

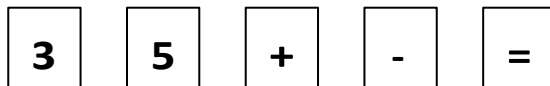
Maths with Super M



Super M's calculator is broken.

Investigation 1

Unfortunately, none of the buttons work, except for the buttons below.



- a. Can you help SuperM make all the numbers from 1 to 20 using his broken calculator?

Example: SuperM can make 11 by using $3 + 3 + 5 = 11$

There can be various answers such as:

$$1 = 3 + 3 - 5$$

$$11 = 3 + 3 + 5$$

$$2 = 5 - 3$$

$$12 = 3 + 3 + 3 + 3$$

$$3 = 3$$

$$13 = 5 + 5 + 3$$

$$4 = 3 + 3 + 3 - 5$$

$$14 = 3 + 3 + 3 + 5$$

$$5 = 5$$

$$15 = 5 + 5 + 5$$

$$6 = 3 + 3$$

$$16 = 5 + 5 + 3 + 3$$

$$7 = 5 + 5 - 3$$

$$17 = 5 + 5 + 5 + 5 - 3$$

$$8 = 5 + 3$$

$$18 = 5 + 5 + 5 + 3$$

$$9 = 3 + 3 + 3$$

$$19 = 5 + 5 + 3 + 3 + 3$$

$$10 = 5 + 5$$

$$20 = 5 + 5 + 5 + 5$$

- b. Can you find different answers for the numbers?

There can be various answers such as:

$$9 = 5 + 5 - 3 - 3$$

$$12 = 5 + 5 + 5 - 3$$

$$13 = 3 + 3 + 3 + 3 + 3 - 5$$

$$17 = 3 + 3 + 3 + 3 + 5$$

$$18 = 5 + 5 + 5 + 5 + 5 + 5 - 3 - 3 - 3 - 3$$

b. Can you make more answers for more numbers?

Many more numbers can be made, by using the above numbers.

Examples of possible answers -

$$21 = 5 + 5 + 5 + 3 + 3$$

$$22 = 5 + 5 + 5 + 5 + 5 - 3$$

$$23 = 5 + 5 + 5 + 5 + 3$$

$$24 = 5 + 5 + 5 + 3 + 3 + 3$$

$$25 = 5 + 5 + 5 + 5 + 5$$

$$30 = 5 + 5 + 5 + 5 + 5 + 5$$

$$31 = 5 + 5 + 5 + 5 + 5 + 3 + 3$$

$$32 = 5 + 5 + 5 + 5 + 5 + 5 + 5 - 3$$

$$36 = 5 + 5 + 5 + 5 + 5 + 5 + 3 + 3$$

$$40 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5$$

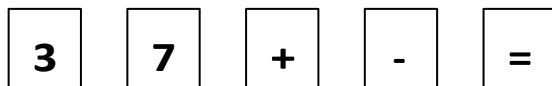
$$47 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 - 3$$

$$48 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 3$$

$$49 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 3 + 3 + 3$$

Investigation 2

Using only these buttons make the numbers below.



a. 20

b. 57

c. 93

$$a. 20 = 7 + 3 + 7 + 3$$

$$b. 57 = 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7$$

or

$$57 = 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 - 3$$

$$c. 93 = 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 3 + 3$$

or

$$93 = 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 + 7 + 3 - 7$$

Investigation 3

On another calculator, the 0 button is malfunctioning.

Can you make 260, 206 and 2062 using any key **BUT NOT** the 0 button?

260:

I cannot multiply 26×10 as I cannot use the 0 button, so instead of multiplying by 10 I can multiply by 5×2 (10)

$$260 = 26 \times 5 \times 2$$

206:

There can be various answers such as:

Method 1:

I multiplied 206 by 2

$$206 \times 2 = 412 \text{ (no zeros) so -}$$

$$206 = 412 \div 2 \text{ (Answer)}$$

or

I multiplied 206 by 3

$$206 \times 3 = 618 \text{ (no zeros) so-}$$

$$206 = 618 \div 3 \text{ (Answer)}$$

Method 2:

I know that I need to get 200 so -

$$206 = 99 \text{ (one less than 100)} \times 2 + 2 \text{ (this gives an answer of 200)} \\ + 6$$

2062:

There can be various answers such as:

Method 1:

I multiplied 2062 by 2

$2062 \times 2 = 4124$ (no zeros) so

$2062 = 4124 \div 2$ (Answer)

or

I multiplied 2062 by 3

$2062 \times 3 = 6186$ (no zeros) so-

$2062 = 6186 \div 3$ (Answer)

Method 2:

I know that I need to get 2000 so -

$2062 = 999$ (one less than 1000) $\times 2 + 2$ (this gives an answer of 2000) $+ 62$

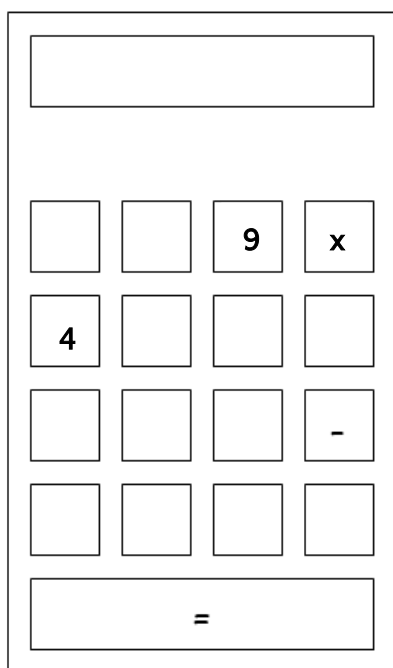
Investigation 4

SuperM tries to fix his calculator. He fixed some buttons but broke another one. Now the **1** button on the calculator is **not working**.

Find the answers and show how you worked it out

- a. $32 + 15 = 32 + 20 - 5$
- b. $182 + 26 = 200 - 9 - 9 + 26$
- c. $125 - 18 = 200 - 75 - 20 + 2$
- d. $52 \times 10 = 52 \times 5 \times 2$
- e. $35 \times 12 = 35 \times 4 \times 3$ or $35 \times 6 \times 2$
- f. $1162 - 213 = 2000 - 838 - 220 + 7$

Investigation 5



This is SuperM's calculator showing the keys he can use.

What numbers up to 100, can you make using only these five buttons.

- There can be various answers such as –
- $36 = 9 \times 4$ or 4×9
 - $32 = 9 \times 4 - 4$
 - $27 = 9 \times 4 - 9$
 - $81 = 9 \times 9$
 - $77 = 9 \times 9 - 4$