A Booklet for

Mental Computation

Compiled and formatted
by Rob and Catherine Vingerhoets

Contents

Compiled and formatted by Rob Vingerhoets and Catherine Vingerhoets
of Rob Vingerhoets Educational Consultancy (RVEC).

Introduction

by Rob Vingerhoets

> "Math facts by themselves are a small part of mathematics, and they are best learned through the use of numbers in different ways and situations. Unfortunately, many classrooms focus on math facts in isolation, giving students the impression that math facts are the essence of mathematics, and, even worse, that mastering the fast recall of math facts is what it means to be a mathematics student. Both of these ideas are wrong, and it is critical that we remove them from classrooms, as they play a key role in creating math-anxious and disaffected students."
> - Jo Boaler, *Mathematical Mindsets* (2016)

First thing's first – mental computation, for me, IS NOT automatic response and being able to regurgitate your tables quicker than another human being. It's way more than that. It's about number sense and knowing how numbers work. It's about having efficient, not necessarily fast, strategies to work out number problems/situations in your head.

We still hold onto the way we taught it in the past, which was clearly rubbish - I think it's just become a tradition. We like to hold onto these. It's like trying to hold onto handwriting longer. Like, give it up a bit - It's 2018!

You should be able to work out a problem in your head. The fact that the only way to do that is by knowing your tables— there's actually no evidence of that. I think that one of the things that teachers and parents are sucked in by is that you can't be any good at maths if you're no good at your tables. That's just not proven. There's no research that connects strength of tables to strength in overall performance in mathematics and I have worked with thousands of kids who are not good at tables races or speed and accuracy tests but are highly capable mathematicians and problem solvers.

It is next to useless to rote learn times tables. We, the nation, don't need regurgitators of a narrow collection of maths facts we need thinkers who can apply known skills (place value, doubles, near doubles, distributive property, commutative property, compatibility, compensation strategy…).

If I know six sevens are 42, but have no picture in my head about 42—I don't see it as an array, I don't see it as six weeks, I don't see it as double 21 or half of 84— I see nothing – then what's the intrinsic value of knowing that single, isolated fact? Bugger all value! I see nothing in my head except the line from the tables chart that I've memorised that says six sevens are 42. That's all I've done and I've said it quicker than you. That doesn't make you smarter at maths and it doesn't mean you have number sense.

But you're sitting there working out, 'okay if I break the seven into fives and twos, so if I make that six lots of five — which I can do because that's a fives pattern and that's easy— well that's 30. And then six twos, that's just a double so that's 12. I'll put the 30 and the 12 together and I get 42'. Well, there's no way you're beating me in speed, but you just beat me all ends up in mathematics. Understanding versus speed. For me, as a teacher, I'll take the understanding any day.

You used the distributive property to work 6 x 7, you used doubling, you used place value, you used common sense, you used great mental computation. Your maths is vastly superior to mine. I just regurgitated a fact that had absolutely no meaning whatsoever to me.

But the fast student often stays standing while the other sits down in a mathematics game. The fast student gets praised while the other is considered slow at mathematics because it took too long to get to an answer.

It's all wrong—the way we've been going. It's not about how fast you are, it's about how well and how efficiently you put it together.

Brent Hughes is a colleague of mine and a primary school teacher and numeracy educator at Matific. He agrees that children remembering something and children understanding something are two vastly different things.

"If you want your children to be better at maths, ditch the flash cards and instead play games where mathematical skills are being applied to problems that need solving.

"I can remember children I've taught who told me that eight times nine was 72, but that there was no such thing as 13 times one. This is a classic example of rote learning not extending to understanding.

"When understanding is the primary focus, all children benefit; when remembering is the primary focus, some children benefit," says Brent.

Just help kids know their tens, your fives and your twos. You can get to every number fact from there. If a student can break that seven times table into fives and twos, they're strong in mathematics, and they'll be fine—better than any kid who can only regurgitate the facts but has no concept of the result.

The activities in the booklet are about efficiency and understanding and connections - NOT speed and memorisation. Use these activities to develop and promote number sense – how numbers work and how they are connected and how you can manipulate them to get results/answers.

Rob Vingerhoets.

BONUS: Your kids will love the activities!

Activities

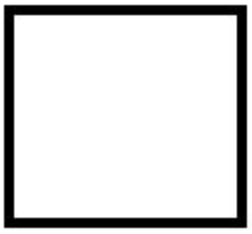
Today's Target

Suitable Grade Levels: Prep to 6

Equipment:

- Enough whiteboard space to write out the strategies

Give students a target number. Ask them to come up with a series of number sentences that equal the target number using the strategies listed below.

Today's target is 

Try to make today's target in each of these ways:

1. Adding two numbers together
2. Finding the difference of two numbers
3. Multiplying two numbers
4. Dividing one number by another
5. Adding three numbers together
6. Multiplying three numbers
7. Multiplying and subtracting
8. Using a fraction
9. Using a decimal
10. An unusual way!

I use algebra from prep onwards in this activity and it works really well. I tell kids that they're going to add and I want them to a + b = 13 (for example). "Kids, you can let **a** be any number you want it to be, you can let **b** be any number you want it to be. As long as the two numbers add up to equal 13."

50 cents - What Coins?

Suitable Grade Levels: Prep to 6

Equipment:

- A variety of Australian silver coins (real preferred)
- Fake or magnetic coins (optional)

This activity combines mental computation skills with real world money, making it even more engaging for students. For younger year levels, write and draw a list of the different coins - 5c, 10c, 20c, and 50c - on the board, or spread out fake money on the table.

Tell the students you have 50c in your pocket, and ask them to guess what coins you have that could equal 50c. It could be a single 50c coin, two 20c and one 10c coin, etc. Combining maths with money is a great way to get students engaged and to help them visualise the numbers they're working with.

Tip: Tell the kids that no-one in the room is allowed to give you more than one combination

Make sure you record all combinations on the board - and even show how each combination 'works' on a metre ruler/number line - especially in the lower grades.

For example a student says 20 and 20 and 10.

Record it:

- 20c + 20c + 10c = 50c

I usually take 5 or 6 combinations from the kids. When I don't have a matching combination to the coins I actually have I tell the kids they have done very well and that matching me takes a lot of luck. I then tell them the number of coins for example, 6. I then get them to turn and talk and try to work out how I can get to 50c in 6 coins.

Once again record the 6 coin combinations the kids come up with:

- (4 x 10c) + (2 x 5c) = 50c
- (1 x 20c) + (1 x 10c) + (4 x 5c) = 50c

Get Me to $120

Suitable Grade Levels: Prep to 6 - just vary the amount as appropriate; $12 for preps

Equipment:

- Australian notes (real or fake)

Like the 50c - What Coins? activity, students are required to reach a target value using real life money values, strengthening their mental computation skills in a way that is particularly relevant and useful. Tell the students that you have $120, but that you're not sure what combination of notes you have. Draw up the notes and coins we have in Australia or use magnetic notes and coins to show them the values they can use - $5, $10, $20, $50, or $100 and $2, $1, 50c, 20c, 10c, 5c. Do multiples of some of the notes. Your board could look like:

50c	$100	$5	$10	20c	$50
$20	$1	$50	$10	5c	
$2	$20	50c	$5	$20	$5

Ask the students to list some possible combinations of notes/coins that could get to exactly $120. Tell the kids you can add money to get there - like $100 but $20. You can add to more than $120 and then subtract to get back to $120 - like $100 + $50 - $20 - $10 = $120.

