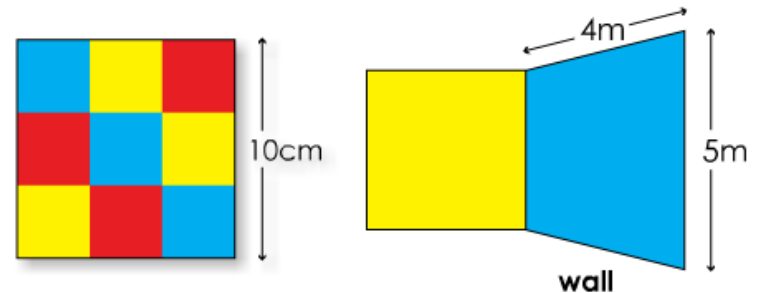


# 22 challenging investigation cards for KS2

If Gareth had scored three more goals in the tournament his mean would have been 4 goals. If he had scored three goals less his mean would have been 3 goals.  
How many goals did Gareth score and how many games were there in the tournament?



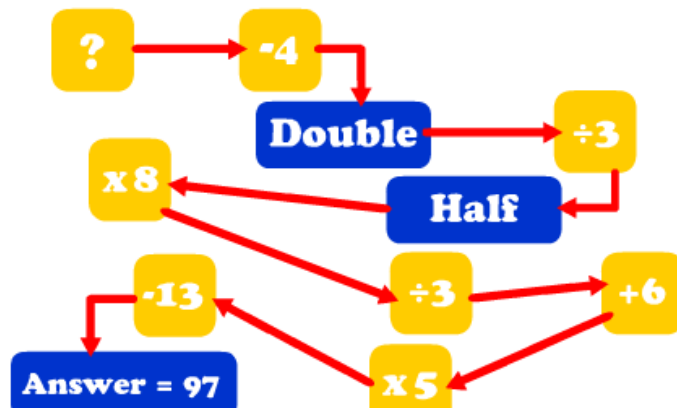
How many square tiles of side **10cm** are needed to tile a wall **4 metres** by **5 metres**?



tile

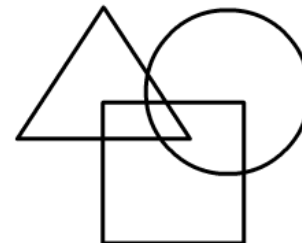
wall

What was the input of this number machine?



Put the numbers 1 to 12 in the diagram.

- Odd numbers must go into the triangle.
- Even numbers must go into the circle.
- Multiples of 3 must go into the square



# Challenge card 1

---

**Which digit does not appear in the powers of 2 up to  $2^{14}$ ?**



- Challenge card 1 answer

7

# Challenge card 2

---

**A boy and girl sit on a bench. “I’m a boy,” said the child with black hair. “I’m a girl”, said the child with red hair. If at least one of the children is lying, which is which?**



# Challenge card 2 answer

The black-haired child is the girl, and the red-haired child is the boy.

If at least one of the children is lying, then both must be lying, or else there would have to be 2 boys or 2 girls sitting on the bench.



# Challenge card 3

---

There are 26 pupils in a primary school class and each of them has a little numbered cupboard in one long row. Initially every cupboard is closed. The first pupil walks along the row of cupboards and opens every one. Then the second pupil comes and he closes every cupboard with an even number on it. Then the third pupil comes and he changes every cupboard which is a multiple of 3 (if the cupboard is closed he opens it, and if the cupboard is open he closes it). Pupil 4 does the same to the cupboards that are multiples of 4, and so on until every pupil has walked along the corridor.

How many cupboards are open at the end?

Can you list the ones that are open?



