APSMO

MATHS GAMES

WEDNESDAY 25 MARCH 2020

MATHS GAMES 1

Suggested Time: ***30 Minutes***

Write your answers in the boxes on the back.

←

Keep your answers hidden by folding backwards on this line.

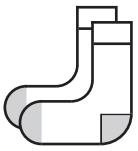
1A. Millie has twenty pens and pencils in her pencil case.
She has four more pencils than pens.
How many pens does she have?

Hint: You could guess a number of pens, and see if it works.

1B. Jerry bought a burger and fruit juice for $9.
The burger cost twice as much as the fruit juice.
How much did the burger cost?

Hint: You could guess a price for the burger.

1C. Socks are sold in packets containing 3 pairs or 7 pairs.
I bought six packets of socks.
If I ended up with 26 pairs of socks, how many packets contained 3 pairs?



Hint: How many pairs of socks would you have if each packet contained 3 pairs?

1D. There are 30 children in a Year 6 class.
17 children play soccer and 15 children play basketball.
6 children do not play either soccer or basketball.
How many children play both soccer and basketball?

Hint: You could draw and label the thirty children.

1E. I have 45 bricks in six stacks, all in a row.
Going from left to right, each stack is one brick taller than the previous stack.
How many bricks are in the smallest stack?

Hint: You could draw a diagram.

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1A.

1B.

1C.

1D.

1E.

Student Name:

Fold here. Keep your answers hidden.

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MATHS GAMES

MATHS GAMES 1

Solutions and Answers

(Items in parentheses are not required)

1A: 8	1B: $6	1C: 4	1D: 8	1E: 5

1A. ***Strategy 1:*** **Guess, Check and Refine**

The question is, How many pens does Millie have?

Pens:	10			
Pencils:	14			
Total:	24			

Let's guess that there are 10 pens in her pencil case.
If so, there would be 10 + 4 = 14 pencils.
In total, there would be 10 + 14 = 24 pens and pencils.

That's too many. There should be 20 pens and pencils all together.

Pens:	10	9		
Pencils:	14	13		
Total:	24	22		

If there were 9 pens, there would be 9 + 4 = 13 pencils.
In total, there would be 9 + 13 = 22 pens and pencils.

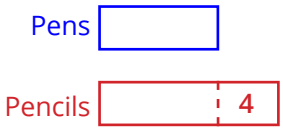
Pens:	10	9	8	
Pencils:	14	13	12	
Total:	24	22	20	

Let's try taking away 1 more pen, for a total of 8 pens.
If so, there would be 8 + 4 = 12 pencils.
In total, there would be 8 + 12 = 20 pens and pencils all together.

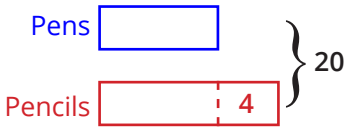
That matches the question. So there are **8** pens in Millie's pencil case.

Strategy 2: **Draw a Diagram**

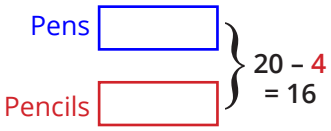
There are 4 more pencils than pens.



There are 20 pens and pencils in total.



Take away 4 pencils and adjust the total.

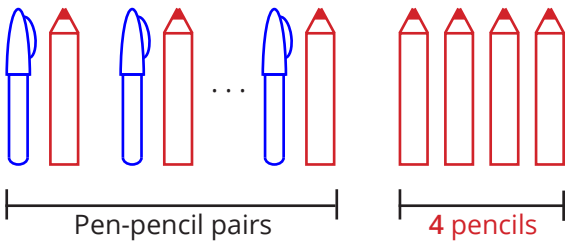


Now there are 2 units.
2 units = 16
1 unit = 8
The pens have 1 unit.
So there are **8** pens.

Strategy 3: **Reason Logically**

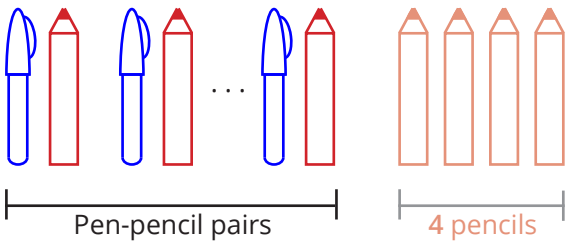
Suppose we paired up each pen with a pencil.

With 4 more pencils than pens, there will be 4 unpaired pencils.



So there will be 20 – 4 = 16 items paired.

Therefore there are 16 ÷ 2 = **8** pens.