If you add or subtract you can only use the notes and coins that are on the board. But if you want to multiply or divide you can have as many of the notes or coins as you wish. There are only three $20 notes on the board but if you want to say 6 lots of $20 - go for it."

No-one in the room is allowed to give you more than one combination.

If you must use the notes and coins that are on the board and all 4 operations are up for grabs.

If you add and/or subtract you can use only the notes and coins that are on the board any equation you provide is worth 1 point. If you use multiplication or division in your equation it's worth 2 points. If you multiply by any number that has a hash to get to $120 - 3 points.
[240 x 50c] would get the grade 3 points.
Target for the grade is to get provide 15 equations that equal $120 AND earn 25 points.

Coin Balance

Suitable Grade Levels: Grades 3 to 6

Equipment:
- Silver Australian coins (real if possible)

Tell the kids that in one hand you have 2 coins and in the other hand you have 6 coins. Tell them that the amount of money in each hand is equal/the same - even though one hand has way more coins.

I now put on the board:

2 coins = 6 coins

I now ask the kids to give me combinations of coins where 2 coins is equal in value to 7 coins.

These combinations are recorded on the board. As usual, I tell the kids that no-one in the room can give me more than one combination.

After 3 or 4 contributions your board should look like:

2 coins	**=**	**6 coins**
50c + 10c		**6 x 10c**
$1 + 20c		**6 x 20c**
50c + 50c		**(4 x 20c) + (2 x 10c)**

The students should provide 5 or 6 combinations. If none of the combinations match what you have (you might have a 50c and 20c in one pocket/place and 2 lots of 20c; 2 lots of 10c and 2 lots of 5c in the other hand/pocket/place) give the kids a clue like - “my amount is between 50c and $1.”

How Much Money in My Pocket?

Suitable Grade Levels: Prep to 6 - depends on the range
Grade 5/6 - between $0 and $500
Prep - between $0 and $20/$50

Equipment:

- A small collection of various notes and coins (real if possible)
- Whiteboard space for writing

Tell your students that you have a certain amount of money in your pocket, and that they have eight questions to figure out how much money you have. After 8 questions, if they haven't worked it out, they can have one guess.

I record the numbers 1 to 8 vertically on the board.

I tell the kids the range of my amount ; Kids, it's between $0 and $500.
I tell them it's a whole dollar amount (no decimal/silver coins)
I tell them that no-one in the room is allowed to ask more than one question.
I tell them that I can only answer yes or no to any question - otherwise one of them could ask you: "How much money do you have?" And you'd be obliged to tell them!
I tell them to try and avoid asking single amount questions until the very end.

The first student with a hand us asks you if it's more then $250. I then go to the board and record my response in writing as well as verbally:

1. **No. it is < $250** [good question, you wiped out 50% of the possible amounts]

A second students asks if it's an odd number. Go to the board.

1. **No. it is < $250** [good question, you wiped out 50% of the possible amounts]
2. **Yes. It is odd.** [very good question, so kids we're looking for an odd amount that's less than $250]

The activity continues until the students have asked their 8 questions.
If they are not successful first time in establishing how much money you had, don't worry, persist. The kids will get better with their questions each time you use this activity - especially if you get them to analyse what questions were less effective than others and why.

Will You Do It In Your Head?

Suitable Grade Levels: Prep to 6 - once again just depends on the numbers you use and when in the year you're doing the activity

Equipment: None

Write out a list of equations and ask students which ones they would try to solve in their heads and which they would try to solve on paper.

Give them some time (5 to 10 minutes) to do this and emphasise that you don't have to pass this - it isn't a test and if you can't do it in your head - no problem.

Who did 370 + 99 in their heads?

Okay, how did you do it?

It is essential that you now get yourself to the board and record how that student worked it out. Either do this or have the student come out and explain and show on the board.

The student might say Ïf you add one more to 99 it becomes 100 and 370 plus 100 i just 470 so then I took one off the answer because I added it on before so the answer is 469.

Make sure the maths on the board matches the verbal explanation:

370 + (99 **+ 1**) = 370 + 100 = 470. 470 **- 1** = 469

For example: (grades 4 - 6 type numbers)

Which of these computations are easy for you to do in your head? Why?

430 + 50	370 + 99	357 - 279	800 + 900
6000 + 6000	855 - 56	750 + 250	100 - 36
548 + 376	1000 - 499	864 - 500	456 + 789
18 + 17 + 16	38 x 3	40 x 9	25 x 12
99 x 7	135 x 2	63 x 24	5 x 26
42 / 7	360 / 12	870 / 10	240 / 24

What Could the Question Be?

Suitable Grade Levels: 2 - 6

Equipment: None

This activity requires students to work backwards from a solution to create an equation. It will help students to realise that sometimes there is more than one correct answer to a problem.

Start by thinking of a random number (24 for example). Tell your students the number and that it's the answer to a question. What could the question be?

Ask them to think of a question that gives you that answer - I randomly choose students to ask me a question. Later on I may encourage them to put hands up and volunteer a question.

I record the maths that results from all questions on the board.

A student asks, "What is 3 times 10 then subtract 6?"

On the board:

3 x 10 - 6 = 24

"What is half of 48?"

On the board:

Half of 40 = 20. Half of 8 = 4. So 20 + 4 = 24.

Encourage all correct responses, especially those that are creative and reflect broader thinking about numbers (for example, what is 6 x 4 is okay and it results in 24 but how many hours in a day, or what's 2 dozen eggs or how many months in 2 years, or when is Christmas Eve are really creative and I make a 'fuss' of the kids who ask them).

Each question should begin with a question word: what, how, etc. If a student doesn't have a question ready just go back to them later; it might take a couple of attempts at this activity to get some really great answers.

Date Maths

Suitable Grade Levels: 3 - 6

Equipment:
- Stopwatch (optional)

This is a whole class, pairs, or individual activity which works really well as a whole class activity as it actively encourages cooperation. You can set the challenge of Date Maths individually and if you need to give homework it makes a worthwhile homework task.

Write the day's date on the board - for example: 02/10/18. Set up the board as shown below for numbers 1 to 10 or 1 to 20.

02/10/18

= 1	**= 11**
= 2	**= 12**
= 3	**= 13**
= 4	**= 14**
= 5	**= 15**
= 6	**= 16**
= 7	**= 17**
= 8	**= 18**
= 9	**= 19**
= 10	**= 20**

The students' task is to make an equation for each of the numbers 1 to 10 or 1 to 20 using ***only*** the digits in the day's date. Students are able to change the order of the numbers (the 0 and the 2 can become 20, or the 2 and the 8 can become 28) but each digit can only be used ***once*** per equation. If there is only one 8, for example, the equation 8 + 8 x 1 = 16 would not be valid.