# Challenge card 3

---

**5 are open**

**(the square numbers 1, 4, 9, 16, 25).**



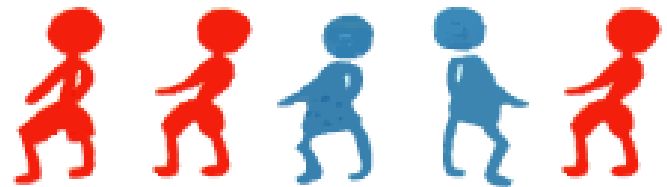
# Challenge card 4

---

**Mary, Nia, Oliver, Peter and Jane stand in a row side by side.**

**(a) In how many ways can they arrange themselves?**

**(b) In how many ways can they arrange themselves if the two boys cannot stand next to each other?**



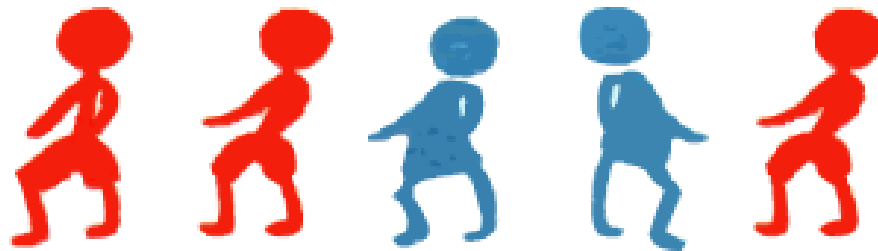


# Challenge card 4

---

**(a)120**

**(b)72**

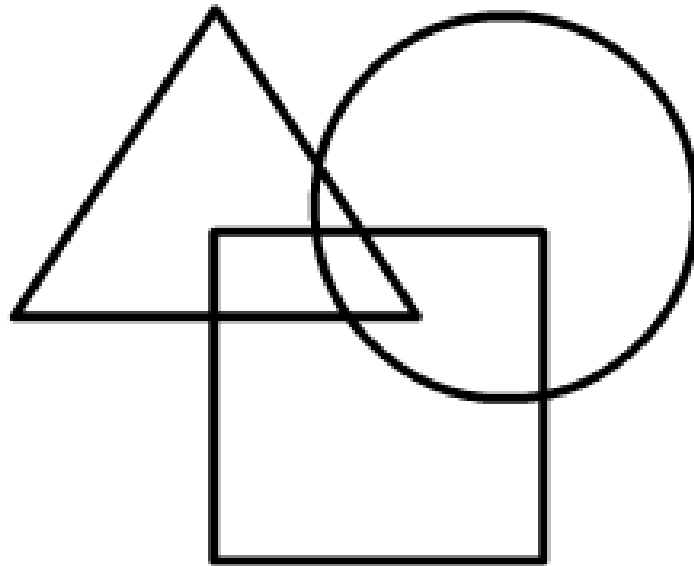


