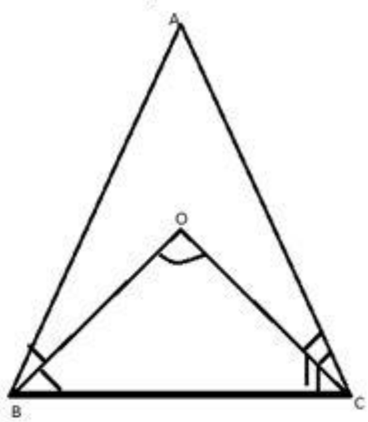
Geometry

<u>Geometry</u>

Some Useful Shortcut Formulas in Geometry

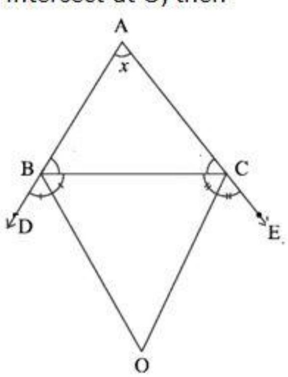
Geometry topic plays an important role in SSC EXAMS examination and questions are frequently asked in SSC exam which generally range from being moderate to difficult. To help in your preparation we are providing you some useful shortcuts so that you can quickly solve the questions in minimum amount of time. In future we will provide you more important tricks and shortcuts.

1. In a ΔABC, if the bisectors of $\angle B$ and $\angle C$ meet at O then



$$\angle BOC = 90^0 + \frac{1}{2}\angle A$$

2. In a ΔABC, if sides AB and AC are produced to D and E respectively and the bisectors of $\angle DBC$ and $\angle ECB$ Intersect at O, then



$\angle BOC = 90^0 - ½ \angle A$

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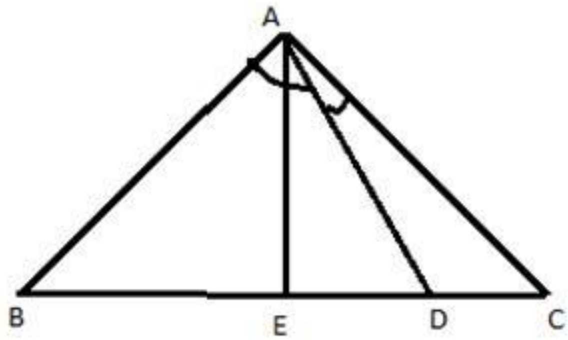
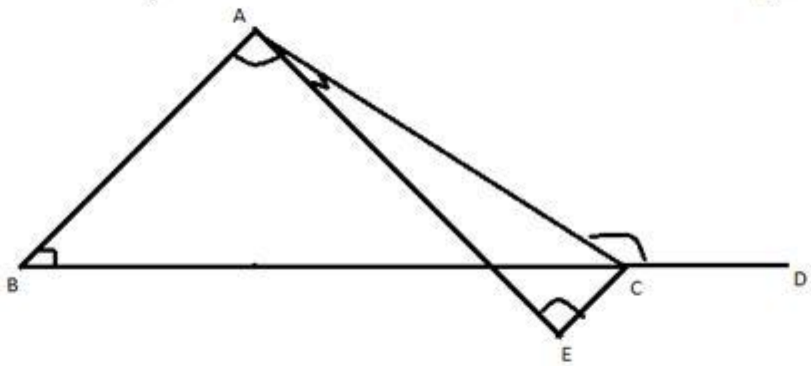
3. In a ΔABC, If AD is the angle bisector of $\angle BAC$ and AE $\perp$ BC, then



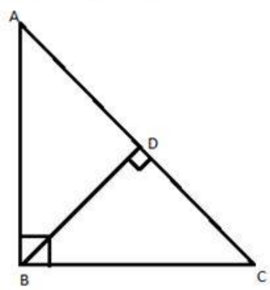
$\angle BAE = 1/2\ (\angle ABC - \angle ACB)$

4. In a ΔABC, If BC is Produced to D and AE is the Angle bisector of $\angle A$, then



$\angle ABC$ and $\angle ACD = 2\ \angle AEC$.