For grade 5/6, tell students they need to use at least 4 of the 6 digits in the date to produce an equation. 8 + 2 – 1 = 9 is correct but it only uses 3 digits. It needs to be 4. At grade ¾ level the kids must use at least 3 of the 6 digits. At foundation/grade ½ level they must use at least 2 of the digits. Students can use any of the 4 operations and if you want to do an operation before another one – 'whack it in a bracket'!

Each student can only provide one equation. First hand up gets the equation.

I go through the numbers in order, as in:

“Who has an equations for 1?” Listen and record it:
10 – (8 + 1) = 9….”Who has an equation for 2?”……..

If students feel they will have trouble keeping up with you then I encourage them to not try and keep up with me but to move ahead to number 10 or 12 or 15 or 20. If any numbers give the students trouble, allow them to turn and talk to a partner to see if they can work something out. In this case it’s likely that a student who has already given an equation knows the answer, and can pass it along to someone who hasn’t given an equation yet.

I time the activity as it encourages the students to try and use all 6 of the digits in the date. If you use all 6 digits that 30 seonds off the final time.

For example – for number 2:

2 x 10 – 18 + 0 = 2 BONUS!! All 6 digits used.

This way a grade may record 9 minutes 36 seconds to produce 20 equations but for 7 equations individuals used all 6 digits so that means 7 x 30 seconds so that 3 minutes 30 seconds that comes off the time – 9.36 – 3.30 = 6.06 and that’s the time to beat next time you play Date Maths.

Heads or Hips?

Suitable Grade Levels: Prep to 6

Equipment: None

Ask all students to stand. Use a target that suits your class (10 works well for foundation; 20 for Year ½; 30 for grade 3/4 and 40 for Year 5/6) and tell the students that you are about to give them a problem they need to work out in their heads.

For example, with a grade ½, put this on your whiteboard:

> 20 = heads
< 20 = hips

Present the first problem.

"I went on holidays for 3 weeks but we had to come back to 2 days early because our cat was sick. Now kids, we were away for more than 20 days or less than 20 days. Wait for the countdown. Don't put your hands on your head or your hips until you hear me say NOW."

If they believe the answer to the equation is larger than 20 (>) the students need to put their hands on their heads; if they believe the answer is less than 20 (<), they must put their hands on their hips. Tell the students that they will have some time to think about the answer and that they can only put their hands on their heads or hips at the ***end*** of the countdown - this is so no student is tempted to just copy someone else. Tell the students that you'll be choosing some of them randomly to explain their answer, so they shouldn't copy! I do a silent countdown from 5 - keeping an eye out for students who look like they're close to working it out but aren't quite there yet - and use my fingers… 5, 4, 3, 2, 1…NOW!

If students have their hands in the wrong place – don't worry about it. Too many mental comp activities have kids sitting down – they then, more than often, tune out. No-one is out. The teaching/learning component of this activity is when you choose a student who has their hands in the correct position and have them explain how they worked it out while you record it on the board for all the grade to see/appreciate/consider.

Christina (student): "I know that there are 5 days in the week so that's 3 lots of 5 and that's 15, and then there are three weekend so that's 3 lots of 2 and that's 6 and 15 and 6 is 21 and then take off 2 so that's less than 20. That is an exact quote of how a grade 1 girl worked it out. As she spoke/explained on the board I recorded –

15 6
(3 x 5) + (3 x 2) and 15 + 6 = 21 and 21 – 2 = 19 and 19 < 21

Try to make the problems you present real life based. My second problem to the grade 1/2s could be something like..

“I went to the shops with four $5 notes and three $2 coins. I spent $5 at the shop. Now do I have more than $20 left or less than $20? Wait for the countdown.” Choose one or two kids to explain how they wrked it out. Make sure you record their thinking on the board.

Problem 3 (if time permits): I had 2 dozen eggs but I fell over. I got up and checked the eggiweggs. Darn, I’ve broken 4 of them. How many eggs do I have left now?! See what the kids do – let them figure it out.

Just a guide but for:

- Preps: more or less than 10
- Grade ½: more or less than 20
- Grade ¾: more or less than 30
- Grade ⅝: more or less than 40

The Number Cruncher

Suitable Grade Levels:

Equipment: None

Ask students to picture a big machine. If you feel creative enough, even try drawing one on the whiteboard - the crazier-looking the better! Ask the students to imagine a number going into the machine, the machine making a whole bunch of weird noises, and a new number coming out the other side. What could have happened to the starting number inside the machine to make it the resulting number that comes out of the end of the number cruncher?

That's the general idea behind Number Cruncher. Students are given a starting number (5, for example) and a finishing number (such as 16). It's up to the students to think of at least five ways that the 5 could become 16, using any and all operations.

For 5 and 16, you could get answers such as:

5 + 9 = 16 (9 was added to it) or

5 x 5 - 9 = 16 (it was multiplied by itself and then 9 was subtracted) or

(5 + 3) x 2 = 16 (three was added to the 5 and then it was doubled)

You could pick any two numbers, so choose ones that are suitable for your class.

8 went into the machine and it came out as -3.

24 went into the machine and it come out as 1.5

Te students can do this as a whole class activity, in pairs or individually.

Record many examples of their work on the whiteboard or have the kids do that.

Compatible Numbers

Suitable Grade Levels:

Equipment:
- Enough whiteboard space to write out the number list

Becoming familiar with numbers and the relationships between them is a great way to work on mental computation skills. In this activity, using numbers that equal 10, 20 or 50 or 100 is also an excellent stepping stone for fraction, decimal, and percentage work!

Write out twenty compatible numbers (numbers that when added produce a neat sum, such as 10, 20 or 50 or 100) in a random fashion. Ask students to record pairs of compatible numbers and explain why the pairs they selected are compatible.
For example (for 10):

_ + _ = 10

4 3 9 6 1 5 0 2

8 10 1 5 2 7 9 8

7 and 3 are compatible because they equal 10 when added.

_ + _ = 50

36 12 26 18 24 39 14 35

11 33 32 15 38 8 42 17

26 and 24 are compatible because 20 + 20 = 40 and 6 + 4 = 10 and 40 + 10 = 50

_ + _ = 100

60 56 88 44 67 71 33 40

12 96 4 29 25 30 75 …

56 and 44 are compatible because they equal 100 when added.
50 + 40 = 90 and 6 + 4 = 10 and 90 + 10 = 100

I Have… Who Has…?

Suitable Grade Levels: Grades 3 to 6

Equipment:

- Print or write out a set of large cards with the number questions

Best as a whole-class or small-group activity, this is an engaging and worthwhile activity – good for listening skills too. Students need to use mental computation to find relationships between numbers and progress the game - it's a good idea to let students help each other out where needed, too. I usually write out questions on cards and hand each student one card. Start with the student who has the card with number 9; they read out their card and the student who thinks they have the corresponding number raises their hand. If they're correct, they then read out their question and the line continues.

Here's a list of questions I use as a sample (suitable for grades ¾), but it's also possible find other examples of this activity online as it's fairly popular.

