other problems that are similar and solve them.

1. Find three consecutive numbers in the three times table that have a product of **648**.

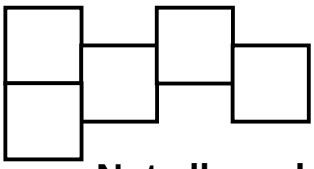
2. Find three consecutive numbers that have a sum of **195**.

Can you also find three consecutive numbers in the **five** times table that have a sum of **195** ?

3. Cut out five squares and arrange them into a shape so that one edge touches another edge completely. Here is an example:



Good



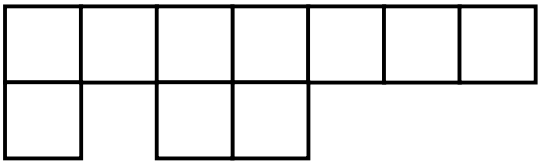
Not allowed

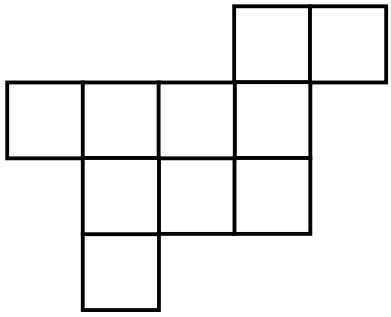
These shapes are called **pentominoes**.

Can you find different ways of doing this?

What shapes can you make by putting two pentominoes together?

Draw two pentominoes joined together and ask a friend to draw the dividing line. Here are two shapes you could try:





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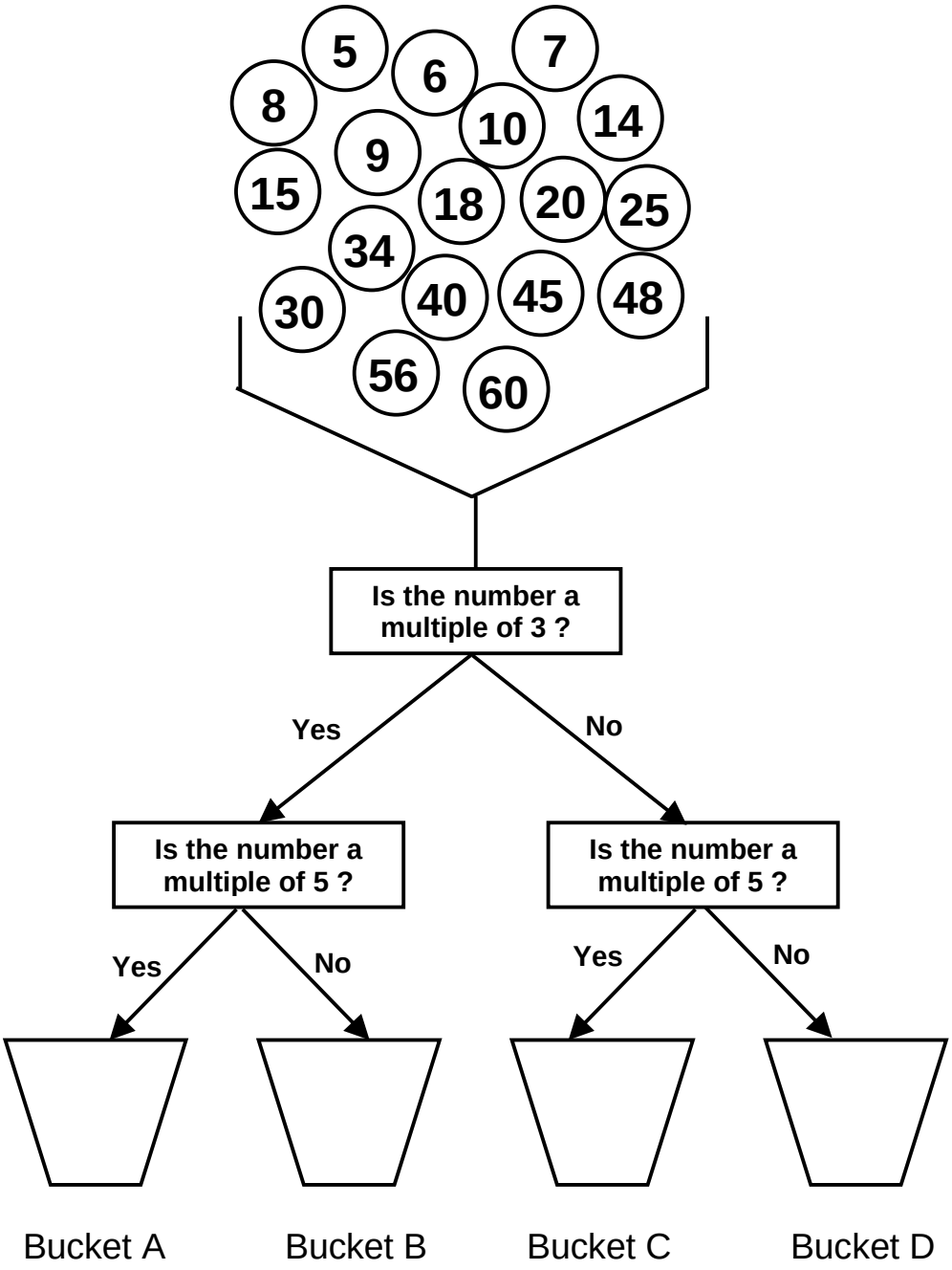
1. Here is a diagram called a 'Binary Tree'. It is used to sort numbers.

