

Grade 5 | Calendar Grid Answer Key

September

Date	Equation 1	Equation 2	Equation 3
1	.25 + .25 = .50	25/100 + 25/100 = 50/100 = 1/2	1/4 + 1/4 = 2/4 = 1/2
2	15/60 + 15/60 = 30/60	³ / ₁₂ + ³ / ₁₂ = ⁶ / ₁₂	1/4 + 1/4 = 1/2
3	.50 + .50 = 1.00	⁵⁰ / ₁₀₀ + ⁵⁰ / ₁₀₀ / ¹⁰⁰ / ₁₀₀ = ¹ / ₁	$\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$
4	30/60 + 30/60 = 60/60	⁶ / ₁₂ + ⁶ / ₁₂ = ¹² / ₁₂	$\frac{1}{2} + \frac{1}{2} = 1$
5	.10 + .10 = .20	10/100 + 10/100 = 20/100 = 1/5	$1/_{10} + 1/_{10} = 2/_{10} = 1/_5$
6	$6/60 + 6/60 = \frac{12}{60} = \frac{15}{5}$	$y_{10} + y_{10} = 2y_{10} = y_5$	
7	.20 + .20 = .40	20/100 + 20/100 = 40/100 = 2/5	$1/_{5} + 1/_{5} = 2/_{5}$
8	12/60 + 12/60 = 24/60 = 2/5	1/5 + 1/5 + = 2/5	
9	.05 + .05 = .10	⁵ /100 + ⁵ /100 = ¹⁰ /100 = ¹ /10	$y_{20} + y_{20} = 2y_{20} = y_{10}$
10	$\frac{3}{60} + \frac{3}{60} = \frac{6}{60} = \frac{1}{10}$	$y_{20} + y_{20} = 2y_{20} = 1y_{10}$	
11	.50 + .50 = 1.00	⁵⁰ /100 + ⁵⁰ /100 = ¹⁰⁰ /100 = 1	$y_2 + y_2 = 1$
12	$^{30}60 + ^{30}60 = ^{60}60 = 1$	6/12 + 6/12 = 12/12 = 1	$\frac{1}{2} + \frac{1}{2} = 1$
13	1.00 + 1.00 = 2.00		
14	$60\%_{60} + 60\%_{60} = 120\%_{60} = 2$	12/12 + 12/12 = 24/12 = 2	1 + 1 = 2
15	.20 + .20 = .40	20/100 + 20/100 = 40/100 = 2/5	1/5 + 1/5 = 2/5
16	12/60 + 12/60 = 24/60 = 2/5	2/10 + 2/10 = 4/10 = 2/5	
17	.40 + .40 = .80	⁴⁰ / ₁₀₀ + ⁴⁰ / ₁₀₀ = ⁸⁰ / ₁₀₀ = ⁴ / ₅	$\frac{2}{5} + \frac{2}{5} = \frac{4}{5}$
18	$^{24}/_{60} + ^{24}/_{60} = ^{48}/_{60} = ^{4/_{5}}$	4/10 + 4/10 = 8/10 = 4/5	
19	.10 + .10 = .20	10/100 + 10/100 = 20/100 = 1/5	1/10 + 1/10 = 2/10 = 1/5
20	6%0 + 6%0 = ¹² %0 = ¹ / ₅	$y_{10} + y_{10} = 2y_{10} = y_5$	
21	.75 + .75 = 1.50	$^{75/100} + ^{75/100} = ^{150/100} = 1 \frac{1}{2}$	$\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{1}{2}$
22	$45/60 + 45/60 = 90/60 = 1 \frac{1}{2}$	$9_{12} + 9_{12} = {}^{18}_{12} = 1 \frac{1}{2}$	$\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{1}{2}$
23	1.50 + 1.50 = 3.00	¹⁵⁰ / ₁₀₀ + ¹⁵⁰ / ₁₀₀ = ³⁰⁰ / ₁₀₀ = 3	
24	$90/120 + 90/120 = 180/120 = 1 \frac{1}{2}$	$18/_{24} + 18/_{24} = 36/_{24} = 11/_{2}$	
25	.30 + .30 = .60	³⁰ / ₁₀₀ + ³⁰ / ₁₀₀ = ⁶⁰ / ₁₀₀ = ³ / ₅	
26	18/60 + 18/60 = 36/60 = 3/5	³ / ₁₀ + ³ / ₁₀ = ⁶ / ₁₀ = ³ / ₅	
27	.60 + .60 = 1.20	⁶⁰ / ₁₀₀ + ⁶⁰ / ₁₀₀ = ¹²⁰ / ₁₀₀	⁶ / ₁₀ + ⁶ / ₁₀ = ¹² / ₁₀
28	$36/60 + 36/60 = 72/60 = 1 \frac{1}{5}$	⁶ /10 + ⁶ /10 + ¹² /10	
29	.15 + .15 + .30	¹⁵ / ₁₀₀ + ¹⁵ / ₁₀₀ = ³⁰ / ₁₀₀ = ³ / ₁₀	³ / ₂₀ + ³ / ₂₀ = ⁶ / ₂₀ = ³ / ₁₀
30	% ₀ + % ₀ = ¹⁸ / ₆₀	³ / ₂₀ + ³ / ₂₀ = ⁶ / ₂₀ = ³ / ₁₀	
31	1.00 + 1.00 = 2.00	$100_{100} + 100_{100} = 200_{100} = 2$	1 + 1 = 2

