

Divisibility Detectives

Divisible by 2, by 3, by 6 — crack the codes

Name: _____ Date: _____

Remember the rules

Divisible by 2: the last digit is 0, 2, 4, 6 or 8.

Divisible by 3: the sum of the digits is divisible by 3.

Divisible by 6: BOTH rules work — the number is even AND its digit sum is divisible by 3.

Puzzle 1 — Four baskets, three words

Sort the 20 numbers into the four baskets. Each number has a letter. Write the letters in each basket in the same order as the numbers appear (left to right, top row first). Three of the baskets spell autumn words; the fourth is just leftovers!

355	297	313	222	385	369	330	73	88	279
X	F	Q	A	Z	R	C	J	M	O

392	138	38	243	363	311	174	324	364	152
A	O	P	S	T	V	R	N	L	E

Divisible by 6	Divisible by 2 but not by 3	Divisible by 3 but not by 2	Neither

The three words: _____

Puzzle 2 — The missing-digit code

In each number one digit is missing. Find the digit that follows the instruction, then turn it into a letter with the code table. Read the six letters from top to bottom.

0	1	2	3	4	5	6	7	8	9
E	S	W	T	I	A	L	O	R	N

	Number	Must be ...	Choose ...	Digit → Letter
1	5 □ 2	divisible by 3	the smallest digit that works	___ → ___
2	4 7 □	divisible by 6	the smallest digit that works	___ → ___
3	8 □ 1	divisible by 3	the largest digit that works	___ → ___
4	3 □ 0	divisible by 6	the smallest digit that works, but not 0	___ → ___
5	1 □ 5	divisible by 3	the smallest digit that works	___ → ___
6	9 □ 4	divisible by 6	the largest digit that works	___ → ___

The word:

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Puzzle 3 — The leaf trail

A squirrel wants to cross the field from the top-left square to the bottom-right square. It may only move RIGHT or DOWN, and it may only step on numbers that are divisible by 6. Colour the trail and collect the letters on it.

108 P	162 U	123 G	27 W
131 H	96 M	167 Y	137 B
165 H	72 P	168 K	105 E
79 G	38 B	186 I	174 N

The word on the trail:

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Trap check: find one number on the field that is divisible by 2 but NOT by 6: _____.

And one divisible by 3 but NOT by 6: _____.

Answer Key (for the teacher)

Puzzle 1: by 6: 222 A, 330 C, 138 O, 174 R, 324 N → ACORN. By 2 not 3: 88 M, 392 A, 38 P, 364 L, 152 E → MAPLE. By 3 not 2: 297 F, 369 R, 279 O, 243 S, 363 T → FROST. Neither: 355, 313, 385, 73, 311.

Puzzle 2: 1) $5\square2$: digit sum $7 + d$, smallest $d = 2 \rightarrow W$. 2) $47\square$: even and $11 + d$ divisible by 3 $\rightarrow d = 4 \rightarrow I$. 3) $8\square1$: $9 + d$, largest $d = 9 \rightarrow N$. 4) $3\square0$: $3 + d$, smallest non-zero $d = 3 \rightarrow T$. 5) $1\square5$: $6 + d$, smallest $d = 0 \rightarrow E$. 6) $9\square4$: even already; $13 + d$ divisible by 3 $\rightarrow d = 2, 5$ or 8 , largest $8 \rightarrow R$.
Word: WINTER.

Puzzle 3: trail $108 \rightarrow 162 \rightarrow 96 \rightarrow 72 \rightarrow 168 \rightarrow 186 \rightarrow 174 \rightarrow PUMPKIN$. It is the only right/down path through multiples of 6. Traps: 38 (by 2 only), 123, 27, 165, 105 (by 3 only).