# Challenge card 5

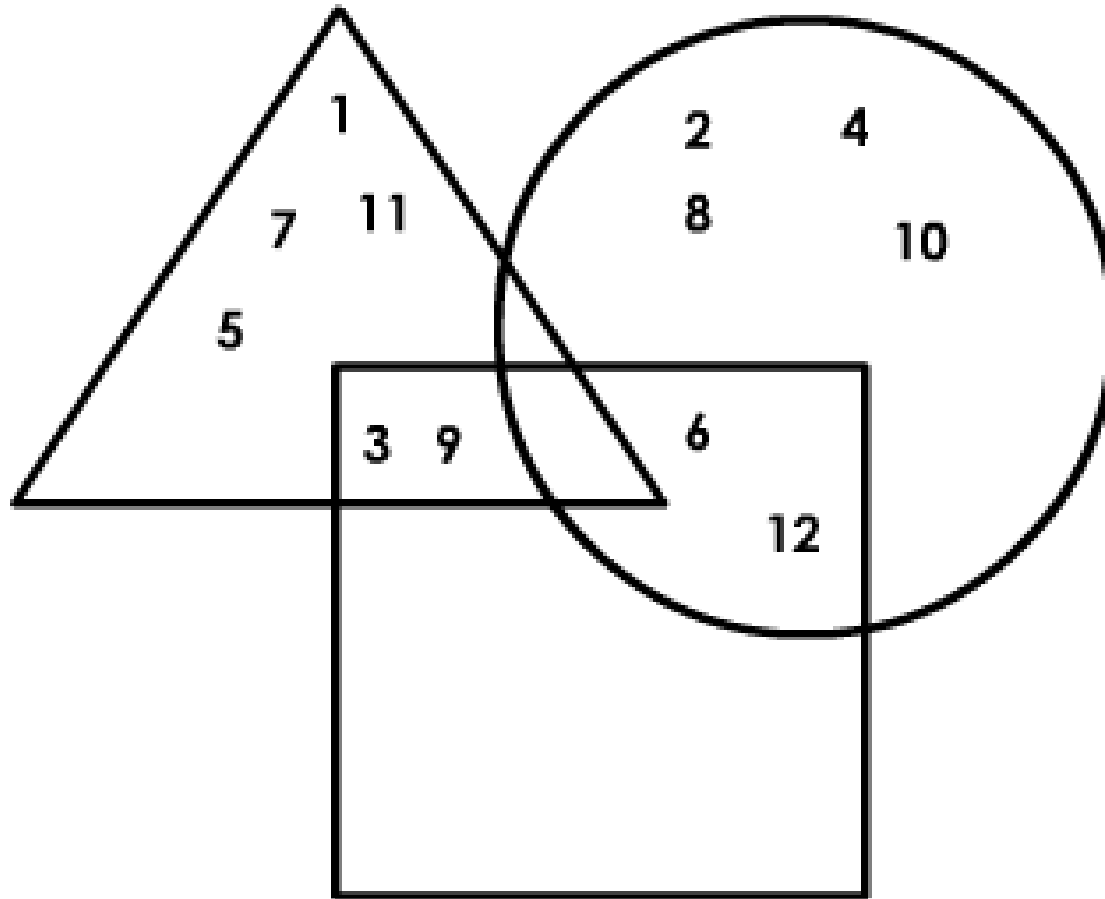
---

Put the numbers 1 to 12 in the diagram.

- Odd numbers must go into the triangle.
- Even numbers must go into the circle.
- Multiples of 3 must go into the square



# Challenge card answer 5



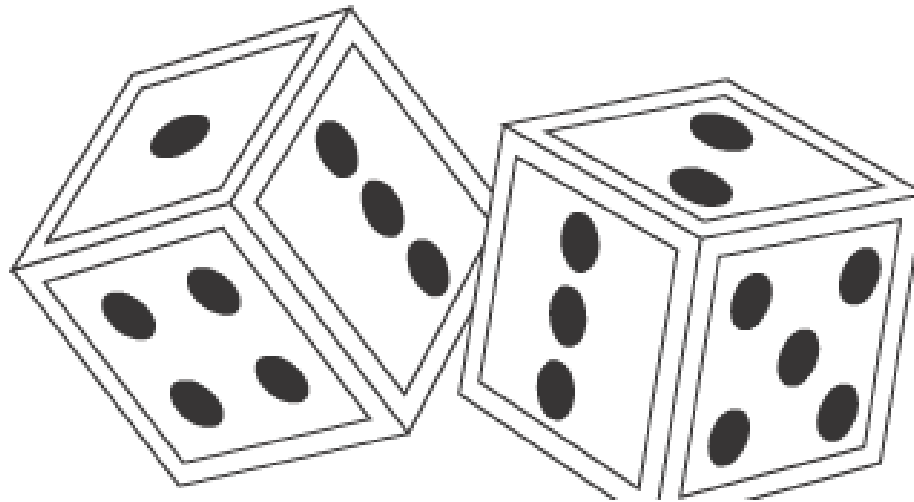
# Challenge card 6

---

Edwin throws two ordinary dice and adds the two numbers on top of the dice to get his score. For example, if the first dice shows 3 and the second dice shows 5, Edwin's score is

$$3 + 5 = 8.$$

What score is Edwin most likely to get?



