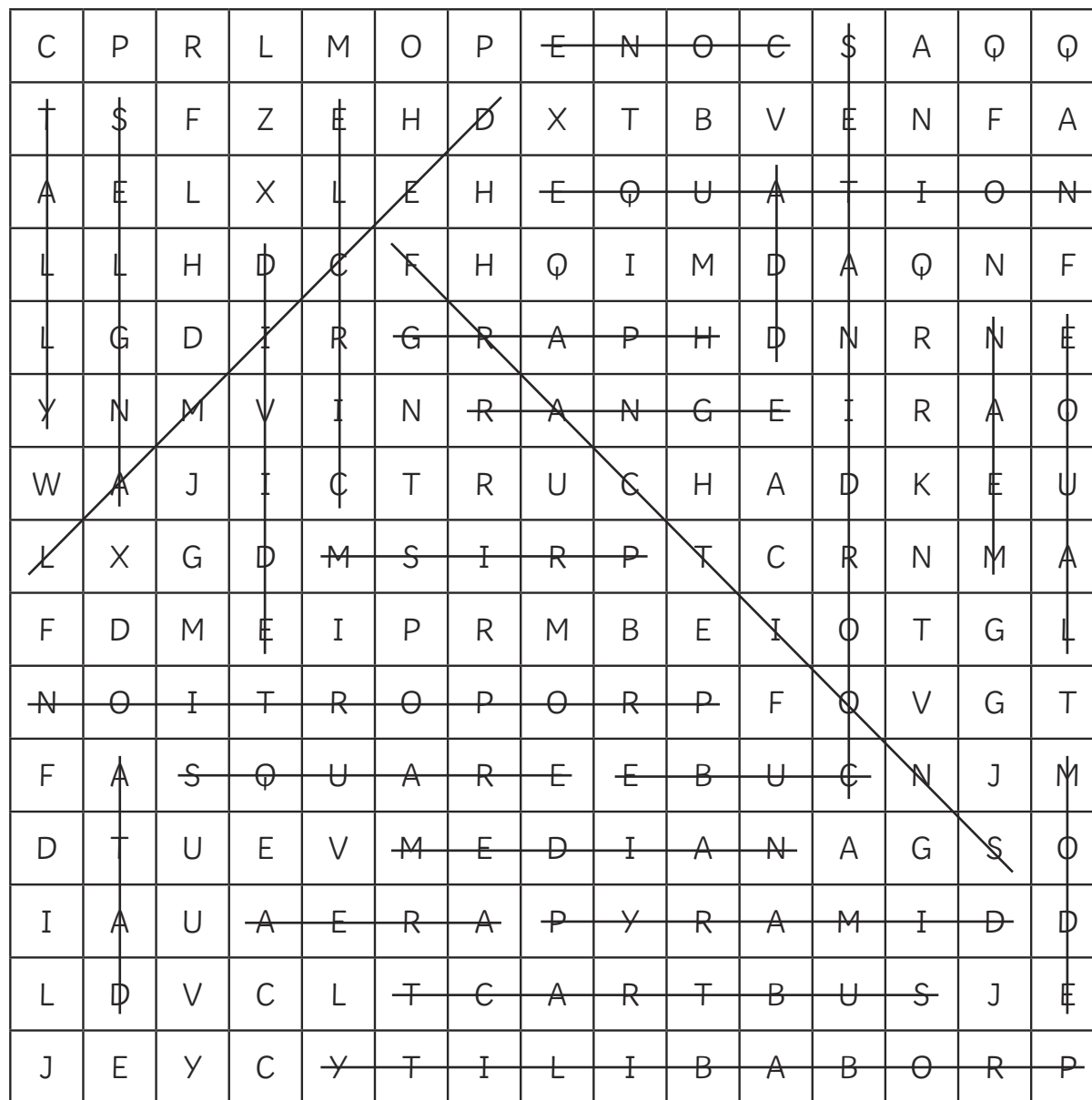**Year 7**

Welcome to Secondary Maths

Activity Booklet

Maths Word Search

This word search contains twenty-five words related to Maths.

