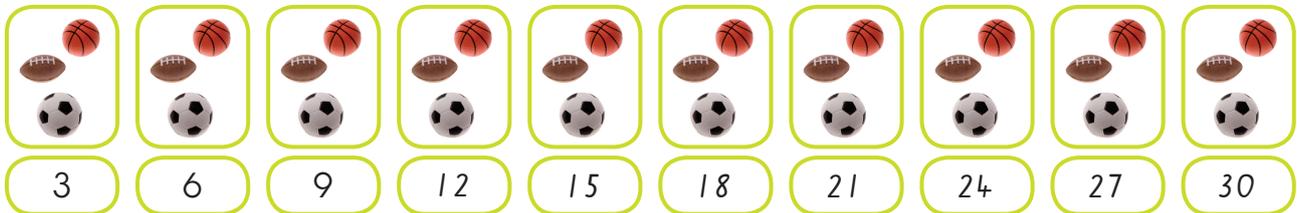
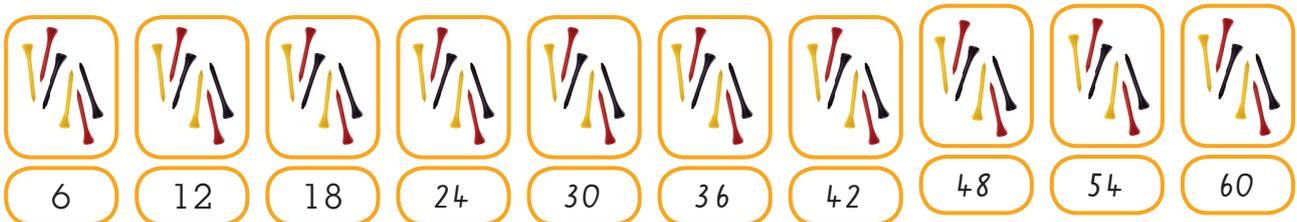


Patterns of 3, 6 and 9

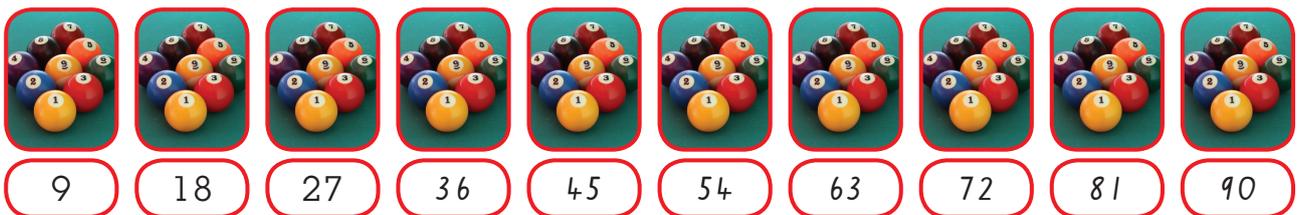
- 1 Continue the number patterns modelled by the pictures. Write down a rule for each one.



Rule: Add 3



Rule: Add 6



Rule: Add 9

- 2
- a Start at 3 on the hundreds chart. Circle all numbers as you count by 3s to 100.
- b Start at 6 on the hundreds chart. Colour all numbers red as you count by 6s to 100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What pattern do you see?

diagonals

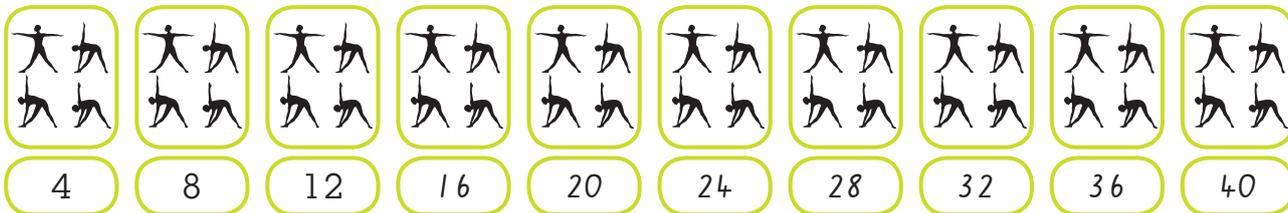
- 3 What happens when you add the digits of each number in the 9 pattern? equal 9

Using your calculator, start with $3 + + =$. Continue to press $=$. How many times can you press it before the screen overflows? Estimate and check for 6 and 9.