My number is 9 - Who has twice me and take away 4?
The number is 14 - Who has this number doubled?
I have number 28 - Who has 13 less than me?
I have number 15 - Who has three times my number?
I have number 45 - Who has my number plus 19?
I have 64 - Who has my number divided by 8?
I have 8 - Who has my number multiplied by 6?
I have 48 - Who has one third of my number?
I have 16 - Who has my number multiplied by 5?
I have 80 - Who was 25% of my number?
I have 20 - I am 10% of somebody else's number. Who has the number?
I have 200 - Who has ¾ of my number?
I have 150 - Who has the number that is the largest number you can make with my digits?
I have 510 - Who has the number 9 less than me?
I have 501 - Who has 401 less than me?
I have 100 - Who has the number that divides evenly into me 4 times?
I have 25 - Who has my number doubled, then divided by 10?
I have 5 - Who has my number multiplied by 200?
I have 1000 - Who has my number minus 901?
I have 99 - Who has my number divided by 9?
I have 11 - Who has 4 lots of me, take away 12?
I have 32 - Who has my number halved three times?
I have 4 - Who has 15 times my number?
I have 60 - Who has ⅔ of me?
I have 40 - Who has my number divided by 5, plus 5/5 (written as a fraction)?
Back at 9!

Equator

Suitable Grade Levels: 3 - 6

Equipment:
- Standard pack of cards (minus the jokers)
- Clean tabletop area
- Clock or stopwatch

This is a whole-class or individual activity that encourages logical thinking about numbers and operations when manipulating them to form an equation. This also helps students to get their head around equations in a different and more enjoyable way than just using word problems. It also relies partially on luck, so if students are struggling to complete the activity it's more likely because of unlucky card selection rather than a lack of mathematical skill - make sure the students know this!

For this activity the cards are at face value, a seven is a 7 etc, aces have a value of 1. Spread all the cards in the pack face down on a table and turn over one card - this becomes the goal number or target card that the students will be making equations to try and equal.

Turn over four more cards - these are the numbers the students will be using to make their equation. For example, first card turned over is a 6 – that's the target card. The 4 cards turned over are an 8, 10, 3 and 4. The board should look like:

8 10 3 4 = 6

The students must use as many of the four cards as possible when making their equation. The more numbers used and the more creative the equation, the higher the received score (two cards is 2 points, three cards is 3 points, all four cards is 5 points, and an extra point can be awarded for creativity).

Some considerations:
- Numbers can be combined so 4 and 8 can be 48.
- You can't use any number twice in the same equation, 3 x 3 is not on as there's only one 3

Students are encouraged to use all of the operations and to use brackets where possible. If needed, explain that anything in brackets is worked out first. Start with a time of three to four minutes for students to think of a few equations and choose their best – it's quality of equation not quantity.

Possible 2 point equations (2 numbers):
10 – 4 = 6
Possible 3 point equations (3 numbers):
(10 + 8) / 3 = 6; 3 x 8 / 4 = 6; 10 + 4 – 8 = 6; (4 – 8) + 10 = 6 (give 3.5 for that one!)
Possible 5 point equations (all 4 numbers):
(10 + 8) – (3 x 4) = 6; 10 – (3 x 4 – 8) = 6

The Calculator v. The Computator

Suitable Grade Levels: 2 - 6

Equipment:
- A calculator

A great way to sharpen automatic responses and mental computation skills that also regularly proves that the human brain is quicker than a manufactured device! The activity is a battle between a proficient computator (the human brain) and the reliable calculator. It might seem like the calculator has an advantage, but students will discover this isn't always the case. Choose two students to come to the front of the class or group. Either give one student the calculator or let them flip a coin for it. Explain that you'll be giving them some mental computation-type questions and that the first student to answer correctly wins a point. The student with the calculator ***must*** use the calculator to get the answer, even if they know the answer in their head. Some questions will also require the calculator-user to think of the right equation to put into the calculator to get their answer. For example:

Middle Primary
What is 6 groups of 7?
How many 6s are there in 36?
What is half of 48?
What is 24 plus 26?
How many centimetres in 1 metre?
How many seconds in 3 minutes?
How many days are there in 4 weeks?
What is 8 lots of 8s?
What is 40 divided by 5?
If I buy 4 things that each cost 75 cents, how much is that altogether?

Upper Primary
How many 9s are there in 72?
7 times what number equals 56?
What is half of 270?
How many millilitres in 5 litres?
How many days are there in winter?
What is one quarter of 88?
How many hours in a week?
6 x 7 = ?
What is 2000 minus 999?
How many months in 4 ½ years?
What is my change from $10, if I buy 4 items that each cost $1.20?

PS: This is the only activity I use where someone gets beaten by an opponent. I get two new kids up for the next round. If you donôt want to use it I understand.

Get Me to 10/100/1000

Suitable Grade Levels: Prep to 6

Equipment:
- Enough whiteboard space to write up at least 20-30 numbers

Students are given a collection of numbers. Using these numbers, students have to reach a target number of either 10, 100, or 1000. They have to use a number of steps (I usually give them 4 steps) to reach the target number. To make things more interesting, tell students that they can earn points for their equations. Scoring system (for middle and upper primary):
- any equation that uses 2 numbers = 1 point
- any equation that uses multiplication and/or division = 2 points
- any equations that uses 5 or more numbers = 3 points
- any equation that uses one of the #numbers anywhere in the equation = 1 point bonus

Some example numbers for year 5/6 are: **GET ME TO 1000**

10	**436**	**200**	**902**	**11 ½ #**	**150**
100	**10,000**	**4**	**25**	**6**	**0.5**
2,000	**3**	**723**	**464**	**50 ¼ #**	**8**
98	**125**	**2**	**13.5#**	**40**	**5**
845	**-10#**	**77**	**60**	**600**	**999**
1.25#	**9**	**1,002**	**500**	**55**	**250**

For prep: **GET ME TO 10**

Six	********	**3**	**(4 + 4)**	**triangle**	**nine**
1	**four**	#####	**dozen**	**5**	**twins**
Five	**2**	**one**	**8**	**seven**	**!!!!!!!**

For grade 1/2: **GET ME TO 100**

56	**20**	**5**	**99**	**-10**	**120**
75	**36**	**25**	**80**	**200**	**44**
4	**50**	**1**	**500**	**64**	**95**
10	**27**	**2**	**73**	**10**	**110**

Find the Connections

Suitable Grade Levels: Prep to 6

Equipment:

- Enough whiteboard space to write out a series of numbers

I realise this activity looks a lot like the previous Get Me To 10/100/100 but it is fundamentally different and a winner for mental comp and with the kids - it's totally open-ended and the students can come into it at a level that suits them.

You can do this activity as an individual one or it also works well as a whole class warm-up.

Here's a good set of numbers for grade 3 to 6 - I wouldn't change it much for prep to grade 2 - who knows?! And if the younger grades don't use any of the more challenging numbers - big deal - only cost you a bit of ink!

12	**$11\frac{1}{4}$#**	**100**	**60**	**371#**	**8**	**25**
6	**15**	**-5#**	**10**	**50**	**82.5#**	
18	**3**	**1000**	**819#**	**0.5#**	**4**	**500**
-10#	**5**	**20**	**$17\frac{1}{2}$#**	**2**	**120**	
7	**1 000 000#**	**0.25#**	**40**	**33**	**75**	**13**

And here's how it works:

- tell the kids they can choose any number on the board

- having chosen a number (example: 15) you can operate it any way you like

- you can **add** another number from the board to 15 (example: 15 **+** 3)

- you can **subtract** another number from the board from 15 (example: 15 **-** 8)

- you can **multiply** your number by another number on the board (example: 15 **x** 3)

- you can **divide** your number by another number on the board (example: 15 **/** 5)

And here's the catch:

- the answer (total +, difference -, product x, quotient /) to whatever you have done to your chosen number MUST BE ON THE BOARD!

