

MATHS CHALLENGE CARDS SET A
ANSWER BOOK

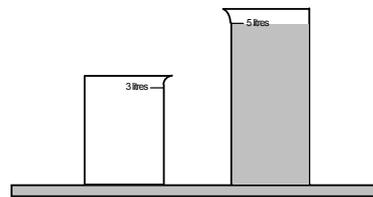
four winds maths

MATHS CHALLENGE CARDS SET A

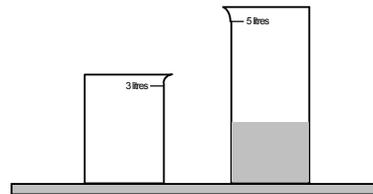
ANSWERS

- 1 You're looking for a number under 20 which gives you a remainder of 1 when you divide it by 2, by 3 or by 4. 13 is the number you're after!
- 2 Bill weighs 10 kg, Judy weighs 30 kg and Samantha weighs 50kg.
- 3 If Basil gives Guy 14 cows, they'll each have 61 cows.
- 4 Here's one way which works :

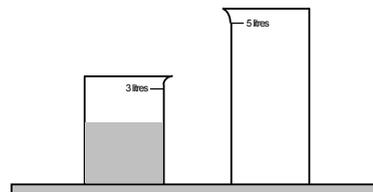
Fill the 5-litre jug.



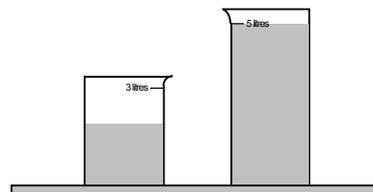
Now pour this liquid into the 3-litre jug, leaving 2 litres behind. Afterwards pour away what's in the 3-litre jug.



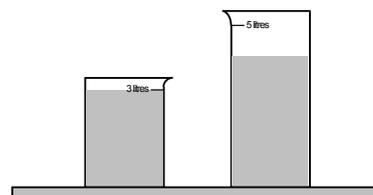
Next, pour your 2 litres of liquid from the 5-litre jug into the 3-litre jug.



Once again, fill up the 5-litre jug.



Next, use the 5-litre jug to top up what's in the 3-litre jug – this will take 1 litre of liquid and will leave 4 litres behind!



5 a 42, 43 b 20, 21, 22 c 17, 18, 19, 20

6 a 5 weeks of course!

b To make things simpler, think of a month as just 4 weeks. We know that the colony reached 8000 ants in 5 weeks, so we can work backwards and forwards from that. Here's the size of the colony after 1 week, 2 weeks, 3 weeks, and so on . . .

1	1000
2	2000
3	4000
4	8000
5	16,000
6	32,000
7	64,000
8	128,000
9	256,000
10	512,000
11	1,024,000

So by the end of 11 weeks the colony must already have passed the 1 million mark – and that would have been well before the end of December. Merry Christmas!

7 You can add up the years and the months separately in this one. The years add up to 18 altogether. The odd months add up to $1 + 2 + 8 + 7 + 1 + 5$, which is 24 months altogether – and that's the same as 2 whole years. So all in all you've got 18 years and 2 years, which is 20 years.

8 a 3 lots of 250cm plus 4 lots of 10cm gives 790cm or 7.9m

b Here you need 10 lots of 250cm plus 11 lots of 10cm and that's 2610cm or 26.1m

- 9 a There are just three : 19, 80 and 91
 b This time there are five : 18, 29, 70, 81 and 92
 c Now there are seven : 17, 28, 39, 60, 71, 82, 93

- 10 To leave them with £12 each (fair shares), Tom will have to give Ben £3 and Peter will have to give Ben £1.

At the end of the evening, Ben must give £1 to Tom and £2 to Peter. After this, they each have £3.

Ben is luckiest as the whole evening has cost him just £5 (he has £8 in his pocket at the start and £3 at the end), Peter ends up with £10 less than he begins with and poor Tom is £12 poorer!