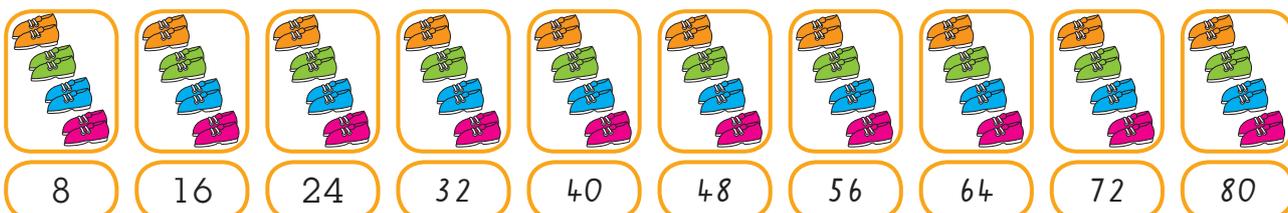


Patterns of 4 and 8

1 Continue the number patterns modelled by the pictures. Write down a rule for each one.



Rule: Add 4



Rule: Add 8

What do the two sets of number patterns have in common?

 All multiples of 8 were in the multiples of 4 pattern.

2 **a** In Rugby League a try is worth 4 points. Using the above counting pattern, work out how many points the following tries are worth.

2 tries 8 6 tries 24 8 tries 32

b In rowing, a boat holds 8 rowers plus the coxswain.



Using the above counting pattern, work out how many rowers are there in:

5 boats 40 7 boats 56

3 boats 24 10 boats 80

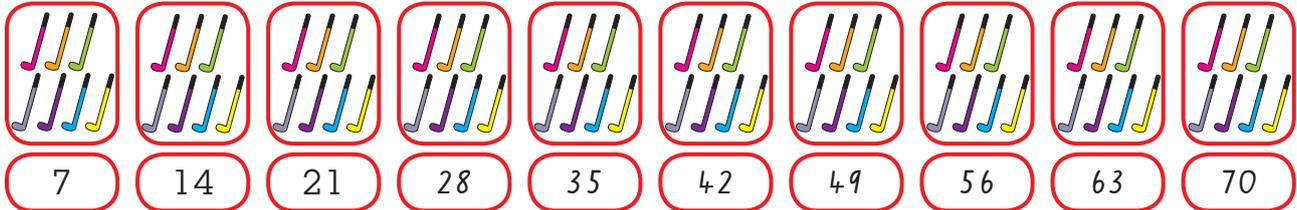
c If there are 32 rowers, how many boats are there? 4 boats

The Olympics Games are held every four years. In which years will the next 10 Olympics be held? The first three have been done for you.

2012	2016	2020	2024	2028	2032	2036	2040	2044	2048
------	------	------	------	------	------	------	------	------	------

Patterns of 7

- 1 Continue the number patterns modelled by the pictures. Write down the rule.



Rule: Add 7

- 2 Start at 7 on the hundreds chart. Circle all numbers as you count by 7s to 100. Describe the pattern that is made on the hundreds chart. diagonal

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- 3 There are 7 days in one week. Using the above counting pattern, write down how many days there are in:

2 weeks 14 4 weeks 28

5 weeks 35 7 weeks 49

9 weeks 63 10 weeks 70

42 days is the same as 6 weeks.

56 days is the same as 8 weeks.

'Heptathlon' derives from the Greek words *hepta* (seven) and *athlon* (contest). A competitor in a heptathlon is referred to as a heptathlete.

- 4 There are seven events in a heptathlon. A heptagon is a polygon with seven sides and seven angles. There are seven Wonders of the Ancient World. A rainbow consists of seven colours. There are seven stories in the Harry Potter series. Using one of the above pieces of information, create your own problem using the seven pattern.