15 + 3 = 18 (18 is on the board so all good); 15 - 8 = 7 (7 is on the board so all goo),

15 x 3 = 45 - oops, no 45 on the board - no 'maths sook' please! Just make a 45, but do it using numbers that are on the board - easily fixed: 40 + 5. So that person's equation would look like 15 x 3 = 40 + 5

And here's the scoring system for Find The Connections:

* any equation using three numbers from the board = 1 point (eg. 10 + 8 = 18)

* any equation using multiplication or division - 2 points (eg. 4 x 15 = 60)

* any equation using 5 or more numbers = 2 points (eg. 20 + 10 + 5 - 2 = 33)

* any equation that has more than one number on the right hand side of the equal signs = 2 points (eg. 4 x 5 =18 + 2)

* one point for bonus for any equation that has a # number in it (eg. **-10** + 20 + 5 - 7 = 8)

Before the kids ask - yes, if you get a bonus point for each # number you use

(eg. 4 x **11 1/4** + 5 = **-10** + 60) ..... = 7 points

- one for just having an equation

- two for having 5 numbers or more in the equation

- two for having more than one number on the rioght hand side of the equal sign

- two extra points - one for each # number: **11 1/4** and **-10**

I set a nominal target of **15 points** for everyone in the grade but will alter that as necessary either up or down to suit individual students

From Here to There

Suitable Grade Levels: Prep to 6 - just depends on the numbers you use. Examples here are from the Grades 3 -4 Number Sense Book

Equipment:

- A large whiteboard space to draw out the number rings

This activity will help students to recognise the variety of relationships among numbers, particularly through addition and subtraction. Uncover or write out the ring of numbers - as shown in the images below - and the connections between them, starting at the top and working around clockwise. The goal is for students to find ways to get from one number to another, or to find the numbers based on the numerical connections.

For the first ring, explain that students are to find ways of getting from one number to the next using one addition and one subtraction. For example, to get from 10 to 31 students could use the connections such as:

10 + 22 - 1 = 31 or

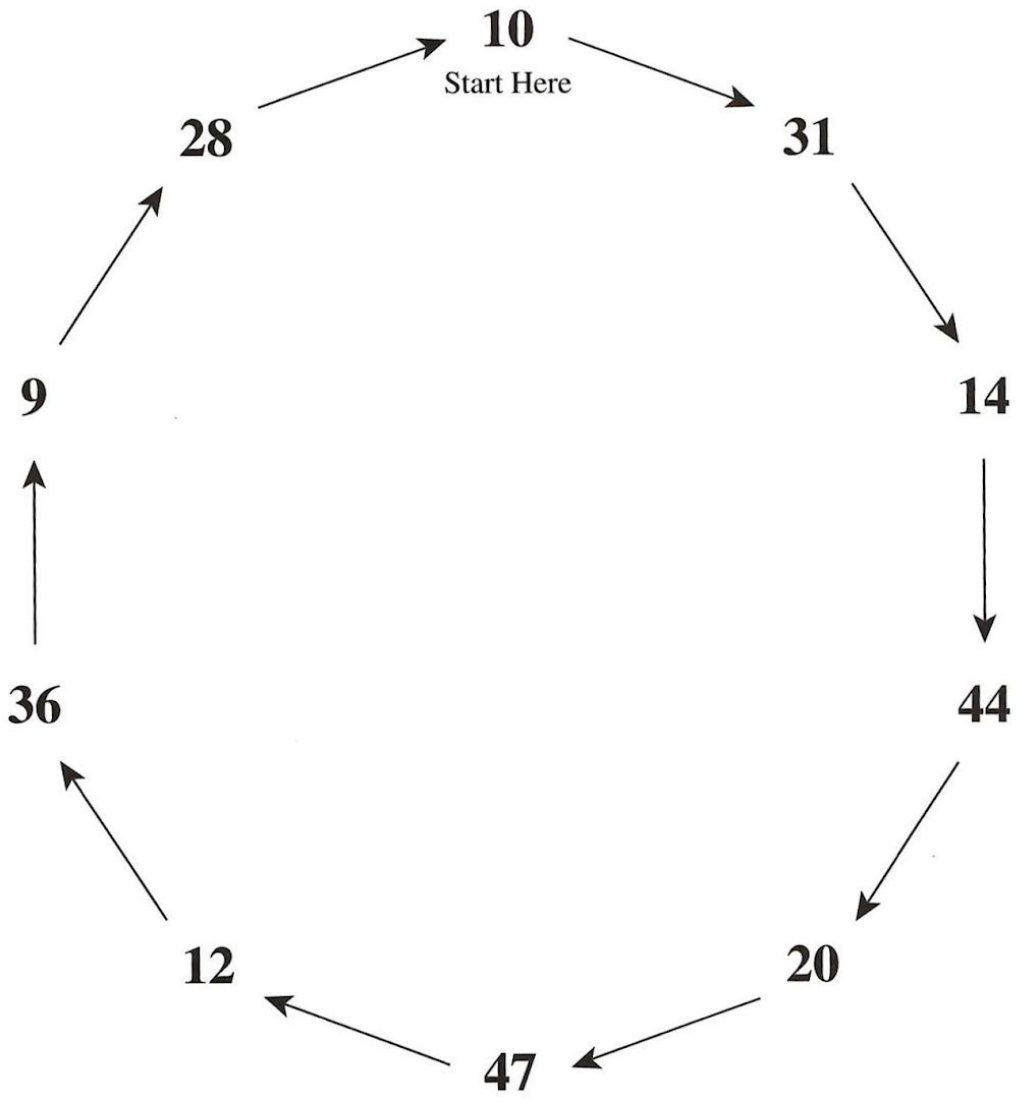
10 + 30 - 9 = 31

Write down the students' suggestions and ask them to comment on any patterns they see (for example, the difference between the number subtracted and the number added is always 21). Do the same for 31 to 14 and so on around the ring. The other two rings follow a similar process.

For an added challenge, ask students to create their own rings and work through them.