How many can you find?

1. add
2. angles
3. area
4. circle
5. cone
6. coordinates
7. cube
8. data
9. decimal
10. divide
11. equal
12. equation
13. fractions
14. graph
15. mean
16. median
17. mode
18. prism
19. probability
20. proportion
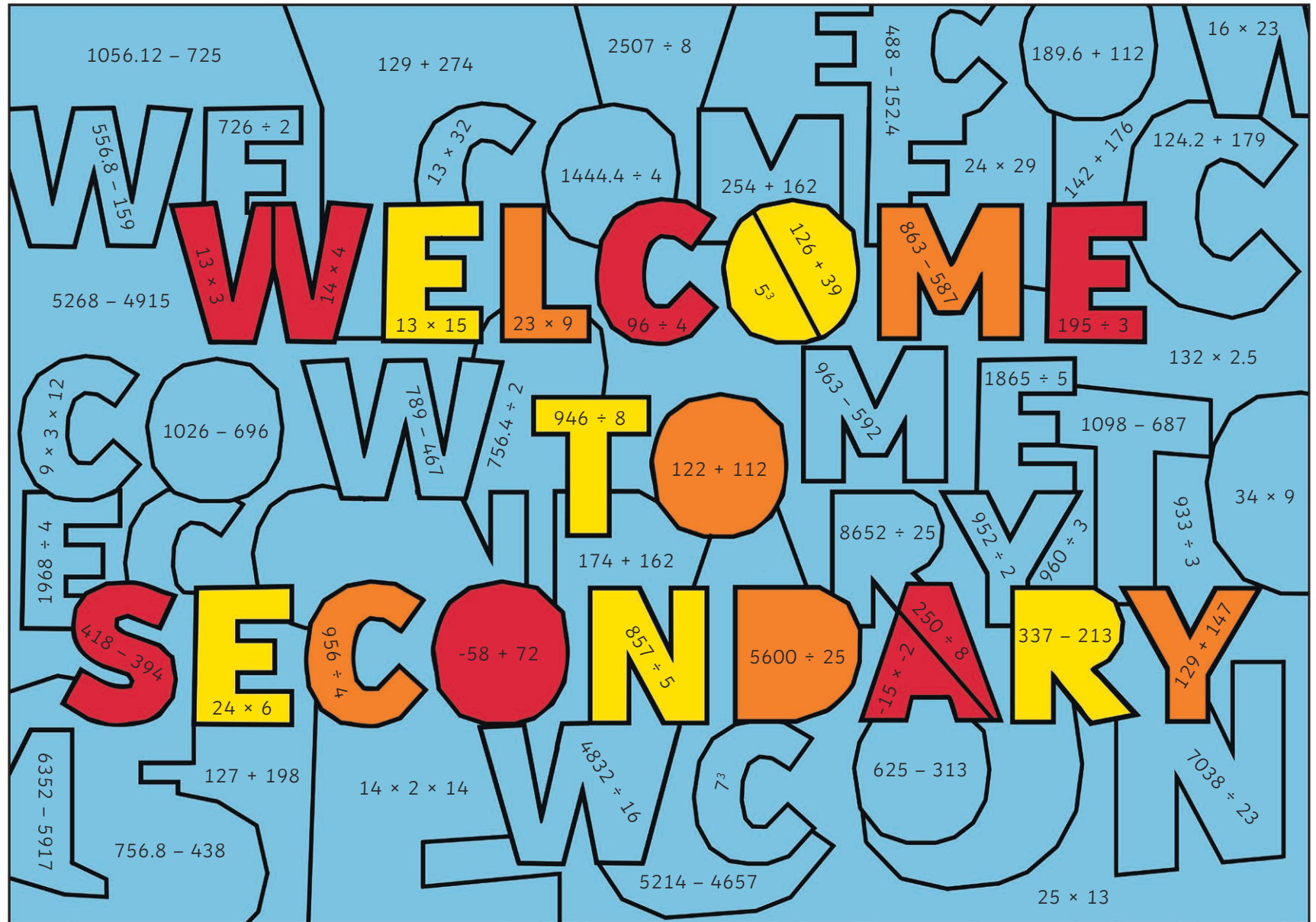21. pyramid
22. range
23. square
24. subtract
25. tally

