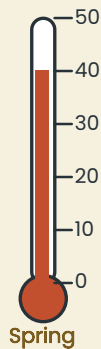
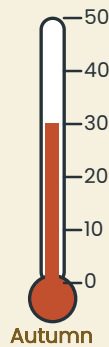


Seasonal Math & Logic: A Year of Puzzles

6 complete activities from Seasonal Math & Logic, each with a worked answer.



Season	Puzzle
Autumn	Data
Winter	Logic
Spring	Garden
Summer	Maps

HOW TO USE

1. Read the situation and the evidence first.
2. Show your thinking in the work boxes, not only an answer.
3. Explain how you know your answer makes sense.
4. Try the new problem at the bottom of the page.

6 activities • 3 answer pages • From the 24-activity collection

10 US Letter pages • Print at 100% / Actual Size

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

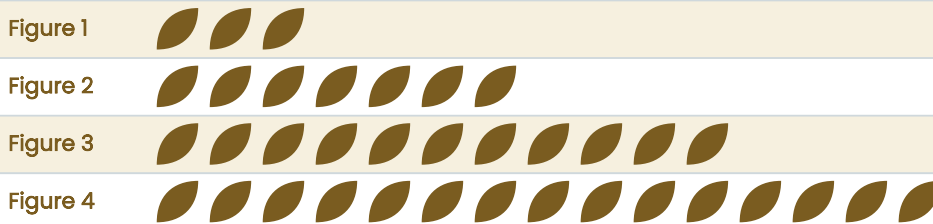
LEVEL 1



Study the leaf figures. Draw, count, and explain how the pattern grows.

A leaf pattern grows. Figure 1 has 3 leaves. Figure 2 has 7 leaves. Figure 3 has 11 leaves. Figure 4 has 15 leaves. Draw Figures 5 and 6. Write a rule that tells how the pattern grows. Then find how many leaves Figure 10 will have, without drawing every figure. Optional challenge: write a rule that uses the figure number n . Test your rule with $n = 10$.

LEAF FIGURES 1 TO 4



 KEY: each symbol = 1 leaf

1. Draw Figures 5 and 6, and label how many leaves each one has.

2. Write the growing rule in words.

A blank sheet of graph paper with a grid of squares. The grid consists of 10 columns and 8 rows of squares. The entire grid is enclosed within a rounded rectangular border.

3. Find the number of leaves in Figure 10 and show your work.

TRY IT • An acorn pattern has 5, 11, 17, 23 acorns. How many acorns are in Figure 8?

Name _____ Date _____

LEVEL 1



Fill in the market receipt one line at a time. All prices are made-up sample prices.

Mia shops at a harvest market. She buys 3 crates of apples and 2 bags of squash. She pays with three \$20 bills. Fill in the receipt. Find the cost of each item line, then the total. Last, find how much change Mia gets back.

HARVEST MARKET	
Apples: 3 crates $\times$ \$12	?
Squash: 2 bags $\times$ \$7	?
TOTAL	?
Paid: three \$20 bills	
CHANGE	?

EVIDENCE TO USE

- Apples: \$12 per crate
- Squash: \$7 per bag
- Mia buys 3 crates and 2 bags
- Mia pays with three \$20 bills
- Prices are fictional sample prices

1. Find the cost of the apples and the cost of the squash.

[illegible]

2. Add the two lines to find the receipt total.

3. Find Mia's change, and label it in dollars.

TRY IT • Leo has \$45. He buys 4 bunches of carrots at \$3 each and 2 crates of pears at \$11 each. How much money does he have left?

Name _____ Date _____

LEVEL 2



Line up the decimal points when you add or subtract. All prices are fictional sample prices.

Rosa has \$40.00 to spend at a harvest market. She buys 3 baskets at \$4.75 each and 2 jars at \$6.20 each. How much does she spend? How much money does she have left? Then Rosa wants to buy exactly two different extras, one of each, without going over the money she has left. Which two items can she buy, and how much will remain?

HARVEST MARKET	HARVEST MARKET	EXTRAS	EXTRAS	EXTRAS
Basket each	Jar each	Flowers	Pears	Honey
\$4.75	\$6.20	\$5.50	\$7.25	\$8.40

EVIDENCE TO USE

- Budget: \$40.00
- Basket: \$4.75 each (buys 3)
- Jar: \$6.20 each (buys 2)
- Extras: flowers \$5.50, pears \$7.25, honey \$8.40
- Prices are fictional sample prices

1. Find the cost of the baskets and the cost of the jars.

2. Find the total spent and the amount left from \$40.00.

[illegible]

3. Test each pair of different extras and choose the pair that fits.

TRY IT • Jo has \$25.00. She buys 4 jars that each cost the same amount, and she has \$3.40 left. What did each jar cost?

