

APSMO

WEDNESDAY 6 MAY 2026

MATHS GAMES JUNIOR

*Suggested Time: **30 Minutes**. Calculators NOT Permitted.*

- 1A.** The big bucket contains 1.6 L more water than the small bucket.
If I pour 500 mL from the small bucket into the big bucket, how much more water is there in the big bucket than the small bucket, in millilitres?

- 1B.** Sophie has a locker. It is in a row of lockers, numbered 1, 2, 3 and so on. She noticed that the sum of the locker numbers less than hers, is equal to the sum of the locker numbers greater than hers.
There are fewer than 12 lockers.
How many lockers are there in the row?

- 1C.** Raymond waters his garden once every four days.
He is away on Tuesdays and so his neighbour Josie does the watering if he is not there.
In an eight-week period, how many times does Josie water Raymond's garden?

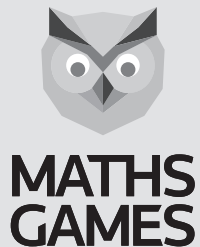
- 1D.** At my school, students can choose to wear:
- A button shirt or a polo shirt,
 - Shorts or trousers,
 - Grey socks or white socks, and
 - A bucket hat or a cap.
- How many different school uniform combinations are there?

- 1E.** Spring rolls come in boxes of 6 and boxes of 8.
In how many different ways can I buy 80 spring rolls exactly?

*Write your
answers in
the boxes on
the back.*



*Keep your
answers
hidden by
folding
backwards
on this line.*



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**MATHS GAMES
JUNIOR**

1A.

Student Name:

1B.

1C.

1D.

1E.

Fold here. Keep your answers hidden.



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*Suggested Time: **30 Minutes**. Calculators NOT Permitted.*

- 1A.** The big bucket contains 1.6 L more water than the small bucket.
If I pour 500 mL from the small bucket into the big bucket, how much more water is there in the big bucket than the small bucket, in millilitres?

Hint: Guess a volume of water that might be in the small bucket.
What happens if you increase the volume?

- 1B.** Sophie has a locker. It is in a row of lockers, numbered 1, 2, 3 and so on. She noticed that the sum of the locker numbers less than hers, is equal to the sum of the locker numbers greater than hers.
There are fewer than 12 lockers.
How many lockers are there in the row?

Hint: If Sophie had locker number 3, what would be the sum of the locker numbers less than hers?

- 1C.** Raymond waters his garden once every four days.
He is away on Tuesdays and so his neighbour Josie does the watering if he is not there.
In an eight-week period, how many times does Josie water Raymond's garden?

Hint: You could draw a calendar.

- 1D.** At my school, students can choose to wear:
- A button shirt or a polo shirt,
 - Shorts or trousers,
 - Grey socks or white socks, and
 - A bucket hat or a cap.
- How many different school uniform combinations are there?

Hint: How many different combinations of shirt and pants are there?

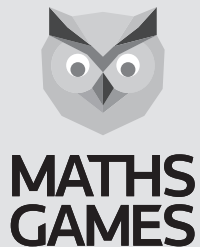
- 1E.** Spring rolls come in boxes of 6 and boxes of 8.
In how many different ways can I buy 80 spring rolls exactly?

Hint: Can you buy exactly 80 spring rolls if you only buy boxes of 6?

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**MATHS GAMES
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1A.

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Solutions and Answers

(Items in parentheses are not required)

1A: 2600 (mL)

1B: 8

1C: 2

1D: 16

1E: 4

1A. How much more water is there in the big bucket than the small bucket, in millilitres?

There are 1000 millilitres in 1 litre.

We can use this idea to convert 1.6 L into mL.

Litres	1	2	1.6	
Millilitres	1000	2000	1600	

The big bucket has 1600 mL more water than the small bucket.

Strategy 1: Find a Pattern

Suppose the big bucket contains 3000 mL.

The small bucket contains $3000 - 1600 = 1400$ mL.

If I pour 500 mL from the small bucket into the big bucket:

Big bucket	$3000 + 500 = 3500$ mL
Small bucket	$1400 - 500 = 900$ mL
Difference	$3500 - 900 = 2600$ mL

Suppose the big bucket contains 4000 mL.

The small bucket contains $4000 - 1600 = 2400$ mL.

If I pour 500 mL from the small bucket into the big bucket:

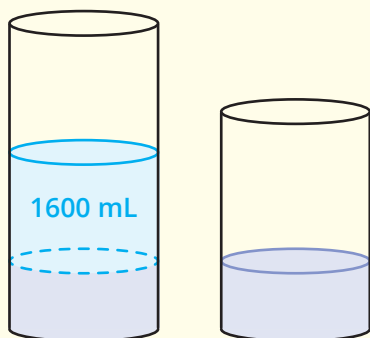
Big bucket	$4000 + 500 = 4500$ mL
Small bucket	$2400 - 500 = 1900$ mL
Difference	$4500 - 1900 = 2600$ mL

There is a pattern in the result.