- 11 This table shows you how to make any length up to 15m :

total length of pipe	made from :
1	1
2	2
3	1 + 2
4	4
5	1 + 4
6	2 + 4
7	1 + 2 + 4
8	8
9	1 + 8
10	2 + 8

11	$1 + 2 + 8$
12	$4 + 8$
13	$1 + 4 + 8$
14	$2 + 4 + 8$
15	$1 + 2 + 4 + 8$

- 12** The first time he goes out, Bill has three 50p coins and one 10p coin.

To solve Bill's problem, his mother takes back these four coins and gives him eight 20p coins instead.

- 13** This is not as hard as it looks. After all, if you're stuck, you can just try an answer and see how good it is. From the number of feet you can see that there must be more than just one or two animals – but there can't be dozens and dozens! Suppose you guess 5 camels and 5 kangaroos – this will give you 30 feet altogether and that's not enough, so try a bigger number. It shouldn't take long to find out that the answer's 7 of each animal.

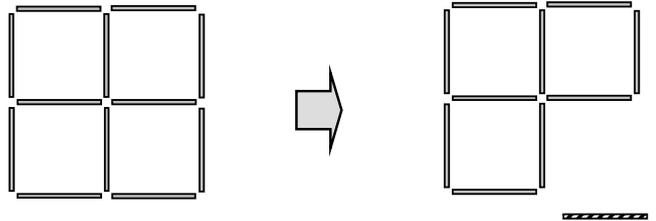
A much smarter way to the answer is this : We know that we've got exactly the same number of camels and kangaroos, so imagine them dancing in pairs . . . each camel / kangaroo pair will have 6 feet altogether. With 42 feet on the dance-floor there must be 7 of these pairs, or in other words 7 camels and 7 kangaroos.

- 14** Here's one way which works :

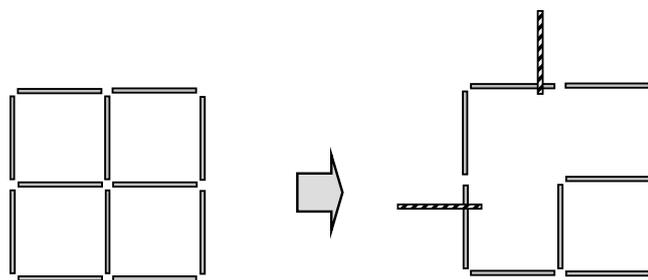
1	7	3
2	6	9
8	4	5

. . . Check it out !

- 15 a** This one's easy – just take out these two matchsticks from the corner of the arrangement :



- b** If instead you take these two matchsticks from the centre of the arrangement, you're left with two squares (a small one in the corner and the large one on the outside) :



- 16** Here are five descriptions – with each one applying to just four numbers in the set :

even numbers	2, 4, 10, 28
multiples of 3	3, 9, 15, 21
multiples of 5	5, 10, 15, 25
multiples of 7	7, 21, 28, 49
square numbers	4, 9, 25, 49

- 17** This is how money passes in and out of Basil's hands :

- 1 Basil sells for £20 . . . so Basil has £20
- 2 Basil buys for £15 . . . now Basil has only £5
- 3 Basil sells for £40 . . . lucky Basil has £45 !

Basil began with nothing, so he's made £45 altogether.

- 18 If you've tried a few sets of five numbers, you'll probably have spotted a pattern and worked out this rule :

Whatever the outer two numbers give you when you multiply them, it's always 4 less than the middle number squared.

Obviously, 18, 19, 20, 21, 22 is a set of five consecutive numbers, so you can use the rule. This will tell you that 18×22 is going to be 4 less than 20^2 . As everyone knows, 20^2 is 400, so the answer you're after is 396.

19

$$\begin{array}{r} 423 \\ 950 \\ + 137 \\ \hline 1510 \end{array}$$

$$\begin{array}{r} 909 \\ 680 \\ + 423 \\ \hline 2012 \end{array}$$

$$\begin{array}{r} 584 \\ 391 \\ + 67 \\ \hline 1042 \end{array}$$

$$\begin{array}{r} 491 \\ - 236 \\ \hline 255 \end{array}$$

$$\begin{array}{r} 920 \\ - 421 \\ \hline 499 \end{array}$$

$$\begin{array}{r} 413 \\ - 202 \\ \hline 211 \end{array}$$

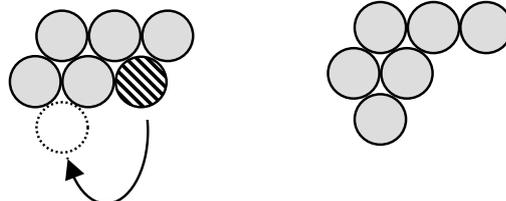
$$\begin{array}{r} 564 \\ 920 \\ + 306 \\ \hline 1790 \end{array}$$

