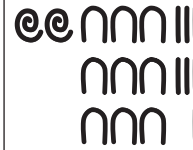
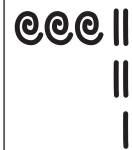
NUMBER® CORNER

Grade 4 | Calendar Grid Answer Key

September

Date	Ancient Egyptian Number	Modern	Date	Ancient Egyptian Number	Modern
1	∩|	11	11	𓍢∩∩|	121
2	∩∩||	22	12	𓍢∩∩∩||	132
3	∩∩∩|||	33	13	𓍢∩∩∩||| ∩	143
4	∩∩∩||| ∩ |	44	14	𓍢∩∩∩||| ∩∩ |	154
5	∩∩∩||| ∩∩ ||	55	15	𓍢∩∩∩||| ∩∩∩ ||	165
6	∩∩∩||| ∩∩∩|||	66	16	𓍢∩∩∩||| ∩∩∩||| ∩	176
7	∩∩∩||| ∩∩∩||| ∩ |	77	17	𓍢∩∩∩||| ∩∩∩||| ∩∩ |	187
8	∩∩∩||| ∩∩∩||| ∩∩ ||	88	18	𓍢∩∩∩||| ∩∩∩||| ∩∩∩ ||	198
9	∩∩∩||| ∩∩∩||| ∩∩∩|||	99	19	𓍢𓍢||| ||| |||	209
10	𓍢∩	110	20	𓍢𓍢∩∩	220

Date	Ancient Egyptian Number	Modern	Date	Ancient Egyptian Number	Modern
21		231	27		297
22		242	28		308
23		253	29		319
24		264	30		330
25		275	31		341
26		286			

About the Pattern

This month's pattern is explained below for your benefit. Don't tell students what the patterns are: instead, help them make and test their own ideas as a new marker is added each day. Don't worry if their ideas seem off base; as they accumulate information and discuss their observations, their ideas will be revised and refined into something more logical that can be justified with what they see.

September's Calendar Grid markers show ancient Egyptian numerals, which were used from approximately 4000 B.C.E. through 1000 C.E. Like our counting system, the ancient Egyptian system functions in base ten, which provides students with a review of place value. The first marker shows the equivalent of the number 11: a "heel bone" for 10 and a "staff" for 1. The numerical value of each marker increases by 11 each day. Symbols for Ancient Egyptian numerals accumulate until they reach a greater power of ten. So, 22, or the second marker, consists of 2 heel bones and 2 staffs, 33 consists of 3 heel bones and 3 staffs, and so on up to the ninth day, which shows 99 or 9 heel bones and 9 staffs. The pattern is predictable up to the tenth day when the symbol for 100 is introduced: a scroll is used with a heel bone to show 110 or 11×10. The pattern continues for the rest of the month, increasing by 11 each day.

Notes:

October

Date	Equivalent Fractions		
	Money	**Fractions**	**Decimals**
1	1 dime, 10 cents (10¢). It's worth 10 pennies or 2 nickels.	$\frac{1}{10}$ of a dollar, $\frac{2}{20}$ of a dollar	0.10, $0.10
2	1 column on the mat is kind of like 1 dime. They're both $\frac{1}{10}$ of a unit.	$\frac{10}{100}$, $\frac{1}{10}$, $\frac{2}{20}$	0.10 (ten hundredths), 0.1 (one tenth)
3	Each square is like a dime because there are 10 of them in the whole rectangle.	$\frac{1}{10}$ of a rectangle	0.1 (1 tenth)
4	2 dimes, 20¢, 4 nickels	$\frac{2}{10}$, $\frac{20}{100}$, $\frac{1}{5}$ or $\frac{4}{20}$	0.20.20
5	If the square was a dollar, the 2 rows could be 2 dimes.	$\frac{2}{10}$, $\frac{20}{100}$, $\frac{1}{5}$ or $\frac{4}{20}$	0.2
6	$\frac{1}{5}$, and $\frac{1}{5}$ of a dollar is 20¢	$\frac{1}{5}$ or $\frac{2}{10}$ if you split each piece in half	0.2
7	It's like 2 dimes.	$\frac{2}{10}$, $\frac{1}{5}$	0.2
8	1 quarter, 25¢	$\frac{1}{4}$ or $\frac{25}{100}$ of a dollar	0.25, $0.25
9	The mat is divided into 100 small squares. This is 25 of them, so it's like 25 cents.	$\frac{25}{100}$, $\frac{1}{4}$	0.25
10	1 quarter, 1 nickel, and 1 dime. Together they are worth 40¢.	$\frac{40}{100}$, $\frac{4}{10}$	0.4, 0.40, $0.40
11	The mat is like a dollar and each strip is like a dime, so this is like 4 dimes or 40¢.	$\frac{40}{100}$, $\frac{4}{10}$	0.4, 0.40
12	The pentagon is divided into 5 parts, so each part is like 20 cents. This would be 40 cents.	$\frac{2}{5}$, $\frac{4}{10}$, $\frac{40}{100}$, $\frac{20}{50}$	0.4, 0.40
13	This is 4 out of 10 equal parts, so that's like 4 dimes or 40¢.	$\frac{4}{10}$, $\frac{40}{100}$, $\frac{8}{20}$	0.4, 0.40
14	It's a half-dollar. 50¢	$\frac{50}{100}$, $\frac{1}{2}$	0.50, 0.5, $0.50
15	Half a mat is like half a dollar.	$\frac{5}{10}$, $\frac{50}{100}$, $\frac{10}{20}$, $\frac{2}{4}$	0.50, 0.5
16	Half the rectangle is like half a dollar.	$\frac{5}{10}$, $\frac{1}{2}$	0.5
17	1 nickel, 1 quarter, and 3 dimes; 60¢	$\frac{60}{100}$, $\frac{6}{10}$	0.60, 0.6, $0.60
18	60 cents; each column of 10 is like a dime and 6 are filled in	$\frac{6}{10}$, $\frac{60}{100}$	0.60, 0.6
19	This shows 3 out of 5 parts filled. That's also like 6 out of 10 parts, so it's like 60¢.	$\frac{3}{5}$, $\frac{6}{10}$, $\frac{60}{100}$	0.6, 0.60
20	This is 6 out of 10 parts, so it's like 60¢.	$\frac{6}{10}$, $\frac{60}{100}$	0.6
21	Three quarters makes 75¢.	$\frac{3}{4}$, $\frac{75}{100}$	$0.75, 0.75
22	This is 75 out of 100 squares filled, so that's like 75¢.	$\frac{75}{100}$, $\frac{3}{4}$	0.75
23	2 quarters, 2 nickels, 2 dimes; The coins are worth 80¢.	$\frac{80}{100}$, $\frac{8}{10}$	$0.80, 0.80, 0.8
24	80 out of 100 squares is like 80¢.	$\frac{80}{100}$, $\frac{8}{10}$	0.80, 0.8
25	4 out of 5 parts is equal to 8 out of 10 parts, so this is sort of like 8 dimes or 80¢.	$\frac{4}{5}$, $\frac{8}{10}$, $\frac{80}{100}$, $\frac{20}{25}$	0.8
26	8 out of 10 parts is like 80¢.	$\frac{8}{10}$, $\frac{80}{100}$, $\frac{4}{5}$	0.8
27	a dollar bill	$\frac{1}{1}$, $\frac{100}{100}$, $\frac{10}{10}$	1.0, 1.00, $1.00
28	It's like a whole dollar.	$\frac{100}{100}$, $\frac{10}{10}$	1.0
29	It's like a whole dollar.	$\frac{5}{5}$	1.0
30	It's like a whole dollar.	$\frac{10}{10}$	1.0
31	A dollar bill and a dime.	$1\frac{1}{10}$	$1.10

About the Pattern

The October Calendar Grid pattern features fractions and decimals—tenths, fifths, fourths, and halves—shown as parts of a dollar, a 10-by-10 grid (also called a base ten mat), a 2-by-5 rectangle, and a pentagon divided into 5 parts. Throughout the month, students devise equivalent expressions for naming the fractional part shown on each marker and look for patterns.