EXPERIENCE 20 / *Activity 1*

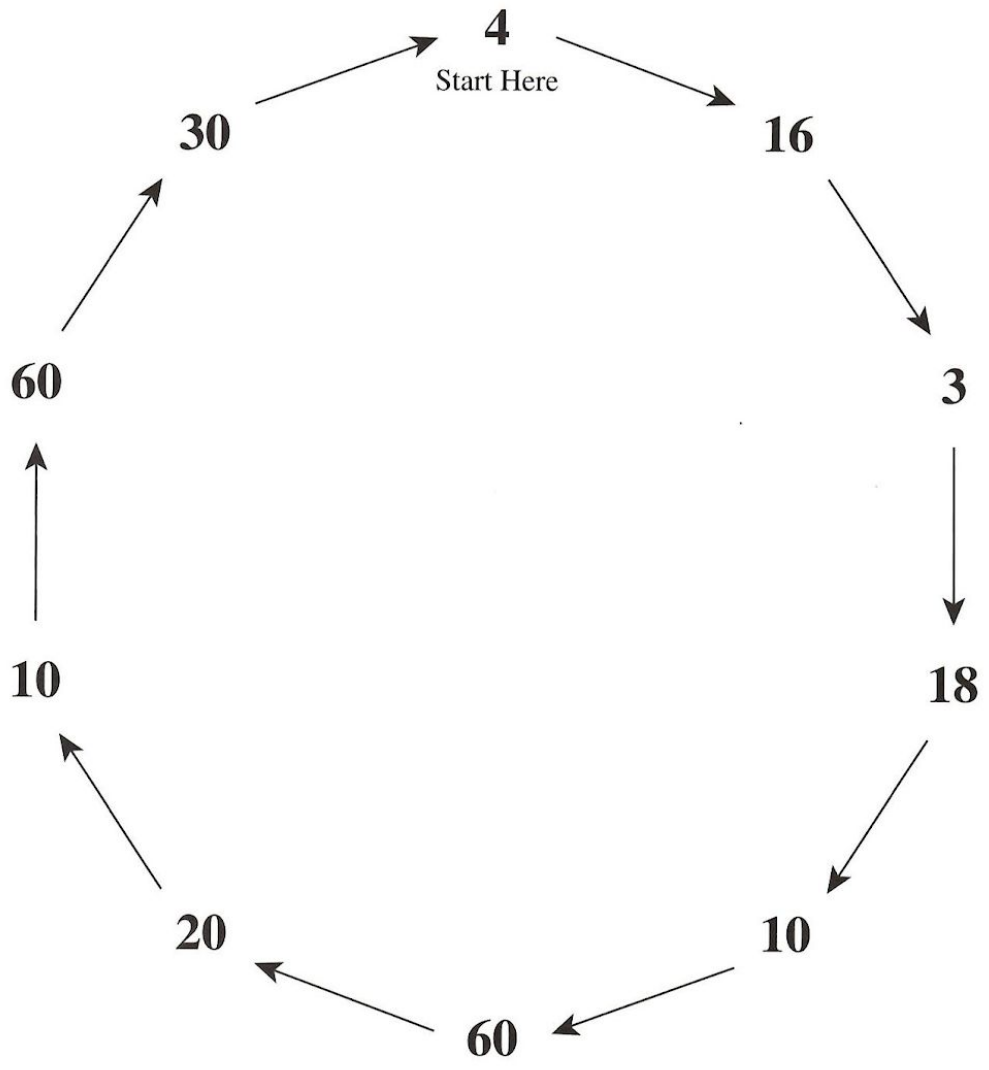
From Here to There



Move from one number to the next by using one addition and one subtraction.

EXPERIENCE 20 / *Activity 2*

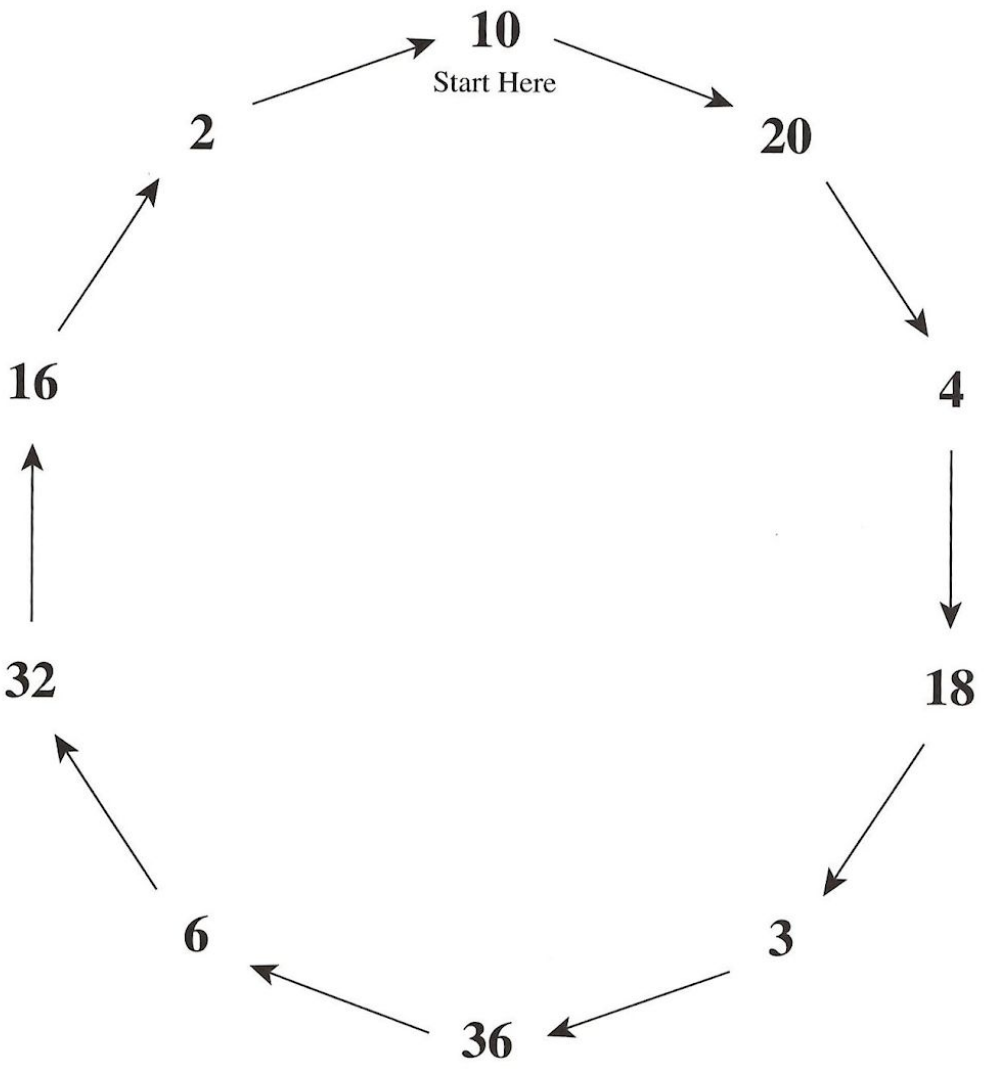
From Here to There



Move from one number to the next by using multiplication, division, or subtraction.

EXPERIENCE 20 / *Activity 3*

From Here to There



Move from one number to the next by using multiplication, division, or addition.

Which Path Will You Take?

Suitable Grade Levels: Prep to 6 - just depends on the numbers you use. Examples here are from the Grades 3 -4 Number Sense book

Equipment:

- A large whiteboard space to draw out the maze

This activity will help students practice mental computation in a way that is interesting and fun. It will help students to think about numbers, recognise numbers that are easy to compute, apply mathematical properties, and explore relationships between numbers. For example, we could compute 5 + 10 -10 by thinking that 5 plus 10 is 15, and 15 minus 10 is 5. A more efficient method would take advantage of the fact that 10 - 10 is 0.