Put the numbers in at the top one by one and write the numbers in the buckets as they come out of the bottom.



Can you make up your own binary tree? Try it with your friends.

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1. Eratosthenes was a Greek mathematician who lived about 2 200 years ago. He found the size of the Earth and produced what we call 'The Sieve of Eratosthenes'.

Here it is for you to try:

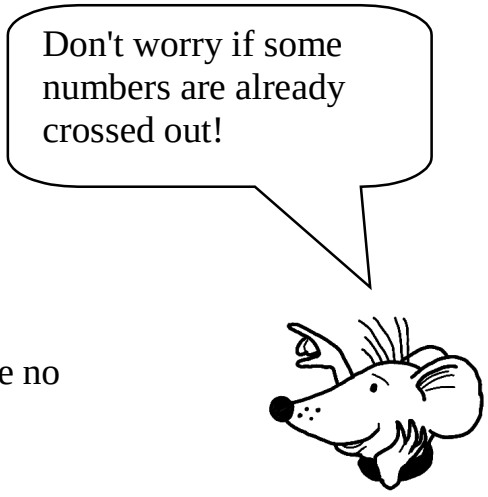
Start with a 100 number square.

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

Cross out all the multiples of 2 except 2 (4, 6, 8, 10, 12 etc).

Cross out all the multiples of 3 except 3 (6, 9, 12, 15 etc)

Cross out all the multiples of 5 except 5 (5, 10, 15, 20 etc)



Keep doing this with tables up to 10, until there are no more numbers to cross out.

Why do you not need to cross out multiples of 4 ?

What numbers are you left with? What is special about them?

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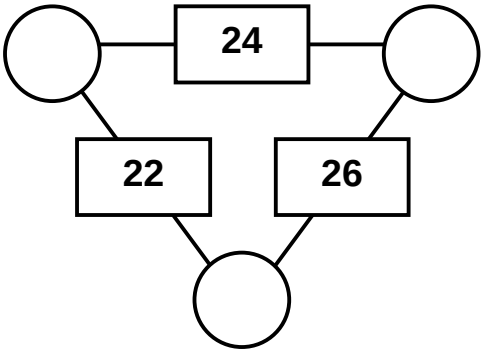
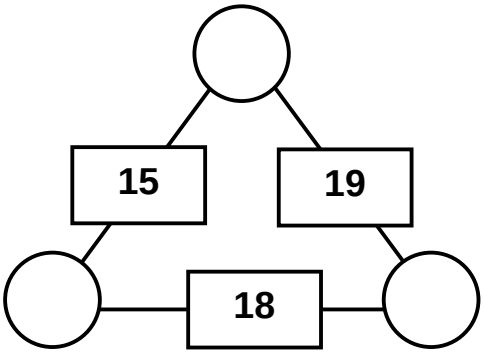
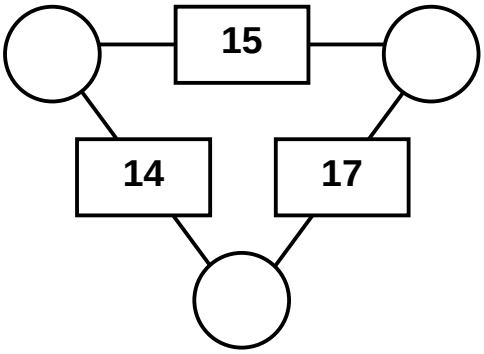
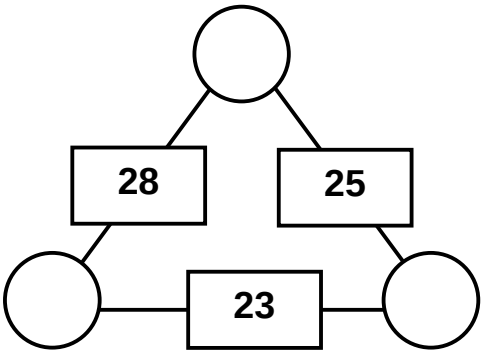
1. Here are some triangular grids. Put a number in each of the circles.
The numbers in the circles on either side of the rectangles must add up to the number in the rectangle.