$$\begin{array}{r} 498 \\ 321 \\ + 679 \\ \hline 1498 \end{array}$$

$$\begin{array}{r} 391 \\ 687 \\ + 438 \\ \hline 1516 \end{array}$$

- 20 This is harder than it looks ! If you don't find a way after a while, it's easy to believe that it can't be done. However, there is a way . . .

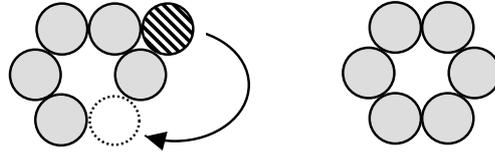
First, move the bottom right counter as shown (the right-hand diagram shows the result) :



Next, just shuffle this middle-row counter along one place :



And finally, slide the top right counter round to complete the hexagon :



21 This works : $7 + 65 + 4 + 3 + 21$

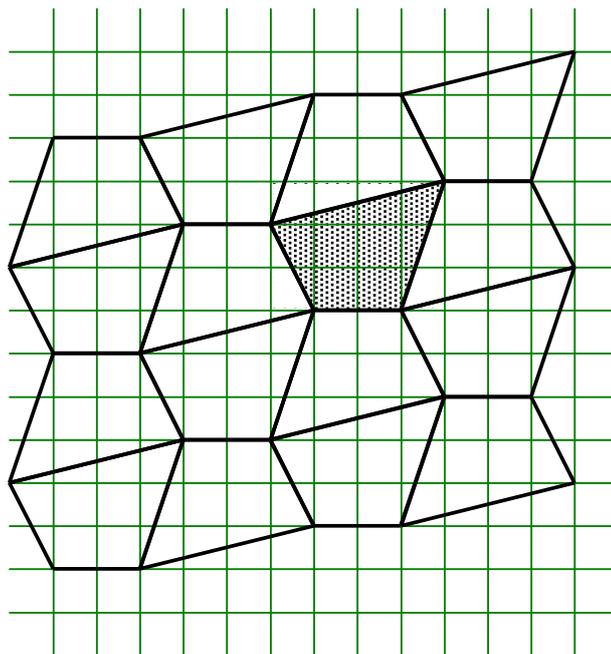
and so does this : $7 + 6 + 54 + 32 + 1$

22 a 5 b 64 c 6 d 3,5

23 Sophie's door-number is not the only 'sandwich number' – in fact, there are six more to be found, giving seven altogether :

3, 8, 10, 24, 48, 80, 82

24 Whatever you might think at first, you really can tessellate with scalene quadrilaterals as this shows you :



	scalene	kite	rhombus	trapezium	parallelogram	rectangle	square
opposite sides are same length	x	x	✓	x	✓	✓	✓
opposite angles are same size	x	✓	✓	x	✓	✓	✓
diagonals are same length	x	x	x	x	x	✓	✓
diagonals bisect each other *	x	x	✓	x	✓	✓	✓
has rotational symmetry	x	x	✓	x	✓	✓	✓
has bilateral symmetry	x	✓	✓	x	x	✓	✓

26 There are 9 different palindromes between mid-day and midnight :
12:21 / 13:31 / 14:41 / 15:51 / 20:02 / 21:12 / 22:22 / 23:32 / 00:00

27 There are 6 different ways of arranging the books :
DPS / DSP / PDS / PSD / SDP / SPD
(D = drawings, P = poems, S = stories)

28 Each small cube has 6 faces, so that's 48 small cube faces altogether to think about. Once you've made the large cube :