Name _____ Date _____

Bird Migration Map: Quadrant I (Stretch)

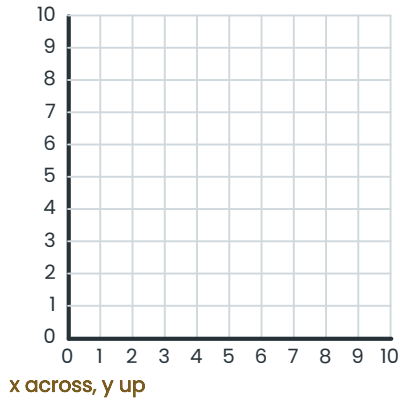
LEVEL 2



Use the grid to plot each stop. Each grid unit stands for 1 map unit. The route is invented.

A fictional bird makes four stops: A(2, 3), B(2, 9), C(7, 9), and D(7, 4). It flies from A to B to C to D in straight lines. Plot and label the stops. Each leg of the route is either vertical or horizontal. Find the length of each leg and the total route length.

FIRST-QUADRANT GRID



EVIDENCE TO USE

- Stop A: (2, 3)
- Stop B: (2, 9)
- Stop C: (7, 9)
- Stop D: (7, 4)
- Route: A to B to C to D

1. Plot and label all four stops.

2. Find the length of legs AB, BC, and CD.

3. Find the total route length in map units.

TRY IT • A bird starts at (4, 1). It flies straight up 7 units and then left 3 units. Name its final stop.

Name _____ Date _____

LEVEL 3



Use the explicit rule to test numbers without listing every term. Justify each answer with an equation.

The leaf pattern 3, 7, 11, 15, ... has the explicit rule: term $n = 4n - 1$. Does 99 belong to the pattern? If it does, which term number is it? Does 150 belong? Explain using the rule rather than by listing terms. Then explain why every term in this pattern must be an odd number.

EVIDENCE TO USE

- Pattern: 3, 7, 11, 15, ...
- Explicit rule: term $n = 4n - 1$
- n must be a counting number: 1, 2, 3, ...

1. Solve $4n - 1 = 99$ and decide whether 99 belongs.

2. Test 150 the same way and explain your decision.

A blank sheet of graph paper with a grid pattern. The grid consists of 10 columns and 10 rows of squares. The paper has rounded corners and a light gray border.

3. Explain why every term is odd.

TRY IT • The pattern 5, 11, 17, 23, ... grows by 6 each time. Write an explicit rule, and decide whether 95 belongs.

Name _____ Date _____

LEVEL 3



Compare unit prices in cents per pound. Then test a real purchase. Prices are fictional sample prices.

Two market stands sell apples. Stand A sells a 4 lb bag for \$6.20. Stand B sells a 6 lb bag for \$8.70. Which stand has the better unit price? Then suppose you need exactly 12 lb of apples. Stand A offers \$1.00 off any purchase of 3 bags. Find the cost of 12 lb at each stand. Does the coupon change which stand is cheaper? By how much?

STAND A	STAND B	EVIDENCE TO USE
<p>Apples 4 lb bag</p> <p style="text-align: right; font-size: 1.5em; font-weight: bold;">\$6.20</p> <div style="border: 1px solid #8B4513; border-radius: 10px; padding: 5px; margin-top: 10px; text-align: center;"> unit price: _____ </div>	<p>Apples 6 lb bag</p> <p style="text-align: right; font-size: 1.5em; font-weight: bold;">\$8.70</p> <div style="border: 1px solid #8B4513; border-radius: 10px; padding: 5px; margin-top: 10px; text-align: center;"> unit price: _____ </div>	<p>EVIDENCE TO USE</p> <ul style="list-style-type: none"> Stand A: 4 lb for \$6.20 (620 cents) Stand B: 6 lb for \$8.70 (870 cents) Stand A coupon: \$1.00 off 3 bags You need exactly 12 lb Prices are fictional sample prices

1. Find the unit price at each stand in cents per pound.

2. Find the cost of exactly 12 lb at each stand, including the coupon.

[illegible]

3. Decide which stand is cheaper, and by how much.

TRY IT • Stand C sells a 5 lb bag for \$7.00. Is Stand C a better buy than Stand B? Use unit prices.

1. Falling Leaf Growing Patterns (Core)

LEVEL 1

Figure 5 has 19 leaves and Figure 6 has 23 leaves. The rule is add 4. Figure 10 has 39 leaves.
Challenge rule: $4n - 1$.

WORKED REASONING • Each figure has 4 more leaves than the one before it: 3, 7, 11, 15, 19, 23. Going from Figure 1 to Figure 10 takes 9 jumps of 4. $9 \times 4 = 36$, and $3 + 36 = 39$ leaves. Challenge: each figure has 1 less than 4 times its figure number. Figure 1: $4 \times 1 - 1 = 3$, which matches. Figure 10: $4 \times 10 - 1 = 39$, which matches the first method.

WATCH FOR • Many students compute $10 \times 4 = 40$ and then add 3 to get 43. This counts 10 jumps instead of 9. Figure 1 already has its 3 leaves, so only 9 jumps of 4 are needed to reach Figure 10.

TRANSFER • 47 acorns. The rule is add 6, and Figure 8 is 7 jumps past Figure 1: $5 + 7 \times 6 = 47$.