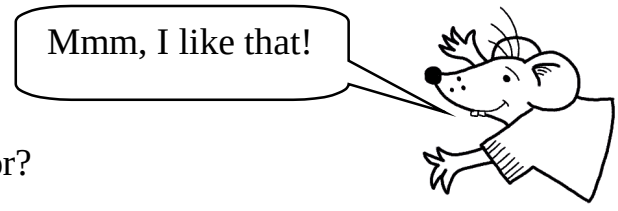
2. The symbol @ represents a missing number. Write the missing numbers to make these statements true.

a) **23 × 4@ = 1104** b) **@@ × 5@ = 3942**

c) **$(@@)^2$ = 79@@** d) **$(@@)^3$ = 103 823**

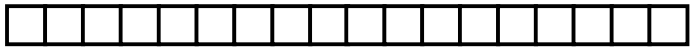
3. In this question the letter **m** represents the same digit throughout the question.

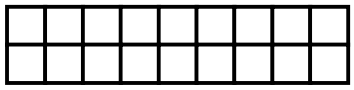
mmm × mm = 43 956

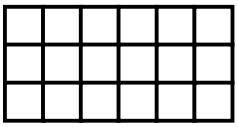


What digit does the letter **m** stand for?

1. If you have **18** square tiles, you can make three different rectangles like this:







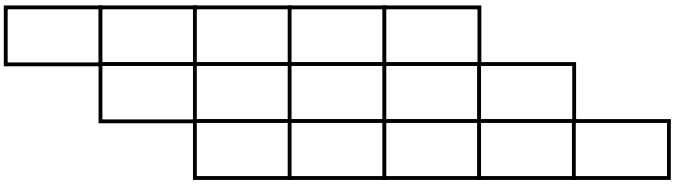
Find out how many rectangles you can make with **4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20, 24, 28, 30, 32** square tiles.

Put your answers in this table:

Number of tiles	Number of different rectangles
4	
5	
6	
8	
10	
12	
14	
15	
16	
18	3
20	
24	
28	
30	
32	

Why do you think some numbers make more different rectangles than others?

2. How many different rectangles are there in this diagram?



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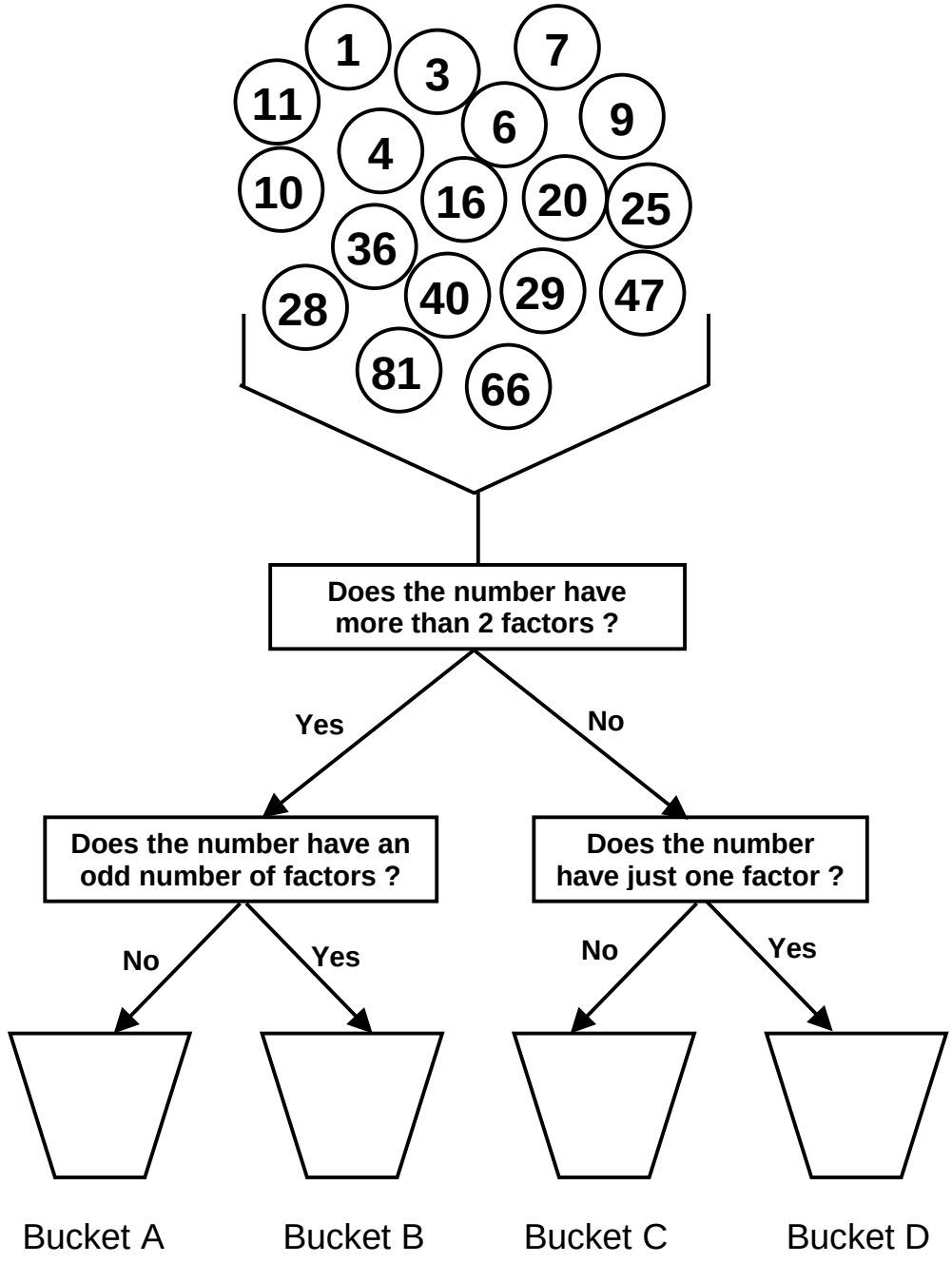

What type of numbers fall into each bucket?

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Answers

Page 3

1. $6 \times 9 \times 12$

2. $64 + 65 + 66$ $60 + 65 + 70$

3. There are twelve different pentominoes. Children will arrange them in many different combinations.

Page 4

1. Bucket A: 15, 30, 45, 60 (Multiples of 15 or multiples of 3 and 5)
Bucket B: 6, 9, 18, 48 (Multiples of 3, but not of 5)
Bucket C: 5, 10, 20, 25, 40 (Multiples of 5, but not of 3)
Bucket D: 7, 8, 14, 34, 56 (Other numbers not satisfying any of the above)

Page 5

1. You do not need to cross out multiples of 4 because they have already been crossed out with the multiples of 2. This applies to other multiples (e.g. multiples of 6 have been crossed out with multiples of 2 and 3)

The following numbers should be left:

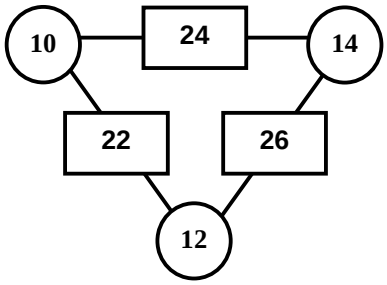
1. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

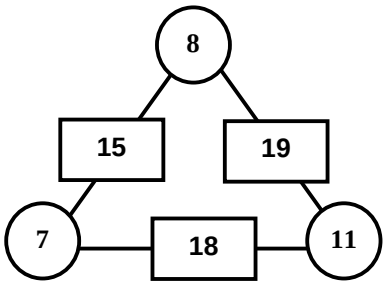
With the exception of 1, all these are prime numbers.

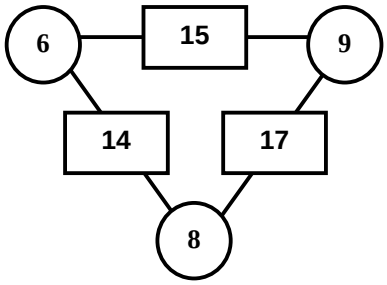
Answers (Contd)

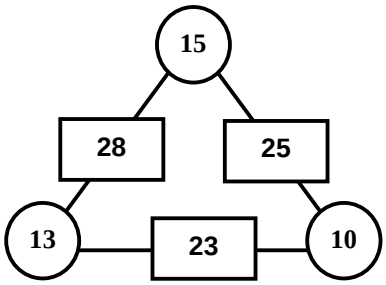
Page 6

1.









2. **a.** $23 \times 48 = 1104$ **b.** $73 \times 54 = 3942$
c. $(89)^2 = 7921$ **d.** $(47)^3 = 103\,823$

3. 666×66 so m = 6

Page 7

1.

4	**2**
5	**1**
6	**2**
8	**2**
10	**2**
12	**3**
14	**2**
15	**2**
16	**3**
18	**3**
20	**3**
24	**4**
28	**3**
30	**4**
32	**3**

Some numbers make more rectangles because they have more combinations of factors.

2. There are **69** different rectangles.

Answers (Contd)

Page 8

Bucket A: 6, 10, 20, 28, 40, 66 (Numbers not satisfying any of the descriptions below)
Bucket B: 4, 9, 16, 25, 36, 81 (Square numbers)
Bucket C: 3, 7, 11, 29, 47 (Prime Numbers)
Bucket D: 1 (The only number with one factor)