

Name That **POLYGON**

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What is a *hexaheptacontakai-octagon*? This sounds unfamiliar, right? But it is actually a polygon. Yes, it is! Let's find out how many sides it has.

What's in a Name

When someone asks your name, you definitely answer the word or combination of words by which you are called and by means of which you can be distinguished or identified. Same goes with everything in the universe. We call them names to identify or distinguish them from each other.

In math, we always deal with polygons and more often than not, we encounter problems in naming, especially those with more than 10 sides.

WORD BOOSTER

The word *polygon* comes from the late Latin word *polygōnum* and from the Greek word *polygōnon*, which means many-angled.

Naming Polygons

Individual polygons are named according to the number of sides. Their names are formed by combining a Greek-derived numerical prefix (which tells its number of sides) with the suffix *-gon* from the word polygon. This "gon" in polygon is said to have been derived from the Greek word *gonu* which means "knee," the joint in the middle part of a human's leg that resembles an angle when bent.

Now, to find out how many sides a *hexaheptacontakai-octagon* has, we need to know the appropriate Greek prefixes together with some rules for their use.

Greek Prefixes

PREFIX	MEANING
Units Digit	
hena (or mono)	1
di	2
tri	3
tetra	4
penta	5
hexa	6
hepta	7
octa	8
ennea	9
11 – 19	
hendeca	11
dodeca	12
trideca	13
tetradeca	14
pentadeca	15
hexadeca	16
heptadeca	17
octadeca	18
enneadeca	19
Multiples of 10	
deca	10
icosa/icosi*	20
triaconta	30
tetraconta	40
pentaconta	50
hexaconta	60
heptaconta	70
octaconta	80
enneaconta	90
hecta/hecto	100
chilia	1000
myria	10,000
googol	10 ¹⁰⁰

*when used to form 21 – 29.

RULES IN FORMING NUMERICAL PREFIXES

For polygons with:	Form numerical prefix by:			
10 sides or less and multiples of 10	simply copy the prefixes for the units digit			
11 – 19 sides*	combine: units digit + <i>kai</i> ** + deca			
21 – 99	combining:			
	tens digit	and	units digit	
	multiples of 10 from the table	<i>kai</i>	units digit from the table	
101 – 999	combining:			
	hundreds digit	tens digit	and	units digit
	units digit from the table + “hecta”	multiples of 10 from the table	<i>kai</i>	units digit from the table

* the word “kai” is often omitted for these numbers (see table for 11 – 19 at the right)

** the word *kai* is a Greek word that stands for “and” and is used before the prefix for the units digit

In Euclidean Geometry, the least number of sides for polygons is three. Thus, from the rules and prefixes above, we form the polygon with the least number of sides by combining tri and gon to have trigon. This polygon is what we commonly know as the *triangle*. The tetragon or the four-sided polygon is what we familiarly call *quadrilateral*.

To construct the names of the polygons in the exercises, it would be helpful to write the number of sides in expanded form and then find the equivalent prefixes for each number.

Challenge!

Name the following polygons:

- 26-sided polygon
- 45-sided polygon
- 102-sided polygon
- 400-sided polygon
- 678-sided polygon

a. 26-sided	=	20	and (+)	6	
		icosi	kai	hexa	gon

= icosikaihexagon (sometimes named icosihexagon)

b. 45-sided	=	40	+	5	
		tetraconta	kai	penta	gon

= tetracontakaipentagon (sometimes tetracontapentagon)

c. 102-sided	=	100	+	0	+	2	
		hecta		kai	di	gon	

= hectakaidigon

d. 400-sided	=	400	+	0	+	0	
		tetrahecta				gon	

= tetrahectagon

e. 678-sided	=	600	+	70	+	8	
		hexahecta		heptaconta	kai	octa	gon

= hexahectaheptacontakaioctagon

So how many sides does a *hexaheptaheptacontakaioctagon* have? Doing the same procedure, we see that it has 678 sides.

Take note that when you see the word *hecta* in a name, that means you are in the hundreds place, *conta* in the tens (30 - 90) place, and the *kai* in the ones place. However, sometimes the word *kai* is already omitted, just like in the names of polygons with 11 to 19 sides. For instance, to tell how many sides a *heptaheptaheptacontaheptagon* has, we need to work backward—*hepta* before gon means 7, heptaconta means 70, and heptahecta means 700. Thus, the polygon has 777 sides.

Wow! What a name! Did the process confuse you? You probably just need practice in applying the rules. But don't worry, because as long as you understand what you are referring to when you say the name, that is all that matters. These days, professional mathematicians consider even prefixing the word "gon" with the number of sides (*n*-gons) for polygons beyond enneagons and decagons.





MORE OR LESS?

Matt and Geo is playing the more or less game but this time with the number of sides of polygons. Each of them writes five polygons on a piece of paper. Your task now is to decide who wins between the two Matt and Geo.