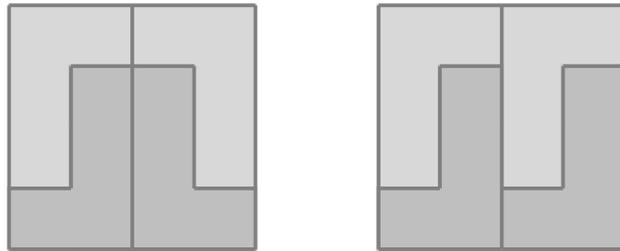
- 24 small cube faces have glue on them
- 24 small cube faces don't have glue on them

29

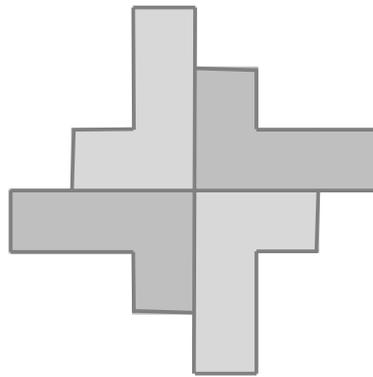
- Andy paid nothing for the shirt and sold it for £30 – so his profit was £30.
- Ben paid £30 for the shirt and sold it for £16 – so he made a loss of £14.
- Josh paid £16 for the shirt and sold it for £48 – so he made a profit of £32.

As you can see, Josh was the one who made most money out of the shirt sales.

30 a Here are two ways of filling the square with four L-shapes :

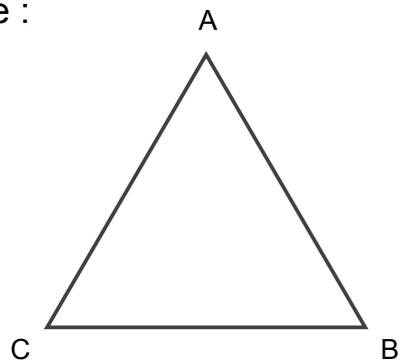


b Here's one way of filling the other shape :

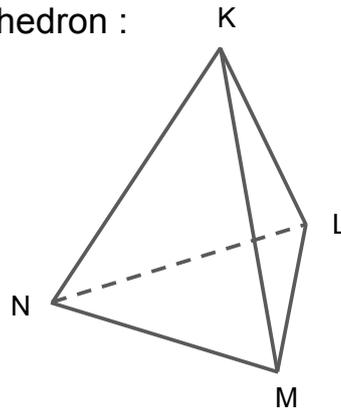


-
- 31
- Kate's number is 8
 - Ewan's number is 8
 - Jack's number is 5

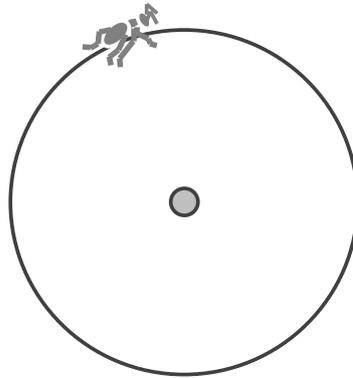
32 a ABC is an equilateral triangle :



b KLMN is a regular tetrahedron :



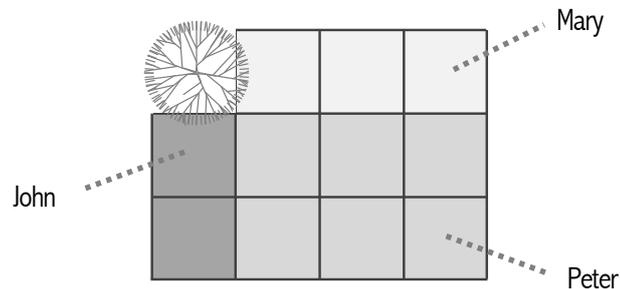
c Simon's path is a circle, with the pebble at its centre :



-
- 33
- For 6 days' work, Ed gets paid £63 and Will gets paid £99 – so Will earns more (quite a lot more !).
 - If there were 7 days' work, Ed would get paid £127 and Will would get paid £126 – so Ed would earn more (just about !).