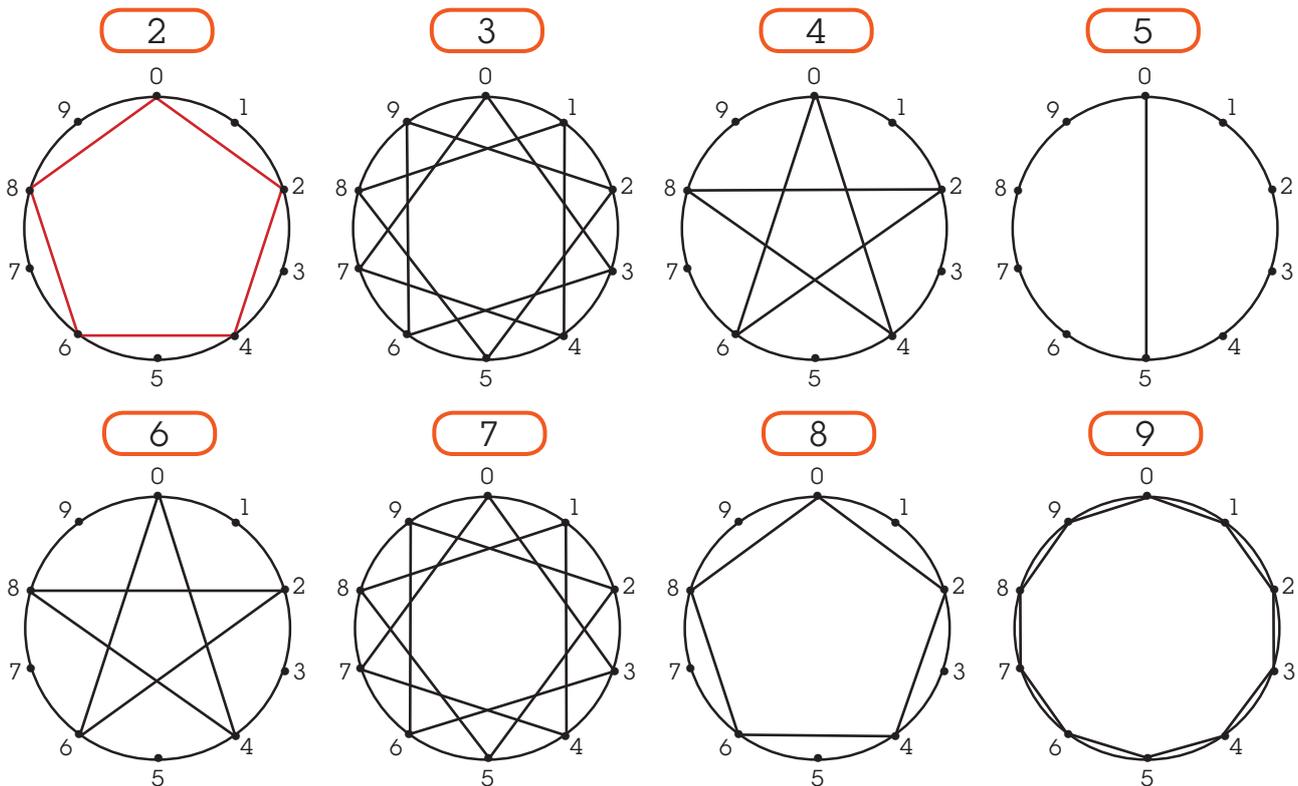
Students' answers will vary.

Patterns in multiples

- 1 Write the first 10 multiples for each number across the table. Underline the unit digit. The first row has been done for you.

2	<u>4</u>	<u>6</u>	<u>8</u>	<u>10</u>	<u>12</u>	<u>14</u>	<u>16</u>	<u>18</u>	<u>20</u>
3	<u>6</u>	<u>9</u>	<u>12</u>	<u>15</u>	<u>18</u>	<u>21</u>	<u>24</u>	<u>27</u>	<u>30</u>
4	<u>8</u>	<u>12</u>	<u>16</u>	<u>20</u>	<u>24</u>	<u>28</u>	<u>32</u>	<u>36</u>	<u>40</u>
5	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>
6	<u>12</u>	<u>16</u>	<u>24</u>	<u>30</u>	<u>36</u>	<u>42</u>	<u>48</u>	<u>54</u>	<u>60</u>
7	<u>14</u>	<u>21</u>	<u>28</u>	<u>35</u>	<u>42</u>	<u>49</u>	<u>56</u>	<u>63</u>	<u>70</u>
8	<u>16</u>	<u>24</u>	<u>32</u>	<u>40</u>	<u>48</u>	<u>56</u>	<u>64</u>	<u>72</u>	<u>80</u>
9	<u>18</u>	<u>27</u>	<u>36</u>	<u>45</u>	<u>54</u>	<u>63</u>	<u>72</u>	<u>81</u>	<u>90</u>

- 2 Draw unit pattern wheels for each number. Always start at zero. For 2, the unit digits are 2, 4, 6, 8, 0, etc.



