# Polygon Problems

**1. A polygon has 35 diagonals. How many sides does it have?**

**Solution:**

Number of sides = n

D is the number of diagonals

D=n(n-3)/2

$$35=n^2-\frac{3n}{2}$$

:

$$n^2-3n-70=0$$

solving you will get n = 10 and n = -7. Neglect the negative value.
:
n = 10 sides so a decagon

**2. If the sum of the interior angles of a polygon is 1800° where one of the interior angles measures 172° and all others are congruent, how many sides does the polygon have? Draw the polygon.**

**Solution:**

The formula for the sum of the interior angles
of a polygon with n sides is

(n - 2)180°

We set that equal to 1800°

(n - 2)180° = 1800°

Divide both sides by 180°

n - 2 = 10
n = 12

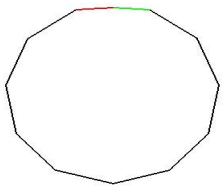
So the polygon has 12 sides, and therefore
12 interior angles.

Since one of the angles is 172°,

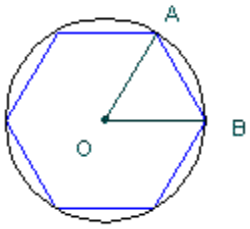
the other 11 interior angles must have sum
1800°-172°=1628°

Since they are all congruent, we divide 1628°/11 = 148°.
So each of the other 11 interior angles measures 148°.

So it's a 12-sided polygon. I'll draw it with the 172° angle at the top. 172° is close to 180°, so it looks almost like the the two sides at the top form a straight line, but they don't. I'll color the sides of the 172° angle red and green, so it will look like a 12-sided polygon, not a 11-sided one. Here's what it looks like:



**3. A 6 sided regular polygon (hexagon) is inscribed in a circle of radius 10 cm, find the length of one side of the hexagon.**




**Solution:**

Angle AOB is given by

angle (AOB) = 360o / 6 = 60o
Since OA = OB = 10 cm, triangle OAB is isosceles which gives

angle (OAB) = angle (OBA)
So all three angles of the triangle are equal and therefore it is an equilateral triangle. Hence

AB = OA = OB = 10 cm.

**4. Find the area of the square , whose one of the side measures 4cm in length**

**Solution:**

Square is a regular polygon whose all the sides are equal . Thus we can find the area of the square using the formula given below
Area = S2 N / 4 tan (π/N)
= 42 * 4 / 4 tan (π/4)
= 16*4 / 4*1 because tan (π/4) = 1
= 64/4
= 16cm2

**5. Find the area of the regular hexagon whose radius is is 6cm.**

**Solution:**

Hexagon is a regular polygon and the radius is given. So, we can find the Area of the hexagon usind the formula mentioned below,
Area = [R2 N sin (2π / N ) ] / 2
= [62 * 6 sin (2π / 6 )]/2
= [ 36 * sin(π/3) ]/2
= [36 * √3/2 ] / 2 because sin(π/3) = √3/2
= [36 * 0.866] / 2
= [ 31.176] / 2
= 15.588 sqcm

**6. Wayne found a stone triangle-shaped arrowhead that is 6 centimeters long and 4 centimeters wide at the base. How many square centimeters is each flat side of the arrowhead?**

**Solution:**

Here the given polygon is a triangle and we need to find the area of the triangle-shaped arrowhead.
The area of a triangle = `1/2 bh` square units
Here, b = 4 centimeters and h = 6 centimeters
So, the area of the triangle-shaped arrowhead = `1/2` * 4 * 6
= 12
So, the area of the triangle-shaped arrowhead is 12 square centimeter on each flat sides.

**7. Naomi used a stick to draw a circle in the sand. The circle was 5 meters in radius. How many square meters were inside the circle?**

**Solution:**

Here the given polygon is a circle, and we need to find the area of the circle.
The area of circle = `pi r^2` square units
Here, the radius, r = 5 meters.
So, the area of the circle =3.14 * 5 * 5
= 78.5
So, the area of the circle is 78.5 square meters.
My previous blog post was on Probability Ratio Formula please express your views on the post by commenting.