The patterns featured in this month's sequence of markers are described below. Revealing one calendar marker each day allows students to make and test predictions, discovering patterns as new markers are added and their predictions are confirmed or proven false. Don't tell them what the patterns are: instead, allow them to pursue their own ideas and investigations. Don't worry if their ideas seem off base early in the month; as they accumulate information, discuss their observations, and justify their predictions, they will revise and refine their thinking.

- Markers alternate between money and clock models, as well as between goldenrod and white backgrounds.
- Money markers alternate between pictures of money value pieces and pictures of coins in an AABB pattern.
- Pairs of consecutive markers have identical fraction expression labels.
- Markers 1–10 are unit fractions, markers 11–20 have numerators of 2 and represent doubles of markers 1–10, and markers 21–30 have numerators of 3 and represent triples of markers 1–10.
- The denominators feature a repeating pattern of 4, 4, 2, 2, 10, 10, 5, 5, 20, 20.



Preparation

Before the first Calendar Grid workout, place the *numbered* Mystery Buildings Calendar Markers face-down, in sequence, in the Calendar Grid pocket chart, so that the visuals are hidden from students. Leave every fourth pocket empty, as these will be filled in at a later time. Also, leave space at the left side of the topmost row of the pocket chart to display a set of four of the lettered markers through the month.

				Ø O	ctober	2014
Monday	Tuesday	Wednesday	Th	ursday	Friday	Saturday
			i heldi (antique		The future way and the second se	The following con-
	Monday UNIN	Monday Tuesday Monday Tuesday Monday Interstant Monday Interstant	Monday Tuesday Wednesday Monday Tuesday Wednesday Image: State	Monday Tuesday Wednesday Th Monday Tuesday Wednesday Th Image: State	Monday Tuesday Wednesday Thursday and Angeles and Ange	Monday Tuesday Wednesday Thursday Friday Monday Tuesday Mednesday Thursday Friday Image: Stress of the st

• Keep the *lettered* Mystery Buildings Calendar Markers near the Calendar Grid pocket chart for use through the month. As mystery buildings are identified and moved into place on the grid, new buildings will be added to the collection in the top row of the pocket chart. The chart below shows which markers belong where, and which marker to add to the set of choices each time.

Markers R, O, W, and J are distractors, and will not appear anywhere in the completed sequence of markers at the end of the month.

Building Collection Chart						
Group of choices	Students identify	Then add to the group of choices				
V Q R S	V as marker 4	L				
Q R S L	Q as marker 8	0				
R S L O	S as marker 12	N				
R L O N	L as marker 16	W G I (remove R & O)				
N W G I	N as marker 20	J				
WGIJ	G as marker 24	В				
WIJB	l as marker 28	None to add				
W J B	B as marker 32					

Following is a description of the patterns found the October calendar marker set. Revealing one calendar marker each day allows students to make and test predictions and to discover the patterns as new markers are added and their predictions are confirmed or proven false. Don't tell them what the patterns are: instead, allow them to pursue their own ideas and investigations.

- There is an ABCD pattern in the views and buildings shown on the markers this month: top view, right side view, front view, mystery building; top view, right side view, front view, mystery building; and so on
- Each new mystery building has a greater volume than the one before it.
- The volumes of the mystery buildings increase by a pattern of 3 cubic units, 6 cubic units; 3 cubic units; 6 cubic units; and so on.

