2023 Maths Games Junior - Years 5 & 6
Resource Kit 2
Teaching Problem Solving

Problem Solving Strategies

This resource kit focuses on the following problem solving strategies:

1. Work Backwards

If a problem describes a procedure and then specifies the final result, this method usually makes the problem much easier to solve.

2. Make an Organised List

Listing every possibility in an organised way is an important tool.

How students organise the data often reveals additional information.

It follows on from strategies introduced in the preparation resource kit and resource kit 1:

Guess, Check and Refine

Draw a Diagram

Find a Pattern

Build a Table

Resource Kit 2 focuses on:

Work Backwards

Make an Organised List

Set Yellow

Example problems for which full worked solutions are included.

Set Green

Problems that are designed to be similar to Set Yellow, but with fewer difficult elements.

Set Orange

Problems that are similar in mathematical structure to the corresponding Yellow problems.

Further questions and solution methods can be found in the APSMO resource book "Building Confidence in Maths Problem Solving", available from www.apsmo.edu.au.

How to use these problems

At the start of the lesson, present the problem and ask the students to think about it. Encourage students to try to solve it in any way they like. When the students have had enough time to consider their solutions, ask them to describe or present their methods, taking particular note of different ways of arriving at the same solution.

Each question includes at least one solution method that the majority of students should be able to follow. By participating in lessons that demonstrate achievable problem solving techniques, students may gain increased confidence in their own ability to address unfamiliar problems.

Finally, the consideration of different solution methods is fundamental to the students' development as effective and sophisticated problem solvers. Even when students have solved a problem to their own satisfaction, it is important to expose them to other methods and encourage them to judge whether or not the other methods are more efficient.

Preparation Kit

Guess, Check and Refine

This involves making a reasonable guess of the answer, and checking it against the conditions of the problem. An incorrect guess may provide more information that may lead to the answer.

Draw a Diagram

A diagram may reveal information that may not be obvious just by reading the problem.

It is also useful for keeping track of where the student is up to in a multi-step problem.

Resource Kit 1

Find a Pattern

A frequently used problem solving strategy is that of recognising and extending a pattern.

Students can often simplify a difficult problem by identifying a pattern in the problem situation.

Build a Table

A table displays information so that it is easily located and understood.

A table is an excellent way to record data so the student doesn't have to repeat their efforts.

Resource Kit 2

Work Backwards

If a problem describes a procedure and then specifies the final result, this method usually makes the problem much easier to solve.

Make an Organised List

Listing every possibility in an organised way is an important tool.

How students organise the data often reveals additional information.

Resource Kit 3

Solve a Simpler Related Problem

Many hard problems are actually simpler problems that have been extended to larger numbers.

Patterns can sometimes be identified by trying the problem with smaller numbers.

Eliminate All But One Possibility

Deciding what a quantity is not, can narrow the field to a very small number of possibilities.

These can then be tested against the conditions of the original problem.

Resource Kit 4

Convert to a More Convenient Form

There are times when changing some of the conditions of a problem makes a solution clearer or more convenient.

Divide a Complex Shape

Sometimes it is possible to divide an unusual shape into two or more common shapes that are easier to work with.

Set Yellow

2.1) Entry to the local show costs $10.
The tickets you buy for your first five rides cost $8 each.
After that, each ride costs $5.
Alex paid $70 all together for entry and rides.
How many rides did he go on?

2.2) Sara said, "If you divide my age by 3 and then add 8 years, the result is my age."
How old is Sara, in years?

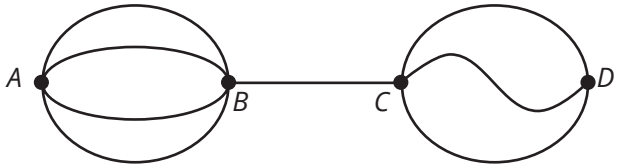
2.3) There are 5 girls in a tennis class.
How many different doubles teams of 2 girls each can be formed from the students in the class?

2.4) David buys a concert ticket.
He later sells it to Jessica and loses $3 on the deal.
Jessica makes a profit of $6 by selling it to Bryan for $25.
How much did David pay for the concert ticket?

Set Yellow

2.5) Following only the paths shown, what is the number of different paths that go from *A* to *B* to *C* to *D*?

You must touch each of those points exactly once.



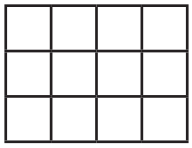
2.6) Five friends have picked some apples. If they share their apples equally, they would have 10 each.

A sixth person arrived with some more apples.

When they shared all of the apples equally amongst the six of them, they all ended up with 9 apples each.

How many apples did the sixth person bring?

2.7) How many squares, of any size, can be traced on the lines in this diagram?



2.8) Miss Kimble's students earn "class money" for helping out in class. Class money comes in $5, $10 and $20 notes.

Lee, Mel, Nate and Olivia have each saved exactly $25 worth of class money. They find that each of them has a different number of notes.

When they combine their money to buy a $100 pencil tin for their table group, how many $5 notes did they hand over?

Set Green

2.1) Entry to the local show costs $10.
Each ticket you buy for rides costs $6.
Amber paid $58 all together for entry and rides.
How many rides did she go on?

2.2) Sara said, "If you divide my age by 2 and then add 6 years, the result is my age."
How old is Sara, in years?

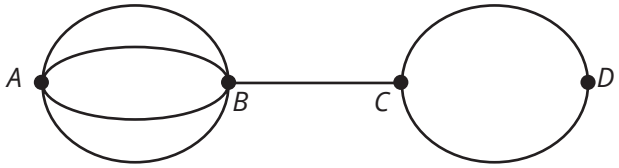
2.3) There are 3 girls in a tennis class.
How many different doubles teams of 2 girls each can be formed from the students in the class?

2.4) Jessica buys a concert ticket.
She makes a profit of $6 by selling it to Bryan for $25.
How much did Jessica pay for the concert ticket?

Set Green

2.5) Following only the paths shown, what is the number of different paths that go from *A* to *B* to *C* to *D*?

You must touch each of those points exactly once.



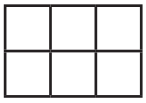
2.6) Three friends have picked some apples. If they share their apples equally, they would have 5 each.

A fourth person arrived with some more apples.

When they shared all of the apples equally amongst the four of them, they all ended up with 6 apples each.