**8. Olivia spends the morning in a play room that is 2 meters long and 2 meters wide. What is the area of the floor in the room?**

**Solution:**

Here the given polygon is a square, and we need to find the area of the square shaped floor.
The area of square = a^2 square units
Here, a = 2 meter
So, the area of the floor = 52
= 5 * 5
= 25
So, the area of the floor is 25 square meters.

**9. The length of a side of a hexagon is 2 inches. What is the perimeter?**

**Solution:**

Hexagon. It means 6 equal sides.

p = 2 + 2 + 2 + 2 + 2 + 2 = 4 + 4 + 4 = 8 + 4 = 12 inches

**10. The perimeter of an equilateral triangle is 6 inches. What is the length of a side?**

**Solution:**

Equilateral. It means 3 equal sides.

**11. Since the triangle has 3 equal sides, you can just say to yourself, " What same number do I add three times to get 6?"**

**Solution:**

Since 2 + 2 + 2 = 6, then the length of one side is 2

Let x be the side you are looking for

$x + x + x = 6$

$3x = 6$

$3x/3 = 6/3$ ( Divide both sides by 3)

$x = 2$

**12. The perimeter of a rectangle is 42 inches. If the width is 8, what is the length?**

**Solution:**

A rectangle has four sides. Parallel and opposites sides are equal.

Since opposite sides are equal, there are two sides (widths) measuring 8 and 8

Therefore, adding two sides give 8 + 8 = 16

The length of the two remaining sides totals to 42 - 16= 26

Since these two sides are equal, just divide by 2 to get the measure of the length of the rectangle

26/2 = 13, so the length is 13

$P = 2 \times L + 2 \times W$

Replace all known values into the formula.

$42 = 2 \times L + 2 \times 8$

$42 = 2 \times L + 16$

Solve the resulting equation:

$42 - 16 = 2 \times L + 16 - 16$

$26 = 2 \times L$

$26/2 = (2 \times L)/2$

$13 = L$

**13. When the perimeter of a regular polygon is divided by 5, the length of a side is 25. What is the name of the polygon? What is the perimeter?**

**Solution:**

Regular polygon. A polygon with equal sides and equal sides.

Divided by 5 to get the length of a side. It is the pentagon since it has 5 sides.

So $p = 5 \times s$

To get the perimeter, just multiply a side by 5.

Since $25 \times 5 = 125$, the perimeter is 125.

**14. The length of a rectangle is 5 more than the width. What are the dimensions of the rectangle if the perimeter is 34?**

**Solution:**

Trial and error can help you solve perimeter word problems sometimes.

Pretend width = 1, then length = 6 ( 1 + 5)

$2 \times 1 + 2 \times 7 = 2 + 14 = 16$. Notice that 16 is far from a perimeter of 34

Try much bigger number.

How about  if we...

Pretend width = 4, then length = 9 ( 4 + 5)

$2 \times 4 + 2 \times 9 = 6 + 18 = 24$. We are getting closer to a perimeter of 34

Pretend width = 5, then length = 10 ( 5 + 5)

$2 \times 5 + 2 \times 10 = 10 + 30 = 30$.

Pretend width = 7, then length = 12 ( 7 + 5)

$2 \times 7 + 2 \times 12 = 14 + 24 = 38$. This is higher than a perimeter of 34. So width should be higher than 5 and smaller than 7. May be  a width of 6 will work.

Pretend width = 6, then length = 11 ( 6 + 5)

$2 \times 6 + 2 \times 11 = 12 + 22 = 34$.

Let  width = x

Let length = x + 5

$P = 2 \times L + 2 \times W$

$34 = 2 \times ( x + 5) + 2 \times x$

$34 = 2x + 10 + 2x$

$34 = 4x + 10$

$34 - 10 = 4x + 10 - 10$

$24 = 4x$

$24/4 = 4x/4$

$6 = x$

Therefore, width = 6 and length = x + 5 = 6 + 5 = 11