				D C	ctober	2014
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Top View	Right Side View	Front View	V
Top View	Right Side View	Front View	Q	Top View 9	Right Side View	Front View
S	Top View	Right Side View	Front View		Top View	Right Side View
Front View 19		Top View	Right Side View	Front View	G	Top View
Right Side View	Front View		Top View	Right Side View	Front View 31	B

Date	Triangle (angles)	Triangles (sides)	Ordered Pairs for Vertices green, blue, purple	Transformation
1	Right	Scalene	(0,0) (3,0) (0,4)	
2	Right	Scalene	(4,0) (7,0) (4,4)	translate right 4 units
3	Right	Scalene	(4,4) (7,4) (4,8)	translate up 4 units
4	Right	Scalene	(4,4) (4,7) (0,4)	rotate 90 degrees left
5	Right	Scalene	(4,4) (4,7) (8,4)	reflect over purple line segment
6	Right	Isosceles	(5,9) (1,5) (5,5)	
7	Right	Isosceles	(4,9) (0,5) (4,5)	translate left 1 unit
8	Right	Isosceles	(4,8) (0,4) (4,4)	translate down 1 unit
9	Right	Isosceles	(8,4) (4,8) (4,4)	rotate 90 degrees right
10	Right	Isosceles	(8,4) (4,0) (4,4)	reflect over blue line segment
11	Obtuse	Scalene	(4,6) (6,4) (0,4)	
12	Obtuse	Scalene	(6,6) (8,4) (2,4)	translate right 2 units
13	Obtuse	Scalene	(6,8) (8,6) (2,6)	translate up 2 units
14	Obtuse	Scalene	(6,4) (8,6) (8,0)	rotate 90 degrees left
15	Obtuse	Scalene	(10,4) (8,6) (8,0)	reflect over green line segment
16	Obtuse	Isosceles	(4,7) (4,3) (3,5)	
17	Obtuse	Isosceles	(3,7) (3,3) (2,5)	translate left 1 unit
18	Obtuse	Isosceles	(3,6) (3,2) (2,4)	translate down 1 unit
19	Obtuse	Isosceles	(7,2) (3,2) (5,3)	rotate 90 degrees right
20	Obtuse	Isosceles	(7,2) (3,2) (5,1)	reflect over purple line segment
21	Acute	Scalene	(3,0) (1,3) (0,0)	
22	Acute	Scalene	(7,0) (5,3) (4,0)	translate right 4 units
23	Acute	Scalene	(7,4) (5,7) (4,4)	translate up 4 units
24	Acute	Scalene	(4,7) (1,5) (4,4)	rotate 90 degrees left
25	Acute	Scalene	(4,7) (7,5) (4,4)	reflect over blue line segment
26	Acute	Isosceles	(3,7) (6,6) (6,8)	
27	Acute	Isosceles	(1,7) (4,6) (4,8)	translate left 2 units
28	Acute	Isosceles	(1,5) (4,4) (4,6)	translate down 2 units
29	Acute	Isosceles	(5,7) (4,4) (6,4)	rotate 90 degrees right
30	Acute	Isosceles	(5,1) (4,4) (6,4)	reflect over green line segment
31	Right	Scalene	(0,4) (5,4) (5,0)	

The calendar markers are grouped in sets of five consecutive markers. Each set begins with a triangle oriented on a coordinate grid. The second triangle in the set translates (slides) left or right. The third triangle translates up or down. The fourth triangle rotates (turns) 90 degrees clockwise or counterclockwise, and the fifth triangle in the set reflects (flips) over one side of the triangle.

Notes:

• Add a column that includes a sketch of the triangle.

December

Date	Shape Name	Pairs of Parallel Sides	Pairs of Congruent Sides	Pairs of Congruent Angles
1	kite	0	2	1, opposite
2	parallelogram	2	2	2, opposite
3	trapezoid	1	0	0
4	kite	0	2	1, opposite
5	parallelogram (square, rhombus)	2	All 4 sides are congruent.	All 4 angles are congruent.
6	trapezoid	1	0	0
7	kite	0	2	1, opposite
8	parallelogram	2	2	2, opposite
9	trapezoid	1	1	2, adjacent
10	kite	0	2	1, opposite
11	parallelogram (rectangle)	2	2	All 4 angles are congruent.
12	trapezoid	1	0	0
13	kite	0	2	1, opposite
14	parallelogram	2	2	2, opposite
15	trapezoid	1	1	1, adjacent
16	kite	0	2	1, opposite
17	parallelogram	2	2	2, opposite
18	trapezoid	1	1	2, adjacent
19	kite	0	2	1, opposite
20	parallelogram (rectangle)	2	2	All 4 angles are congruent.
21	trapezoid	1	1	0
22	kite	0	2	1, opposite
23	parallelogram (rhombus)	2	All 4 sides are congruent.	2, opposite
24	trapezoid	1	0	0
25	kite	0	2	1, opposite
26	parallelogram	2	2	2, opposite
27	trapezoid	1	0	0
28	kite	0	2	1, opposite
29	parallelogram (rhombus)	2	All 4 sides are congruent.	2, opposite
30	trapezoid	1	1	1, adjacent
31	kite	0	2	1, opposite