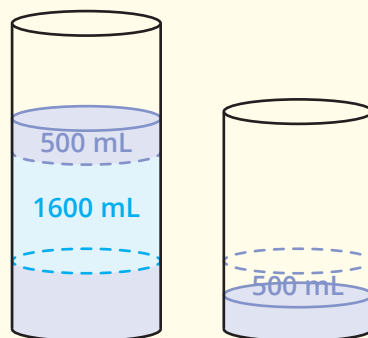
Regardless of how much water there was in the big bucket, after pouring 500 mL from the small bucket into the big bucket, **the big bucket will have 2600 mL more water than the small bucket.**

Strategy 2: Draw a Diagram

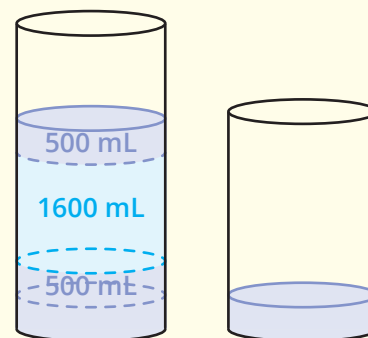
The big bucket has 1600 mL more water than the small bucket.



If I pour 500 mL from the small bucket into the big bucket, the small bucket has 500 mL less, and the big bucket ends up with 500 mL more.



The big bucket now has $500 + 1600 + 500 = 2600$ mL more water than the small bucket.



Follow-Up: There is 100 mL more water in the kettle than there is in the jug. After I pour 150 mL from the kettle into the jug, how much more water is there in the jug than there is in the kettle? [200 mL]



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1B. How many lockers are there in the row?

Strategy 1: Build a Table

There are fewer than 12 lockers in the row.

If Sophie had locker number 3, then the sum of the numbers less than hers would be $1 + 2 = 3$.

However, the numbers greater than hers cannot also add up to 3.

1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

If Sophie had locker number 4, then the sum of the numbers less than hers would be $1 + 2 + 3 = 6$.

However, the numbers greater than hers cannot also add up to 6.

1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

If Sophie had number 5, then the sum of the numbers less than hers would be $1 + 2 + 3 + 4 = 10$.

However, the numbers greater than hers cannot also add up to 10.

1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

If Sophie had number 6, then the sum of the numbers less than hers would be $1 + 2 + 3 + 4 + 5 = 15$.

We can also get a sum of 15 by adding 7 and 8.

1	2	3	4	5	6	7	8	9	10	11
---	---	---	---	---	---	---	---	---	----	----

Therefore, Sophie must have locker number 6, and there are 8 lockers in the row.

Strategy 2: Build a Table (Alternative Approach)

Let's start by supposing there are 11 lockers in the row.

We can try to find Sophie's locker by counting values up from 1, and counting values down from 11.

1	2	3	4	5	6	7	8	9	10	11
$1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$								$9 + 10 + 11 = 30$		

We now know that there are fewer than 11 lockers, and Sophie's locker number must be less than 8.

If Sophie had number 7, then the sum of the numbers less than hers would be $1 + 2 + 3 + 4 + 5 + 6 = 21$. We can see that this doesn't work, since $8 + 9 = 17$, and $8 + 9 + 10 = 27$.

If Sophie had number 6, then the sum of the numbers less than hers would be $1 + 2 + 3 + 4 + 5 = 15$.

$7 + 8$ is also equal to 15.

We can see that the conditions are satisfied if there are 8 lockers.

1	2	3	4	5	6	7	8	9	10	11
$1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$							8	$9 + 10 + 11 = 30$		
$1 + 2 + 3 + 4 + 5 + 6 = 21$						7	$8 + 9 = 17$			
$1 + 2 + 3 + 4 + 5 = 15$					6	$7 + 8 = 15$				

Follow-Up: Suppose the lockers are numbered from 3 to 12. What locker number would I need to choose, so that the sum of the numbers less than mine would be equal to the sum of the numbers greater than mine? [9]



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1C. In an eight-week period, how many times does Josie water Raymond's garden?

Strategy 1: Build a Table, and Find a Pattern

We can begin by supposing that Raymond waters his garden on the Sunday of the first week, and then every four days after that.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	1	2	3
4	1	2	3	4	1	2
3	4					

If Raymond waters his garden on the Monday of the first week, the pattern would look like this.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	1	2	3
4	1	2	3	4	1	2
3	4					

Starting on the Tuesday or Wednesday of the first week would result in the following patterns. We can see that, in each case, **there are 2 Tuesdays when Josie would need to water the garden.**

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	1	2	3
4	1	2	3	4	1	2
3	4					

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	1	2	3
4	1	2	3	4	1	2
3	4					

Strategy 2: Find a Pattern

Raymond waters his garden once every 4 days.

His watering schedule looks like this:

Mon	Fri	Tue	Sat	Wed	Sun	Thu	Mon	Fri
-----	-----	-----	-----	-----	-----	-----	-----	-----

We can see that:

- the schedule repeats after 7 watering days, and
- every day of the week occurs exactly once for every 7 watering days.

For every 7 watering days, there is exactly one Tuesday when Josie will water the garden.