Follow-Up: *There are a total of 100 men and women on a plane. There are 12 more women than men. How many women are on the plane?* [56]

1B. ***Strategy 1:*** **Guess, Check and Refine**

The question is, How much did the burger cost?

Let's guess the price of the fruit juice is $4.

The burger would cost 2 × $4 = $8.

So the total cost of the burger and fruit juice is $12.

Fruit juice	Burger	Total
$4	$8	$4 + $8 = $12

That's too much. The question says that the total cost of the burger and fruit juice is $9.

Let's guess the price of the fruit juice is $5.

The burger would cost 2 × $5 = $10.

The total cost of the burger and fruit juice is $15.

That's even further away from the result we need.

We tried increasing the price of the fruit juice. Let's try a smaller price.

Fruit juice	Burger	Total
$4	$8	$4 + $8 = $12
$5	$10	$5 + $10 = $15

Let's guess the price of the fruit juice is $3.

The burger would cost 2 × $3 = $6.

The total cost of the burger and fruit juice is $9.

That matches the question.

Fruit juice	Burger	Total
$4	$8	$4 + $8 = $12
$5	$10	$5 + $10 = $15
$3	$6	$3 + $6 = $9

So the burger must have cost **$6**.

Strategy 2: **Draw a Diagram**

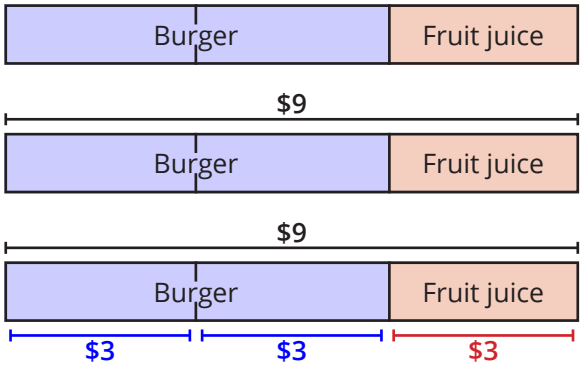
Since the burger costs twice as much as the fruit juice, we can count it as 2 parts while the fruit juice is only 1 part.

This is like replacing a burger with two fruit juices.

The total cost of the burger and the fruit juice was $9.

So each part is $9 ÷ 3 = $3.

Since the burger is 2 parts, it costs 2 × $3 = **$6**.



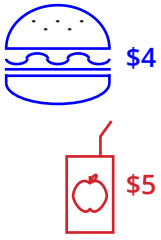
Strategy 3: **Guess, Check and Refine (2)**

The cost of the burger is an even number because it is twice the cost of the fruit juice.

Let's guess that the cost of the burger is $4.

Then the cost of the fruit juice would be $9 – $4 = $5.

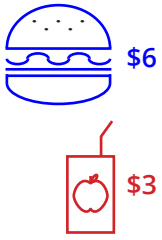
$4 is not double $5.



Let's guess that the cost of the burger is $6.

Then the cost of the fruit juice would be $9 – $6 = $3.

$6 is double $3.



So the burger must have cost **$6**.

Follow-Up: *The sum of two numbers is 54. One number is five times the other number. What is the larger number?* [45]

1C. ***Strategy 1:*** **Guess, Check and Refine**

The question is, How many of the packets contained **3** pairs?

Let's guess that there are **2** packets with **3** pairs.
Then there are **6 – 2 = 4** packets with **7** pairs.
In total, there are **2 × 3 + 4 × 7 = 6 + 28 = 34** pairs of socks.

Packets with 3 pairs	Packets with 7 pairs	Total no. of pairs
2	4	34

The question says that I ended up with **26** pairs of socks. We need fewer pairs of socks.

Let's guess that there are **3** packets with **3** pairs.
Then there are **6 – 3 = 3** packets with **7** pairs.
In total, there are **3 × 3 + 3 × 7 = 9 + 21 = 30** pairs of socks.
We still need fewer pairs of socks.