How many apples did the fourth person bring?

2.7) How many squares, of any size, can be traced on the lines in this diagram?



2.8) Miss Kimble's students earn "class money" for helping out in class. Class money comes in $5 and $10 notes.

Lee, Mel, and Nate have each saved exactly $20 worth of class money. They find that each of them has a different number of notes.

When they combine their money to buy a $60 pack of textas for their table group, how many $5 notes did they hand over?

Set Orange

2.1) I bought a large box of oranges at the farmers' market.

I gave half of the oranges to my brother, and then I gave him one more.

I gave half of the remaining oranges to my sister, and then I gave her two more.

I gave half of the remaining oranges to my neighbour, and then I gave him three more.

I had just two oranges left.

How many oranges were in the box in the beginning?

2.2) Kristen has had her cat since it was a kitten.

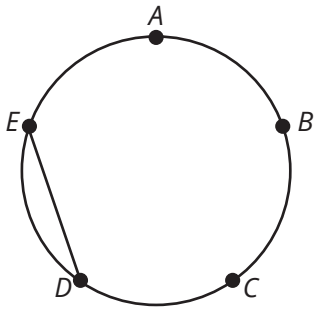
She says, "If you multiply my cat's age by 4, and then divide by 12, you get 5."

How old is Kristen's cat?

2.3) A line segment (such as *ED* as shown) that connects any two points of a circle is called a "chord" of the circle.

How many different chords, including *ED*, can be drawn using only points *A*, *B*, *C*, *D*, and *E*?

(Note: *ED* is the same as *DE*)



2.4) Kelly made two purchases.

She gave one cashier $20 for a scarf and received $6 change.

Then, she gave another cashier $15 for a bracelet and received $3 change.

After these purchases she had $28.

How many dollars did she have before buying the scarf and the bracelet?

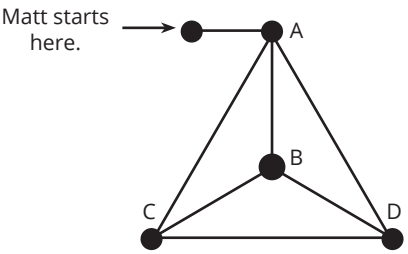
Set Orange

2.5) Matt needs to visit four towns, *A*, *B*, *C* and *D*, as shown on the map.

It doesn't matter what order he visits them in, or where he finishes up, but he can only travel along the roads.

He starts on the road to Town *A*, and then visits each town exactly once.

In how many different ways can Matt visit all four towns?



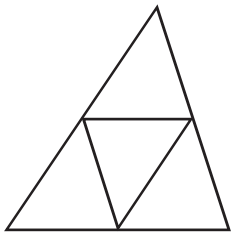
2.6) The average of five numbers is 8.

Two of the numbers are 2 and 5.

The other three numbers are equal.

What is the value of one of the three equal numbers?

2.7) How many four-sided figures can be traced, using only the lines in this picture?

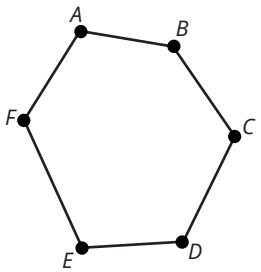


2.8) Teo's hexagon has six different side lengths.

Each vertex is marked with a black dot.

He cuts the hexagon into two pieces using a single straight cut from one dot to another.

In how many different ways could Teo cut his hexagon?



Maths Games – Example Problem 2.1

Example Problem 2.1 - Green

Entry to the local show costs $10.
Each ticket you buy for rides costs $6.
Amber paid $58 all together for entry and rides.
How many rides did she go on?

Example Problem 2.1 - Yellow

Entry to the local show costs $10.
The tickets you buy for your first five rides cost $8 each.
After that, each ride costs $5.
Alex paid $70 all together for entry and rides.
How many rides did he go on?

Example Problem 2.1 - Orange

I bought a large box of oranges at the farmers' market.
I gave half of the oranges to my brother, and then I gave him one more.
I gave half of the remaining oranges to my sister, and then I gave her two more.
I gave half of the remaining oranges to my neighbour, and then I gave him three more.
I had just two oranges left.
How many oranges were in the box in the beginning?

Maths Games Example Solution 2.1 - Yellow

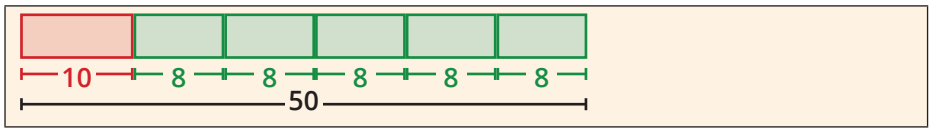
Entry to the local show costs \$10. The tickets you buy for your first five rides cost \$8 each.

After that, each ride costs \$5. Alex paid \$70 all together for entry and rides. How many rides did he go on?

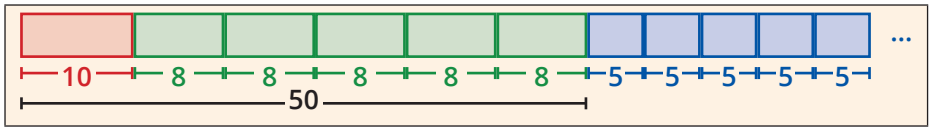
Strategy 1: Draw a Diagram, and Work Backwards

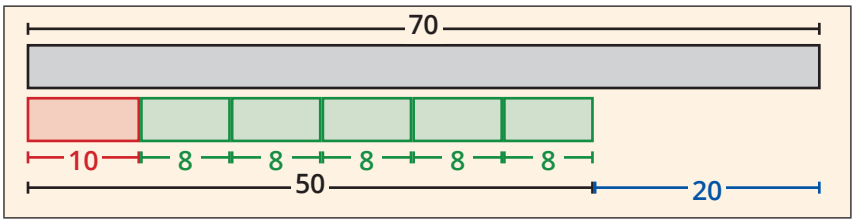
Let's draw a diagram to show how much it costs to go to the show.

Entry + 5 rides would cost
\$10 + 5 × \$8 = \$50.



After that, each ride costs \$5.