5. In a right angle ΔABC, $\angle B = 90^0$ and AC is hypotenuse. The perpendicular BD is dropped on hypotenuse AC from right angle vertex B, then



(I) BD = (AB x BC)/ (AC)
(ii) $AD = AB^2 /AC$
(iii) $CD = BC^2/AC$
(iv) $1/BD^2 = (1/AB^2) + (1/BC^2)$

Geometrical Concept : Part 1

Geometry

Dear Readers,

Today in this post, we are providing you all the necessary formula and concepts related to Geometry from the Quant section.Keeping in view the recent papers of SSC CGL, we can say that It is an important topic as per SSC CGL, SSC CPO and other Govt. Exam.

Fundamental concepts of Geometry:

Point: It is an exact location. It is a fine dot which has neither length nor breadth nor thickness but has position i.e., it has no magnitude.

Line segment: The straight path joining two points A and B is called a line segment AB . It has and points and a definite length.

Ray: A line segment which can be extended in only one direction is called a ray.

Intersecting lines: Two lines having a common point are called intersecting lines. The common point is known as the point of intersection.

Concurrent lines: If two or more lines intersect at the same point, then they are known as concurrent lines.

Angles: When two straight lines meet at a point they form an angle.

Right angle: An angle whose measure is 90° is called a right angle.

Acute angle: An angle whose measure is less then one right angle (i.e., less than 90°), is called an acute angle.

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Obtuse angle: An angle whose measure is more than one right angle and less than two right angles (i.e., less than 180° and more than 90°) is called an obtuse angle.

Reflex angle: An angle whose measure is more than 180° and less than 360° is called a reflex angle.

Complementary angles: If the sum of the two angles is one right angle (i.e.,90°), they are called complementary angles. Therefore, the complement of an angle θ is equal to 90° - θ.

Supplementary angles: Two angles are said to be supplementary, if the sum of their measures is 180°. Example: Angles measuring 130° and 50° are supplementary angles. Two supplementary angles are the supplement of each other. Therefore, the supplement of an angle θ. is equal to 180° - θ..

Vertically opposite angles: When two straight lines intersect each other at a point, the pairs of opposite angles so formed are called vertically opposite angles.

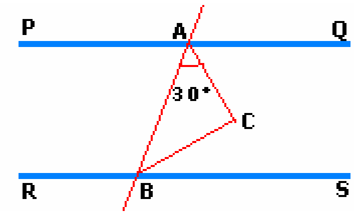
Bisector of an angle: If a ray or a straight line passing through the vertex of that angle, divides the angle into two angles of equal measurement, then that line is known as the Bisector of that angle.

Parallel lines: Two lines are parallel if they are coplanar and they do not intersect each other even if they are extended on either side.

Transversal: A transversal is a line that intersects (or cuts) two or more coplanar lines at distinct points.

1.In the figure given below, PQ and RS are two parallel lines and AB is a transversal.

Geometry



AC and BC are angle bisectors of ∠BAQ and ∠ABS, respectively. If ∠BAC = 30°, find ∠ABC and ∠ACB.

A. 60° and 90°

B. 30° and 120°

C. 60° and 30°D. 30° and 90°

2.1. If 45° arc of circle A has the same length as 60° arc of circle B, find the ratio of the areas of circle A and circle B.

A. 16/8

B. 16/9

C. 8/16

D. 9/16

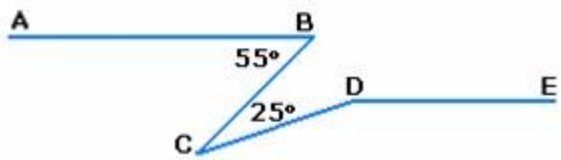
3.In the figure given below, lines AB and DE are parallel. What is the value of ∠CDE?