Notes:

November

Date	Time	a.m. / p.m.	Elapsed Time	
			Between today and the day before	Total Time elapsed since the 1st
1	12:00	a.m.		
2	1:10	a.m.	1 hour 10 minutes	1 hour 10 minutes
3	2:20	a.m.	1 hour 10 minutes	2 hours 20 minutes
4	3:30	a.m.	1 hour 10 minutes	3 hours 30 minutes
5	4:40	a.m.	1 hour 10 minutes	4 hours 40 minutes
6	5:50	a.m.	1 hour 10 minutes	5 hours 50 minutes
7	7:00	a.m.	1 hour 10 minutes	7 hours
8	8:20	a.m.	1 hour 20 minutes	8 hours 20 minutes
9	9:40	a.m.	1 hour 20 minutes	9 hours 40 minutes
10	11:00	a.m.	1 hour 20 minutes	11 hours
11	12:20	p.m.	1 hour 20 minutes	12 hours 20 minutes
12	1:40	p.m.	1 hour 20 minutes	13 hours 40 minutes
13	3:00	p.m.	1 hour 20 minutes	15 hrs.
14	4:30	p.m.	1 hour 30 minutes	16 hours 30 minutes
15	6:00	p.m.	1 hour 30 minutes	18 hours
16	7:30	p.m.	1 hour 30 minutes	19 hours 30 minutes
17	9:00	p.m.	1 hour 30 minutes	21 hours
18	10:30	p.m.	1 hour 30 minutes	22 hours 30 minutes
19	12:00	a.m.	1 hour 30 minutes	24 hours
20	1:40	a.m.	1 hour 40 minutes	25 hours 40 minutes
21	3:20	a.m.	1 hour 40 minutes	27 hr . 20 minutes
22	5:00	a.m.	1 hour 40 minutes	29 hours
23	6:40	a.m.	1 hour 40 minutes	30 hours 40 minutes
24	8:20	a.m.	1 hour 40 minutes	32 hours 20 minutes
25	10:00	a.m.	1 hour 40 minutes	34 hours
26	11:50	a.m.	1 hour 50 minutes	35 hours 50 minutes
27	1:40	p.m.	1 hour 50 minutes	37 hours 40 minutes
28	3:30	p.m.	1 hour 50 minutes	39 hours 30 minutes
29	5:40	p.m.	1 hour 50 minutes	41 hours 20 minutes
30	7:10	p.m.	1 hour 50 minutes	43 hours 10 minutes
31	9:00	p.m.	1 hour 50 minutes	45 hours

About the Pattern

The markers this month feature analog clocks that show times that get later each day according to a predictable pattern. For the first six days, the time increases by 1 hour and 10 minutes each day. For the next 6 days, the time increases by 1 hour and 20 minutes each day. This pattern continues every 6 days throughout the month, so that by the end of the month, each new time is 1 hour and 50 minutes later than the last.

Notes:

December

Date	Number of sides	Perimeter	Area	Lines of Symmetry	Parallel Sides	Perpendicular Sides
1	8	12 units	5 sq. units	1	8	8
2	10	12 units	5 sq. units	0	10	10
3	12	12 units	5 sq. units	4	12	12
4	4	12 units	5 sq. units	2	4	4
5	8	12 units	5 sq. units	0	8	8
6	6	12 units	5 sq. units	0	6	6
7	6	12 units	5 sq. units	1	6	6
8	10	12 units	5 sq. units	1	10	10
9	8	12 units	5 sq. units	1	8	8
10	6	10 units	5 sq. units	0	6	6
11	8	12 units	5 sq. units	0	8	8
12	8	12 units	5 sq. units	0	8	8
13	8	12 units	5 sq. units	1	8	8
14	10	12 units	5 sq. units	0	10	10
15	12	12 units	5 sq. units	4	12	12
16	4	12 units	5 sq. units	2	4	4
17	8	12 units	5 sq. units	0	8	8
18	6	12 units	5 sq. units	0	6	6
19	6	12 units	5 sq. units	1	6	6
20	10	12 units	5 sq. units	1	10	10
21	8	12 units	5 sq. units	1	8	8
22	6	10 units	5 sq. units	0	6	6
23	8	12 units	5 sq. units	0	8	8
24	8	12 units	5 sq. units	0	8	8
25	8	12 units	5 sq. units	1	8	8
26	10	12 units	5 sq. units	0	10	10
27	12	12 units	5 sq. units	4	12	12
28	4	12 units	5 sq. units	2	4	4
29	8	12 units	5 sq. units	0	8	8
30	6	12 units	5 sq. units	0	6	6
31	6	12 units	5 sq. units	1	6	6

About the Pattern

A pentomino may be formally defined as “a two-dimensional shape made from five congruent squares such that each square has at least one of its sides in common with another square” (Cowan, 1977)[1]. As students will discover during the second and third workouts this month, there are only 12 unique pentominoes, although reflected or rotated versions of the pentominoes may at first appear to be different shapes. All pentominoes have an area of 5 square units, and all but one have a perimeter of 12 linear units, although the number and lengths of the sides vary from figure to figure. Six pentominoes have reflective symmetry.