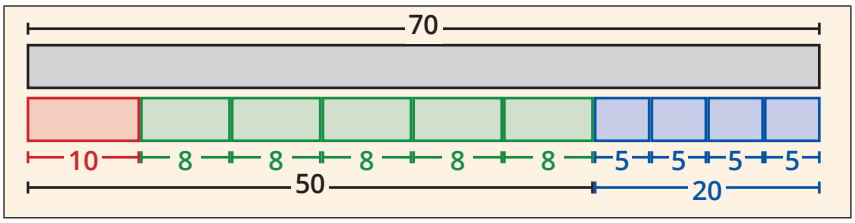




Alex spent **\$70** on entry and rides.

We know that entry + 5 rides costs **\$50**.

Alex spent **\$70 – \$50 = \$20** more than the price of entry + 5 rides.



Any further rides would cost \$5 each.

Alex must have paid for \$20 ÷ \$5 = 4 more rides.

Alex went on **5 + 4 = 9** rides.

Strategy 2: Guess, Check and Refine

If Alex went on 10 rides, he would have paid:	\$10 for entry, 5 × \$8 = \$40 for the first 5 rides, and 5 × \$5 = \$25 for the next 5 rides.	\$10 + \$40 + \$25 = \$75. That is more than the amount Alex paid. Let's reduce the number of rides.
If Alex went on 8 rides, he would have paid:	\$10 for entry, 5 × \$8 = \$40 for the first 5 rides, and 3 × \$5 = \$15 for the next 3 rides.	\$10 + \$40 + \$15 = \$65.

Alex paid **\$70**, which is between **\$65** and **\$75**.

It looks like we will need a number of rides between 8 and 10.

If Alex went on 9 rides, he would have paid:	\$10 for entry, 5 × \$8 = \$40 for the first 5 rides, and 4 × \$5 = \$15 for the next 4 rides.	\$10 + \$40 + \$20 = \$70.

Alex must have gone on **9** rides.

Answers

2.1 - Green: 8

2.1 - Orange: 50

2.1 - Yellow: 9

Maths Games – Example Problem 2.2

Example Problem 2.2 - Green

Sara said, "If you divide my age by 2 and then add 6 years, the result is my age."
How old is Sara, in years?

Example Problem 2.2 - Yellow

Sara said, "If you divide my age by 3 and then add 8 years, the result is my age."
How old is Sara, in years?

Example Problem 2.2 - Orange

Kristen has had her cat since it was a kitten.
She says, “If you multiply my cat’s age by 4, and then divide by 12, you get 5.”
How old is Kristen's cat?

Maths Games Example Solution 2.2 - Yellow

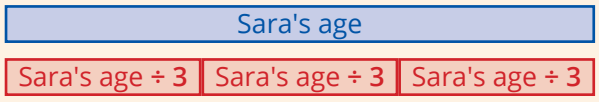
Sara said, "If you divide my age by 3 and then add 8 years, the result is my age."

How old is Sara, in years?

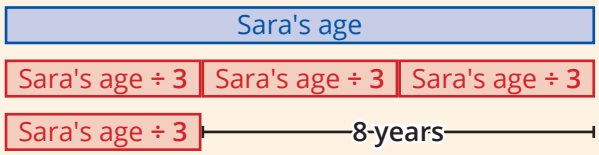
Strategy 1: Draw a Diagram, and Work Backwards

Let's use a bar to represent Sara's age.

We can also use bars to represent dividing Sara's age by 3.



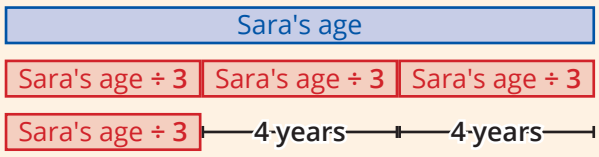
If we add 8 years to Sara's age ÷ 3, the result will be Sara's age.



From our diagram, we can see that

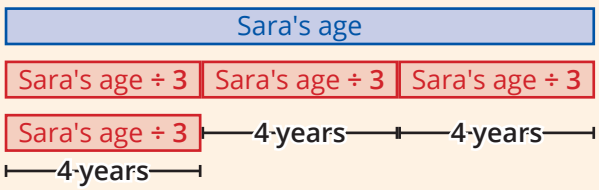
2 × Sara's age ÷ 3 = 8 years, so

Sara's age ÷ 3 = 8 ÷ 2 = 4 years.



We can now work out Sara's age.

Sara's age = 4 years + 4 years + 4 years = **12 years.**



Strategy 2: Guess, Check and Refine

Sara's age must be divisible by 3.

Let's guess that Sara is 9 years old.

- Dividing Sara's age by 3: 9 ÷ 3 = 3 years
- Adding 8 years to the result: 3 + 8 = 11 years.

The calculation doesn't work if Sara is 9 years old.

The result differs from her age by 11 – 9 = 2 years.

Let's see what happens if Sara is 6 years old.

- Dividing Sara's age by 3: 6 ÷ 3 = 2 years
- Adding 8 years to the result: 2 + 8 = 10 years.

When we guess that Sara is 6 years old, the result differs from her age by 10 – 6 = 4 years.

As our guesses get smaller, the differences get larger.
Perhaps if we guess a larger number for Sara's age, the difference will get smaller.

Let's guess that Sara is 12 years old.

- Dividing Sara's age by 3: 12 ÷ 3 = 4 years
- Adding 8 years to the result: 4 + 8 = 12 years.

The result is the same as our guess.

Sara is **12** years old.

Answers

2.2 - Green: 12

2.2 - Orange: 15

2.2 - Yellow: 12

Maths Games – Example Problem 2.3

Example Problem 2.3 - Green

There are 3 girls in a tennis class.

How many different doubles teams of 2 girls each can be formed from the students in the class?

Example Problem 2.3 - Yellow

There are 5 girls in a tennis class.

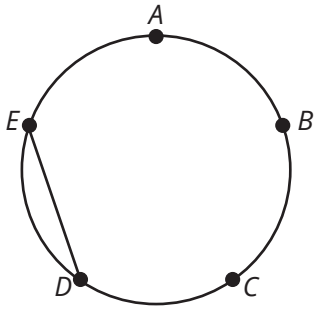
How many different doubles teams of 2 girls each can be formed from the students in the class?

Example Problem 2.3 - Orange

A line segment (such as *ED* as shown) that connects any two points of a circle is called a "chord" of the circle.

How many different chords, including *ED*, can be drawn using only points *A*, *B*, *C*, *D*, and *E*?

