

## Multiplication grid

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

## Abundant Numbers

An **abundant number** (or **excessive** number) is a positive number which is less than the sum of its factors (not including the number itself).

For example:

The number 12 is the first abundant number: its factors are 1, 2, 3, 4 and 6 for a total of 16. This total of 16 is greater than the number itself (12), so 12 is an abundant number.

1. Can you find some more abundant numbers? Will you begin to use a system or search at random?
2. Look carefully at any abundant numbers you find... Can you begin to make any generalisations about these numbers? Do they follow a rule or pattern of any sort?
3. How many abundant numbers  $<100$  are there?
4. Investigate prime numbers – are any of these abundant numbers?
5. Do you predict whether there will be any odd abundant numbers? Try a few for yourself, then ask your teacher for a hint...

Finished everything?! Ask your teacher for Challenge 2....

## Design your bedroom at Hogwarts Castle

Choose items from the following:

Single bed 90cm wide, 2m long, 60cm high

Cabin bed 2.1m long, 90cm wide, 1m high

4 poster bed 1.5m wide, 1.9m long, 2m high

Trunk 90cm wide, 50cm tall, 40cm wide

Owl's cage 90cm tall, 40cm wide, 40cm deep

Box of potions 30cm by 20cm by 20cm

Desk 80cm tall, 1.2m wide, 70cm deep

Spells book 50cm tall, 30cm wide, 10cm deep

Flat screen TV 1m wide, 60cm tall and 10cm deep

Mini TV 30cm by 20cm by 10cm

CD player 40cm by 20cm by 20cm

Cube seat, 40cm by 40cm by 40cm

Video console 30cm by 20cm by 10cm.

Wardrobe, 80cm wide, by 1.2m tall and 50cm deep.

Chest of drawers 80cm wide, 80cm tall, 40cm deep.

Bedside drawers 50cm wide, 40cm deep, 60cm tall.

## Goldbach's conjecture

Christian Goldbach (1690 – 1764) thought that every even number greater than 4 could be made by adding two prime numbers, but he couldn't prove it. This is known as Goldbach's conjecture.

Centuries later, mathematicians all over the world are still trying to prove or disprove this conjecture.

List the prime numbers up to 50: 2, 3, 5, ...

Find pairs of prime numbers which add to make even numbers in the table. Do you think Goldbach's conjecture might be true or not?

Even numbers	Pairs of prime numbers	Even numbers	Pairs of prime numbers
6	3 + 3	22	
8		24	
10		26	
12		28	
14		30	
16		32	
18		34	
20		36	

# Rates

## Sheet 1

1. A space hopper champion can hop 3 metres every second. How far can be hopped in 30 seconds? In a minute?
2. A record holder can pop 5 balloons every second with a nail. How many balloons will be popped in 30 seconds? In a minute?
3. A food record challenger can eat a sugared doughnut in 30 seconds. How many could be eaten in 5 minutes? In 10 minutes?
4. A professional typist can type 60 words per minute. How many words could be typed in 30 seconds? In 10 minutes?
5. A tea lover drinks tea at the rate of 9 cups a day. How many cups are drunk in a week? A month? A year?!
6. A book lover reads 20 pages an hour. How long will it take to finish a 240 page book?
7. A person working in a supermarket is paid £6.50 per hour. How much will they earn in 8 hours?
8. A hot air balloon is gently descending at the rate of 20 metres per minute. If it is 600m above the ground, how long will it take to reach the ground?

# Rates

## Sheet 2

Look at the following world records. Work with a partner to calculate the rate they had to aim for to achieve these records, e.g. number of balloons per second, or metres hopped per second.

1. The record for the number of sugared doughnuts eaten without licking lips is 6 in 3 minutes.
2. The record for popping 200 balloons with a nail is 37.25s.
3. The record for jumping 100m on a space hopper is 30.2s
4. Most tosses of a pancake in one minute is 140.
5. The most pizzas made in one hour is 206.
6. The greatest distance paddled on a lake in 24 hours is 151.87 miles.

(Records are being broken all the time; some of these may have been broken already!)