A. 60°

B. 120°

C. 30°D. 150°

Geometry

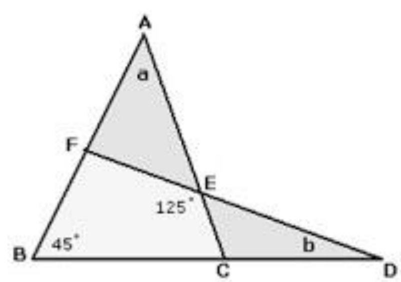


4.Find the value of a + b in the figure given below:

A. 60°

B. 120°

C. 80°D. 150°



5.Points D, E and F divide the sides of triangle ABC in the ratio 1: 3, 1: 4, and 1: 1, as shown in the figure. What fraction of the area of triangle ABC is the area of triangle DEF?

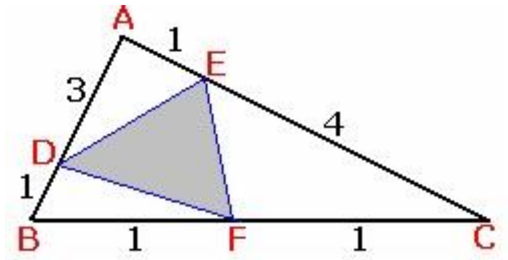
A. 16/40

B. 13/40

C. 14/16

D. 12/16

Geometry



ANSWERS AND SOLUTION:

1**(A):** ∠BAQ + ∠ABS = 180° [Supplementary angles]

⇒∠BAQ/2 + ∠ABS/2 = 180°/2=90°⇒∠BAC+ ∠ABC= 90°

Therefore, ∠ABC = 60° and ∠ACB = 90°.

2.**(B):** Let the radius of circle A be r1 and that of circle B be r2.

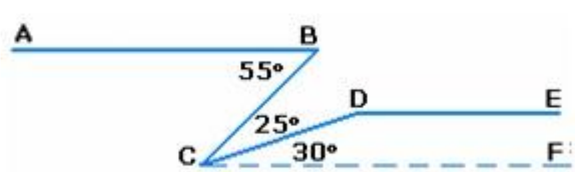
45/360 x 2π x r1 = 60/360 x 2πx r2 => r1/r2= 4/3

Ratio of areas =πr1^2/πr2^2 = 16/9

3**(D):** We draw a line CF // DE at C, as shown in the figure below.

∠BCF = ∠ABC = 55° ⇒ ∠DCF = 30°.

⇒ CDE = 180° − 30° = 150°.



4.**(C)** In the above figure, ∠CED = 180° − 125° = 55°. ∠ACD is the exterior angle of ΔABC. Therefore,

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∠ACD = a + 45°. In ΔCED, a + 45° + 55° + b = 180° ⇒ a + b = 80°

5.**(B)**AreaΔ ADE/Area ΔABC = (1x3)/(4x5)=3/20,

AreaΔ BDF/Area ΔABC = (1x1)/(4x2)=1/8,

AreaΔ CFE/Area ΔABC = (4x1)/(5x2)=2/5,

Therefore, AreaΔ DEF/Area ΔABC = 1-(3/20+1/8+2/5)=13/40

Geometrical Concept part -2

Dear Readers,

Today in this post, we are providing you remaining part of the necessary formula and concepts related to Geometry and Mensuration from the Quant section.

TRIANGLES : Triangles are closed figures containing three angles and three sides.

General Properties of Triangles:

The sum of the two sides is greater than the third side: a + b > c, a + c > b, b + c > a

The sum of the three angles of a triangle is equal to 180°: In the triangle ∠A + ∠B + ∠C = 180°

Area of a Triangle:

•Area of a triangle = 1/2 x base x height=1/2 x a x h

•Area of a triangle= 1/2 bcsinA = 1/2ab sinC=1/2 acsinB

•Area of a triangle = abc/4R where R circumradius

•Area of a triangle= r x s where r inradius and s = (a+b+c)/2

REGULAR POLYGONS : A regular polygon is a polygon with all its sides equal and all its interior angles equal. All vertices of a regular lie on a circle whose center is the center of the polygon.