- 3
- What shape is the 2 unit pattern? pentagon
 - Which unit patterns are identical? 4 and 6, 3 and 7, 2 and 8
 - Which unit patterns are similar? 3 and 7 are similar to 4 and 6
 - Colour each unit pattern wheel.

Terms in a number pattern

- 1 Complete the number pattern up to 5 numbers. The first number is the ball.

	6	9	12	15
---	---	---	----	----

What would the 10th term be? 30

	10	15	20	25
---	----	----	----	----

What would the 10th term be? 50

	16	24	32	40
---	----	----	----	----

What would the 10th term be? 80

- 2 Did you notice that if you double the 5th term you get the 10th term? How do you think you can easily find the 20th term?

Double the 10th term

- 3 Complete the number pattern up to 5 numbers. The first number is on the ball.

	16	30	44	58
--	----	----	----	----

What would the 10th term be? 128

	10	16	22	28
---	----	----	----	----

What would the 10th term be? 60

	16	27	38	49
---	----	----	----	----

What would the 10th term be? 104

Check your answers using the constant function on the calculator.

To use the constant function on your calculator, you need to press a number, then $++=$
 For the 4 pattern, press $4++=$
 Continue to press the $=$ button to count by fours.



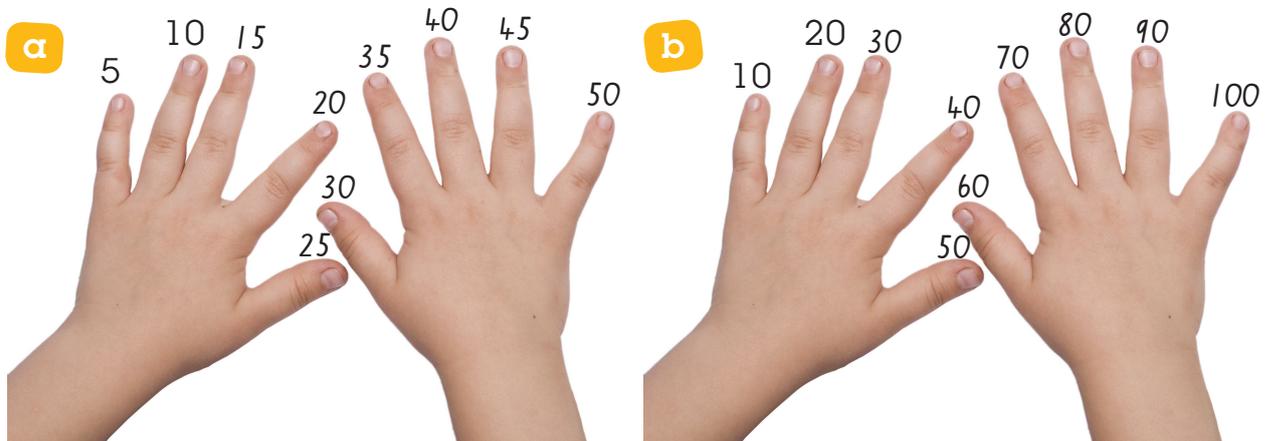
 Find out about the Mayans of Central America. This is the Mayan numeral system. The numerals are made up of three symbols: zero (shell shape), one (a dot) and five (a bar). Using the symbols write down the first five terms in the 2, 3 and 4 pattern. It has been started for you.

0	1	2	3	4
	•	••	•••	••••
5	6	7	8	9
				
10	11	12	13	14
				
15	16	17	18	19
				

Recall multiplication facts of 5 and 10

1 Write down the first 10 multiples of **a** 5 and **b** 10 onto the fingers.



13

2 Use the hands if necessary to complete these multiplication facts.

$2 \times 5 = 10$	$4 \times 5 = 20$	$5 \times 5 = 25$	$7 \times 5 = 35$
$8 \times 5 = 40$	$10 \times 5 = 50$	$1 \times 10 = 10$	$3 \times 10 = 30$
$5 \times 10 = 50$	$6 \times 10 = 60$	$9 \times 10 = 90$	$10 \times 10 = 100$

3 Ten girls from Class 3W took off their shoes at lunchtime. They decided to work out how many toes they had altogether. They began to fill out this table when the bell rang and they had to go back to class. Can you complete the table for them?

If you double the multiples of 5, you get the multiples of 10.

