

**HALF YEARLY EXAM 2020
CLASS X
SUBJECT MATHEMATICS
BLUEPRINT**

S.NO	CHAPTER	MCQ	VSQ	SA-I	SA-II	LA	TOTAL
		1 MARK	1 MARK	2 MARK	3 MARK	4 MARK	
6	Triangles	2(2)	1(1)	2(1)	3(1)	5(1)	13(6)
7	Coordinate Geometry	1(1)	2(2)		3(1)	5(1)	11(5)
8	Introduction to Trigonometry	2(2)	1(1)	2(1)	3(1)		8(5)
9	Some Applications of Trigonometry	1(1)	2(2)	2(1)	3(1)	5(1)	13(6)
10	Circles	1(1)	3(3)	2(1)	3(1)		9(6)
11	Constructions	1(1)	1(1)		3(1)		5(3)
12	Areas Related to Circles	2(2)	1(1)	2(1)	3(1)		8(5)
13	Surface Areas and Volumes	2(2)	1(1)	2(1)	3(1)	5(1)	13(6)
		12(12)	12(12)	12(6)	24(8)	20(4)	80(42)

THE INDIAN PUBLIC SCHOOL, DEHRADUN
HALF YEARLY- 2020
MATHEMATICS /CLASS X/TUESDAY/13-10-2020

TIME: 3 hr 15 Mins

MM: 80

RST:

General Instruction:

1. All questions are compulsory.
2. The question paper consists of **42** questions divided into **four sections A, B, C and D. section- A** comprises of **24** questions of **1 mark** each; **section-B** comprises of **6** questions of **2 marks** each; **section-C** comprises of **10** questions of **3 marks** each and **Section-D** comprises of **4** questions of **5 marks** each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

Section A

(QUESTION 1 TO QUESTION 24)
(1 MARK EACH)

QUESTION 1

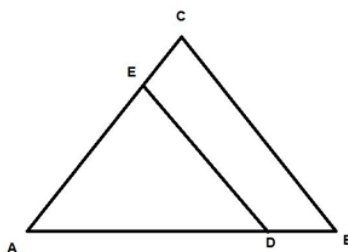
In the figure given below $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, the value of x is:

(a) 4

(c) 16

(b) 8

(d) 32



QUESTION 2

Triangle ABC is an equilateral A of side a . Its area will be...

(a) $\frac{\sqrt{3}}{4} a^2$

(b) $\frac{\sqrt{3}}{4} a$

(c) $\frac{\sqrt{3}}{2} a^2$

(d) $\frac{\sqrt{3}}{2} a$

QUESTION 3

If the distance between the points (2,-2) and (-1,x) is 5 then the value of x is:

(a) -2

(b) 2

(c) -1

(d) 1

QUESTION 4

If $\tan A = \frac{4}{3}$, then value of $\cos A$ is

(a) $\frac{3}{5}$

(b) $\frac{4}{3}$

(c) 1

(d) None of these

QUESTION 5

The value of $\sin^2 30^\circ - \cos^2 30^\circ$ is

(a) $-\frac{1}{2}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\frac{3}{2}$

(d) $\frac{2}{3}$

QUESTION 6

A tower stands vertically on the ground. From a point on the ground, 20 m away from the foot of the tower, the angle of elevation of the top the tower is 60° . What is the height of the tower?

(a) $20\sqrt{3}$ m

(b) 20 m

(c) $30\sqrt{3}$ m

(d) 30 m

QUESTION 7

If the angle between two radii of a circle is 130° , then angle between the tangents drawn at the ends of the radii is:

(a) 90°

(b) 40°

(c) 50°

(d) 70°

QUESTION 8

The number of tangents can be drawn from an external point to a circle are:

- (a) 1 (c) 3
(b) 2 (d) 4

QUESTION 9

If the area of circle is 154 cm^2 , then its perimeter is

- (a) 11
(b) 22
(c) 44
(d) 55

QUESTION 10

A sharpen pencil is combination of

- (a) A cone and a cylinder
(b) A frustum and a cylinder
(c) A hemisphere and cylinder
(d) Two cylinders

QUESTION 11

Find the volume of a hemisphere if the radius of the base is 3.5m?