-
- 34
- a** the beetle takes 15 seconds to walk 3 cm
so in 1 minute (60 sec) he would walk 12 cm
which means in 10 minutes he would walk 120 cm
- b** this beetle takes 45 seconds to walk 12 cm
so in 90 seconds he would walk 24 cm
which means in 180 seconds (= 3 min) he would walk 48 cm
so in 15 minutes he would walk $48 \times 5 = 240$ cm
-

35 Here's one way of doing it :



– but any way of dividing the patch will do which gives John 2 squares, Mary 3 squares and Peter 6 squares. In real life it would obviously be better to keep each child's squares together.

36 Mr Hooke has 11 pupils in his class. You might have got to this answer by guessing or by trying out a few numbers until you found the right one – but here's one way of getting straight to the answer :

If you make a list of the numbers which leave a remainder of 1 when you divide by 2, you get :

1, 3, 5, 7, 9, 11, 13, 15, 17, 19 . . .

Then if you list the numbers which leave a remainder of 2 when you divide by 3, you get :

5, 8, 11, 14, 17 . . .

And finally, if you list the numbers which leave a remainder of 3 when you divide by 4, you get :

7, 11, 15, 19 . . .

(There's no need to carry on with any of the lists past 20 as we know Mr Hooke has fewer than 20 pupils in his class.)

You can see straight away that 11 is the only number in all three lists – so Mr Hooke has 11 pupils in his class.

37 a The area of the square is 8 cm^2 .

b The rectangle is $8 \text{ cm} \times 4 \text{ cm}$.

38 Felix was at the seaside for 6 hours.

39 a 5, 6, 8, 11, **15**, 20, 26

(add 1, add 2, add 3 and so on . . .)

b 32, 16, 8, 4, 2, 1, $\frac{1}{2}$

(just keep dividing by 2 . . .)

c 3, 4, 7, **11**, 18, 29, 47

(it's a Fibonacci sequence – just add two terms to get the next)

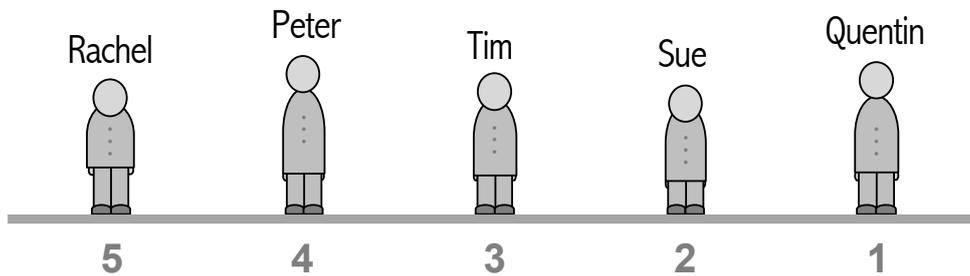
d 81, 64, 49, **36**, 25, 16

(these are just the square numbers : 9^2 , 8^2 , 7^2 , 6^2 . . .)

40 Here are three different ways of getting two equal groups :



41 Here's the order you want :



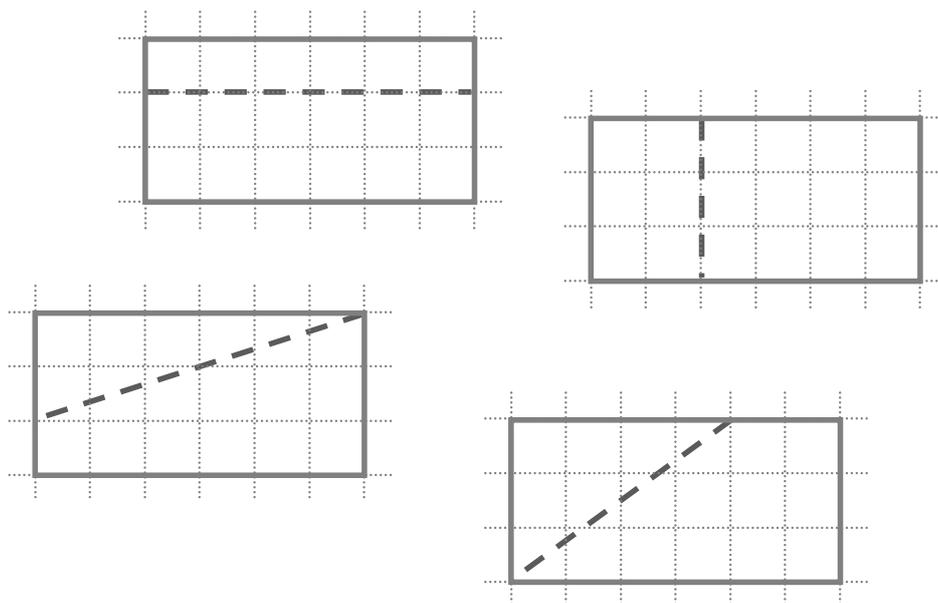
42 The minute hand will pass the hour hand 5 times, at :

