# WEFI - SSF
# SSLC - EXCELLENCY TEST - 2023

## MATHEMATICS
**(ENGLISH)**

**Time : 2 $^{1}/_{2}$ Hours** **Total Score : 80**

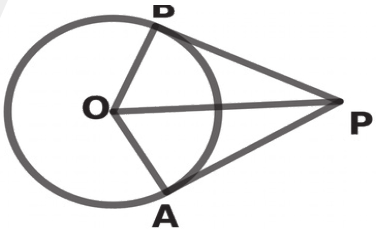
***Instructions :***

- Read and understand carefully and then only write the answer
- Give explanation wherever necessary.
- Simplification using irrational like π, √2, √3 etc. with their approximate values is not required if not specified in the questions.
- The first 15 minutes is given as *'Cool-off- Time'* you may read and understand the question during that time.

**Answer any three from questions 1 to 4. Each carries 2 scores** **[ 3 x 2 = 6]**

**1.** *a)* What is the common difference of the arithmetic sequence 2,7,12,17,.....
*b)* Find the 11$^{th}$ term of the arithmetic sequence 2, 7, 12, 17,.....

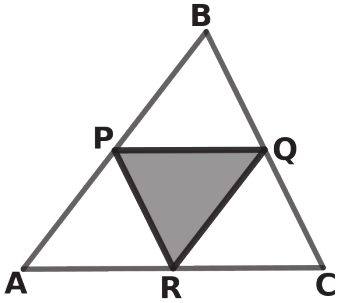
**2.** In the figure O is the center of circle.
PA and PB are tangents to the circle. If ∠ APB = $60^0$
*a)* Find measure of ∠ APO
*b)* If OA = 3 centimeters then find PA




**3.** Score of a batsman in 6 innings are 24, 42, 13, 66, 36, 51.
Find the median score.

**4.** In the figure P, Q, R are the midpoints of sides of the triangle ABC. The area of triangle ABC is 20 square centimeters

*a)* What is the area of triangle PQR ?
*b)* a dot is marked in triangle ABC without looking
It calculate the probability that the dot inside the triangle PQR



**Answer any four from question 5 to 10. Each carries 3 scores** **[4 x 3 = 12 ]**

**5.** Draw a circle of radius 3 centimeter .Mark a point 7 centimeter away from its centre. Draw the tangents to the circle from that point.

**6.** When sun is an elevation of $45^0$, the length of shadow of a flag post is 10 meters.

*a.* Draw a rough figure based on the given details.

*b.* Find the height of flag post.

*c.* What will be the length of the shadow if sun is an elevation of $35^o$

*[ sin 35° =0.57 ; cos 35° = 0.82 ; tan 35° = 0.7]*

**7.** If $p(x) = x^2 - 3x + 5$

*a)* Find $p(1)$

*b)* Find $p(2)$

*c)* Write a second degree polynomial such that $x - 1$ and $x - 2$ are the factors

**8.** Surface area of a solid metallic sphere is $400\pi$ square centimeters.

*a)* What is the radius of the sphere?

*b)* How many small spheres of radius one centimeter can be made by melting and recasting the given sphere?

*c)* How many small spheres of radius one centimeter can be made by melting and recasting a solid metallic hemisphere of total surface area $300\pi$ square centimeters?

**9.** Find the sum

*a)* 1 + 2 + 3 + 4 + ..... + 20

*b)* 4 + 8 + 12 + 16 + ..... + 80

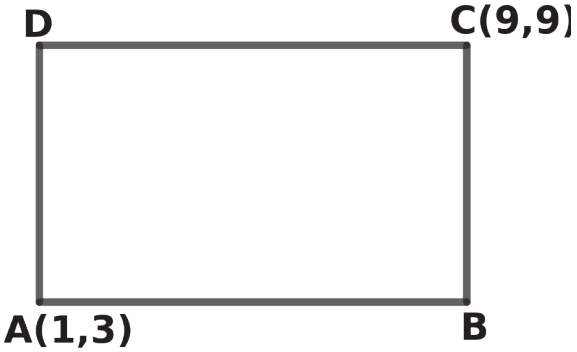
*c)* 6 + 10 + 14 + 18 + ..... + 82

**10.** In the figure , the sides of the rectangle ABCD are parallel to the axes.

Two of its vertices are A (1, 3) and C (9, 9)

*a)* Write the coordinates of B and D

*b)* Find the length of AC



**Answer any eight from question 11 to 21. Each carries 4scores [8 x 4 = 32]**

**11.** $5^{th}$ term of an arithmetic sequence is 70 and $15^{th}$ term is 130 .

*a)* Find the difference between $5^{th}$ term and $15^{th}$ term.
*b)* Find the $10^{th}$ term of the sequence.
*c)* Find sum of first 19 terms of the sequence.
*d)* Find sum of first 19 terms of the arithmetic sequence its $5^{th}$ term is 72 and $15^{th}$ term is 132 .