(Note: *ED* is the same as *DE*)



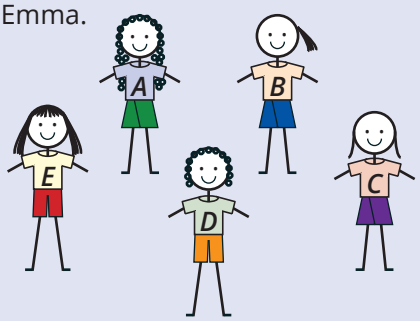
Maths Games Example Solution 2.3 - Yellow

There are 5 girls in a tennis class.

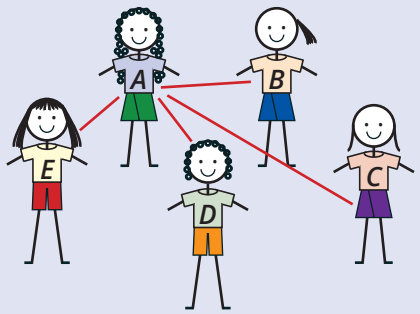
How many different doubles teams of 2 girls each can be formed from the students in the class?

Strategy 1: Make an Organised List

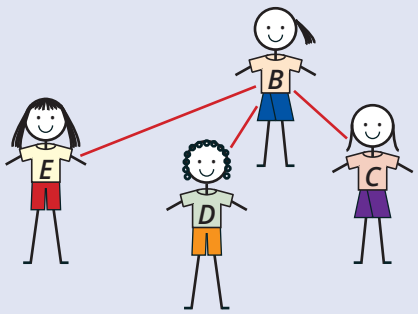
Let's say that the girls are called Abbie, Bella, Cate, Dora and Emma.



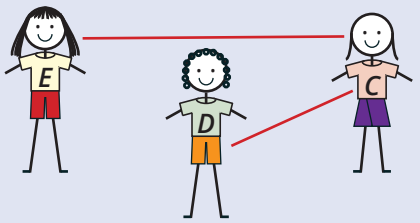
Abbie can be paired with each of the other 4 girls.



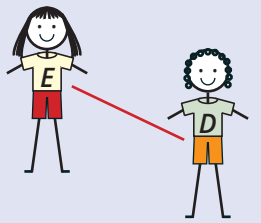
Bella can then be paired with each of the remaining 3 girls.



Cate can then be paired with each of the remaining 2 girls.



There is 1 more possible pairing, between Dora and Emma.



The list of possible teams is:

- *A-B, A-C, A-D, A-E* (4 teams)
- *B-C, B-D, B-E* (3 teams)
- *C-D, C-E* (2 teams)
- *D-E* (1 team).

The girls can make 4 + 3 + 2 + 1 = **10** different doubles teams.

Strategy 2: Build a Table

We can use a table to list the teams in an organised way.

Each girl has four possible partners.

For example:

- Abbie can team up with Bella, Cate, Dora and Emma.
- Bella can team up with Abbie, Cate, Dora and Emma,

and so on.

All of the possible combinations are shown in the table.

	Abbie	Bella	Cate	Dora	Emma
Abbie		*A-B*	*A-C*	*A-D*	*A-E*
Bella	*B-A*		*B-C*	*B-D*	*B-E*
Cate	*C-A*	*C-B*		*C-D*	*C-E*
Dora	*D-A*	*D-B*	*D-C*		*D-E*
Emma	*E-A*	*E-B*	*E-C*	*E-D*	

There are **20** doubles teams in the table.

However, we can see that Abbie teaming up with Bella (*A-B*) is the same as Bella teaming up with Abbie (*B-A*).

Likewise, Cate teaming up with Emma (*C-E*) is the same as Emma teaming up with Cate (*E-C*).

This table counts every team twice.

The number of teams that can be formed is **20 ÷ 2 = 10**.

	Abbie	Bella	Cate	Dora	Emma
Abbie		*A-B*	*A-C*	*A-D*	*A-E*
Bella	*B-A*		*B-C*	*B-D*	*B-E*
Cate	*C-A*	*C-B*		*C-D*	*C-E*
Dora	*D-A*	*D-B*	*D-C*		*D-E*
Emma	*E-A*	*E-B*	*E-C*	*E-D*	

Answers

2.3 - Green: 3

2.3 - Orange: 10

2.3 - Yellow: 10

Maths Games – Example Problem 2.4

Example Problem 2.4 - Green

Jessica buys a concert ticket.
She makes a profit of $6 by selling it to Bryan for $25.
How much did Jessica pay for the concert ticket?

Example Problem 2.4 - Yellow

David buys a concert ticket.
He later sells it to Jessica and loses $3 on the deal.
Jessica makes a profit of $6 by selling it to Bryan for $25.
How much did David pay for the concert ticket?

Example Problem 2.4 - Orange

Kelly made two purchases.
She gave one cashier $20 for a scarf and received $6 change.
Then, she gave another cashier $15 for a bracelet and received $3 change.
After these purchases she had $28.
How many dollars did she have before buying the scarf and the bracelet?

Maths Games Example Solution 2.4 - Yellow

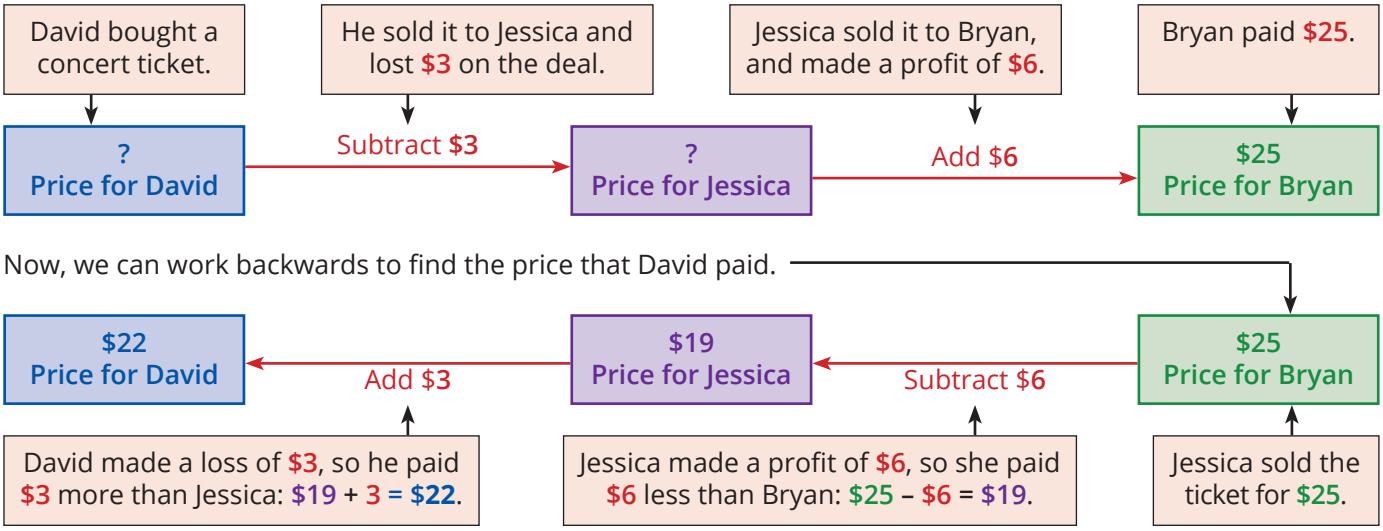
David buys a concert ticket.