	Number of people									
	1	2	3	4	5	6	7	8	9	10
toes of one foot	5	10	15	20	25	30	35	40	45	50
toes on two feet	10	20	30	40	50	60	70	80	90	100

4 $1 \times 10 = 1 \text{ ten} = 10$ $2 \times 10 = 2 \text{ tens} = 20$ $3 \times 10 = 3 \text{ tens} = 30$

What pattern do you notice? multiples of five = toes on one foot

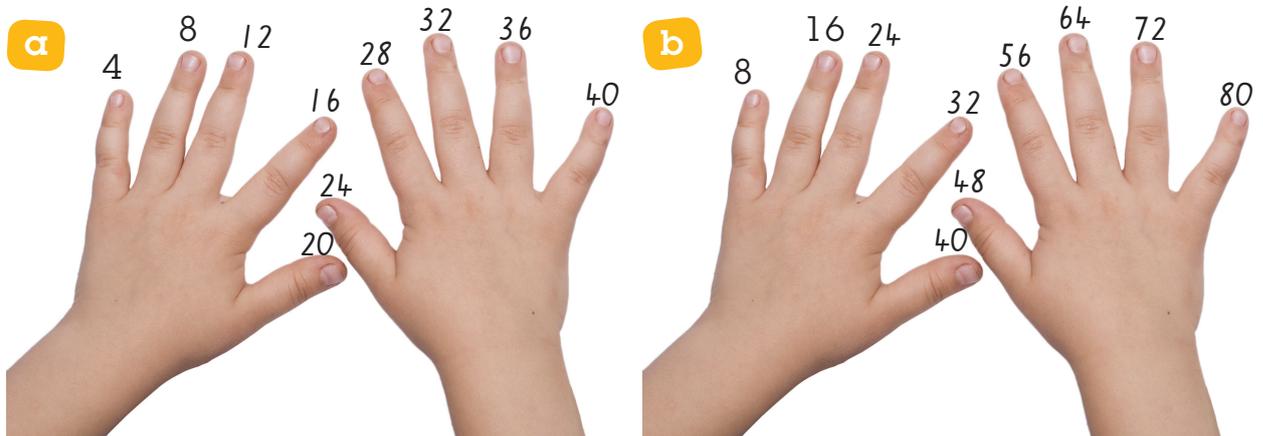
 multiples of ten = toes on two feet

Using this pattern, what is **a** $14 \times 10?$ 140 **b** $35 \times 10?$ 350

c $55 \times 10?$ 550 **d** $90 \times 10?$ 900

Recall multiplication facts of 2, 4 and 8

1 Write down the first 10 multiples of **a** 4 and **b** 8 onto the fingers.



2 Use the hands if necessary to complete these multiplication facts.

$2 \times 4 = 8$	$4 \times 4 = 16$	$5 \times 4 = 20$	$7 \times 4 = 28$
$8 \times 4 = 32$	$10 \times 4 = 40$	$1 \times 8 = 8$	$3 \times 8 = 24$
$5 \times 8 = 40$	$6 \times 8 = 48$	$9 \times 6 = 54$	$10 \times 8 = 80$

3 At Toni's Pizzeria, a mini pizza has two slices, a medium pizza has four slices and a large pizza has eight slices. Multiply the number of pizzas by the number of slices.

If you double the multiples of 2, you get the multiples of 4.
If you double the multiples of 4, you get the multiples of 8.

Toni's Pizzeria	Number of pizzas									
	1	2	3	4	5	6	7	8	9	10
mini pizza (2 slices)	2	4	6	8	10	12	14	16	18	20
medium pizza (4 slices)	4	8	12	16	20	24	28	32	36	40
large pizza (8 slices)	8	16	24	32	40	48	56	64	72	80