The aim of each maze shown below is to find the fastest way to reach a target number. Students begin at the bottom of the maze with their starting number and travel along the various paths by performing the computations shown. It's not a bad idea to photocopy the mazes so students can record their thinking.

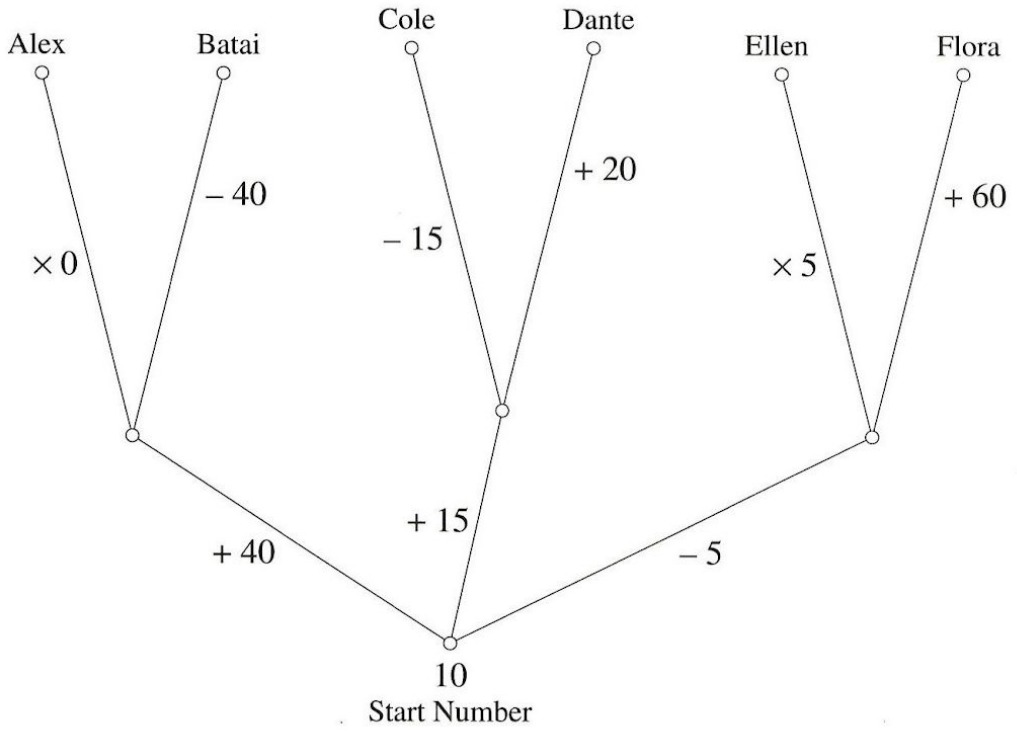
For the blank mazes there's a few options:

- Ask students to write in the values and operations and then compute each person's numbers,
- Provide numbers for each person, and have students enter appropriate values and operations,
- Provide all the numbers, and have students enter operations that will produce the correct results.

For an added challenge:

- Ask students to change the start number and see how each path's result changes,
- Ask students to change one operation at a particular path and find the new results,
- Challenge students to create their own mazes that produce certain results.

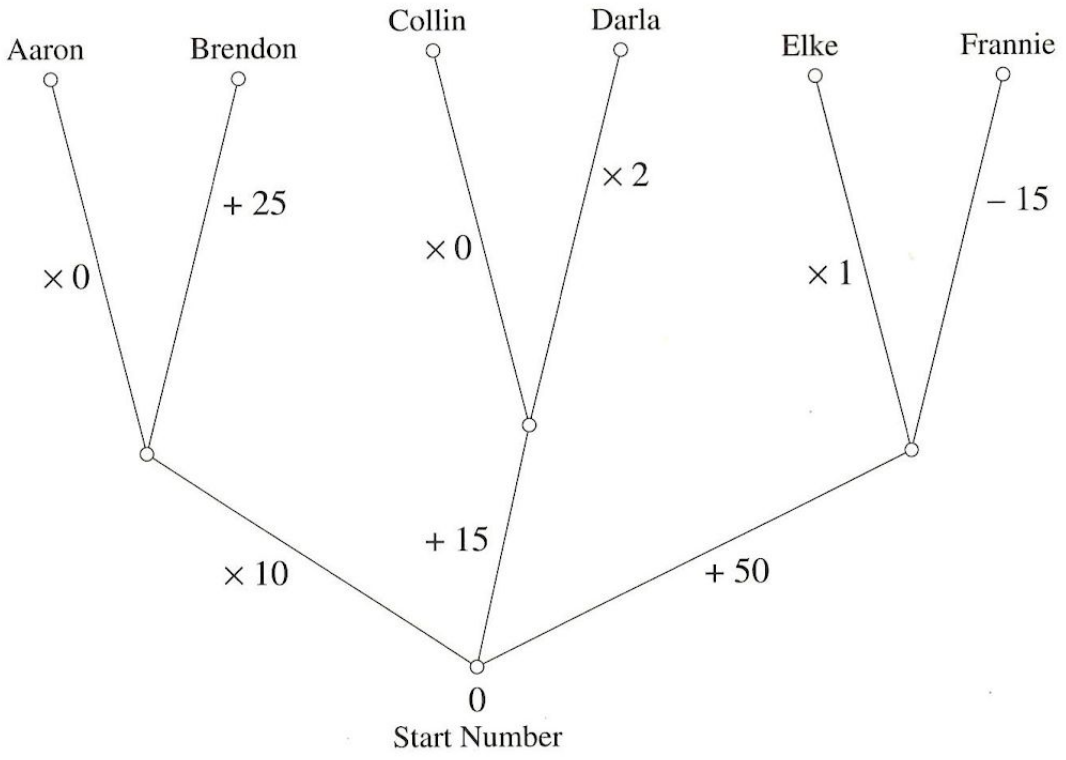
Which Path Will You Take?



1. Whose path gives 0?
2. Whose path gives 25?
3. What does Dante's path give?
4. Which two paths give the same number?
5. Whose path gives the largest number?