He later sells it to Jessica and loses $3 on the deal.

Jessica makes a profit of $6 by selling it to Bryan for $25.

How much did David pay for the concert ticket?

Strategy 1: Work Backwards



David originally paid **$22** for the concert ticket.

Strategy 2: Guess, Check, and Find a Pattern

Let's guess that David paid $20 for the concert ticket.
Jessica paid $3 less, which would be $20 – $3 = $17.
Bryan paid $6 more than Jessica. $17 + $6 = $23.

Cost for David	$20			
Cost for Jessica	$17			
Cost for Bryan	$23			

That's less than the amount Bryan actually paid for the concert ticket ($25), so let's guess a higher price.

Let's guess that David paid $25 for the concert ticket.
Jessica paid $3 less, which would be $25 – $3 = $22.
Bryan paid $6 more than Jessica. $22 + $6 = $28.

Cost for David	$20	$25		
Cost for Jessica	$17	$22		
Cost for Bryan	$23	$28		

For both of our guesses, we can see that the cost for David was $3 less than the cost for Bryan.

Why might this be the case?

If this pattern continues, then if Bryan paid $25 for the concert ticket, perhaps David paid $25 – $3 = $22.

Let's check: Suppose David paid $22 for the concert ticket.
Jessica paid $3 less, which would be $22 – $3 = $19.
Bryan paid $6 more than Jessica, so $19 + $6 = $25.

Cost for David	$20	$25	$22	
Cost for Jessica	$17	$22	$19	
Cost for Bryan	$23	$28	$25	

That matches the question. David must have originally paid **$22** for the concert ticket.

Answers

2.4 - Green: $19

2.4 - Orange: $54

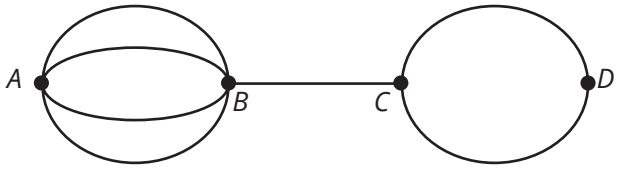
2.4 - Yellow: $22

Maths Games – Example Problem 2.5

Example Problem 2.5 - Green

Following only the paths shown, what is the number of different paths that go from *A* to *B* to *C* to *D*?

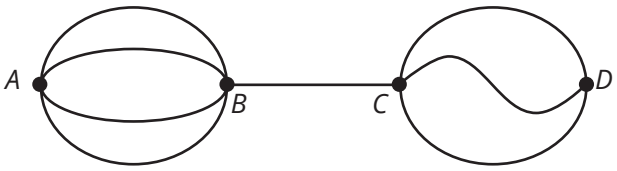
You must touch each of those points exactly once.



Example Problem 2.5 - Yellow

Following only the paths shown, what is the number of different paths that go from *A* to *B* to *C* to *D*?

You must touch each of those points exactly once.



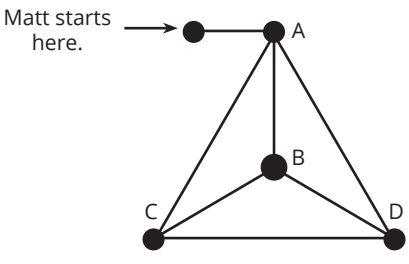
Example Problem 2.5 - Orange

Matt needs to visit four towns, *A*, *B*, *C* and *D*, as shown on the map.

It doesn't matter what order he visits them in, or where he finishes up, but he can only travel along the roads.

He starts on the road to Town *A*, and then visits each town exactly once.

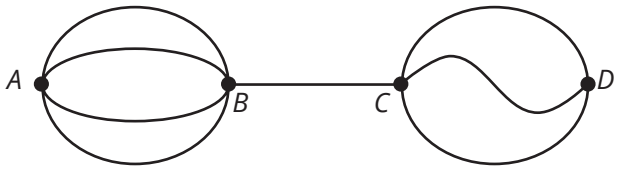
In how many different ways can Matt visit all four towns?



Maths Games Example Solution 2.5 - Yellow

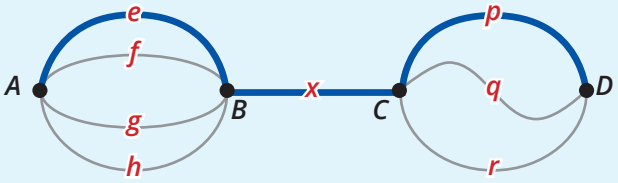
Following only the paths shown, what is the number of different paths that go from *A* to *B* to *C* to *D*?

You must touch each of those points exactly once.