**12.** The table below shows the students of a class sorted according to their score in an examination.

| Score | 0 - 20 | 20 - 40 | 40 - 60 | 60 - 80 | 80 - 100 | Total |
|---|---|---|---|---|---|---|
| No of students | 5 | 8 | 10 | 9 | 7 | 39 |

*a)* If the students are arranged in the increasing order of their scores ,the score of the student at which position is taken as the median ?
*b)* What is assumed to be the score of $14^{th}$ student in the arrangement ?
*c)* Find the median score .

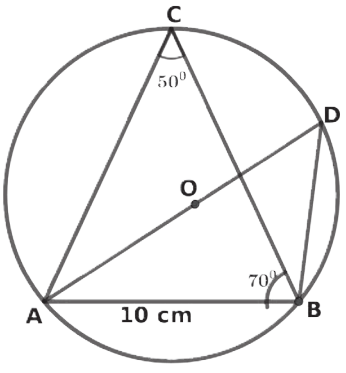
**13.** A box contain five paper slips numbered 1, 2, 3, 4 ,5 and another box contain four paper slips numbered 6, 7, 8 ,9. If one slip is taken from each box .

*a)* What is the total number of possible pairs ?
*b)* What is the probability of both being odd numbers ?
*c)* What is the probability of both being even numbers ?
*d)* What is the probability of sum of the numbers being even ?

**14.** Draw a rectangle of length 6 centimeters and breadth 4 centimeters and draw a square of the same area.

**15.** In the figure AD is the diameter of circumcircle of triangle ABC

$\angle ACB = 50^0$ and AB =10 centimeter




*a)* Find measure of $\angle ABD$
*b)* Find measure of $\angle ADB$
*c)* Find diameter of circumcircle of triangle ABC
*d)* If $\angle ABC = 70^0$ then find measure AC.

*[ $\sin 50^0 = 0.77$ ; $\cos 50^0 = 0.64$ ; $\tan 50^0 = 1.19$*
*$\sin 70^0 = 0.93$ ; $\cos 70^0 = 0.34$ ; $\tan 70^0 = 2.74$ ]*

**16.** In a rectangle the length is 2 centimeters more than its breadth.

*a)* Taking the breadth of the rectangle as $x$ write the length in terms of $x$.
*b)* If the length of diagonal is 10 centimeters form a second degree equation.

**17.** If $p(x) = x^2 - 5x + 6$

*a)* Find $p(1)$ and $p(4)$

*b)* Write the polynomial $p(x) - p(1)$ as the product of two first degree polynomials.

*c)* Find the solution of the second degree equation $x^2 - 5x + 4 = 0$.

**18.** A cone of maximum size is made by rolling up a sector of radius 25 centimeters and central angle $288^o$.

*a)* Find the slant height of the cone.

*b)* Find the radius of the cone.

*c)* Find the height of the cone?

*d)* Find the volume of the cone.

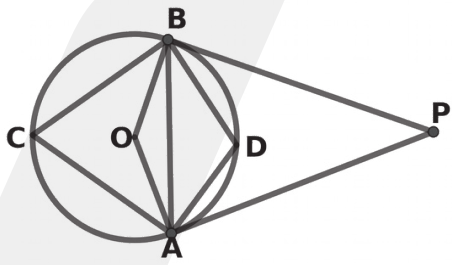
**19.** In the figure A, B, C, D are point on the centered at O . PA and PB are two tangents. If $\angle D = 110^0$ find the Find measure of following angles.

a) $\angle C$

b) $\angle AOB$

c) $\angle PAB$

d) $\angle P$



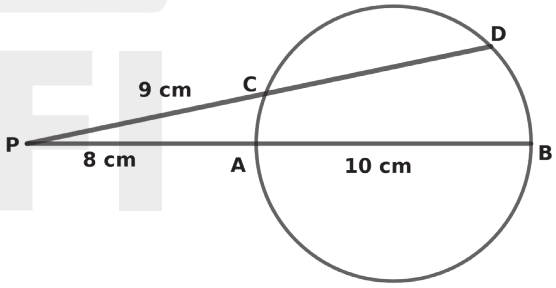

**20.** In the figure, the chord AB and CD are extended to meet at P.
PA = 8 centimeters ,
AB = 10 centimeters and
PC = 9 centimeters .

*a)* Find PB

*b)* Find PC x PD

*c)* Find CD

*d)* Find the length of tangents from P to the circle.