This month’s calendar pattern involves many of these properties. There is a pattern in the reflective symmetry (AB, AABB, AAABBB, and so on, in which As have reflective symmetry and Bs do not). The sequence of 12 pentominoes is repeated in exactly the same order, although each figure has been flipped, and in some cases turned as well, with each repetition.

Notes:

1 Cowan, Richard A. “Pentominoes for Fun and Learning.” *Arithmetic Teacher* 24 (March 1977): 188–90.

January

Date	Shape Name	Area (in sq. units)	Other Observations
1	rectangle	½ sq. unit	
2	rectangle	2 sq. units	
3	right triangle	½ sq. unit	
4	right triangle	2 sq. units	
5	parallelogram	1 sq. unit	
6	parallelogram	4 sq. units	
7	right triangle	1 sq. unit	
8	right triangle	4 sq. units	
9	trapezoid	1 ½ sq. units	
10	trapezoid	6 sq. units	
11	pentagon	1 ½ sq. units	
12	pentagon	6 sq. units	
13	square	2 sq. units	
14	square	8 sq. units	
15	isosceles triangle	2 sq. units	
16	isosceles triangle	8 sq. units	
17	quadrilateral	2 ½ sq. units	
18	quadrilateral	10 sq. units	
19	pentagon	2 ½ sq. units	
20	pentagon	10 sq. units	
21	quadrilateral	3 sq. units	
22	quadrilateral	12 sq. units	
23	pentagon	3 sq. units	
24	pentagon	12 sq. units	
25	hexagon	3 ½ sq. units	
26	hexagon	14 sq. units	
27	pentagon	3 ½ sq. units	
28	pentagon	14 sq. units	
29	square	4 sq. units	
30	square	16 sq. units	
31	right triangle	4 sq. units	

About the Pattern

January's markers feature pairs of similar shapes. Each pair begins with a small version of the shape followed by a larger version in which the dimensions are doubled, resulting in a shape that has exactly 4 times the area of the first. The area of the shapes increases in a consistent predictable manner: the area of the first shape is ½ and the area of the second shape is 2. The area of the third shape is 1 and the area of the fourth shape is 4. If you look at every other shape, beginning with the first shape, the area increases by ½ with each new shape. If you look at every other shape, beginning with the second shape, the area increases by 2 with each new shape. There are other patterns for students to notice and explore. For example, the number of sides of the figures alternates from even to odd: one set of shapes has an even number of sides and the next has an odd number.

Notes:

February

Date	Angle Name	Angle Measure	Equations	Observations
1	zero angle	0°		
2	acute angle	45°		
3	right angle	90°		
4	obtuse angle	135°		
5	straight angle	180°		
6	reflex angle	225°		
7	reflex angle	270°		
8	reflex angle	315°		
9	full angle	360°		

Date	Number of Lines in Figure	Angles in Figure (Name & Number)	Figure Name (Prediction or Actual)	Observations
10	1	none	line segment	
11	2	1 acute angle	acute angle	
12	3	2 acute angles and 1 right angle	isosceles right triangle	
13	1	none	line segment	
14	2	1 obtuse angle	obtuse angle	
15	3	1 obtuse and 2 acute angles	obtuse scalene triangle	
16	1	none	line segment	
17	2	1 acute angle	acute angle	
18	3	3 acute angles	acute equilateral triangle	
19	1	none	line segment	
20	2	1 right angle	right angle	
21	3	1 right angle, 1 obtuse angle	a right and an obtuse angle	
22	4	2 right angles, 1 acute angle, 1 obtuse angle	trapezoid	
23	1	none	line segment	
24	2	1 acute angle	acute angle	
25	3	1 acute angle, 1 obtuse angle	an acute and an obtuse angle	
26	4	2 acute angles, 2 obtuse angles	rhombus	
27	1	none	line segment	
28	2	1 right angle	right angle	
29	3	2 right angles	2 right angles	
30	4	4 right angles	square	
31	1	none	line segment	