7 watering days will occur over a period of $7 \times 4 = 28$ days, which is the same as $28 \div 7 = 4$ weeks.

Over $2 \times 4 = 8$ weeks, there will be exactly 2 Tuesdays on which Josie will water the garden.

Follow-Up: Josie will water the garden twice during June. What day of the week might the 1st of June be? [Monday or Tuesday]



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1D. How many different school uniform combinations are there?

Strategy 1: Build a Table

There are 2 possible shirts: button shirt, or polo shirt.

There are 2 possible kinds of pants: shorts or trousers.

	Shorts	Trousers
Button shirt		
Polo shirt		

We can now combine each pairing of shirt and pants, with a choice of socks.

There are 2 possible options for the socks: grey or white.

	Grey socks	White socks
Button shirt and shorts		
Button shirt and trousers		
Polo shirt and shorts		
Polo shirt and trousers		

Finally, each combination has a choice of hat.

There are 2 possible options for the hat: bucket hat or cap.

With 2 possible shirts and 2 possible kinds of pants, there are $2 \times 2 = 4$ combinations of shirt and pants.

With 2 possible options for socks, there are $2 \times 2 \times 2 = 8$ combinations of shirt, pants and socks.

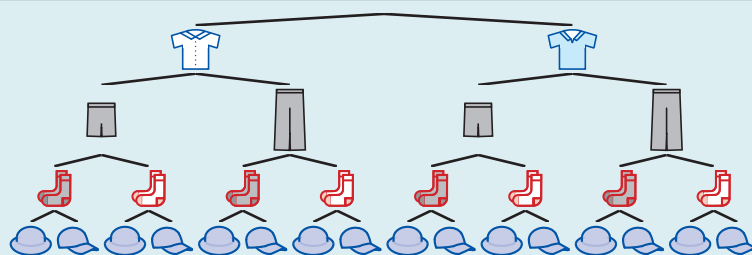
With 2 possible options for a hat, there are $2 \times 2 \times 2 \times 2 = 16$ combinations in total for the entire uniform, comprising of a shirt, pants, socks, and a hat.

	Bucket hat	Cap
Button shirt and shorts		
Button shirt and trousers		
Polo shirt and shorts		
Polo shirt and trousers		
Button shirt and shorts		
Button shirt and trousers		
Polo shirt and shorts		
Polo shirt and trousers		

Strategy 2: Draw a Diagram

A tree diagram can be used to illustrate all of the options in this situation.

By starting at the top and following one branch each time, we can see that there are $2 \times 2 \times 2 \times 2 = 16$ school uniform combinations in total.



Follow-Up: The school has introduced black socks as an option. How many different uniform combinations are there now? [24]



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1E. In how many different ways can I buy 80 spring rolls exactly?

Strategy 1: Build a Table, and Find a Pattern

Spring rolls come in boxes of 6 and boxes of 8.

Since $10 \times 8 = 80$, it is possible to buy 80 spring rolls by buying 10 boxes of 8 spring rolls, and 0 boxes of 6 spring rolls.

Boxes of 8	10	
Boxes of 6	0	
Extra spring rolls	0	

If I buy 9 boxes of 8 spring rolls, I would have $9 \times 8 = 72$ spring rolls.

To end up with 80 spring rolls, I would have to buy 2 boxes that each contain 6 spring rolls.

I would have $(9 \times 8) + (2 \times 6) = 72 + 12 = 84$ spring rolls in total, which is $84 - 80 = 4$ rolls too many.

Boxes of 8	10	9									
Boxes of 6	0	2									
Extra spring rolls	0	4									

We can continue filling in the table, each time reducing the number of boxes of 8 spring rolls.

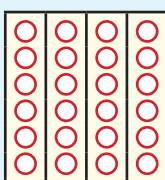
For each circumstance, I need to be sure I have at least 80 spring rolls.

Boxes of 8	10	9	8	7	6	5	4	3	2	1	0
Boxes of 6	0	2	3	4	6	7	8	10	11	12	14
Extra spring rolls	0	4	2	0	4	2	0	4	2	0	4

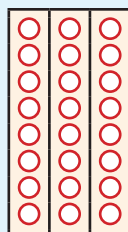
There are 4 ways to buy exactly 80 spring rolls.

Strategy 2: Build a Table

We note that it is possible to buy exactly 24 spring rolls in 4 boxes of 6.



It is also possible to buy exactly 24 spring rolls in 3 boxes of 8.



I can buy each set of 24 spring rolls in one of two ways.

As a result, I could buy $3 \times 24 = 72$ spring rolls in 4 different ways, as shown in the table.

1st set of 24	2nd set of 24	3rd set of 24
4×6	4×6	4×6
4×6	4×6	3×8
4×6	3×8	3×8
3×8	3×8	3×8

After buying 72 spring rolls, I am 8 rolls short of the 80 rolls we need, so in each case I would just need to buy one more box of 8 rolls.

There are 4 ways to buy exactly 80 spring rolls.

Follow-Up: In how many different ways can I buy exactly 70 spring rolls? [3]