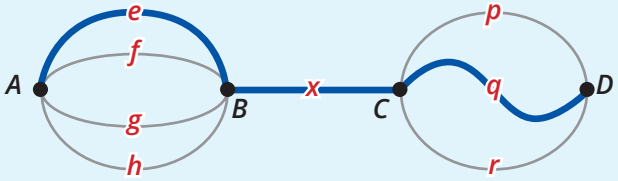


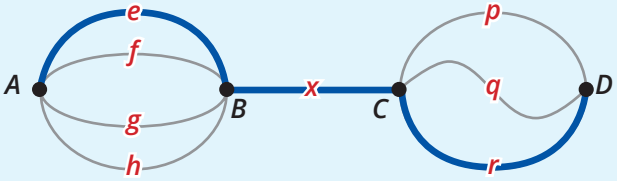
Strategy 1: Make an Organised List

Let's label all of the paths.
We can then try out one path and see how it goes.
The topmost path from ***A*** to ***B*** is ***e***.
From ***B*** to ***C***, there is only one path, ***x***.
From ***C*** to ***D***, the topmost path is ***p***.
So, we can go from ***A*** to ***B*** to ***C*** to ***D*** along paths ***e***, ***x***, ***p***.



What if we follow the same path to ***C***, and then just change the last path?
If we do that, we can go from ***A*** to ***B*** to ***C*** to ***D*** along paths ***e***, ***x***, ***q***, and ***e***, ***x***, ***r***.





Let's make a list.

We will start with the paths ***e***, ***x***, something.

A → B	B → C	C → D
e	x	p
e	x	q
e	x	r

There is only one option for the ***B*** → ***C*** path.

Let's try the next ***A*** → ***B*** path.

A → B	B → C	C → D
f	x	p
f	x	q
f	x	r

We can also travel from ***A*** → ***B*** along path ***g***,

A → B	B → C	C → D
g	x	p
g	x	q
g	x	r

and along path ***h***.

A → B	B → C	C → D
h	x	p
h	x	q
h	x	r

That's all of the possible paths.

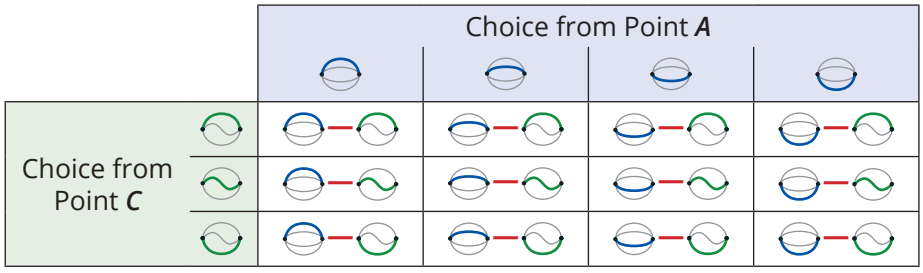
In total, there are **4 × 3 = 12** different paths that go from *A* to *B* to *C* to *D*.

Strategy 2: Build a Table

Since there is only one possible path from ***B*** → ***C***, we don't need to worry about having multiple options when we reach ***B***.

There are only choices at points ***A*** and ***C***.

Let's build a table that lists all of the possible choices at points ***A*** and ***C***.



There are **4 × 3 = 12** different paths that go from *A* to *B* to *C* to *D*.

Answers

2.5 - Green: 8

2.5 - Orange: 6

2.5 - Yellow: 12

Maths Games – Example Problem 2.6

Example Problem 2.6 - Green

Three friends have picked some apples. If they share their apples equally, they would have 5 each.
A fourth person arrived with some more apples.
When they shared all of the apples equally amongst the four of them, they all ended up with 6 apples each.
How many apples did the fourth person bring?

Example Problem 2.6 - Yellow

Five friends have picked some apples. If they share their apples equally, they would have 10 each.
A sixth person arrived with some more apples.
When they shared all of the apples equally amongst the six of them, they all ended up with 9 apples each.
How many apples did the sixth person bring?

Example Problem 2.6 - Orange

The average of five numbers is 8.
Two of the numbers are 2 and 5.
The other three numbers are equal.
What is the value of one of the three equal numbers?

Maths Games Example Solution 2.6 - Yellow

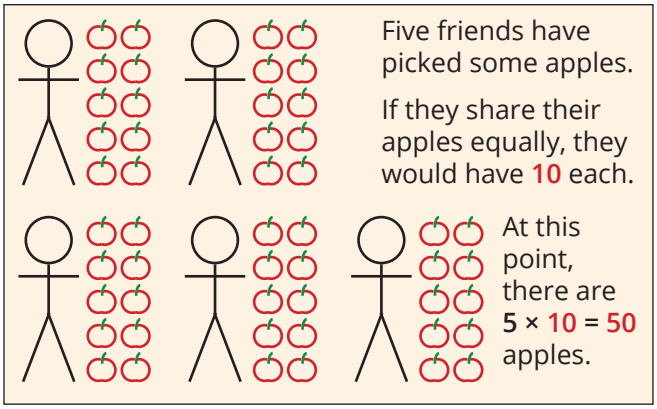
Five friends have picked some apples. If they share their apples equally, they would have 10 each.

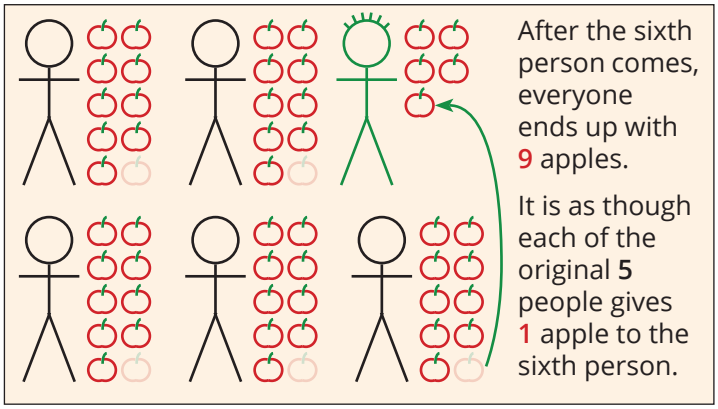
A sixth person arrived with some more apples.

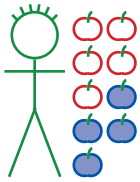
When they shared all of the apples equally amongst the six of them, they all ended up with 9 apples each.

How many apples did the sixth person bring?

Strategy 1: Draw a Diagram







After giving one apple away to the sixth person, each of the original **5** people has 9 apples.

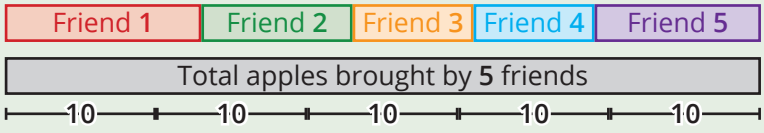
The sixth person has those 5 apples that were given to him, plus whatever he brought with him when he first arrived.