# Challenge card answer 6

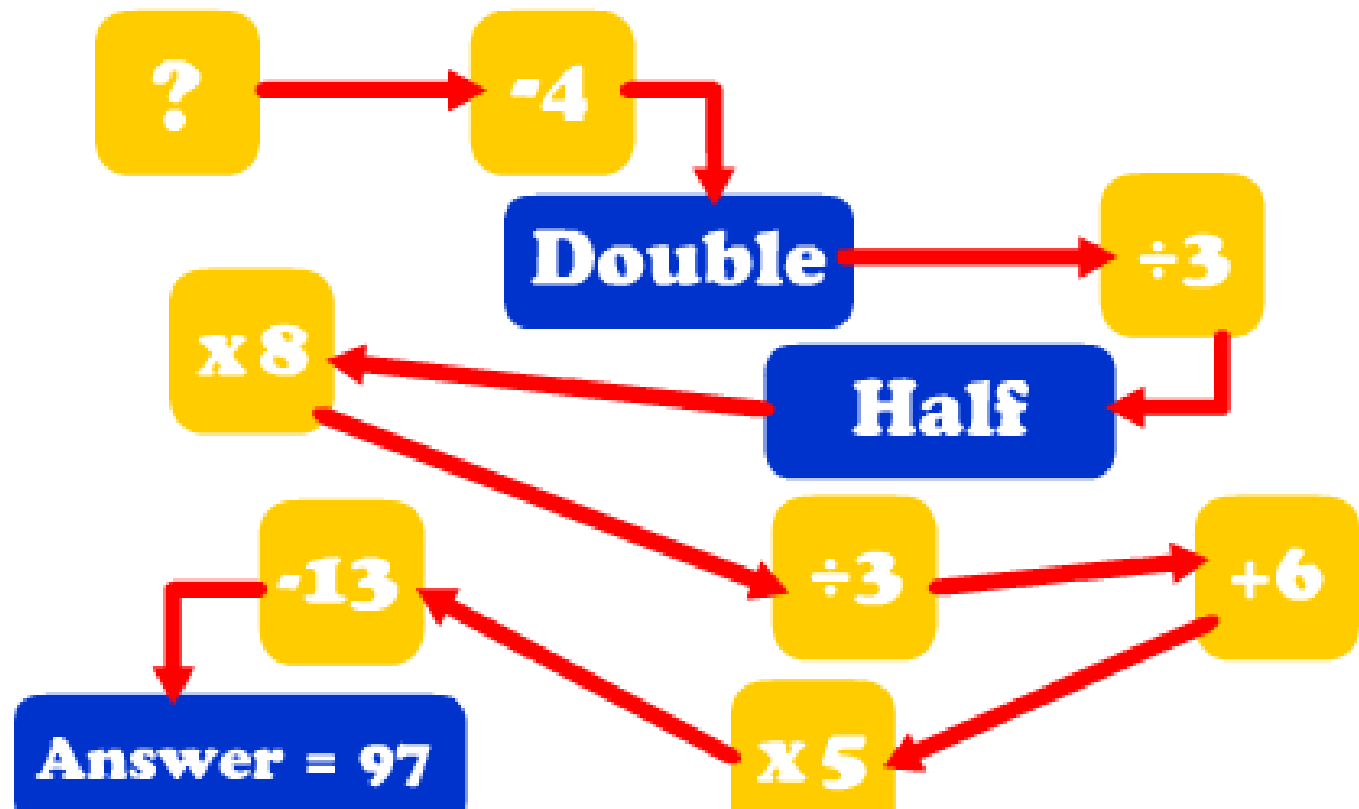
Edwin has more chance of having a score of 7 than any other number. The following table shows the possibilities.

		1st dice					
	+	1	2	3	4	5	6
2nd dice	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

7 appears in the table more than any other number, so 7 is the most likely score.