- a) 85.9 m^3 b) 80 m^3 c) 98 m^3 d) 89.83 m^3

QUESTION 12

If θ is the angle (in degrees) of a sector of a circle of radius r , then area of the sector is

- (a) $\frac{\pi r^2 \theta}{360^\circ}$ (b) $\frac{\pi r^2 \theta}{180^\circ}$ (c) $\frac{2\pi r \theta}{360^\circ}$ (d) $\frac{2\pi r \theta}{180^\circ}$

QUESTION 13

12 solid spheres of the same radii are made by melting a solid metallic cylinder of base diameter 2cm and height 16cm. Find the diameter of each sphere.

QUESTION 14

Find the area of a sector of a circle with radius 6cm if angle of the sector is 60° . (Take $\pi = 22/7$)

OR

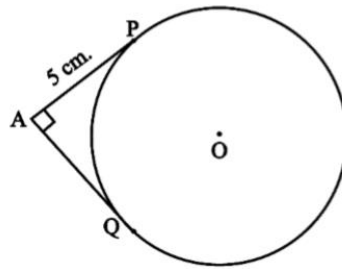
A horse tied to a pole with 28m long rope. Find the perimeter of the field where the horse can graze. (Take $\pi = 22/7$)

QUESTION 15

Construct a circle of radius 3 cm, take point 'P' on circle and draw tangent at point 'P'.

QUESTION 16

In the below figure, the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5cm. then find the radius of the circle.

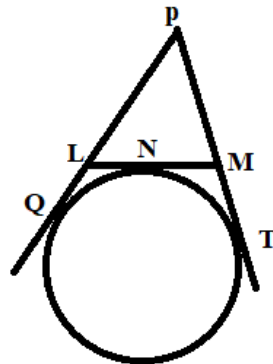


QUESTION 17

If angle between two radii of a circle is 130° , find the angle between the tangents at the ends of the radii.

QUESTION 18

If $PQ=28\text{cm}$, then find the perimeter of $\triangle PLM$

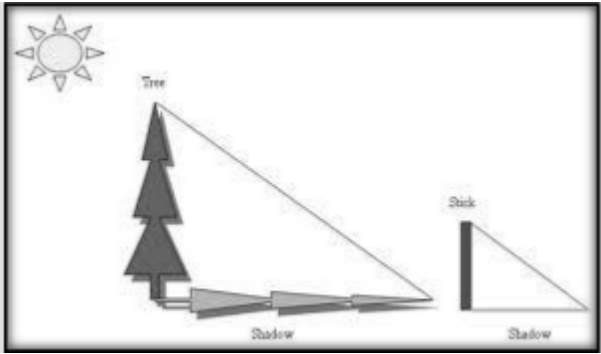


QUESTION 19

The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30° . Find the height of the tower.

QUESTION 20

The shadow of a stick 5m long is 2m. At the same time find the shadow of a tree 12.5m high.



QUESTION 21

If $\cos A = 4/5$, then the value of $\tan A$.

QUESTION 22

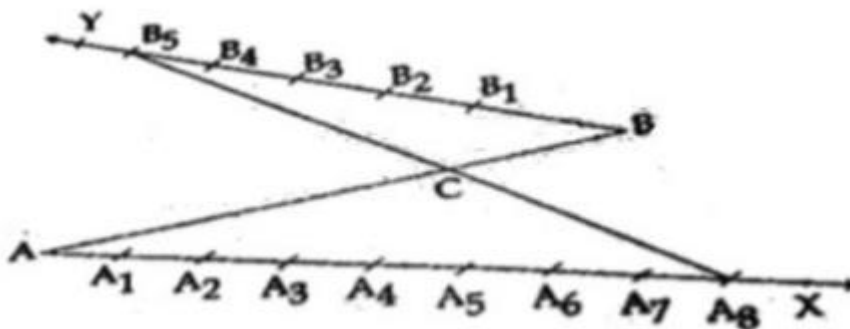
Find the mid-point of the line segment joining the points A $(-2, 8)$ and B $(-6, -4)$.

QUESTION 23

Find the distance between the points A $(0, 6)$ and B $(0, -2)$

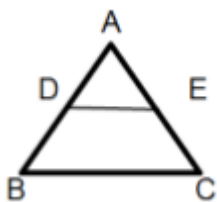
QUESTION 24

In the figure, if B_1, B_2, B_3, \dots and A_1, A_2, A_3, \dots have been marked at equal distances. In what ratio C divides AB?