The markers this month follow a repeating pattern of kite, parallelogram, trapezoid. There is no pattern within the set of parallelograms, which contains rectangles, squares, rhombuses, and other parallelograms (rhomboids, which have no right angles and whose adjacent sides are unequal). The shapes on the first six markers are meant to challenge students' ideas about the defining attributes of each kind of shape: for example, is a trapezoid that is not the familiar isosceles trapezoid from the set of pattern blocks really a trapezoid? If so, what makes a shape a trapezoid? Similarly, the second parallelogram (marker 5) is a rhombus and also a square, and the fourth parallelogram (marker 8) is a rectangle.

These disruptions of students' expectations prompts them to find similarities among figures; in the course of doing that, they clarify (for example) that the defining attribute of a parallelogram is that it has 2 pairs of parallel sides. See the Mathematical Background section for more information about classifying rhombuses as a special kind of parallelogram and a special kind of kite.

January

Date	White	Brown	Yellow	Blue	Pink	Total	Equations
1	0	0				0	$0 + 0 = 0$ $0 \times 2 = 0$
2	1	1				2	1 + 1 = 2 1 × 2 = 2
3	2	2				4	2+2=4 2×2=4
4	3	3				6	3+3=6 2×3=6
5							2x = y
6	0	0	0			0	
7	1	1	1			3	1 + 1 + 1 = 3 1 × 3 = 3
8	2	2	2			6	2+2+2=6 2×3=6
9	3	3	3			9	3 + 3 + 3 = 9 3 × 3 = 9
10							3x = y
11	0	0	0	0		0	
12	1	1	1	1		4	$1 + 1 + 1 + 1 = 4$ $1 \times 4 = 4$
13	2	2	2	2		8	2+2+2+2=8 2×4=8
14	3	3	3	3		12	3 + 3 + 3 + 3 = 12 3 × 4 = 12
15							4x = y
16	0	0	0	0	1	1	
17	1	1			1	3	1 + 1 + 1 = 3 1 × 2 + 1 = 3
18	2	2			1	5	2+2+1=5 2×2+1=5
19	3	3			1	7	3 + 3 + 1 = 7 3 × 2 + 1 = 7
20							2x + 1 = y
21					2	2	
22	1	1	1		2	5	1 + 1 + 1 + 2 = 5 1 × 3 + 2 = 5
23	2	2	2		2	8	2+2+2+2=8 2×3+2=8
24	3	3	3		2	11	3 + 3 + 3 + 2 = 11 3 × 3 + 2 = 11
25							3x + 2 = y
26					3	3	
27	1	1	1	1	3	7	1 + 1 + 1 + 1 + 3 = 7 1 × 4 + 3 = 7
28	2	2	2	2	3	11	2 + 2 + 2 + 2 + 3 = 11 2 × 4 + 3 = 11
29	3	3	3	3	3	15	3 + 3 + 3 + 3 + 3 = 15 3 × 4 + 3 = 15
30							4x + 3 = y
31						4	

Each set of five markers begins with four arrangements of colored squares, many of which begin with 0 squares, followed by a fifth marker that shows a graph of the pattern. On the graphs, the *x*-coordinates are the term numbers and the *y*-coordinates are the total number of squares. The colors and arrangement of the squares are meant to help students see groups that help them write equations for the pattern. For each marker, students write equations that show how they got from the term number to the total number of squares in the term. These equations are written in more general form, as the equation for a line, when students encounter the graph for each pattern.