Matt's List

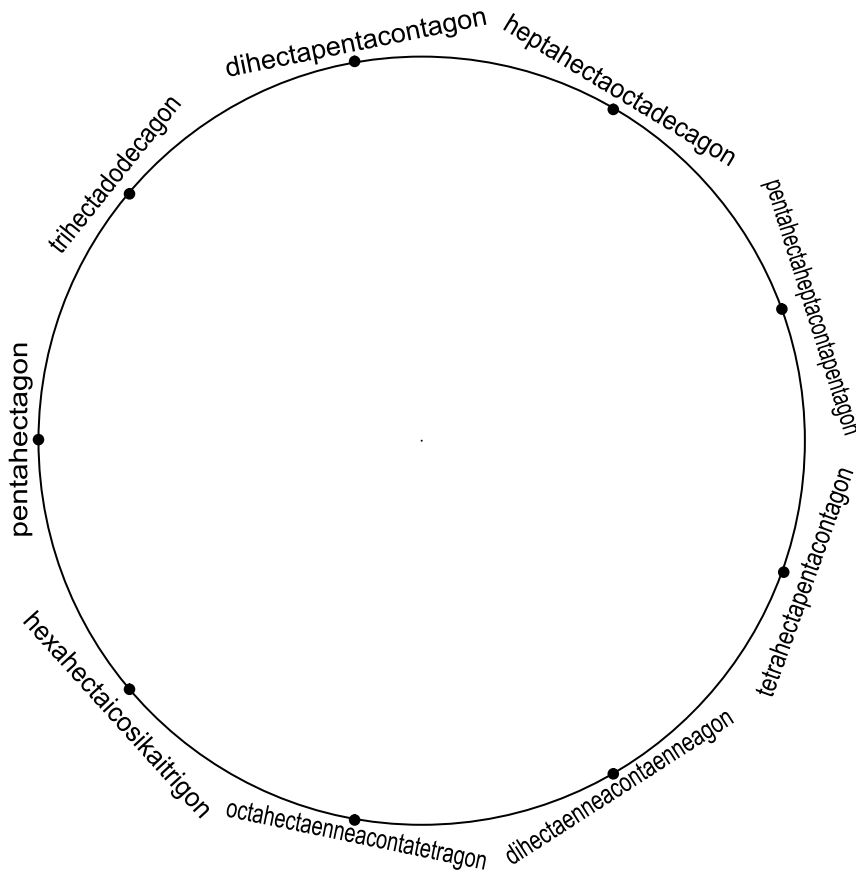
1. icosikaienneagon
2. pentakaidecagon
3. hectaenneacontakaitrigon
4. octahectapentacontahenagon
5. tetrahectohexagon

Geo's List

1. tetracontakaidigon
2. pentadecagon
3. dihectagon
4. heptahectahexacontakaidigon
5. pentahectopentacontagon

WORKSHEET

A. Connect the polygons from the least to the greatest number of sides then back to the least. What kind of polygon is inscribed?



B. Name the following polygons.

1. 111-sided
2. 222-sided
3. 333-sided
4. 444-sided
5. 555-sided
6. 666-sided
7. 777-sided
8. 888-sided
9. 999-sided
10. 10 100-sided

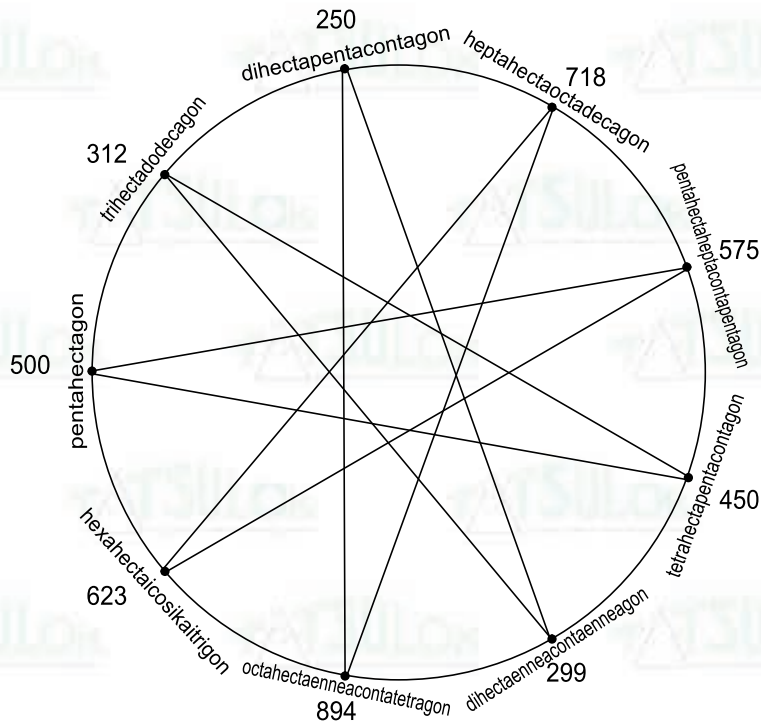
Answer to Activity

Matt's list		Geo's list
icosikaienneagon (29)	<	tetracontakaidigon (42)
pentakaidecagon (15)	=	pentadecagon (15)
hectannencontakaitrion (193)	<	dihectagon (200)
octahectapentacontahenagon (851)	>	heptahectahexacontakaidigon (762)
tetrahectohexagon (406)	<	pentahectopentacontagon (550)

Geo wins!

Answer to Worksheet

A. The inscribed polygon is 18-sided or octadecagon.



B.

1. hectahendecagon
2. dihectacosikaidigon
3. trihectatrickontakaitrion
4. tetrahectatetracontakaitrion
5. pentahectapentacontakaipentagon or pentahectapentacontapentagon
6. hexahectahexacontakaihexasagon or hexahectahexacontahexasagon
7. heptahectaheptacontakaiheptagon or heptahectaheptacontaheptagon
8. octahectaoctacontakaiocagon or octahectaoctacontaocagon
9. enneahectannencontakaienenneagon or enneahectannencontannenenneagon
10. googolon