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•Each interior angle of a regular polygon = 180(n-2)/n

•Sum of all the angles of a regular polygon = n x180(n- 2)/n = 180(n-2).

Quadrilateral: A quadrilateral is any closed shape that has four sides. The sum of the measures of the angles is 360°. Some of the known quadrilaterals are square, rectangle, trapezium, parallelogram and rhombus.

Square: A square is regular quadrilateral that has four right angles and parallel sides. The sides of a

square meet at right angles. The diagonals also bisect each other perpendicularly.

If the side of the square is a, then its

•Perimeter = 4a,

•Area = a^2 and the length of the diagonal = √2a

Rectangle: A rectangle is a parallelogram with all its angles equal to right angles.

•Area of a rectangle = length × breadth

•Perimeter = 2(sum of length and breath)

Parallelogram: A parallelogram is a quadrangle in which opposite sides are equal and parallel.

Any two opposite sides of a parallelogram are called bases, a distance between them is called a height.

•Area of a parallelogram = base × height

•Perimeter = 2(sum of two consecutive sides)

Rhombus: If all sides of parallelogram are equal, then this parallelogram is called a rhombus.

•Area of a rhombus = 1/2 product of diagonals

•Perimeter = 4a,

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Trapezoid: Trapezoid is a quadrangle two opposite sides of which are parallel.

•Area of a trapezoid = 1/2(Sum of parallel sides)height

CIRCLE: A circle is a set of all points in a plane that lie at a constant distance from a fixed point. The fixed point is called the center of the circle and the constant distance is known as the radius of the circle.

Arc: An arc is a curved line that is part of the circumference of a circle. A minor arc is an arc less than the semicircle and a major arc is an arc greater than the semicircle.

Chord: A chord is a line segment within a circle that touches 2 points on the circle.

Diameter: The longest distance from one end of a circle to the other is known as the diameter. It is

equal to twice the radius.

Circumference: The perimeter of the circle is called the circumference.

•circumference = **$2\pi r$**, where r is the radius of the circle.

•Area of a circle: Area = π x (radius)^2 = πr^2.

Sector: A sector is like a slice of pie (a circular wedge).

Area of Circle Sector: (with central angle θ) Area = $\theta/360 \times \pi \times r^2$

Length of a Circular Arc: (with central angle θ) The length of the arc = $\theta/360 \times 2\pi \times r$

Tangent of circle: A line perpendicular to the radius that touches ONLY one point on the circle

Cuboid: A parallelepiped whose faces are rectangular is called a cuboid. The three dimensions

associated with a cuboid are its length, breadth and height (denoted as l, b and h here.)

• The total surface area of the cuboid = 2(lb + bh + hl)

• Volume of a cuboid = lbh

Cube: A cube is a parallelepiped all of whose faces are squares.

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•Total surface area of the cube = 6a^2

• Volume of the cube = a^3

Right Circular Cylinder: A right circular cylinder is a right prism whose base is a circle. the cylinder has a base of radius r and a height of length h.

•Curved surface area of the cylinder = 2πrh

• Total surface area of the cylinder = 2πrh + 2πr^2

• Volume of the cylinder = πr^2h

Right Circular Cone: a right circular cone is a pyramid whose base is a circle. In , the right circular cone has a base of radius r and a height of length h.

•Curved surface area of the cone = πrl

• Total surface area of the cone = πrl + πr^2

• Volume of the cone =1/3πr^2h

Sphere: A sphere is a set of all points in space which are at a fixed distance from a given point. The fixed point is called the centre of the sphere, and the fixed distance is the radius of the sphere.

•Surface area of a sphere = 4πr^2

• Volume of a sphere = 4/3πr^3