- Markers 1–5: 2x = y
- Markers 6–10: 3*x* = *y*
- Markers 11–15: 4*x* = *y*
- Markers 16–20: 2*x* + 1 = *y*
- Markers 21-25: 3x + 2 = y
- Markers 26–30: 4*x* + 3 = *y*
- Marker 31: ? + 4

E February

Date	Object	Vertical Dimension (inch)	Horizontal Dimension (inch)	Area (sq. inch)	Other
1	small block	¼ in	5∕8 in	1/32 in ²	other
2	gum	² ⁄4 in	5∕s in	¹⁰ / ₃₂ in ² (⁵ / ₁₆ in ²)	food
3	chewy candy	7∕8 in	¾ in	² ¹ / ₃₂ in ²	food
4	% key on calculator	⅓ in	¼ in	1⁄32 in ²	electronics
5	price tag	³∕₀ in	¾ in	%32 in ²	other
6	gum	²⁄4 in	¹¹ / ₈ in	²² / ₃₂ in ² (¹¹ / ₁₆ in ²)	food
7	fruit candy	7∕8 in	7∕8 in	49%4 in ²	food
8	phone power button	³⁄ଃ in	³⁄8 in	%4 in ²	electronics
9	bandaid	² ⁄4 in	% in	¹² / ₁₆ in ² (⁶ / ₈ in ² , ³ / ₄ in ²)	other
10	gum	² /4 in	¹⁵ / ₈ in	³⁰ / ₃₂ in ² (¹⁵ / ₁₆ in ²)	food
11	cheese cracker	1 in	1 in	1 in ²	food
12	addition key on calculator	⅔ in	¾ in	² 1⁄64 in ²	electronics
13	fortune cookie fortune	² ⁄4 in	% in	¹⁸ / ₁₆ in ² (% in ² , 1 ² / ₁₆ in ² , 1 ½ in ²)	other
14	butter pat	7∕8 in	⁵⁄₄ in	³⁵ / ₃₂ in ² (1 ³ / ₃₂ in ²)	food
15	cracker	¹¹ / ₈ in	¹¹ / ₈ in	¹²¹ ⁄ ₆₄ in ² (1 ⁵⁷ ⁄ ₆₄ in ²)	food
16	enter key from keyboard	⁵⁄s in	% in	⁴⁵ ⁄64 in ²	electronics
17	eraser	7‰ in	¹⁰ / ₄ in	⁷⁰ / ₃₂ in ² (³⁵ / ₁₆ in ² , 2 ⁶ / ₃₂ in ² , 2 ³ / ₁₆ in ²)	other
18	cracker	% in	% in	³⁶ / ₁₆ in ² (¹⁸ / ₈ in ² , % in ² , 2 ⁴ / ₁₆ in ² , 2 ² / ₈ in ² , 2 ¹ / ₄ in ²)	food
19	sweetener packet	¹ / ₈ in	¹⁵ / ₈ in	¹⁶⁵ ⁄64 in ² (2 ³⁷ ⁄64 in ²)	food
20	shift key from keyboard	⁵⁄s in	¹³ / ₈ in	⁶⁵ ⁄64 in ² (1 ¼64 in ²)	electronics
21	book of matches	¹⁵ / ₈ in	% in	⁹⁰ /32 in ² (⁴⁵ /16 in ² , 2 ¹³ /16 in ² , 2 ²⁶ /32 in ²)	other
22	mini chocolate bar	1 in	² 1/ ₈ in	²¹ / ₈ in ² (2 ⁵ / ₈ in ²)	food
23	graham cracker	% in	¹⁹ % in	¹⁷¹ / ₆₄ in2 (2 ⁴³ / ₆₄ in ²)	food
24	USB drive	7∕8 in	¾ in	⁴⁹ / ₃₂ in2 (1 ¹⁷ / ₃₂ in ²)	electronics
25	price tag	1 in	²³ / ₈ in	²³ / ₈ in2 (2 ⁷ / ₈ in ²)	other
26	cracker	5∕4 in	¹ ¼ in	⁵⁵ ⁄16 in2 (3 7⁄16 in²)	food
27	ravioli	¹⁵ ⁄ ₈ in	¹⁵ ⁄ ₈ in	²²⁵ ⁄64 in ² (3 ³³ ⁄64 in ²)	food
28	cell phone battery	2 in	2 in	4 in ²	electronics
29	larger bandaid	% in	3 in	²⁷ / ₈ in ² (3 ³ / ₈ in2)	other
30	snack-size cheese	% in	¹¹ /4 in	⁶⁶ / ₁₆ in ² (³³ / ₈ in ² , 4 ¹ / ₈ in ² , 4 ² / ₄ in ²)	food
31	tea bag packet	3 in	² % in	⁶³ / ₈ in ² (7 ⁷ / ₈ in ²)	food

There is a basic pattern of *other, food object, food object, electronics object* that repeats all month. Within each of those three categories, the areas of the objects increase, although there is no way to predict exactly what the dimensions and areas will be; the only things students can predict with certainty is what sort of object will be featured on a marker and that its area will be greater than the area of the previous object in that same category.