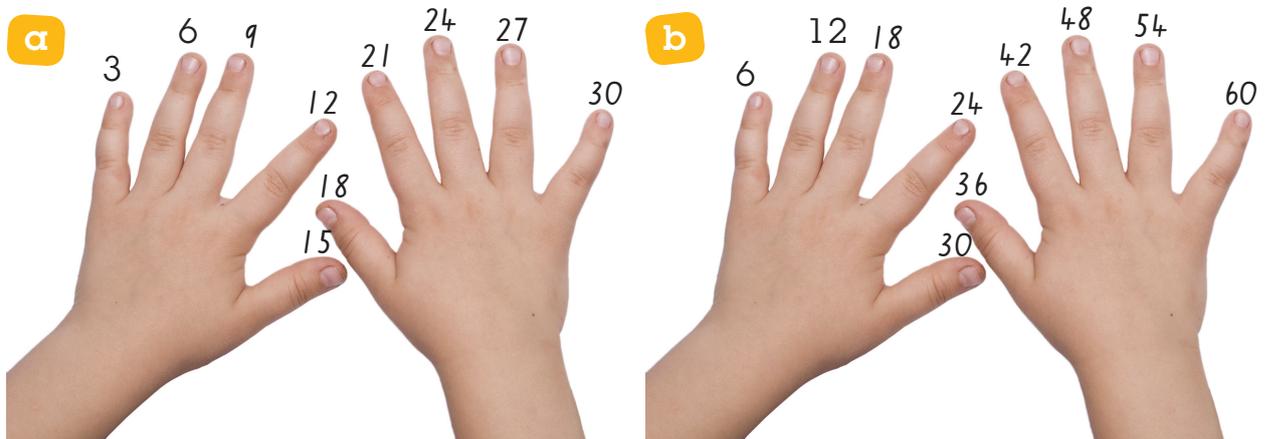
4 How many slices on:

- a** 2 medium pizzas? 8 **b** 4 mini pizzas? 8
c 5 large pizzas? 40 **d** 8 mini pizzas? 16
e 9 medium pizzas? 36 **f** 7 large pizzas? 56



Recall multiplication facts of 3, 6 and 9

1 Write down the first 10 multiples of **a** 3 and **b** 6 onto the fingers.



2 Using the hands if necessary, complete these multiplication facts.

$2 \times 3 = 6$	$4 \times 3 = 12$	$5 \times 3 = 15$	$7 \times 3 = 21$
$8 \times 3 = 24$	$10 \times 3 = 30$	$1 \times 6 = 6$	$3 \times 6 = 18$
$5 \times 6 = 30$	$6 \times 6 = 36$	$9 \times 9 = 81$	$10 \times 6 = 60$

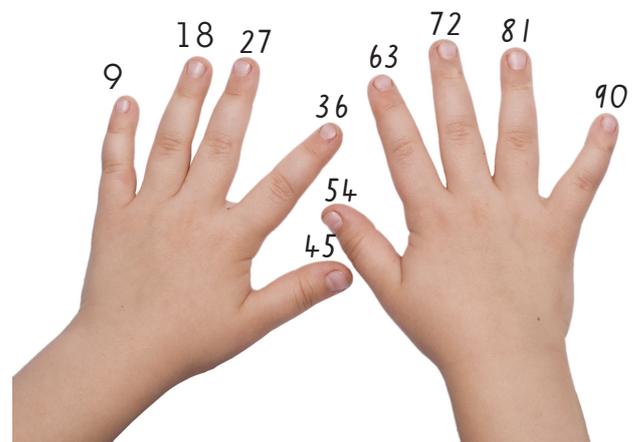
3 Write down the first 10 multiples of 9 onto the fingers. What patterns do you notice in the table of nines?

The digits add up to 9

4 Complete these multiplication facts.

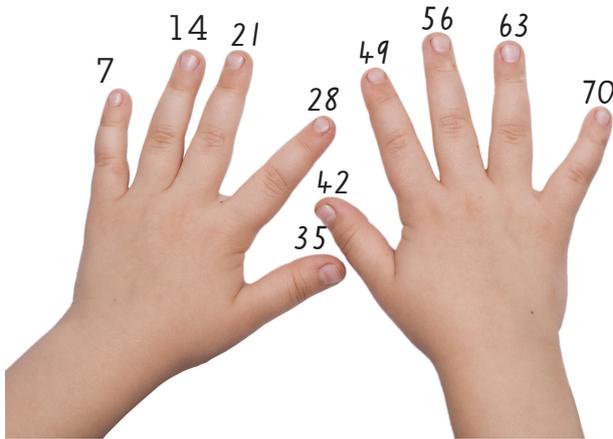
What happens when you add the digits of each answer?

$1 \times 9 = 9$	$9 = 9$
$2 \times 9 = 18$	$1 + 8 = 9$
$3 \times 9 = 27$	$2 + 7 = 9$
$4 \times 9 = 36$	$3 + 6 = 9$
$5 \times 9 = 45$	$4 + 5 = 9$
$6 \times 9 = 54$	$5 + 4 = 9$
$7 \times 9 = 63$	$6 + 3 = 9$
$8 \times 9 = 72$	$7 + 2 = 9$
$9 \times 9 = 81$	$8 + 8 = 9$
$10 \times 9 = 90$	$9 + 0 = 9$



Recall multiplication facts of 7

- 1 Write down the first 10 multiples of 7.