We know that he, too, ended up with 9 apples.

Therefore the sixth person must have brought 9 – 5 = **4** apples.

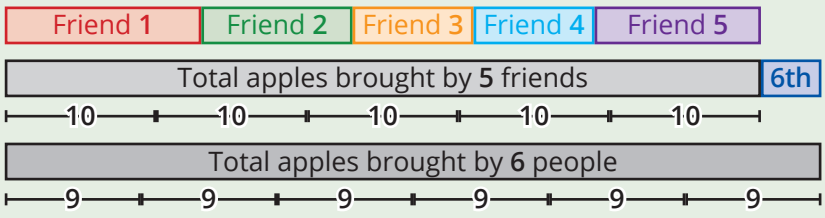
Strategy 2: Draw a Diagram, and Work Backwards

We begin with the apples brought by the five friends.
If we share all of the apples equally between the friends, they get 10 each.



A sixth person brings more apples, which are added to the total apples brought by the **5** friends.

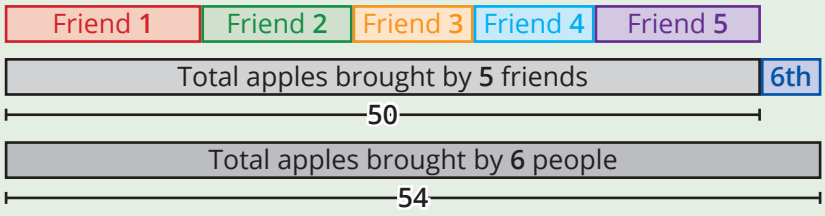
This total divided by **6** is **9**.



The total number of apples brought by the **5** friends is **5 × 10 = 50**.

The total number of apples brought by all 6 people is **6 × 9 = 54**.

The 6th person's apples is the difference between these two sums.



The sixth person brought **54 – 50 = 4** apples.

Answers

2.6 - Green: 9

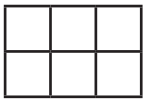
2.6 - Orange: 11

2.6 - Yellow: 4

Maths Games – Example Problem 2.7

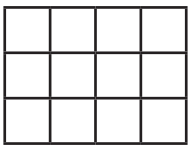
Example Problem 2.7 - Green

How many squares, of any size, can be traced on the lines in this diagram?



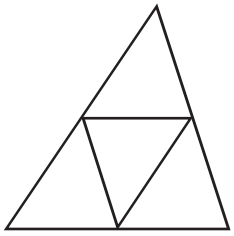
Example Problem 2.7 - Yellow

How many squares, of any size, can be traced on the lines in this diagram?

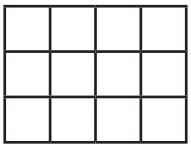


Example Problem 2.7 - Orange

How many four-sided figures can be traced, using only the lines in this picture?



Maths Games Example Solution 2.7 - Yellow

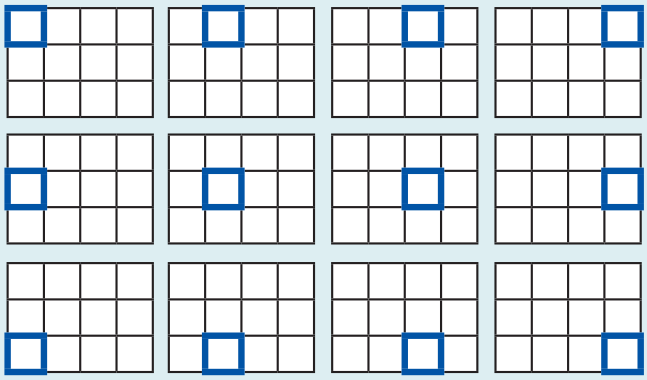


How many squares, of any size, can be traced on the lines in this diagram?

Strategy 1: Make an Organised List (1)

We'll start with squares that have side length 1.

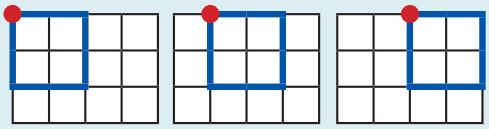
There are 12 of these squares, as shown.



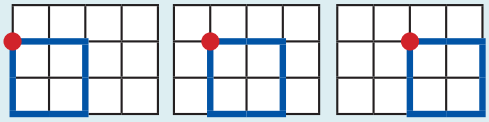
To find squares with side length 2, we'll start by placing the top left of a square on the top left point of the diagram.

Then, we'll move along the top row, placing the top left point of the square on the next intersection.

The same process happens with the next row.

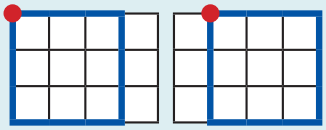


There are 6 squares with side length 2.



We can repeat this process to find squares with side length 3.

There are 2 squares with side length 3.



There are no squares with side lengths greater than 3.

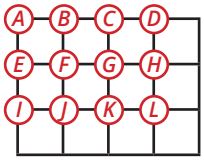
We can see that there are 12 + 6 + 2 = **20** squares in this diagram.

Strategy 2: Make an Organised List (2)

We can count the squares by considering one intersection at a time:

Let's label each intersection point to make it easier to talk about them.

We shall consider a point if it is possible for it to be the top left corner of a square.