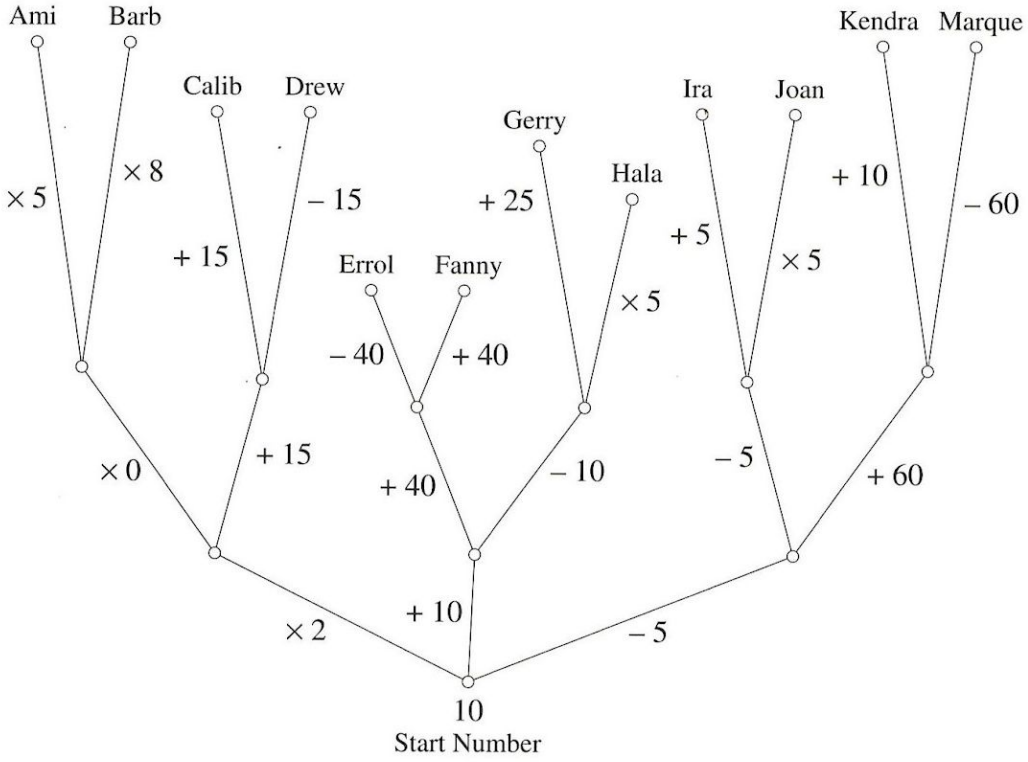
EXPERIENCE 5 / *Activity 2*

Which Path Will You Take?



1. Whose path gives 0?
2. Whose path gives 35?
3. What does Darla's path give?
4. Whose path gives the largest number?
5. What would the Start Number have to be for Brendon's path to give 75? Would Aaron's number change?

Which Path Will You Take?

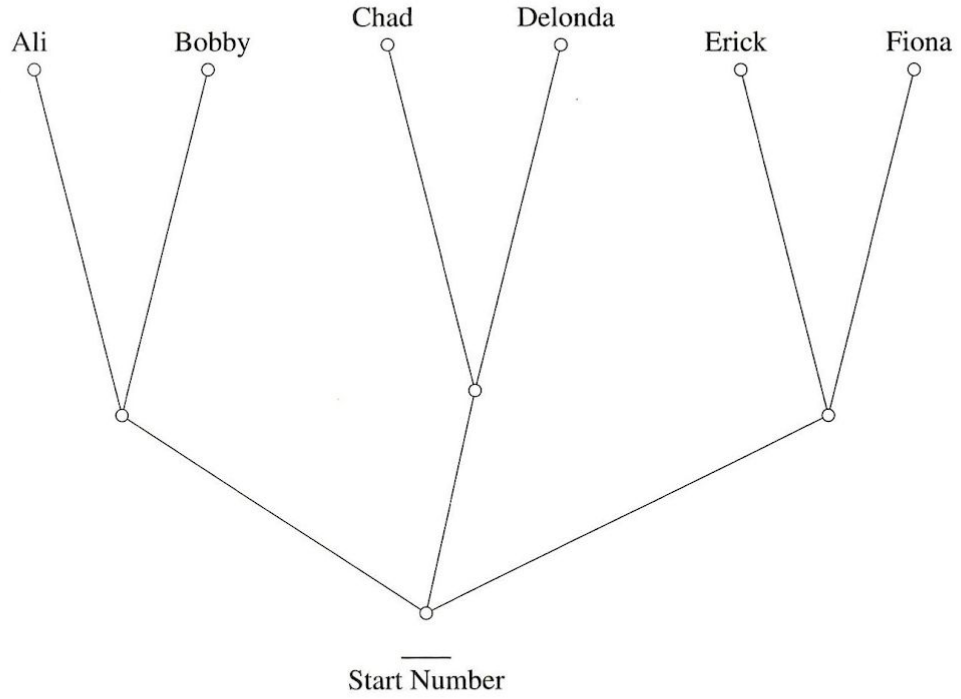


Whose path gives

1. 0?
2. 5?
3. 20?
4. 75?
5. 100?

EXPERIENCE 5 / *Activity 4*

Which Path Will You Take?

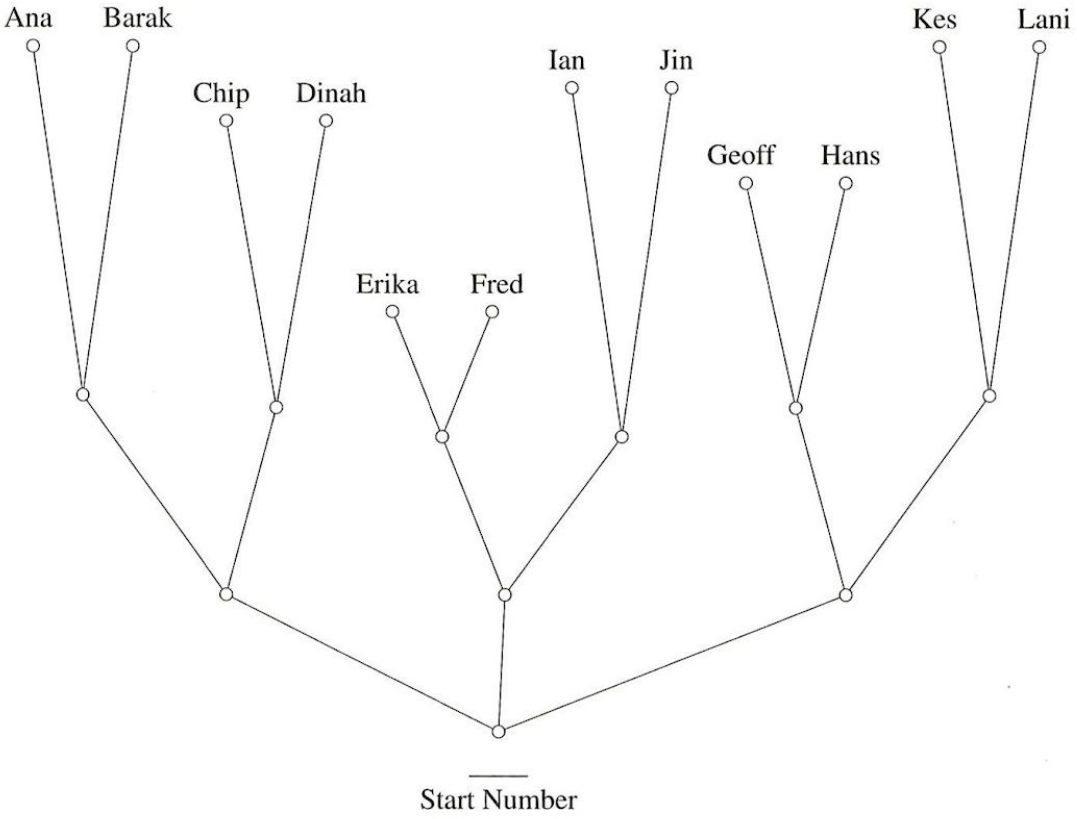


Write numbers and operations to make your own paths.

What does each path give?

EXPERIENCE 5 / *Activity 5*

Which Path Will You Take?



Write numbers and operations to make your own paths.

What does each path give?