5:25 / 6:30 / 7:35 / 8:40 / 9:45 / 10:50

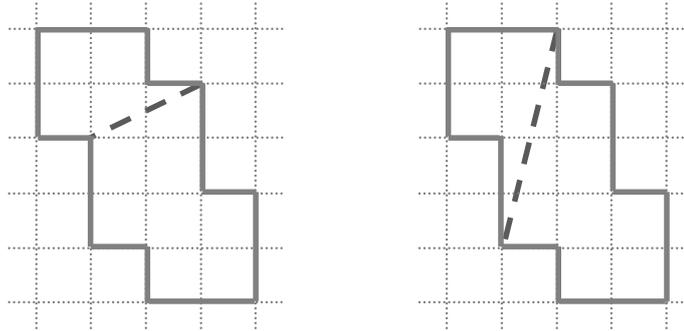
43 We know that 10 kg is roughly the same as 22 pounds – so 5 kg must be roughly the same as 11 pounds.

- a The first pig weighs 15 kg – so that's about 33 pounds.
- b The second pig weighs 77 pounds – and that's about 35 kg.

44 Here are four ways of dividing shape 1 :

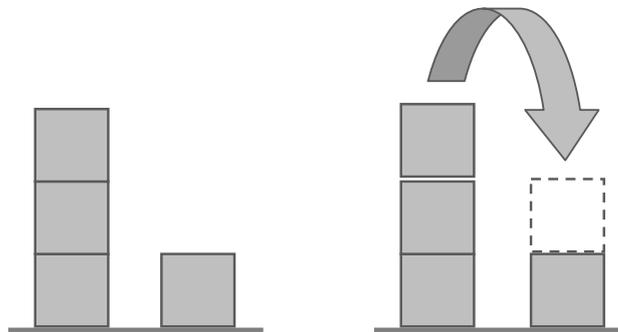


. . . and here are two ways of dividing shape 2 :



-
- 45 a The Brown family bought tickets for 3 children and 1 adult.
 b The Watsons bought tickets for 3 children and 2 adults.

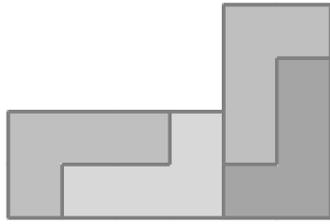
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- 46 Simon caught 12 trout – and Tim caught just 4 !
 This picture shows you how the shares are evened out :



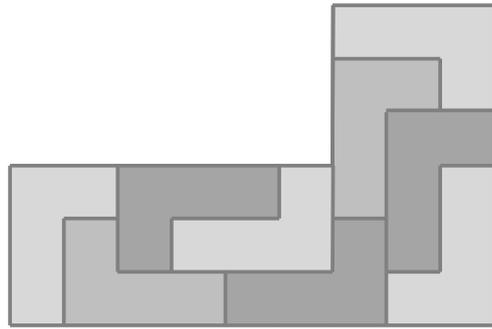
-
- 47 Emma's rule is '*square the number and take it away from 50*'.
 So, what happens to 4 using Emma's rule ? First of all you square it – that gives you 16. Then take the 16 away from 50 – and that gives you 34 !

-
- 48 There are 3 sheep on the farm (along with 7 pigs and 4 cows).
-

49



(a)



(b)

50 **a** This year Sally was 4 (and Ben was 3).

b Next year they'll need 9 candles (5 for Sally and 4 for Ben).
