Nugent, Bennet Langton, Beauclerc, Chamier, Hawkins and Goldsmith. David Garrick, Sir Wm. Jones and Boswell were afterward elected, the last narrowly escaping a black-balling. For Goldsmith's opinion of the members see his poem, *Retaliation.*

Mathematical Department.

Communications intended for this part of the JOURNAL should be on separate sheets, written on only one side, and properly paged to prevent mistakes.
ALFRED BAKER, B.A., EDITOR.

ON THE RATIO OF THE CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER.

The following elementary method of finding the ratio of the circumference of a circle to its diameter (usually indicated by π) will be of interest to those not already acquainted with it, and especially to those who are unable to follow the ordinary trigonometrical method by which it is obtained.

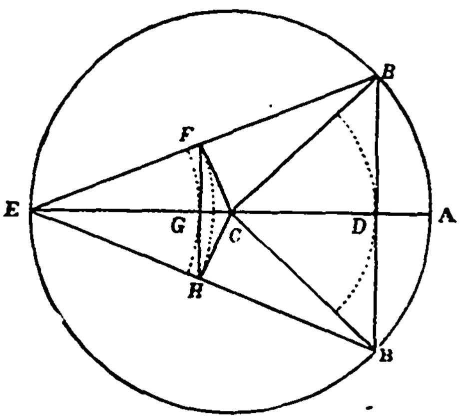
Since circumference $\div$ diamater $= \pi$, circumference $= 2\ \pi$R. We shall assume that the perimeter of a polygon is less than the circumference of a circle described about it, and greater than the circumference of a circle described in it. It will also be necessary to prove the following proposition:

If there be two regular polygons of the same perimeter, the second of which has twice as many sides as the first, and if R R' be the radii of the circles described about, and r r' of those inscribed in the first and second polygon respectively, then $r' = \dfrac{R+r}{2}$, $R' = \sqrt{r'.R}$.

Let BB' be a side of the first polygon, C the centre of the circle described about it. From C as centre with CB as radius describe the circle $BB'E$. Draw $ECDA$ perpendicular to BB'.

Then CB, CD are the radii of the circles described about and inscribed in the first polygon, *i. e.* are R, r respectively.

Join EB, EB'. Draw CF perpendicular to EB, and FGH perpendicular to EA.



Now CF bisects EB. Hence FH is half BB', and the angle FEH is half the angle BCB'. Therefore FH is the side of a regular polygon having the same perimeter, but twice as many sides as that to which BB' belongs.

Then EF, EG are the radii of the circles described about and inscribed in the second polygon, *i. e.* are R', r' respectively.

Now $r' = EG = \frac{1}{2}ED = \frac{1}{2}(EC + CD) = \frac{1}{2}(R + r)$.

Also by similar triangles CEF, FEG,

$CE : EF :: EF : EG$; $\therefore EF^2 = CE.EG$, or $R' = \sqrt{R.r'}$.

If the first polygon be a square, whose side is 1, and for which therefore $r_1 = \cdot 5$, $R_1 = \sqrt{\cdot 5} = \cdot 7071067812$, these formulas $\left(r' = \frac{1}{2}(R+r),\ R' = \sqrt{r'.R}\right)$ will enable us to find the radii of the inscribed and circumscribed circles of a regular octagon *of the same perimeter*, *i.e.*, 4; and hence of a figure of sixteen equal sides whose perimeter is still 4, &c. Thus

$$r_1 = \cdot 5,\ R_1 = \sqrt{\cdot 5} = \cdot 7071067812.$$

$$\therefore r_2 = \frac{\cdot 5 + \cdot 7071067812}{2} = \cdot 6035533906,$$

$$\text{and } R_2 = \sqrt{\cdot 7071067812 \times \cdot 6035533906} = \cdot 6532814824.$$

Proceeding in this way we shall obtain the results in the following table:

No. of sides of the Polygon.	Radius of Inscribed Circle.	Radius o. [illegible] cumscribing Circle.
4	·5000000000	·7071067812
8	·6035533906	·6532814824
16	·6284174365	·6407288619
32	·6345731492	·6376435773
64	·6361083633	·6368755077
128	·6364919355	·6366836927
256	·6365878141	·6366357516
512	·6366117828	·6366237671
1024	·6366177750	·6366207710
&c.	&c.	&c.

Stopping at the polygon of 1024 sides, the circumference of its inscribed circle is $2\pi \times \cdot 636617$, and the circumference of its circumscribing circle is $2\pi \times \cdot 636621$, and the perimeter of the polygon (*i. e.* 4) must be intermediate in length between these circumferences. Hence

$$2\pi \times \cdot 636617 < 4,\ 2\pi \times \cdot 636621 > 4$$

$$\text{or} \quad \pi < \frac{2}{\cdot 636617},\ > \frac{2}{\cdot 636621}$$

$$< 3\cdot 14160 > 3\cdot 14158$$

or approximately $\pi = 3\cdot 14159$.

COMMUNICATED.

1. At what distance above the earth's surface must a person be to see one-fourth of its surface?

2. A lets B have 30 lbs. of wool to spin on the following condition: B is to spin A's portion at $12\frac{1}{2}$ cents per lb. of yarn, and take his pay in wool from the 30 lbs. at 30 cents per lb. How many lbs of yarn should A receive, and how many lbs. of wool should B keep in payment, there being a waste of $1\frac{1}{4}$ lbs. of wool on every 10 manufactured? SUBSCRIBER.

St. John, N. B.

Practical Education.

Queries in relation to methods of teaching, discipline, school management, &c., will be answered in this department. J. HUGHES, EDITOR.

PRACTICAL CONVERSATIONS.

W. R. S., Halifax. 1. Should the teacher talk loud?

Not if he desires good order, and attention on the part of his pupils. The voice should be pitched below rather than above the natural key, and uttered with moderate *force* in the school-room. A loud voice soon becomes monotonous, and loses its influence in securing attention or order. Loud talking by the teacher makes loud-talking pupils. Never try to drown the noise in your class by a great volume of noise made by yourself. It is a great pity that so many teachers acquire a strained unnatural tone in "preaching" to their pupils. This fosters the natural tendency of children to read in a forced, chanting manner.

2. Should we keep pupils after school to learn lessons?

Pupils should *very rarely* be kept after school as a punishment. It is right to make a pupil make up time after school which he has