OR

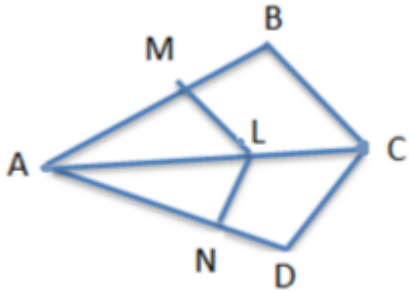
In the given figure, $AD = 2\text{cm}$, $BD = 3\text{cm}$, $AE = 3.5\text{cm}$ and $AC = 7\text{cm}$. Is DE parallel to BC ?



Section B
(QUESTION 25 TO QUESTION 30)
(2 MARKS EACH)

QUESTION 25

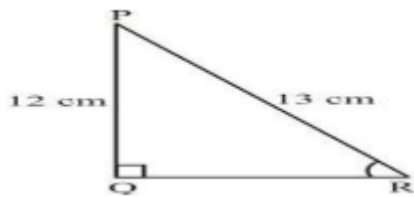
In the fig. if $LM \parallel CB$ and $LN \parallel CD$, prove that $\frac{AM}{MB} = \frac{AN}{ND}$



QUESTION 26

Given $15 \cot A = 8$, find $\sin A$ and $\sec A$.

OR



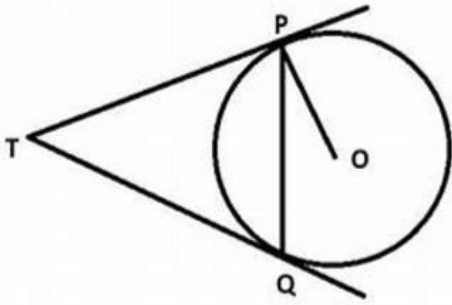
Find $\tan P - \cot R$

QUESTION 27

A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string.

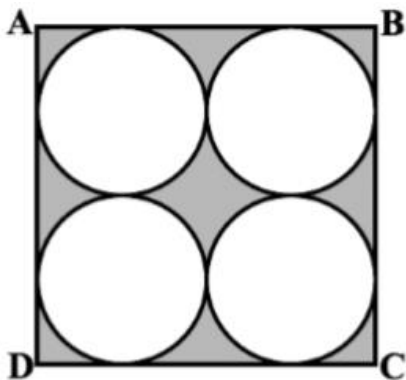
QUESTION 28

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



QUESTION 29

Find the area of the shaded region in below left figure, where ABCD is a square of side 14 cm.



QUESTION 30

From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2 .

SECTION C
(QUESTION 31 TO QUESTION 38)
(3 MARKS EACH)

QUESTION 31

Find the point on x-axis which is equidistant from the points (2,-2) and (-4,2)

OR

P (-2, 5) and Q (3, 2) are two points. Find the co-ordinates of the point R on PQ such that $PR=2QR$

QUESTION 32

State and prove 'Pythagoras Theorem'.

OR

In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3} BC$. Prove that $9 AD^2 = 7 AB^2$.

QUESTION 33

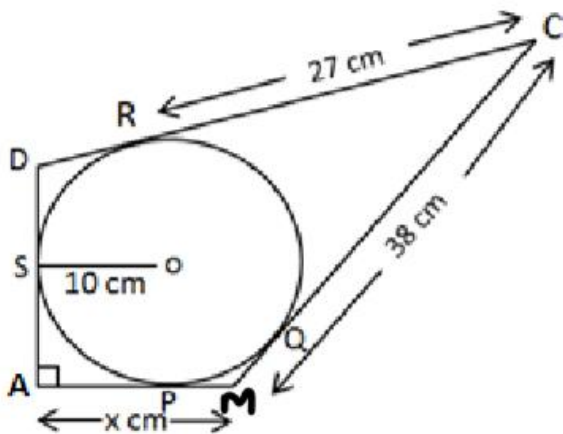
If $\sin \theta - \cos \theta = 0$, then the value of $(\sin^4 \theta + \cos^4 \theta)$

QUESTION 34

As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

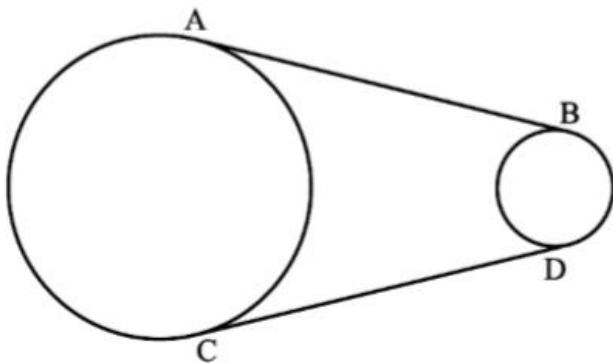
QUESTION 35

In the figure, quadrilateral ABCD is circumscribing a circle with centre O and $AD \perp AB$. If radius of incircle is 10cm, then the value of x.