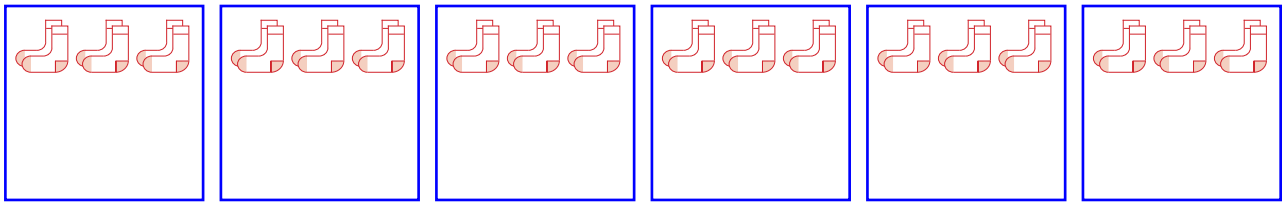
Packets with 3 pairs	Packets with 7 pairs	Total no. of pairs
2	4	34
3	3	30

Let's guess that there are **4** packets with **3** pairs.
Then there are **6 – 4 = 2** packets with **7** pairs.
In total, there are **4 × 3 + 2 × 7 = 12 + 14 = 26** pairs of socks.
That matches the question.
So there are **4** packets with **3** pairs of socks.

Packets with 3 pairs	Packets with 7 pairs	Total no. of pairs
2	4	34
3	3	30
4	2	26

Strategy 2: **Draw a Diagram**

I bought **6** packets of socks. Each packet has at least **3** pairs of socks.

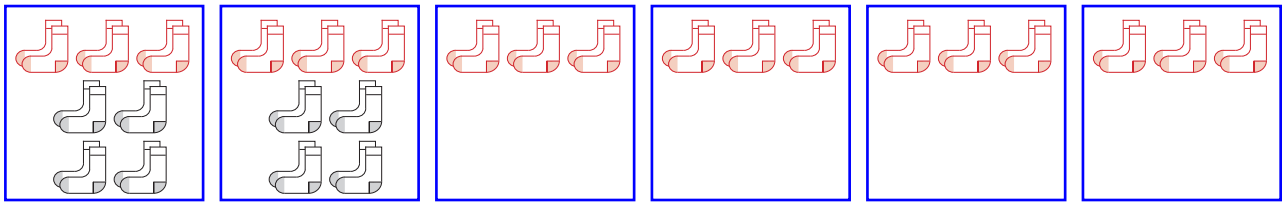


So far, that's **6 × 3 = 18** pairs of socks.

There are **26** pairs of socks in total.

If we add **7 – 3 = 4** pairs of socks to one packet, we'll have **18 + 4 = 22** pairs of socks.

After adding **4** pairs of socks to another packet, we'll have **22 + 4 = 26** pairs of socks.



That matches the question.

So **4** of the packets contained **3** pairs of socks.

Follow-Up: *23 friends decided to go to the football game. The adult tickets cost $30 and the tickets for children cost $20. The total cost for all of the tickets is $540. How many adults went to the football game?* [8]

1D. ***Strategy 1:*** **Draw a Diagram**

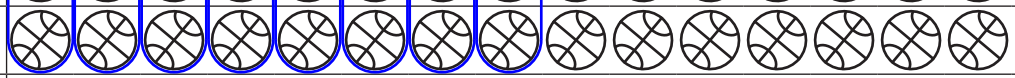
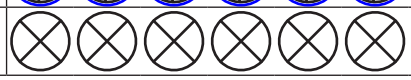
The question is, How many people play both soccer and basketball?

There are **30** students. **17** play soccer, **15** play basketball and **6** do not play either sport.

Soccer	
Basketball	
Neither	

Some students play both soccer and basketball.

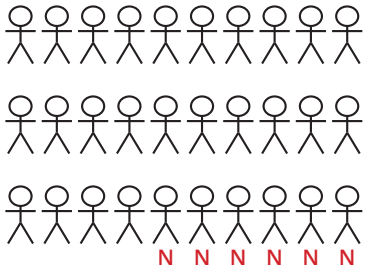
Circle a basketball and a soccer ball, and count this as one student until the total number of students is **30**.

Soccer	
Basketball	
Neither	

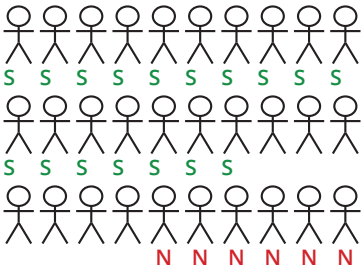
Therefore, **8** students play both soccer and basketball.

Strategy 2: **Draw a Diagram (2)**

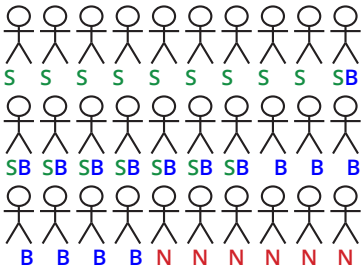
There are **30** students.
6 do not play either sport.