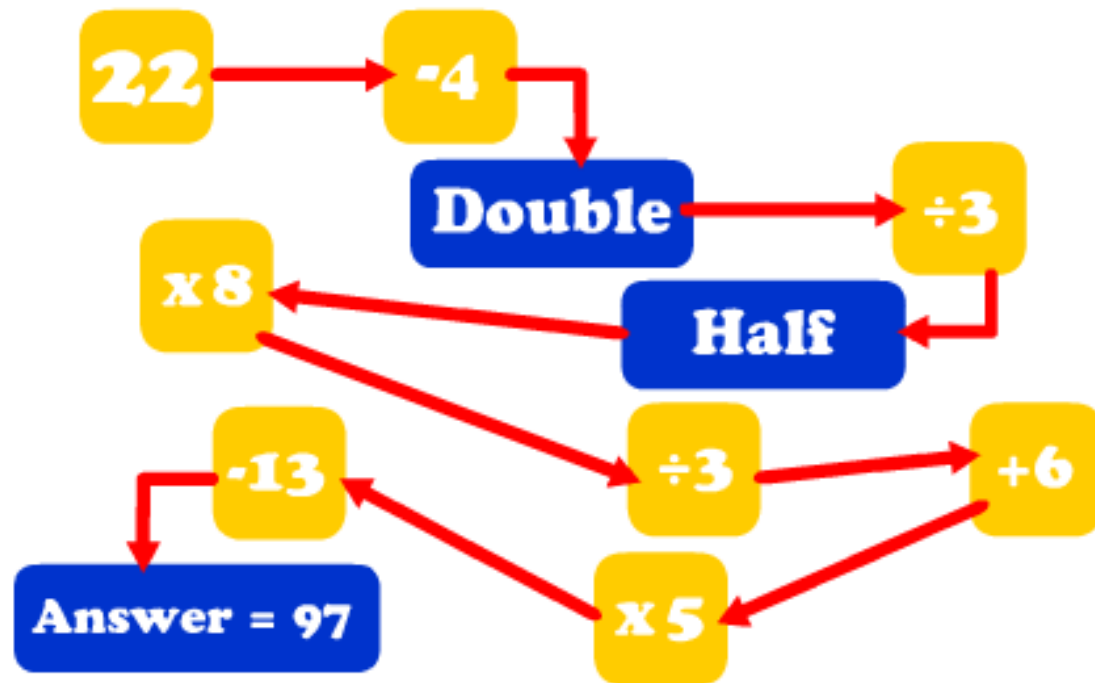
# Challenge card 7

What was the input of this number machine?



# Challenge card answer 7

---



# Challenge card 8

---

**Magic square.**

**Complete the diagram below so that the totals of each row, column and both diagonals are equal.**

<b>2</b>		
	<b>5</b>	
		<b>8</b>



# Challenge card answer 8

---

2	7	6
9	5	1
4	3	8

# Challenge card 9

---

**What is the smallest number that has these three properties?**

- (a) It's a total of five consecutive numbers.**
- (b) It's a total of two consecutive odd numbers.**
- (c) It's a total of three consecutive even numbers.**



# Challenge card answer 9

---

$$60 = 10 + 11 + 12 + 13 + 14$$

$$60 = 29 + 31$$

$$60 = 18 + 20 + 22$$



# Challenge card 10

---

**The final score in a football match was 7-5. How many different half-time scores were possible?**



# Challenge card answer 10

---

48



# Challenge card 11

**Tudor has £3 more than Ivor, but if Ivor had three times more money than he currently has, he would have £3 more than the total of both boys money. How much money does Tudor have?**



# Challenge card answer 11



**Tudor £9, Ivor £6.**

**If Ivor had  $£6 \times 3 = £18$  he would have £3 more than the total of £9 and £6, that is £15.**

# Challenge card 12

---

**If Gareth had scored three more goals in the tournament his mean would have been 4 goals. If he had scored three goals less his mean would have been 3 goals.  
How many goals did Gareth score and how many games were there in the tournament?**





# Challenge card answer 12

---

**21 goals  
6 games**



# Challenge card 13

---

**Seven friends decide to have lunch together today as they are all in town on the same day. Use the following information to decide how many days from now they will next meet to have lunch.**

**Ann goes to town every day.**

**Belinda goes every other day.**

**Ceri goes every third day.**

**Deirdre goes every fourth day.**

**Elaine goes every fifth day.**

**Fiona goes every sixth day.**

**Gwen goes every seventh day.**



# Challenge card answer 13

---

**Lowest Common Multiple.  
In 420 days.**



# Challenge card 14

Two cowboys were arguing about their horses.

You give me one of  
your horses and I'll  
have double the  
amount you've got



No, it would be better if  
you gave me one of  
your horses, then we'll  
have the same number

# Challenge card answer 14

One cowboy had 5 horses, the other had 7 horses.



# Challenge card 15

How many three-digit numbers  
contain only odd numbers?