C	P	R	L	M	O	P	E	N	O	C	S	A	Q	Q
T	S	F	Z	E	H	D	X	T	B	V	E	N	F	A
A	E	L	X	L	E	H	E	Q	U	A	T	I	O	N
L	L	H	D	C	F	H	Q	I	M	D	A	Q	N	F
L	G	D	I	R	G	R	A	P	H	D	N	R	N	E
Y	N	M	V	I	N	R	A	N	G	E	I	R	A	O
W	A	J	I	C	T	R	U	C	H	A	D	K	E	U
L	X	G	D	M	S	I	R	P	T	C	R	N	M	A
F	D	M	E	I	P	R	M	B	E	I	O	T	G	L
N	O	I	T	R	O	P	O	R	P	F	O	V	G	T
F	A	S	Q	U	A	R	E	E	B	U	C	N	J	M
D	T	U	E	V	M	E	D	I	A	N	A	G	S	O
I	A	U	A	E	R	A	P	Y	R	A	M	I	D	D
L	D	V	C	L	T	C	A	R	T	B	U	S	J	E
J	E	Y	C	Y	T	I	L	I	B	A	B	O	R	P

Colour by Number

Instructions

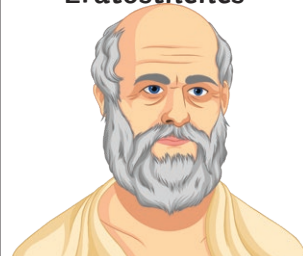Calculate each answer then use the key to shade each section in the correct colour.

Red	0-100
Yellow	101-200
Orange	201-300
Blue	301 or more

$1056.12 - 725$

$129 + 274$

$2507 \div 8$

$488 - 152.4$

$189.6 + 112$

16×23

$556.8 - 159$

$726 \div 2$

13×32

$1444.4 \div 4$

$254 + 162$

24×29

$142 + 176$

$124.2 + 179$

13×3

14×4

$126 + 39$

5^3

$863 - 587$

$5268 - 4915$

13×15

23×9

$96 \div 4$

$195 \div 3$

132×2.5

$6 \times 3 \times 12$

$1026 - 696$

$789 - 467$

$756.4 \div 2$

$946 \div 8$

$963 - 592$

$1865 \div 5$

$1098 - 687$

$122 + 112$

$1968 \div 4$

$174 + 162$

$8652 \div 25$

$952 \div 2$

$960 \div 3$

$933 \div 3$

34×9

$418 - 394$

$956 \div 4$

$-58 + 72$

$857 \div 5$

$5600 \div 25$

$250 \div 8$

$-15 \div 2$

$337 - 213$

$129 + 147$

24×6

$6352 - 5917$

$127 + 198$

$14 \times 2 \times 14$

$4832 \div 16$

7^3

$625 - 313$

$7038 \div 23$

$756.8 - 438$

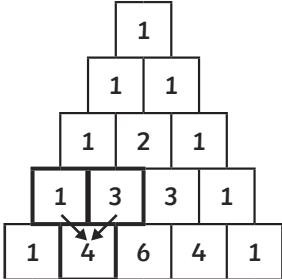$5214 - 4657$

25×13

Famous Mathematicians

Your task is to find out about six famous mathematicians. You might want to think about:

- what their full name was and how long they were alive for;

- when they were alive;

- what they are famous for/what they discovered.

