

Acorn the Squirrel's Autumn Harvest

A math logic puzzle

Name: _____ Date: _____

Puzzle 1 — Crack the code

Each shape stands for a number. The same shape always means the same number. Use the four equations to find the numbers.

$$\text{Red Hexagon} + \text{Green Pentagon} = 15$$

$$\text{Blue Circle} \times \text{Red Hexagon} = 72$$

$$\text{Red Hexagon} - \text{Green Pentagon} = 1$$

$$\text{Orange Star} \times \text{Green Pentagon} = 42$$

Now work out the moon:

$$\text{Green Pentagon} \times \text{Red Hexagon} - \text{Blue Circle} \times \text{Orange Star} = \text{Moon}$$

Write the value of each shape under its letter:



O

= _____



R

= _____



N

= _____



C

= _____



A

= _____

Finally, write the five letters in the boxes in order of their numbers, from the least to the greatest. What word do you get?

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The story

Acorn the squirrel hid her acorns in four trees in the park: an **Oak**, a **Maple**, a **Pine** and a **Birch**. Each tree holds a different number of acorns: **12, 18, 25 or 36**. Acorn is very forgetful, so she left herself these clues:

1. The number of acorns in the Oak is divisible by 9.
2. The Pine holds an odd number of acorns.
3. The Maple holds exactly twice as many acorns as one of the other trees.
4. The Birch holds fewer acorns than the Oak.

Puzzle 2 — Where are the acorns?

How many acorns are in each tree? Fill in the table, then explain how you know.

Tree	Oak	Maple	Pine	Birch
Acorns				

Explain: which clue did you use first, and why?

Think: one of the four clues is not really needed — you can solve the puzzle without it. Which one? _____

Puzzle 3 — Winter

Winter comes. Every day Acorn eats 2 acorns from the Pine and 1 acorn from the Oak. After how many days will the Pine and the Oak hold the same number of acorns? How many acorns will be in each of them on that day?

Day	0	1	2	3	4	5	6	7	8
Pine	25								
Oak	18								

Answer: after _____ days, each tree holds _____ acorns.

Can you write a rule for the number of acorns in the Pine after d days?

Pine: _____

Oak: _____

Puzzle 4 — Spring

In spring, Acorn starts a new stash under the Birch. On the first day she buries 1 acorn, on the second day 3 acorns, on the third day 5 acorns, and so on — each day 2 more than the day before.

Day	1	2	3	4	5	6	7	8	9	10
Buried that day	1	3	5							
Total so far	1	4	9							

- a) How many acorns does she bury on the 10th day? _____
- b) How many acorns are under the Birch in total after 10 days? _____
- c) Look at the "Total so far" row: 1, 4, 9, 16, ... What kind of numbers are these? _____
- d) Without adding, how many acorns will be under the Birch after 20 days? _____
- After 100 days? _____

Bonus — Hazel's claim

Acorn's friend Hazel says she has 4 285 acorns hidden in five hollow logs, with the same number in each log. Could Hazel be telling the truth? Explain without dividing.

Hazel then says her cousin has 4 285 acorns in nine logs, the same number in each. Could that be true? Explain.

Answer Key (for the teacher)

Puzzle 1

From hexagon + pentagon = 15 and hexagon – pentagon = 1: hexagon R = 8, pentagon O = 7. Then circle N = $72 \div 8 = 9$ and star C = $42 \div 7 = 6$. Moon A = $7 \times 8 - 9 \times 6 = 56 - 54 = 2$. Ordering 2, 6, 7, 8, 9 gives A, C, O, R, N: ACORN.

Puzzle 2

Oak 18, Maple 36, Pine 25, Birch 12.

Clue 1: the Oak holds 18 or 36. Clue 2: the Pine holds 25 (the only odd number). Clue 3: among 12, 18 and 36 the only "double" pair is $36 = 2 \times 18$, so the Maple has 36 and the Oak has 18. That leaves 12 for the Birch. Clue 4 is the unnecessary one — it only confirms $12 < 18$.

Puzzle 3

Pine: $25 - 2d$; Oak: $18 - d$. They are equal when $25 - 2d = 18 - d$, so $d = 7$. After 7 days each tree holds 11 acorns. Students without algebra can fill the day table: Pine 25, 23, 21, 19, 17, 15, 13, 11; Oak 18, 17, 16, 15, 14, 13, 12, 11.

Puzzle 4

a) Day n has $2n - 1$ acorns, so day 10 has 19. b) $1 + 3 + 5 + \dots + 19 = 100$. c) Square numbers. d) $20^2 = 400$ and $100^2 = 10\,000$.

e) Start with 1 dot. Adding an L-shaped layer of 3 dots makes a 2×2 square; adding an L of 5 makes 3×3 ; and so on. Each new odd number is exactly the L-shaped border needed to grow the square by one.

Bonus

4 285 ends in 5, so it is divisible by 5 — Hazel could be telling the truth (857 per log). A common wrong answer is to use the digit sum; digit sums only work for 3 and 9.

Nine logs: $4 + 2 + 8 + 5 = 19$, which is not divisible by 9, so 4 285 is not divisible by 9. The cousin's claim cannot be true.