17 of the students play soccer.



15 of the students play basketball.
Some of these must be students who also play soccer.



From the diagram, we can see that **8** students play both soccer and basketball.

Strategy 3: **Guess, Check and Refine**

If **6** students play both sports, there would be **32** students in total.

If **7** students play both sports, there would be **31** students in total.

If **8** students play both sports, there would be **30** students in total.

No sport	Play both	Soccer only	B'ball only	Total
6	6	17 – 6 = 11	15 – 6 = 9	6 + 6 + 11 + 9 = 32
6	7	17 – 7 = 10	15 – 7 = 8	6 + 7 + 10 + 8 = 31
6	8	17 – 8 = 9	15 – 8 = 7	6 + 8 + 9 + 7 = 30

That matches the question. So **8** students play both soccer and basketball.

Follow-Up: *A teacher surveyed 24 students and discovered that 18 of them like to play video games, 15 of them like to go to the movies, and 2 of them do not like playing video games or going to the movies. How many of the 24 students like both activities?* [11]

1E. ***Strategy 1:*** **Guess, Check and Refine**

The question is, How many bricks are in the smallest stack?

Let's guess that the first stack has **3** bricks.

If so, the total would be **33**.

Stack no.	1	2	3	4	5	6	Total number of bricks
Number of bricks	3	4	5	6	7	8	3 + 4 + 5 + 6 + 7 + 8 = 33

That's not enough.

If the first stack had **4** bricks, the total would be **39**.

Stack no.	1	2	3	4	5	6	Total number of bricks
Number of bricks	3	4	5	6	7	8	3 + 4 + 5 + 6 + 7 + 8 = 33
	4	5	6	7	8	9	4 + 5 + 6 + 7 + 8 + 9 = 39

That's still not enough.

Let's guess that the first stack has **5** bricks.

If so, the total would be **45**.

That matches the question.

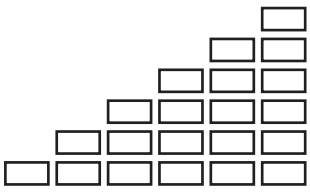
Stack no.	1	2	3	4	5	6	Total number of bricks
Number of bricks	3	4	5	6	7	8	3 + 4 + 5 + 6 + 7 + 8 = 33
	4	5	6	7	8	9	4 + 5 + 6 + 7 + 8 + 9 = 39
	5	6	7	8	9	10	5 + 6 + 7 + 8 + 9 + 10 = 45

So the number of bricks in the smallest stack is **5**.

Strategy 2: **Draw a Diagram**

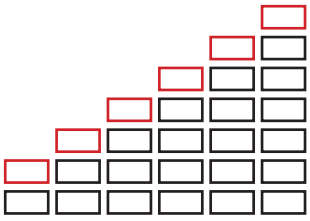
Let's start with **1** brick in the first stack.

That makes **21** bricks.

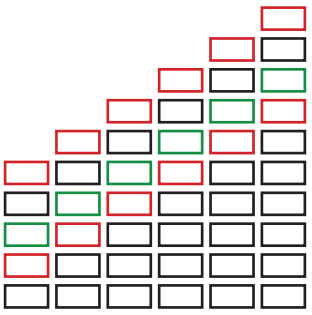


That wasn't enough.

If we add another row, there would be another 6 bricks.



Every time we add another row, there would be another 6 bricks.

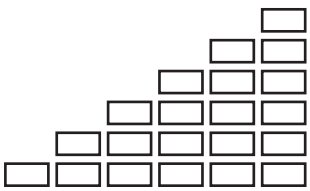


1st stack	Total bricks
1	21
2	21 + 6 = 27
3	27 + 6 = 33
4	33 + 6 = 39
5	39 + 6 = 45

There are **45** bricks when the smallest stack has **5** bricks.

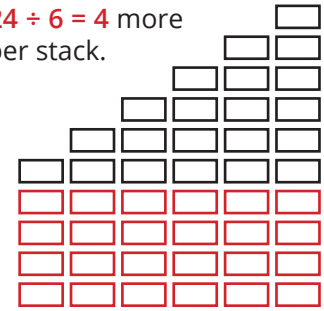
Strategy 3: **Draw a Diagram (2)**

There are **21** bricks if the first stack has **1** brick.



We need **45 – 21 = 24** more bricks.

That's 24 ÷ 6 = 4 more bricks per stack.



There are **5** bricks in the smallest stack.

Follow-Up: *How many bricks would be in the smallest stack if there were 105 bricks in total?* [15]