| Mathematician	Fact 1	Fact 2	Fact 3
Archimedes	Archimedes was a Greek mathematician who lived for approximately 75 years. He was a philosopher and inventor who wrote important works on geometry, arithmetic and mechanics.	He discovered (and mathematically proved!) the formulas for the volume and surface area of a sphere.	He calculated π to the most precise value known. His upper limit for π was the fraction $\frac{22}{7}$.
Eratosthenes	Eratosthenes of Cyrene was a Greek mathematician, geographer, poet, astronomer and music theorist who lived for approximately 82 years.	Eratosthenes produced a logical method to discover prime numbers: The Sieve of Eratosthenes.	In about 240 BC, Eratosthenes calculated the Earth's circumference with good accuracy (approximately 25 000 miles!)
Fibonacci	His full name was Leonardo Pisano Bigollo and he lived for approximately 80 years. He was an Italian mathematician during the Middle Ages.	In 1225, Fibonacci completed Liber Quadratorum (Book of Square Numbers) which is considered his masterpiece.	A Fibonacci sequence is a series of numbers in which the next number is calculated by adding the previous two numbers. The most common example is 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55 and so on. Although the sequence had been described in Indian mathematics long ago, it was Fibonacci who introduced the sequence in his book.

Lovelace	Her full name was Augusta Ada King-Noel, Countess of Lovelace. She was an English mathematician and writer who died when she was 37 years old.	She has been called the world's first computer programmer. She wrote the world's first machine algorithm for an early computing machine.	Lovelace's ideas about computing were so far ahead of their time that it took nearly a century for technology to catch up!
Pascal	His full name was Blaise Pascal and he lived until he was 39 years old. He was a French mathematician.	Pascal invented the world's first fully-functional mechanical calculator.	Pascal's triangle is named after him. The triangle is built by starting with '1' at the top, then continuing to place numbers below it in a triangular pattern. Each number is the sum of the two numbers directly above it. Lots of different patterns can be seen in the triangle, such as counting numbers, triangular numbers, the Fibonacci sequence as well as symmetry. 1 1 1 1 2 1 1 3 3 1 1 4 6 4 1
Pythagoras	His full name was Pythagoras of Samos and he lived for approximately 75 years.	He was an Ancient Greek mathematician and philosopher.	He is best known for the Pythagorean theory which states that in a right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

Key Terms

Instructions

Write a definition for each key term. You may use a dictionary.
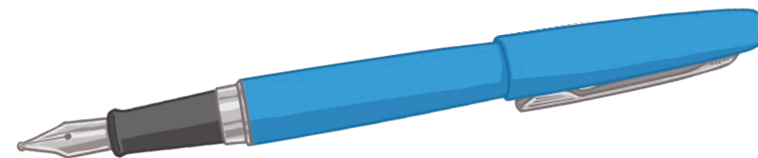
acute angle	An angle measuring less than 90 degrees.
area	The space that a surface takes up, measured in square units.
average	A measure used to find the middle/central tendency of a data set.
circumference	The distance around a circle.
cube number	Cube numbers are formed by multiplying an integer by itself then multiplying the result by the original integer.
cube root	The number which produces a given number when cubed.
diameter	A straight line which passes through the centre of a circle to touch both sides of the circumference.
difference	The result of subtracting one number from another.
equation	A mathematical statement which shows that two expressions are equal. An equation contains an equal sign.
equal	Having the same amount of value.
expression	An expression combines numbers and/or variables as well as mathematical operations.
factor	A whole number that divides exactly into another number.

formula	A formula is a special type of equation that shows the relationship between different variables.
hexagon	A polygon with 6 sides.
integer	A number which is positive, negative or zero, but which isn't a fraction or decimal.
isosceles triangle	A triangle with two equal sides and two equal angles.
length	The distance from one point to another.
multiple	Multiples are what we get after multiplying the number by an integer.
obtuse angle	An angle which measures between 90 degrees and 180 degrees.
octagon	A polygon with 8 sides.
pentagon	A polygon with 5 sides.
polygon	A plane shape which has 3 or more straight sides.
prime number	A number that has exactly two factors: 1 and itself.
probability	The chance of a particular outcome occurring.
product	The result when two or more numbers are multiplied.
quadrilateral	A polygon with four angles and four sides.

