



## Puzzle time



### 20 Golden rings

King Ratticus was coming up to his 20<sup>th</sup> birthday. He decided he wanted a special treat so he called for Goldie, his goldsmith, who could make anything out of gold.

"Goldie, I want you to make me 20 gold rings, one for each year of my life, to fit on my fingers and toes. Oh, and by the way, see Queen Ratticus for payment."

Goldie went away and made the 20 gold rings. He then went to see the Queen for payment.

"Well, Goldie, they are excellent, but how much will they cost?" asked the Queen.

"My dear Queen, they are not cheap!" said Goldie, "they are one million pounds in all....or you could pay £1 for the first ring, £2 for the second, £4 for the third, £8 for the fourth and so on, doubling the cost for each ring."

"I can't afford a million pounds," said the queen, "so I will pay by the second way, it will be much cheaper!"

**Was she right ?**

**Did she save money or not?**

**How much did it cost her?**



## Puzzle time

### 20 Golden rings - answers

Queen Ratticus can really cause some confusion - even if you use a calculator. Remember, the queen could have paid one million pounds or £1 for the first, doubling each time. The second method works out like this:

Cost of each ring:

1. £1
2. £2
3. £4
4. £8
5. £16
6. £32
7. £64
8. £128
9. £256
10. £512
11. £1 024
12. £2 048
13. £4 096
14. £8 192
15. £16 384
16. £32 768
17. £65 536
18. £131 072
19. £262 144
20. £524 288

↖  
Not the answer!!

Now, the trick here is to add up the total for 20 rings - quite a challenge and it is also easy to forget to do!!  
But there is a quick way of finding the total .....



Helpful hint: to add up the total, take the last number, double it and then subtract 1.

eg to add  $1 + 2 + 4 + 8$ , double 8 which is 16, subtract 1 which leaves 15.

So.... the total for 20 rings is £525288 doubled which is £1 048 576, subtract 1, which is:

**£1 048 575.** ← the answer

So.... Queen Ratticus paid £48 575 more by paying the second way!