- 2 Use the hands if necessary to complete these multiplication facts.

$1 \times 7 = 7$	$5 \times 7 = 35$	$8 \times 7 = 56$
$10 \times 7 = 70$	$3 \times 7 = 21$	$7 \times 7 = 49$
$2 \times 7 = 14$	$6 \times 7 = 42$	$9 \times 7 = 63$
$4 \times 7 = 28$	$0 \times 7 = 0$	

- 3 By rule-of-thumb, one dog year equals seven years of a human life. Complete the table to compare the age of a dog to a human.

Age of dog	1	2	3	4	5	6	7	8	9	10
Age of human	7	14	21	28	35	42	49	56	63	70

- 4 In the story of *Snow White and the Seven Dwarfs*

	Working	Answer
a how many eyes do seven dwarfs have?	$7 \times 2 =$	14
b how many fingers do seven dwarfs have?	$7 \times 10 =$	70
c how many legs and arms do seven dwarfs have?	$4 \times 7 =$	28

- a** What is the highest number you can reach if you skip count by 7s, starting at zero and stopping before 100?

98

- b** Using your calculator, press the buttons $7 + + =$. Continue to press $=$. How many times can you press it before the screen overflows?



Commutative property

1 Complete the multiplication grid.



14

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

2 Complete these multiplication facts.

a $3 \times 2 = \underline{6}$ **b** $5 \times 4 = \underline{20}$ **c** $8 \times 6 = \underline{48}$ **d** $9 \times 7 = \underline{63}$
 $2 \times 3 = \underline{6}$ $4 \times 5 = \underline{20}$ $6 \times 8 = \underline{48}$ $7 \times 9 = \underline{63}$

What did you notice? They equal the same amount in either order

Can numbers be multiplied in any order to get the same answer?

yes

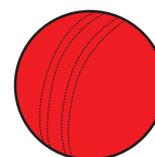
3 Match the multiplication problems that give the same answer.

6 books at \$3 each		9 pizzas with 4 slices
4 pizzas with 9 slices		8 vases with 5 flowers in each
5 vases with 8 flowers in each		3 books at \$6 each

4 In cricket, Jason hit 4 sixes and Donna hit 6 fours.

Who scored more runs? They equal

Explain the reason for your answer. $4 \times 6 = 6 \times 4$



MiB
Card
90

Number patterns

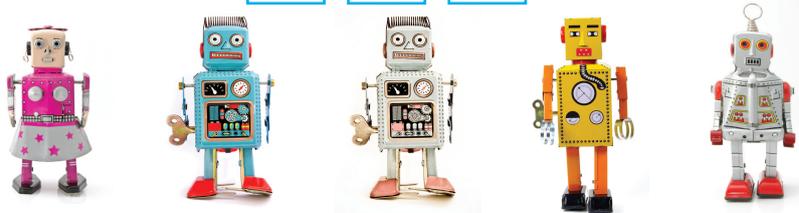


1 Is the pattern increasing or decreasing? Tick the correct label.

- | | | | | | |
|----------|---------------------|-------------------------------------|------------|-------------------------------------|------------|
| a | 4, 8, 12, 16, 20 | <input checked="" type="checkbox"/> | increasing | <input type="checkbox"/> | decreasing |
| b | 32, 42, 52, 62, 72 | <input checked="" type="checkbox"/> | increasing | <input type="checkbox"/> | decreasing |
| c | 45, 40, 35, 30, 25 | <input type="checkbox"/> | increasing | <input checked="" type="checkbox"/> | decreasing |
| d | 2, 4, 8, 16, 32 | <input checked="" type="checkbox"/> | increasing | <input type="checkbox"/> | decreasing |
| e | 102, 82, 62, 42, 22 | <input type="checkbox"/> | increasing | <input checked="" type="checkbox"/> | decreasing |