About the Pattern

There are several patterns in this month's series of calendar markers. The first nine markers focus on angles. Marker 1 features a zero angle, and then one ray rotates 45 degrees on each following day. By the ninth day, students have seen examples of zero, acute, right, obtuse, straight, reflex, and full angles. After the ninth day, the focus of the pattern changes from angles to polygons. Each day, the calendar marker accumulates a new line segment until a polygon has been constructed. By the end of the month, students will have seen a right isosceles triangle, an obtuse scalene triangle, an acute equilateral triangle, a trapezoid, a rhombus, and a square. All angles and polygons are placed on grid lines that help students determine lengths and angle measures.

Besides the growing angles and polygons, there are other patterns and features for students to notice. For example, several angle measures are repeated. Students see a 45-degree angle on marker 2 and then they see a 45-degree angle in the triangle on marker 12. They can use their knowledge of previous measures to help them with subsequent ones. For the polygons, students can make many different types of predictions that lead to deeper understanding. For example, they can predict how many sides and angles the polygon will have, or whether the polygon is regular or irregular. Students may be interested to note that when a new line is added, a new angle is also added, and when a new line closes off or completes the polygon, *two* angles are added.

Notes:

March

Date	Input Number	Output Number	Observations
1	1	4	
2	2	7	
3	3	10	
4	4	13	
5	5	16	
6	6	19	
7	7	22	
8	8	25	
9	9	28	
10	10	31	
11	11	34	
12	12	37	
13	13	40	
14	14	43	
15	15	46	
16	16	37	
17	17	39	
18	18	41	
19	19	43	
20	20	45	
21	21	47	
22	22	49	
23	23	51	
24	24	53	
25	25	55	
26	26	57	
27	27	59	
28	28	61	
29	29	63	
30	30	65	
31	31	67	

About the Pattern

Each calendar marker features two numbers: the input number, which is the date, and the output number. Students will examine the markers, T-charts of the values on the markers, and arrangements of tiles that represent each output number to determine the relationship between each input number and its corresponding output number. This month offers two different functions. From the 1st to the 15th, the output number is produced by multiplying the input number by 3 and adding 1. From the 16th to the 31st, the output number is produced by multiplying the input number by 2 and adding 5.

Notes:

April

Date	Shape Name	Perimeter	
		Calculations	Total
1	Equilateral Triangle	1 + 1 + 1 = 3 or 3 × 1	3 cm
2	Rectangle	(2 × 1) + (2 × 2)	6 cm
3	Regular Pentagon	1 + 1 + 1 + 1 + 1	5 cm
4	Isosceles Triangle	2 ½ + 2 ½ + 3	8 cm
5	Trapezoid	3 + 1 + 1 + 2	7 cm
6	Regular Pentagon	2 + 2 + 2 + 2 + 2 or 5 × 2	10 cm
7	Equilateral Triangle	3 + 3 + 3 or 3 × 3	9 cm
8	Square	3 + 3 + 3 + 3 or 4 × 3	12 cm
9	Pentagon	1 + 2 + 2 + 3 + 3	11 cm
10	Isosceles Triangle	5 + 5 + 4 or (2 × 5) + 4	14 cm
11	Rectangle	1 ½ + 1 ½ + 5 + 5	13 cm
12	Pentagon	2 + (2 × 3) + (2 × 4)	16 cm
13	Triangle	4 + 5 + 6	15 cm
14	Rectangle	2 + 2 + 7 + 7 or (2 × 2) + (2 × 7)	18 cm
15	Pentagon	6 + 2 + 3 + 2 + 4	17 cm
16	Scalene Triangle	4 + 7 + 9	20 cm
17	Trapezoid	8 + 3 + 5 + 3	19 cm
18	Pentagon	6 + 3 + 4 + 3 + 6	22 cm
19	Equilateral Triangle	7 × 3 or 7 + 7 + 7	21 cm
20	Rhombus	6 × 4 or 6 + 6 + 6 + 6	24 cm
21	Pentagon	3 + 3 + 4 + 8 + 5	23 cm
22	Isosceles Triangle	6 + 10 + 10 or 6 + (2 × 10)	26 cm
23	Rectangle	4.5 + 8 + 4.5 + 8	25 cm
24	Pentagon	5 + 6 + 5 + 6 + 6	28 cm
25	Equilateral Triangle	9 + 9 + 9 or 9 × 3	27 cm
26	Rectangle	10 + 5 + 10 + 5	30 cm
27	Pentagon	5 + 3 + 7 + 6 + 8	29 cm
28	Scalene Triangle	11 + 12 + 9	32 cm
29	Quadrilateral	5 + 5 + 12 + 9	31 cm
30	Pentagon	8 + 5 + 5 + 8 + 8	34 cm
31	Isosceles Triangle	10 + 13 + 10	33 cm