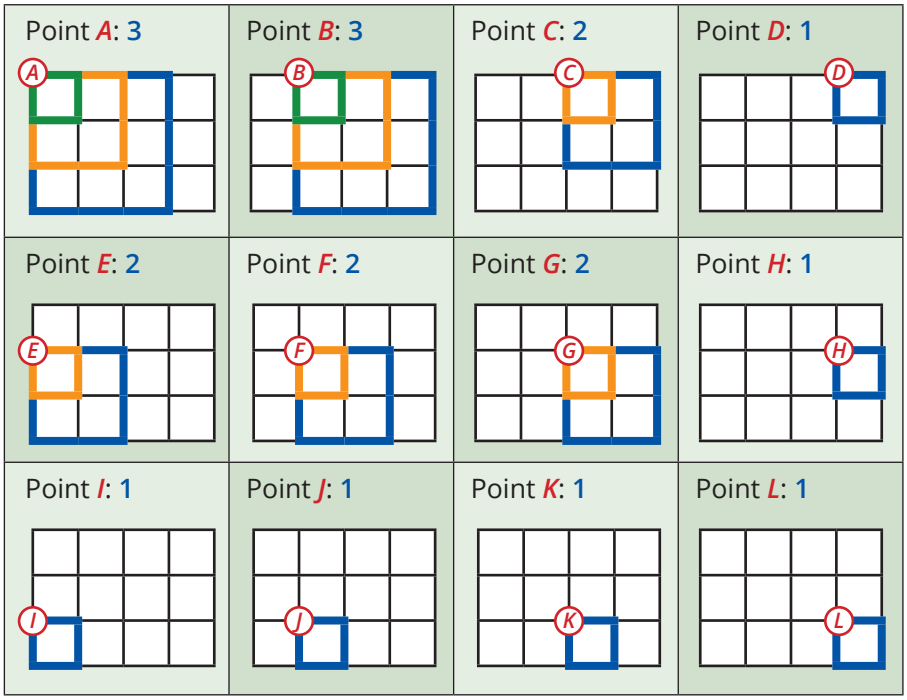
Since we have created the list in an organised way, we can be sure that we have included every possible square.

Therefore there are

(3+3+2+1)+(2+2+2+1)+(1+1+1+1)

= 9 + 7 + 4

= 20 squares in this diagram.



Answers

2.7 - Green: 8

2.7 - Orange: 6

2.7 - Yellow: 20

Maths Games – Example Problem 2.8

Example Problem 2.8 - Green

Miss Kimble's students earn "class money" for helping out in class.

Class money comes in $5 and $10 notes.

Lee, Mel, and Nate have each saved exactly $20 worth of class money.

They find that each of them has a different number of notes.

When they combine their money to buy a $60 pack of textas for their table group, how many $5 notes did they hand over?

Example Problem 2.8 - Yellow

Miss Kimble's students earn "class money" for helping out in class.

Class money comes in $5, $10 and $20 notes.

Lee, Mel, Nate and Olivia have each saved exactly $25 worth of class money.

They find that each of them has a different number of notes.

When they combine their money to buy a $100 pencil tin for their table group, how many $5 notes did they hand over?

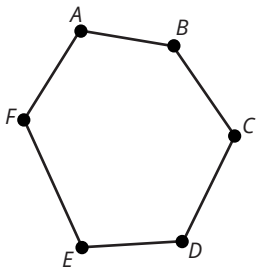
Example Problem 2.8 - Orange

Teo's hexagon has six different side lengths.

Each vertex is marked with a black dot.

He cuts the hexagon into two pieces using a single straight cut from one dot to another.

In how many different ways could Teo cut his hexagon?



Maths Games Example Problem 2.8 - Solution

Miss Kimble's students earn "class money" for helping out in class. Class money comes in $5, $10 and $20 notes.

Lee, Mel, Nate and Olivia have each saved exactly $25 worth of class money. They find that each of them has a different number of notes.

When they combine their money to buy a $100 pencil tin for their table group, how many $5 notes did they hand over?

Strategy: Make an Organised List

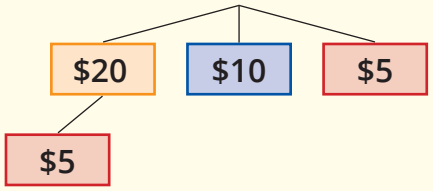
We can list all of the different ways there are to make $25.

Largest Note | **Combinations**

$20

If the combination includes a $20 note, then there is **$25 – $20 = $5** in other notes.

There is only one way to make **$5** using Miss Kimble's class money, so there is only one way to make **$25** using a $20 note: $20 + $5.



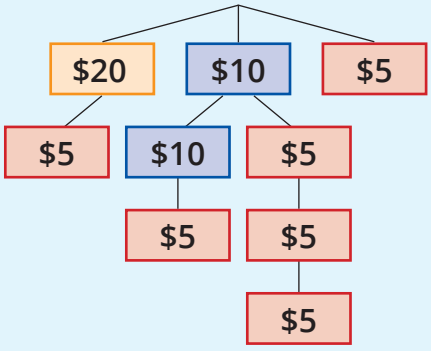
$10

If the combination includes a **$10** note, then there is **$25 – $10 = $15** in other notes.

- To make **$15** with a second **$10** note, there would be **$15 – $10 = $5** in other notes.

  So **$10** + **$10** + **$5** is the only combination with two **$10** notes.
- To make **$15** where the second note is **$5**, there would be **$15 – $5 = $10** in other notes.

To make the **$10**, we cannot use a **$10** note since we are counting from the largest note down to the smallest. So this **$10** must be a combination of two **$5** notes.



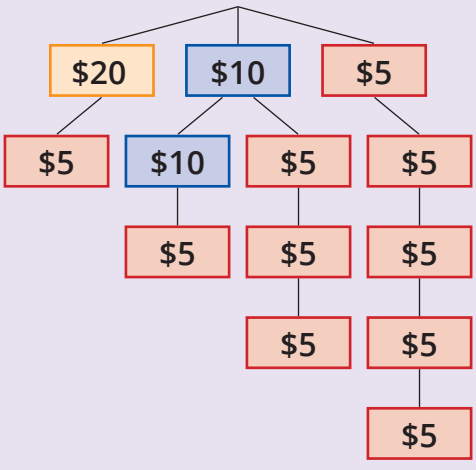
$5

If the combination does not include either a $20 or a **$10** note, then it must consist of five **$5** notes.

Since it's not possible to have smaller notes, that must be all of the possible combinations.

It also matches the question, because each combination has a different number of notes.

Lee, Mel, Nate and Olivia must have had one of these combinations each.



By counting the **$5** notes in the completed diagram, we can see that all together, the group had **1 + 1 + 3 + 5 = 10 $5** notes.

Answers

2.8 - Green: 6

2.8 - Orange: 9

2.8 - Yellow: 10

Answers

Set Green	
2.1	8
2.2	12
2.3	3
2.4	$19
2.5	8
2.6	9
2.7	8
2.8	6

Set Yellow	
2.1	9
2.2	12
2.3	10
2.4	$22
2.5	12
2.6	4
2.7	20
2.8	10

Set Orange	
2.1	50
2.2	15
2.3	10
2.4	$54
2.5	6
2.6	11
2.7	6
2.8	9