radius	The distance from the centre of a circle to its circumference.
reflex angle	An angle measuring between 180 degrees and 360 degrees.
scalene triangle	A triangle in which all three sides and all three angles have a different measurement.
square number	Square numbers are formed by multiplying a digit by itself.
square root	The number which produces a given number when squared.
sum	The total or whole amount.
variable	A letter or symbol representing a varying quantity.
volume	The amount of space occupied by a 3D object, measured in cubic units.

The Value of Words

Instructions

Use the key to calculate the value of each word, in pounds. The first question has been completed for you.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
50p	£1.03	£0.62	£0.15	10p	72p	22p	£0.15	£0.08	£1.21	£2.50	£1.08	42p	£0.78	£0.05	£1.65	£3.00	45p	68p	£0.18	95p	£0.27	£1.11	£1.85	£2.05	£2.88

	Word	Calculation
1	N U M B E R	£0.78 + 95p + 42p + £1.03 + 10p + 45p = £3.73
2	A L G E B R A	50p + £1.08 + 22p + 10p + £1.03 + 45p + 50p = £3.88
3	P R O B A B I L I T Y	£1.65 + 45p + £0.05 + £1.03 + 50p + £1.03 + £0.08 + £1.08 + £0.08 + £0.18 + £2.05 = £8.18
4	S T A T I S T I C S	68p + £0.18 + 50p + £0.18 + £0.08 + 68p + £0.18 + £0.08 + £0.62 + 68p = £3.86
5	G E O M E T R Y	22p + 10p + £0.05 + 42p + 10p + £0.18 + 45p + £2.05 = £3.57
6	R A T I O	45p + 50p + £0.18 + £0.08 + £0.05 = £1.26
7	M E A S U R E	42p + 10p + 50p + 68p + 95p + 45p + 10p = £3.20
8	O P E R A T I O N	£0.05 + £1.65 + 10p + 45p + 50p + £0.18 + £0.08 + £0.05 + £0.78 = £3.84
9	A D D I T I O N	50p + 15p + 15p + £0.08 + £0.18 + £0.08 + £0.05 + £0.78 = £1.97
10	S U B T R A C T I O N	68p + 95p + £1.03 + £0.18 + 45p + 50p + £0.62 + £0.18 + £0.08 + £0.05 + £0.78 = £5.50
11	M U L T I P L I C A T I O N	42p + 95p + £1.08 + £0.18 + £0.08 + £1.65 + £1.08 + £0.08 + £0.62 + 50p + £0.18 + £0.08 + £0.05 + £0.78 = £7.73
12	D I V I S I O N	15p + £0.08 + £0.27 + £0.08 + 68p + £0.08 + £0.05 + £0.78 = £2.17

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13	S U M	68p + 95p + 42p = £2.05
14	T O T A L	£0.18 + £0.05 + £0.18 + 50p + £1.08 = £1.99
15	P R O D U C T	£1.65 + 45p + £0.05 + 15p + 95p + £0.62 + £0.18 = £4.05
16	C A L C U L A T O R	£0.62 + 50p + £1.08 + £0.62 + 95p + £1.08 + 50p + £0.18 + £0.05 + 45p = £6.03

Extension

- Does the longest word have the largest value?

  No, multiplication is the longest word but it has a smaller value than probability.

- Does the shortest word have the smallest value?

  No, sum is the shortest word but it has a larger value than ratio.

- Create a mathematical word which has a bigger value than any of the words in the list.

  Answers may vary, e.g. quadrilateral = £3.00 + 95p + 50p + 15p + 45p + £0.08 + £1.08 + 50p + £0.18 + 10p + 45p + 50p + £1.08 = £9.02

The Broken Calculator

Instructions

- Both calculators are broken and most of the buttons have fallen off.

- Using the buttons that are left over on each calculator, how could you make each of the numbers below?

  You don't have to use all the digits and you may use each number more than once.

Calculator 1	
	AC
+	×
2 3	
	+ =

Example

How could you make 26?

23 + 3 = 26

Calculator 2	
	÷ AC
+	×
1 2	
0	=

Example

How could you make 3?

120 ÷ 20 ÷ 2 = 3

a	How could you make 6?	For example: 2 × 3 = 6
b	How could you make 7?	For example: 2 + 3 + 2 = 7
c	How could you make 12?	For example: 2 × 3 × 2 = 12

a	How could you make 4?	For example: 2 × 2
b	How could you make 5?	For example: 20 ÷ 2 ÷ 2
c	How could you make 6?	For example: 120 ÷ 20
d	How could you make 10?	For example: 120 ÷ 12

Complete each question without a calculator.

4 × 5	20	108 ÷ 9	12	2 × 13	26	65 ÷ 5	13
9 × 8	72	72 ÷ 6	12	3 × 12	36	2 ÷ 2	1
7 × 2	14	35 ÷ 5	7	11 × 7	77	8 ÷ 4	2
12 × 11	132	40 ÷ 8	5	6 × 12	72	25 ÷ 5	5
10 × 9	90	28 ÷ 4	7	8 × 5	40	56 ÷ 8	7
13 × 3	39	66 ÷ 11	6	5 × 12	60	77 ÷ 11	7
2 × 12	24	144 ÷ 12	12	15 × 2	30	117 ÷ 9	13
4 × 6	24	36 ÷ 2	18	3 × 20	60	132 ÷ 12	11
7 × 8	56	45 ÷ 5	9	2 × 18	36	169 ÷ 13	13
2 × 11	22	99 ÷ 9	11	3 × 4	12	156 ÷ 12	13
9 × 7	63	120 ÷ 10	12	4 × 4	16	35 ÷ 7	5
11 × 9	99	84 ÷ 6	14	0 × 5	0	42 ÷ 6	7
8 × 4	32	96 ÷ 8	12	2 × 6	12	54 ÷ 9	6
12 × 9	108	48 ÷ 6	8	3 × 9	27	63 ÷ 7	9
5 × 6	30	49 ÷ 7	7	7 × 12	84	48 ÷ 4	12
7 × 4	28	21 ÷ 3	7	13 × 11	143	30 ÷ 5	6
3 × 8	24	16 ÷ 2	8	10 × 9	90	40 ÷ 10	4
9 × 6	54	12 ÷ 4	3	15 × 10	150	88 ÷ 8	11
8 × 1	8	15 ÷ 5	3	13 × 4	52	130 ÷ 10	13
0 × 7	0	60 ÷ 12	5	2 × 14	28	121 ÷ 11	11

Maths

Complete each question without a calculator.

|							
45 + 101	146	67 – 34	33	1088 + 478	1566	4506 – 216	4290
23 + 27	50	98 – 55	43	2056 + 789	2845	9997 – 658	9339
68 + 43	111	104 – 89	15	295 + 498	793	2054 – 417	1637
112 + 45	157	256 – 87	169	312 + 714	1026	1081 – 804	277
145 + 62	207	567 – 314	253	896 + 747	1643	670 – 487	183
132 + 98	230	312 – 49	263	409 + 6802	7211	248 – 119	129
43 + 56	99	687 – 563	124	608 + 7897	8505	902 – 675	227
98 + 35	133	981 – 607	374	2145 + 421	2566	9783 – 406	9377
114 + 232	346	604 – 239	365	3987 + 318	4305	8962 – 434	8528
101 + 98	199	345 – 268	77	803 + 746	1549	786 – 387	399
85 + 67	152	938 – 412	526	1043 + 157	1200	962 – 908	54
42 + 55	97	656 – 437	219	952 + 986	1938	4894 – 1394	3500
109 + 156	265	298 – 131	167	475 + 9042	9517	561 – 416	145
246 + 398	644	385 – 215	170	1037 + 2498	3535	896 – 516	380
312 + 497	809	1085 – 617	468	5682 + 492	6174	7845 – 2478	5367
458 + 984	1442	2567 – 678	1889	632 + 1084	1716	2398 – 1304	1094
1092 + 48	1140	9875 – 567	9308	783 + 209	992	9987 – 4377	5610
456 + 86	542	2050 – 498	1552	6013 + 549	6562	9832 – 984	8848
549 + 290	839	114 – 89	25	619 + 8014	8633	736 – 698	38
236 + 641	877	262 – 119	143	378 + 504	882	295 – 117	178
1032 + 1067	2099	562 – 229	333	409 + 656	1065	8978 – 3659	5319