About the Pattern

The shapes follow a repeating pattern of triangle, rectangle, pentagon, which is complemented by a color pattern of blue, yellow, orange. The perimeters of these shapes increase in a predictable manner. On even days, the perimeter increases by 3 cm from the previous day and on odd days, the perimeter decreases by 1 cm. The result is a pattern that looks like this: 3, 6, 5, 8, 7, 10, 9, 12 and so on. Students can use these clues not only to make predictions but also to verify their thinking as they determine the perimeter of each polygon.

Notes:

May

Date	Number of Sides	Polygon Name	Symmetries
1	3	right triangle	reflective
2	3	right triangle	reflective
3	3	right triangle	reflective
4	3	right triangle	reflective
5	4	square	reflective and rotational
6	4	trapezoid	no symmetry
7	4	trapezoid	no symmetry
8	4	trapezoid	no symmetry
9	4	trapezoid	no symmetry
10	12	n/a	rotational
11	5	pentagon	reflective
12	5	pentagon	reflective
13	5	pentagon	reflective
14	5	pentagon	reflective
15	20	n/a	reflective and rotational
16	6	hexagon	no symmetry
17	6	hexagon	no symmetry
18	6	hexagon	no symmetry
19	6	hexagon	no symmetry
20	24	n/a	rotational
21	7	heptagon	reflective
22	7	heptagon	reflective
23	7	heptagon	reflective
24	7	heptagon	reflective
25	12	n/a	reflective and rotational
26	8	octagon	no symmetry
27	8	octagon	no symmetry
28	8	octagon	no symmetry
29	8	octagon	no symmetry
30	32	n/a	rotational
31	9	nonagon	reflective

About the Pattern

In this set of markers, a single shape is rotated 90° each day to land in a different quadrant of a coordinate grid for four consecutive days. On the fifth day, four copies of the shape are combined to form a quilt block. This cycle begins anew every six days, each time featuring a polygon with one more side than the previous one. A few weeks into the month, students will begin making observations and generalizations about the symmetries of the figures (the polygons and the quilt blocks), in addition to observations about the properties (number of sides and angles) of each polygon.

The chart below shows the name of each polygon featured this month, as well as information about the line and rotational symmetry of each polygon and its associated quilt block. It's interesting to note that the polygons with reflective symmetry, such as the right triangles on markers 1–4, and the pentagons on markers 11–14, produce quilt blocks that have both reflective and rotational symmetry, whereas the polygons without reflective symmetry, such as the trapezoids on markers 6–9, produce quilt blocks that only have rotational symmetry.

Calendar Markers Polygon Pattern

Markers	Number of Sides	Polygon Name	Symmetries
1–4	3	right triangle	reflective
5	4*	square	reflective and rotational
6–9	4	trapezoid	no symmetry
10	12*	n/a	rotational
11–14	5	pentagon	reflective
15	4 × 5 = 20*	n/a	reflective and rotational
16–19	6	hexagon	no symmetry
20	4 × 6 = 24*	n/a	rotational
21–24	7	heptagon	reflective
25	8 + 4 = 12*	n/a	reflective and rotational
26–29	8	octagon	no symmetry
30	4 × 8 = 32*	n/a	rotational
31	9	nonagon	reflective

* Students may count and record the number of sides for markers 5 and 10 without questioning them. Markers 5, 10, 15, 20, 25, and 30 show an arrangement of the previous four figures. Marker 25's figure could additionally be described as a regular octagon with a square cut out of it; in that case, the two polygons have 12 sides in all. It is not necessary for this month's activities that students consider these markers in this way; in that case, you can leave the "Number of Sides" column blank.

Notes: