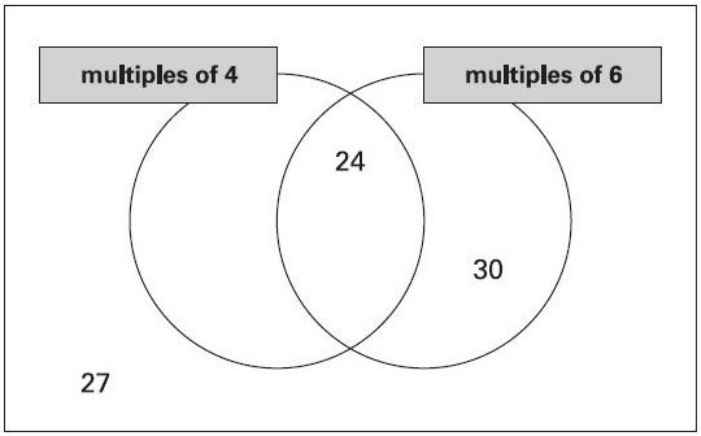
Maths Reasoning Questions – Multiplication: Number sequences, factors and highest common factors.

- Follow this explanation to help you complete missing number sequences
- What are factors?
- Watch this video: What is a common factor?

Worked example:

Write these numbers in the correct places on this sorting diagram.

16 26 36

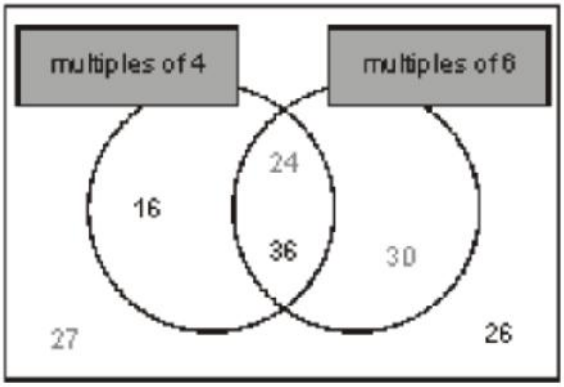


- We are being asked to place the numbers in the correct sections of the Venn diagram.
- They are titled, 'multiples of 4' and 'multiples of 6'
- To know which section the numbers must go into I need to know my multiples of 4 and multiples of 6. It would be a good idea to list the multiples of both numbers.

Multiples of four: 4, 8, 12, **16**, 20, 24, 28, 32, **36**, 40

Multiples of six: 6, 12, 18, 24, 30, **36**, 42.

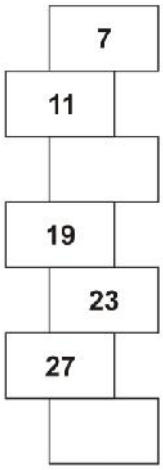
- Because 16 is in the multiples of four list, it must go in that section.
- 26 is in neither list, so must be placed outside the circles.
- 36 is in both list so it must go in the middle.



Warming up*

1.

Complete this sequence.



2.

Write **all** the **multiples** of **3** that are greater than **10** and smaller than **20**.

3.

Continue the number sequence in **both** directions.

4.

John says,

'Every multiple of 5 ends in 5'

Is he correct?

Circle Yes or No.

Yes / No

Explain how you know.

.....

.....

.....

Feeling more confident**

1.

Here are four number cards.

Which two number cards are **factors of 42**?

2.

Write in the missing numbers in this multiplication grid.

×	5		
4	20	36	32
	35	63	56
	30	54	48

3.

Circle all the **multiples of 8** in this list of numbers.

18 32 56 68 72

4.

The numbers in this sequence increase by 3 each time.

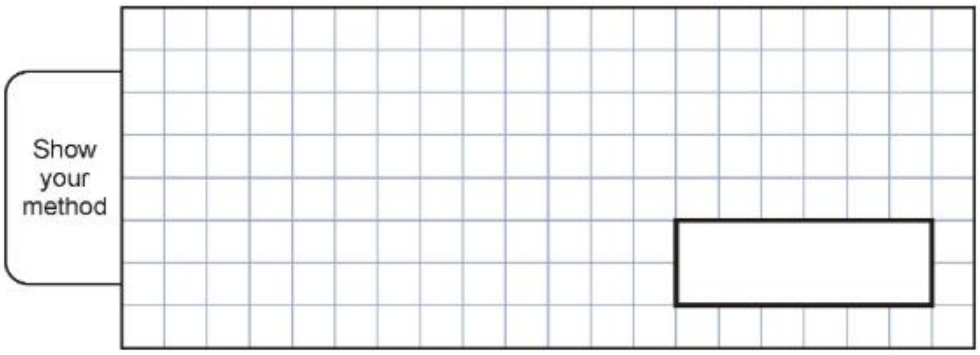
3 6 9 12 . . .

The numbers in this sequence increase by 5 each time.

5 10 15 20 . . .

Both sequences continue.

Write a number **greater than 100** which will be in **both** sequences.

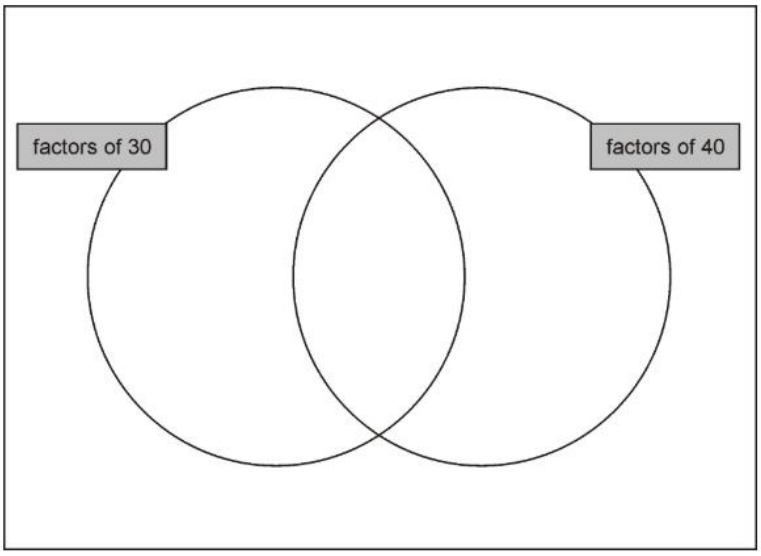


Ready for a challenge***

1.

Write these numbers in the correct places on the diagram.

5 **6** **7** **8**



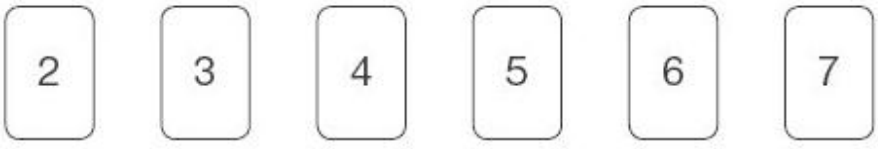
2.

Write all the factors of 30 which are **also** factors of 20

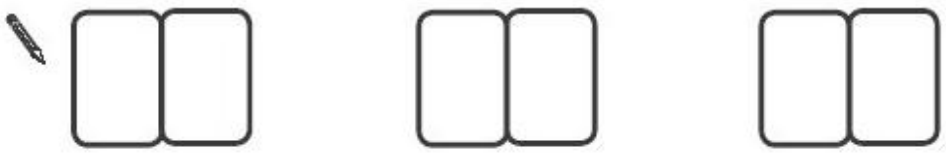
.....

3.

Here are six digit cards.



Use **all six** digit cards to make three multiples of 3



4.

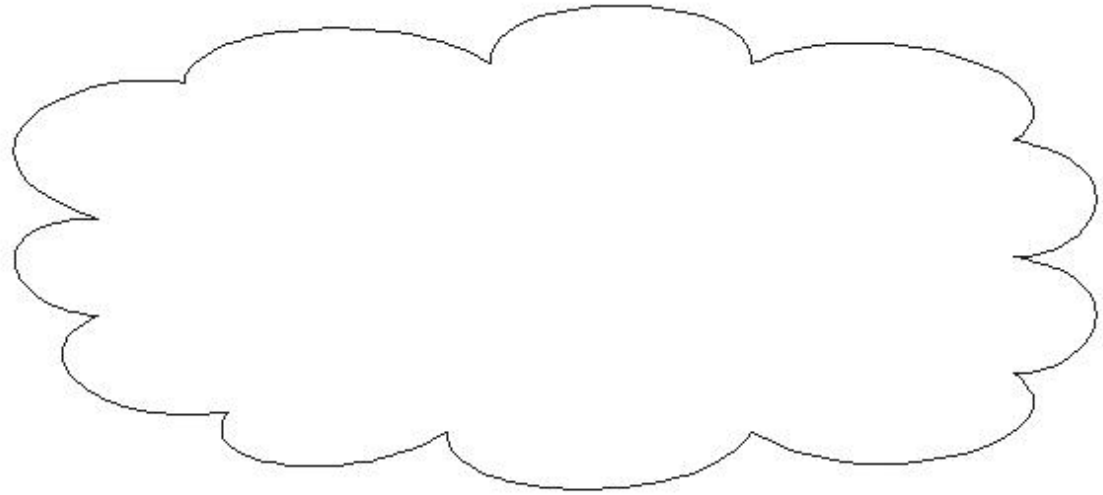
Here is a sorting diagram with four sections, **A**, **B**, **C** and **D**.

	multiple of 10	not a multiple of 10
multiple of 20	**A**	**B**
not a multiple of 20	**C**	**D**

Write a number that could go in section **C.**

Section **B** can never have any numbers in it.

Explain why.



Answers

Warming up*

1.

15, 31

Both correct for 1 mark.

2.

12 15 18

Multiples may be given in any order.

3.

25, 28, 31 on left **and** 43, 46, 49 on right.

All six numbers must be correct for the 2 marks to be awarded.

or

either 25, 28, 31 on left **or** 43, 46, 49 on right

To gain 1 mark either set of numbers must be in the correct order. Write 1 or 2 for score for question 7.

4.

An explanation which recognises that a multiple of 5 can end in 0 as well as 5, eg

- 'Because 10 is a multiple of 5';
- 'Because it can end in 0;
- 'Because some numbers end in 0'.

No mark is awarded for circling 'No' alone.

***Do not** accept vague or arbitrary answers, eg*

- 'Because not all multiples of 5 end in 5'

If 'Yes' is circled but a correct unambiguous explanation is given, then award the mark.

Feeling more confident**

1.

Cards completed as shown:

3	and	7

Accept answers in either order.

2.

Award **TWO** marks for all four boxes completed correctly as shown:

×	5	9	8
4	20	36	32
7	35	63	56
6	30	54	48

3.

All three numbers circled as shown:

18 (32) (56) 68 (72)

4.

Award **TWO** marks for a multiple of 15 which is greater than 100, eg

105 **OR** 120 **OR** 135 **OR** 150 **OR** 300

Accept more than one answer if all are correct.

If the answer is incorrect, award **ONE** mark for evidence of appropriate method eg:

*Accept for **ONE** mark 30, 45, 60, 75 **OR** 90*

- 90 93 96 99 102 105 108 …
  90 95 100 105 110 115 …
  ← *Not spotting matching number (105)*
- 90 93 96 98 101 104 107 (110) …
  90 95 100 105 (110) 115 …
  ← *One step size incorrect (96 tc 98)*
- 15 30 45 60 75 80 95 110 (125)
  ← *One step size incorrect (75 tc 80)*
- 3 × 5 × 20
  OR
  15 × 10
  ← *Multiple greater than 100 but not calculated*

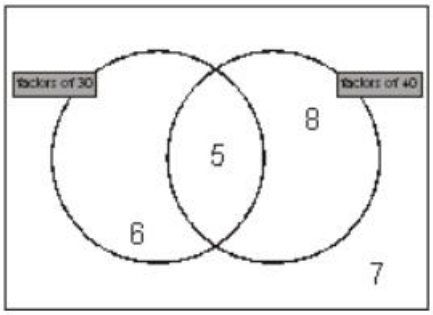
*Answer need not be obtained for the award of **ONE** mark.*

Up to 2

Ready for a challenge***

1.

Award **TWO** marks for numbers written in the correct regions as shown:



2.

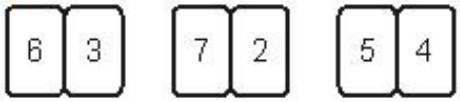
Award **TWO** marks for all four factors, as shown:

1, 2, 5, 10

3.

Three multiples of 3, eg:

OR



Multiples may be given in any order.
*Digits may be in either order, eg 24 **OR** 42*
***Do not** accept digits used more than once.*
***Do not** accept digits other than those shown.*

4.

Any odd numbered multiple of 10, ie 10 **OR** 30 **OR** 50 **OR** 70 **OR** 90 **OR** any number ending with any of the pairs of digits above.

An explanation which recognises that all multiples of 20 are also multiples of 10, eg:

- 'Because all the numbers in the 20 times table are also in the 10 times table'
- 'Because all multiples of 20 are multiples of 10'
- 'Because 20 is in the 10 times table'
- 'All multiples of 20 go in box A because 10 goes into them'
- '20 is a multiple of both 20 and 10, and so is 40, 60, etc'
- 'Because if it's not a multiple of 10, it can't be a multiple of 20'
- 'Because if it is a multiple of 20, it has to be a multiple of 10'
- 'Because 10 is a factor of 20'.