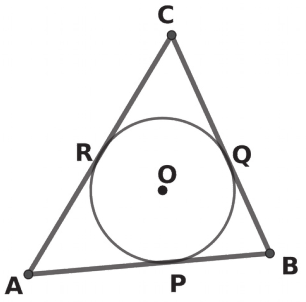



**21.** In the figure O is the centre of circle. AB, BC, and AC are the tangents through the points P, Q, and R . If AP = 7 centimeters and BC = 14 centimeters

*a)* Find AR

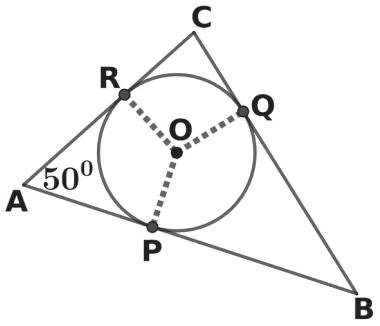
*b)* Find the perimeter of triangle ABC

*c)* If the area of triangle ABC is 42 square Centimeters find its in radius.



**Answer any six from question 22 to 29. Each carries 5 scores** **[6 x 5 = 30]**

**22.** In the figure, O is the centre of circle. The sides of triangle ABC touches the circle at P , Q, R . If $\angle A = 50^0$

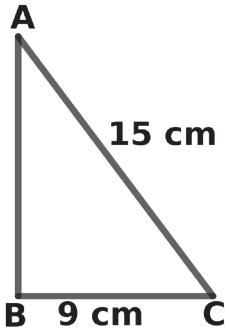



a) Find measure of $\angle$ POR
b) Draw a circle of radius 3 centimeters. Draw triangle with angles $50^o$, $60^o$, $70^o$ and the sides of the triangle touch the circle.

**23.** The algebraic form of an arithmetic sequence is $3n + 2$.

*a)* What is the first term of the sequence.
*b)* Find the $20^{th}$ term of the sequence.
*c)* Find the sum of first 20 terms of the sequence.
*d)* Find the difference between first term and $21^{st}$ term of this sequence.
*e)* How much greater is the sum of the next 20 terms than the sum of first 20 terms in the sequence?

**24.** In the figure in triangle ABC , $\angle B = 90^o$, BC = 9 centimeters and AC = 15centimeteres




*a)* If $\angle A = x$ find $\angle C$
*b)* Find sin x
*c)* Prove that sin x = cos (90-x).
*d)* If sin 68 = cos x then find x.

**25.** *a)* Draw X, Y axes and mark the points A(1 ,1), B (7 ,1), D(3,4)
*b)* If ABCD is a parallelogram then write the coordinates of the point C.

**26.** Consider the point A ( 2,1) and B (8,4)


*a)* Find the slope of the line AB
*b)* If AC : BC = 1 : 2 then write the coordinates of the point C.
*c)* If (x, y) is point on the line AB then prove that x = 2y .
*d)* Find the coordinates of point of intersection of the line AB and the line parallel to Y axis and passing through (5, 0).

**27.** *a)* In a square pyramid base edge is 'a' and slant height is 'l'. What is its total surface area.

*b)* If the slant height is 13 centimeters and total surface area is 360 square centimeters find the base edge of square pyramid

*c)* Find the height of square pyramid.

*d)* Find the volume of square pyramid.

**28.** C is the mid-point of the line joining the point A (3, 3) and B (13 ,3)

*a)* Write the coordinates of the point C.

*b)* Find the radius of the circle AB as diameter.

*c)* Write the equation of circle.

*d)* Write the coordinates of the points which circle cuts the X – axis.

**29. Read and understand the following mathematical concept, then answer the following questions that follows**

We know that $1 + 2 + 3 + \ldots\ldots + n = \frac{n(n+1)}{2}$. A pattern is given below

| | | | |
|---|---|---|---|
| $1^3$ | $= 1$ | $= 1$ | $= 1^2$ |
| $1^3 + 2^3$ | $= 1 + 8$ | $= 9$ | $= (1+2)^2$ |
| $1^3 + 2^3 + 3^3$ | $= 1 + 8 + 27$ | $= 36$ | $= (1+2+3)^2$ |
| $1^3 + 2^3 + 3^3 + 4^3$ | $= 1 + 8 + 27 + 64$ | $= 100$ | $= (1+2+3+4)^2$ |
| ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... |

Sum of cubes of consecutive natural numbers is the square of sum of the natural numbers.

*a)* What is the sum of first 5 natural numbers?

*b)* Find $1^3 + 2^3 + 3^3 + 4^3 + 5^3$.

*c)* Write $(1+2+3+4+5)^2$ as the sum of cubes of consecutive natural numbers.

*d)* Find $(1^3 + 2^3 + 3^3 + 4^3 + 5^3)\ (1+2+3+4+5)^2$

*e)* Find $1^3 + 2^3 + 3^3 + 4^3 + \ldots\ldots\ldots + n^3$

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