2. Harvest Market Receipt (Core)

LEVEL 1

Apples cost \$36 and squash costs \$14, for a total of \$50. Mia's change is \$10 (1000 cents).

WORKED REASONING • Apples: $3 \times \$12 = \36 . Squash: $2 \times \$7 = \14 . Total: $\$36 + \$14 = \$50$. Mia pays with three \$20 bills: $3 \times \$20 = \60 . Change: $\$60 - \$50 = \$10$.

WATCH FOR • Some students subtract from \$20 because they see a \$20 bill. Mia hands over three \$20 bills, so she pays \$60 in all. Always find the full amount paid before you subtract.

TRANSFER • \$11. Carrots cost $4 \times \$3 = \12 and pears cost $2 \times \$11 = \22 , so he spends \$34 in all. $\$45 - \$34 = \$11$.

9. Harvest Market Decimal Budget (Stretch)

LEVEL 2

Rosa spends \$26.65 and has \$13.35 left (1335 cents). The only pair she can afford is flowers and pears (\$12.75), which leaves \$0.60.

WORKED REASONING • Baskets: $3 \times \$4.75 = \14.25 . Jars: $2 \times \$6.20 = \12.40 . Total: $\$14.25 + \$12.40 = \$26.65$. Left: $\$40.00 - \$26.65 = \$13.35$. Test the pairs: flowers + pears = \$12.75, which fits. Flowers + honey = \$13.90, which is too much. Pears + honey = \$15.65, which is too much. After buying flowers and pears: $\$13.35 - \$12.75 = \$0.60$.

WATCH FOR • When subtracting \$26.65 from \$40.00, students may regroup incorrectly across the zeros: forgetting to take 1 from the ones gives \$14.35, and copying the 65 cents gives \$13.65. Write \$40.00 with both zeros, and regroup across the zeros carefully.

TRANSFER • \$5.40 per jar. She spent $\$25.00 - \$3.40 = \$21.60$, and $\$21.60 / 4 = \5.40 .

10. Bird Migration Map: Quadrant I (Stretch)

LEVEL 2

AB = 6 units, BC = 5 units, and CD = 5 units. The total route length is 16 map units.

WORKED REASONING • A and B share $x = 2$, so AB is vertical. Its length is $9 - 3 = 6$ units. B and C share $y = 9$, so BC is horizontal. Its length is $7 - 2 = 5$ units. C and D share $x = 7$, so CD is vertical. Its length is $9 - 4 = 5$ units. Total: $6 + 5 + 5 = 16$ map units.

WATCH FOR • Students often count the grid points from 3 to 9 and get 7. Distance is the number of unit jumps between the points, not the number of points touched. Subtracting the coordinate that changes avoids this error.

TRANSFER • (1, 8). Moving up 7 changes y from 1 to 8, and moving left 3 changes x from 4 to 1.

17. Does It Belong? Explicit Leaf Rules (Challenge)

LEVEL 3

Yes, 99 belongs: it is term 25, because $4n = 100$ and $n = 25$. No, 150 does not belong, because $151 \div 4$ is not a whole number. Every term is odd, because $4n$ is always even and 1 less than an even number is odd.

WORKED REASONING • For 99: $4n - 1 = 99$, so $4n = 100$ and $n = 100 \div 4 = 25$. Since 25 is a counting number, 99 is term 25. Check: $4 \times 25 - 1 = 99$. For 150: $4n = 151$, but $151 \div 4 = 37.75$, which is not a counting number, so 150 does not belong. Every term is $4n - 1$. The number $4n$ is a multiple of 4, so it is even, and 1 less than an even number is odd. Since 150 is even, it could never belong.

WATCH FOR • Some students plug in 99 as n and compute $4 \times 99 - 1 = 395$. The number 99 is a term value, not a position. To decide whether a value belongs, set the rule equal to the value and solve for n .

TRANSFER • The rule is term $n = 6n - 1$. Yes, 95 belongs: $6n = 96$, so $n = 16$, and 95 is term 16.

18. Harvest Market Better Buy (Challenge)

LEVEL 3

Stand B is the better buy at 145 cents per pound, compared with 155 cents per pound at Stand A. For 12 lb, Stand B costs \$17.40 and Stand A costs \$17.60 with the coupon, so Stand B is still cheaper by \$0.20.

WORKED REASONING • Unit prices: Stand A is $620 \div 4 = 155$ cents per pound, and Stand B is $870 \div 6 = 145$ cents per pound. Stand B is lower. For 12 lb, Stand A needs 3 bags: $3 \times \$6.20 = \18.60 , and $\$18.60 - \$1.00 = \$17.60$. Stand B needs 2 bags: $2 \times \$8.70 = \17.40 . The coupon narrows the gap, but Stand B still saves $\$17.60 - \$17.40 = \$0.20$.

WATCH FOR • Students often pick the smaller sticker price (\$6.20) as the better buy. A bag with fewer pounds can cost less overall but more per pound. Compare the price for the same amount, either per pound or for the full amount you need.

TRANSFER • Yes. Stand C costs $700 \div 5 = 140$ cents per pound, which is less than Stand B's 145 cents per pound.