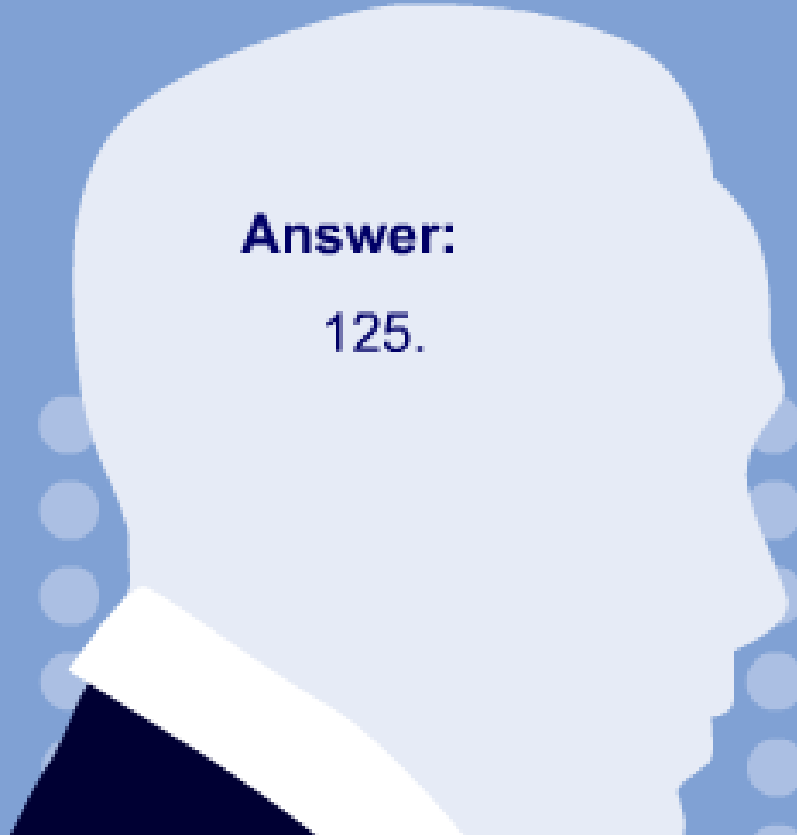


# Challenge card answer 15

How many three-digit numbers  
contain only odd numbers?

**Answer:**

125.



# Challenge card 16

Which is greater: the number of seconds in a week, or the number of minutes in a year?



# Challenge card answer 16

**Number of seconds in a week =  $60 \times 60 \times 24 \times 7 = 604,800$ .**

**Number of minutes in a year =  $60 \times 24 \times 365 = 525,600$ .**

**Therefore there are more seconds in a week.**

# Challenge card 17

On this digital clock the hours and minutes are equal.



It will be **1 hour and 1 minute** before this happens again at **5:05**.  
What is the **least** amount of time between **two** of the times this happens?

# Challenge card answer 17



49 minutes  
(between 12:12 and 1:01).

# Challenge card 18

---



Since my birth I have had a cake to celebrate my birthday with the appropriate number of candles on it, e.g. 10 candles for 10 years old.

Up to now I have blown out 253 candles.

**How old am I?**

# Challenge card answer 18

---



**22**

$(253 = 1 + 2 + \dots + 21 + 22).$

# Challenge card 19

---

Think of a fraction that is equivalent to one-third and uses each of the digits from 1 to 9 once.

# Challenge card answer 19

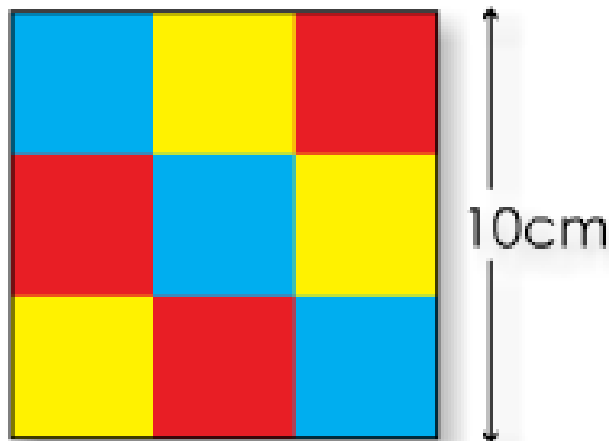
---

Think of a fraction that is equivalent to one-third and uses each of the digits from 1 to 9 once.

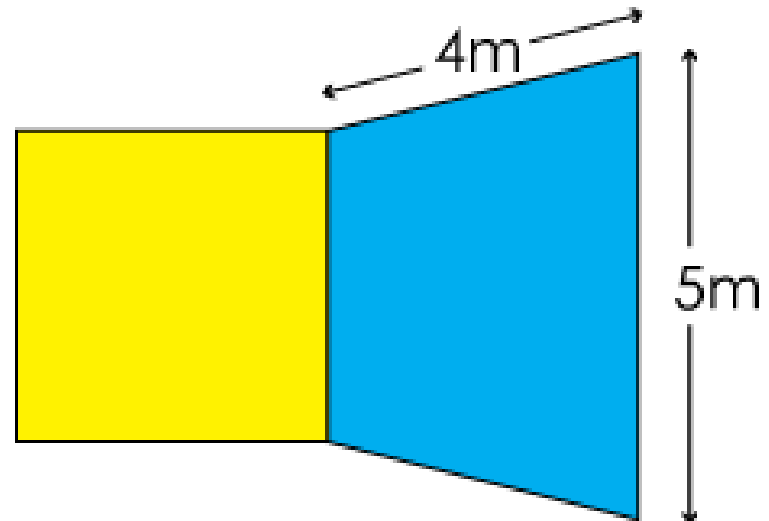
$$\frac{5823}{17469}$$

# Challenge card 20

How many square tiles of side **10cm** are needed to tile a wall **4 metres** by **5 metres**?