Numberpillars

Instructions

Your task is to find the number with the most 'links'.

Rules

- Start with any number less than 100.

- If the number is even, then halve it.

- If the number is odd, add 1 and then halve it.

- Carry on until you get to the number 1.

10 **5** **3** **2** **1**
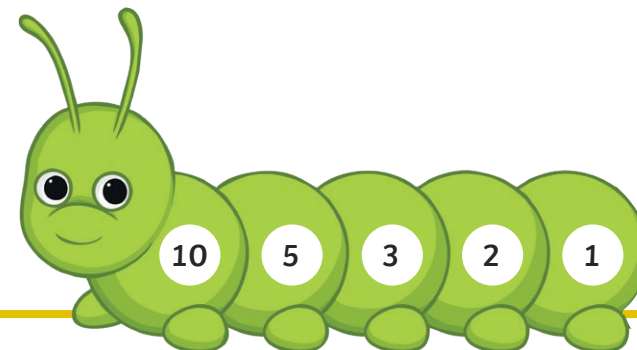
For example: 5 links

- Start with any number less than 100:   **10**

- If the number is even, then halve it: $10 \div 2 =$ **5**

- If the number is odd, add 1 and then halve it: $5 + 1 =$ **6** then $6 \div 2 =$ **3**

- The answer is odd, so you must add 1 and then halve it again: $3 + 1 =$ **4** then $4 \div 2 =$ **2**

- If the number is even, then halve it: $2 \div 2 =$ **1**

   So, the number 10 has 5 links: 10, 5, 3, 2, 1

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Lagrange's Four-Square Theorem

Instructions

Lagrange's theorem states that every positive integer can be made by adding four square numbers.

For example, 7 is made by $2^2 + 1^2 + 1^2 + 1^2$ (or $4 + 1 + 1 + 1$).

Your task is to find eight different ways to make 214 using Lagrange's theorem.

1 $\quad 14^2 + 4^2 + 1^2 + 1^2$

5 $\quad 10^2 + 8^2 + 5^2 + 5^2$

2 $\quad 13^2 + 5^2 + 4^2 + 2^2$

6 $\quad 10^2 + 8^2 + 7^2 + 1^2$

3 $\quad 12^2 + 6^2 + 5^2 + 3^2$

7 $\quad 10^2 + 7^2 + 7^2 + 4^2$

4 $\quad 11^2 + 8^2 + 5^2 + 2^2$

8 $\quad 9^2 + 9^2 + 6^2 + 4^2$

Maths Riddles

- I am a cube number and a square number below 100.

- 8, 4 and 16 are factors.

What number am I? 64

- I am a square number.

- I am an even number.

- I am between 20 and 50.

What number am I? 36

- I am a prime number.

- I am less than 20 and I have two digits.

- If you double me and subtract 9, you get a square number.

What number am I? 17

- I am a square number.

- I am an odd number.

- I am between 20 and 50.

- 7 is one of my factors.

What number am I? 49

- I am an even number.

- I am more than 80 but less than 90.

- 6, 12 and 7 are some of my factors.

What number am I? 84