2 Continue the number pattern, then write down the rule for each. The first one has been done for you.

- | | | | | | |
|----------|---------------------|----------------------------------|----------------------------------|----------------------------------|-------------------------------------|
| a | 11, 14, 17, 20, | <input type="text" value="23"/> | <input type="text" value="26"/> | <input type="text" value="29"/> | <i>The pattern increases by 3.</i> |
| b | 63, 68, 73, 78, | <input type="text" value="83"/> | <input type="text" value="88"/> | <input type="text" value="93"/> | <i>The pattern increases by 5</i> |
| c | 149, 142, 135, 128, | <input type="text" value="121"/> | <input type="text" value="114"/> | <input type="text" value="107"/> | <i>The pattern decreases by 7</i> |
| d | 258, 248, 238, 228, | <input type="text" value="218"/> | <input type="text" value="208"/> | <input type="text" value="198"/> | <i>The pattern decreases by 10</i> |
| e | 91, 192, 293, 394, | <input type="text" value="495"/> | <input type="text" value="596"/> | <input type="text" value="697"/> | <i>The pattern increases by 101</i> |



3 Use the constant function on your calculator to make the following patterns.

- | | | | | | | | | | | | | | | | |
|----------|----------------------------------|----|----------------------------------|---|-----------------------------------|---|-----------------------------------|---|-------------------------------------|---|---------------------------------|---|-----------------------------------|---|----------------------------------|
| a | <input type="text" value="7"/> | ++ | <input type="text" value="23"/> | = | <input type="text" value="30"/> | = | <input type="text" value="53"/> | = | <input type="text" value="76"/> | = | <input type="text" value="99"/> | = | <input type="text" value="122"/> | = | <input type="text" value="145"/> |
| b | <input type="text" value="12"/> | ++ | <input type="text" value="0.5"/> | = | <input type="text" value="12.5"/> | = | <input type="text" value="13"/> | = | <input type="text" value="13.5"/> | = | <input type="text" value="14"/> | = | <input type="text" value="14.5"/> | = | <input type="text" value="15"/> |
| c | <input type="text" value="101"/> | -- | <input type="text" value="13"/> | = | <input type="text" value="88"/> | = | <input type="text" value="75"/> | = | <input type="text" value="62"/> | = | <input type="text" value="49"/> | = | <input type="text" value="36"/> | = | <input type="text" value="23"/> |
| d | <input type="text" value="2"/> | xx | <input type="text" value="3"/> | = | <input type="text" value="6"/> | = | <input type="text" value="12"/> | = | <input type="text" value="24"/> | = | <input type="text" value="48"/> | = | <input type="text" value="96"/> | = | <input type="text" value="192"/> |
| e | <input type="text" value="50"/> | xx | <input type="text" value="2"/> | = | <input type="text" value="100"/> | = | <input type="text" value="5000"/> | = | <input type="text" value="250000"/> | | | | | | |

Describing number patterns

1 Continue these counting patterns. Write the rule for each.

a	15, 25, 35, 45, 55,	65	75	85	<i>Add 10</i>
b	74, 69, 64, 59, 54,	49	44	39	<i>Subtract 5</i>
c	26, 32, 38, 44, 50,	56	62	68	<i>Add 6</i>
d	$5\frac{1}{2}$, 6, $6\frac{1}{2}$, 7, $7\frac{1}{2}$,	8	$8\frac{1}{2}$	9	<i>Add $\frac{1}{2}$</i>
e	$51\frac{1}{2}$, $49\frac{1}{2}$, $47\frac{1}{2}$, $45\frac{1}{2}$, $43\frac{1}{2}$,	$41\frac{1}{2}$	$39\frac{1}{2}$	$37\frac{1}{2}$	<i>Subtract 2</i>
f	87, 76, 65, 54, 43,	32	21	10	<i>Subtract 11</i>

2 When a number passes through a robot, it is changed according to the rule. Complete the number patterns as each number passes through the robot. The first one has been done for you.

a	7	→	11	b	23	→	33	c	20	→	14
	8		12		24		34		22		16
	9		13		25		35		24		18
	10		14		26		36		26		20
	11		15		27		37		28		22
d	2	→	4	e	20	→	2	f	7	→	10
	4		8		30		3		17		20
	6		12		40		4		18		21
	8		16		50		5		19		22
	10		20		60		6		20		23

3 What is the rule for each? Write it on the robot.

a	43	→	52	b	45	→	40	c	2	→	1
	42		51		35		30		4		2
	41		50		25		20		6		3
	40		49		15		10		8		4
	39		48		5		0		10		5

4 Colour the number in each number pattern that is not correct.

a	8	10	12	14	15	18	b	67	61	56	49	43	37
c	$4\frac{1}{2}$	$6\frac{1}{2}$	$10\frac{1}{2}$	$13\frac{1}{2}$	$16\frac{1}{2}$	$19\frac{1}{2}$	d	111	131	151	161	181	201