tile

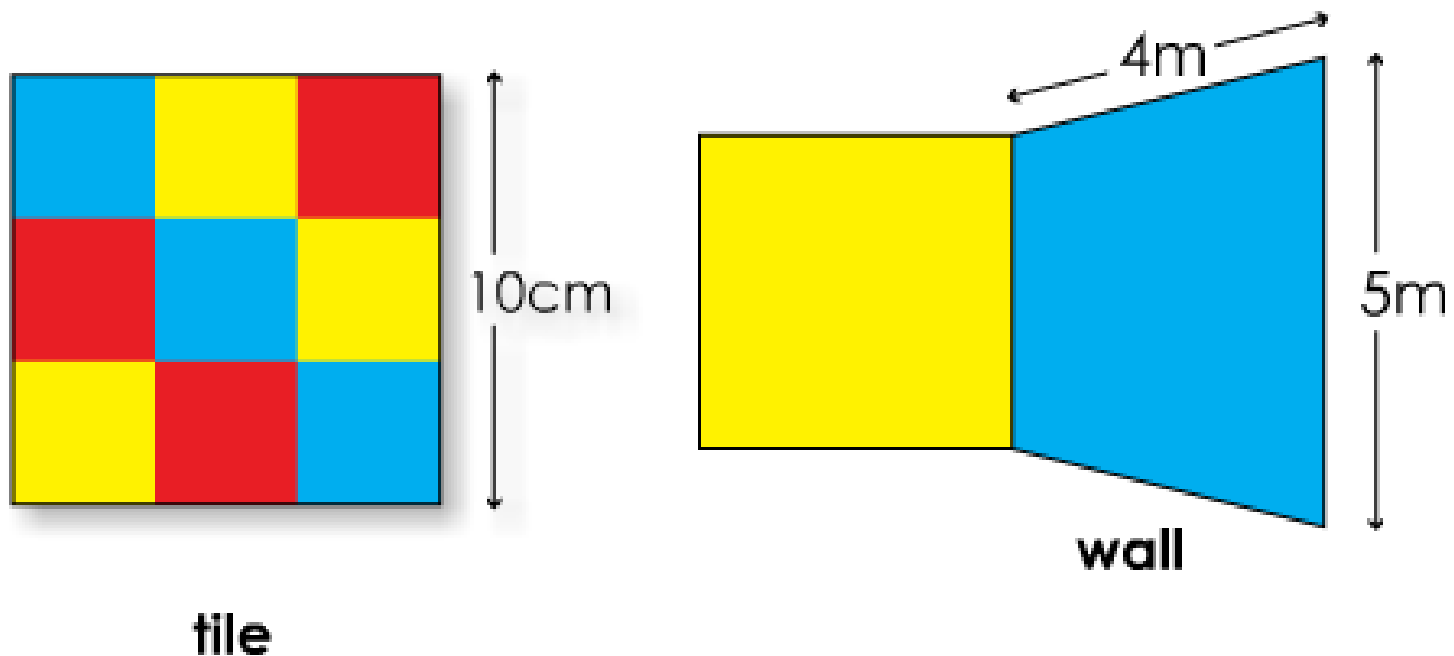


wall



# Challenge card answer 20

How many square tiles of side **10cm** are needed to tile a wall **4 metres** by **5 metres**?



**2000 tiles**

# Challenge card 21

---

**500 people live on a particular island. 4% of them wear one ear-ring, and half the other 96% wear two ear-rings. Nobody else wears any ear-rings. How many ear-rings are worn?**



# Challenge card answer 21

---



$$4\% = 20.$$

$$20 \times 1 = 20 \text{ ear-rings.}$$

Remaining 480.

Half have two ear-rings, so  
there are  $240 \times 2 = 480$   
other ear-rings.

$$\text{Total: } 480 + 20 = 500.$$