March

Date	Vertical Dimension	Horizontal Dimension	Estimated Area	Exact Area
1	76	264	Estimates will vary.	20,064
2	76	26.4		2,006.4
3	7.6	264		2,006.4
4	7.6	2.64		20.064
5	0.76	2.64		2.0064
6	101	284		28,684
7	101	28.4		2,868.4
8	10.1	284		2,868.4
9	10.1	2.84		28.684
10	1.01	2.84		2.8684
11	126	304		38,304
12	126	30.4		3,830.4
13	12.6	304		3,830.4
14	12.6	3.04		38.304
15	1.26	3.04		3.8304
16	151	324		48,924
17	151	32.4		4,892.4
18	15.1	324		4,892.4
19	15.1	3.24		48.924
20	1.51	3.24		4.8924
21	176	344		60,544
22	176	34.4		6,054.4
23	17.6	344		6,054.4
24	17.6	3.44		60.544
25	1.76	3.44		6.0544
26	201	364		73,164
27	201	36.4		7,316.4
28	20.1	364		7,316.4
29	20.1	3.64		73.164
30	2.01	3.64		7.3164
31	226	384		86,784

Many of the major patterns are listed below, but your students may think of others.

- Each set of five consecutive markers (e.g., 1–5, 6–10, and so on) are the same color.
- Each set of five markers features multiplication combinations in which the factors change by powers of 10.
- The first four markers in each set show the multiplication combination as a labeled array on a grid. The fifth marker in the set shows the multiplication combination with numbers only.
- The vertical dimension increases by 25 and the horizontal dimension increases by 20 with each new set. This results in predictable changes in the products for each new set of markers.

April

Date	Length	Width	Height	Volume (cm3)
1	1	1	1	1 cm ³
2	2	1	1	2 cm ³
3	2	2	1	4 cm ³
4	2	2	2	8 cm ³
5	1	2	2	4 cm ³
6	2	1	1	2 cm ³
7	4	1	1	4 cm ³
8	4	2	1	8 cm ³
9	4	2	2	16 cm ³
10	2	2	2	8 cm ³
11	2	1	2	4 cm ³
12	4	1	2	8 cm ³
13	4	2	2	16 cm ³
14	4	2	4	32 cm ³
15	2	2	4	16 cm ³
16	3	1	1	3 cm ³
17	6	1	1	6 cm ³
18	6	2	1	12 cm ³
19	6	2	2	24 cm ³
20	3	2	2	12 cm ³
21	3	1	3	9 cm ³
22	6	1	3	18 cm ³
23	6	2	3	36 cm ³
24	6	2	6	72 cm ³
25	3	2	6	36 cm ³
26	4	1	1	4 cm ³
27	8	1	1	8 cm ³
28	8	2	1	16 cm ³
29	8	2	2	32 cm ³
30	4	2	2	16 cm ³
31	4	1	4	16 cm ³

Many of the major patterns are listed below, but your students may think of others.

- The markers are grouped in sets of 5.
- The volumes of the buildings in each set doubles three times, and is then cut in half.
- Every third building is shown as a solid with labeled dimensions rather than as a centimeter cube construction.



There are a variety of patterns, or building codes, to be found as the map emerges over the month. Many of the major patterns are listed below, but your students may think of others.

- It is always 4 points on the grid from one nest to the next.
- Each nest always has 2 feeding areas.
- Every time Mumford makes a tunnel to a new nest, he makes a 90 degree turn.
- The tunnels to the odd-numbered nests, like Nest 1, 3, and 5, always run straight east.
- The tunnels to the feeding areas always go northwest, northeast, southwest, or southeast.
- There's a pattern in the direction of the tunnels from one nest to the next. They go East, South, East, North, East, North, East, South, and then the pattern repeats.
- The feeding area tunnels are always on the same side of the main tunnels that go east. They're always on the opposite sides on the main tunnels that go south and north.
- The feeding area tunnels come right in the middle of the tunnels that run west to east, but not right through the middle of tunnels that run south to north or north to south.

Notes:

• Use the Meadow Grid Student Book Page instead of a Calendar Grid Observation Chart.