OR

In below figure, AB and CD are common tangents to two circles of unequal radii. Prove that $AB = CD$.



QUESTION 36

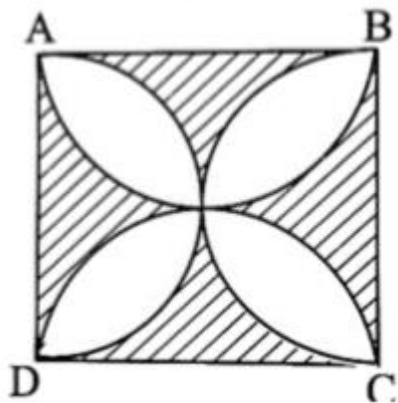
Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

QUESTION 37

Metallic spheres of radii 6cm, 8cm and 10cm respectively are melted to form a solid sphere. Find the radius of the resulting sphere.

QUESTION 38

In the figure, ABCD is a square of side 14 cm. Semi-circles are drawn with each side of square as diameter. Find the area of the shaded region.



SECTION D
(QUESTION 39 TO QUESTION 42)
(5 MARKS EACH)

QUESTION 39

The two palm trees are of equal heights and are standing opposite each other on either side of the river, which is 80 m wide. From a point O between them on the river the angles of elevation of the top of the trees are 60° and 30° , respectively. Find the height of the trees and the distances of the point O from the trees.

OR

The angles of depression of the top and bottom of a building 50 meters high as observed from the top of a tower are 30° and 60° respectively. Find the height of the tower, and the horizontal distance between the building and the tower.

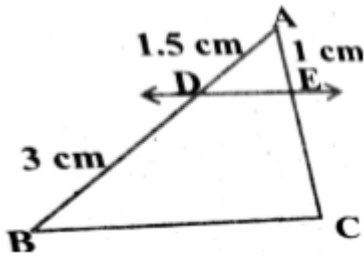
QUESTION 40

(a) State and prove 'Basic proportionality Theorem'

4 marks

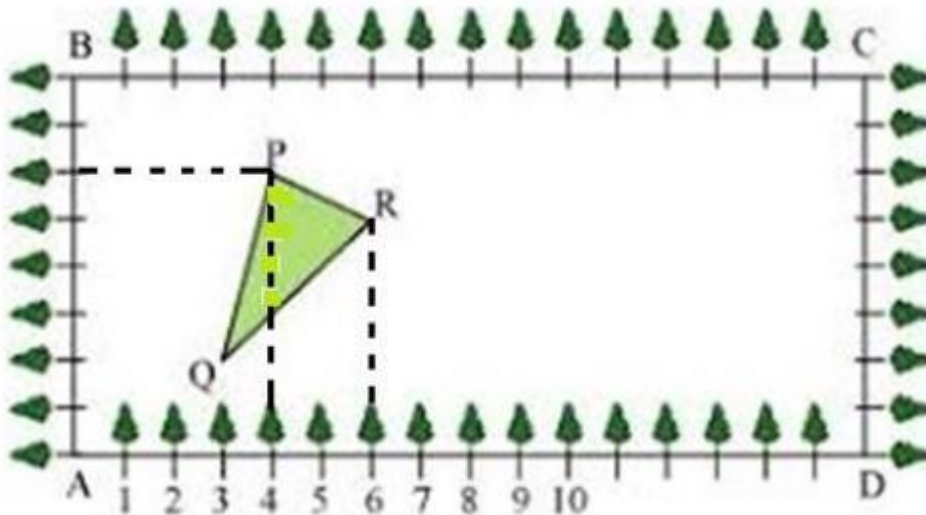
(b) In the given fig. If $DE \parallel BC$ Find EC.

1 marks



QUESTION 41

Class X students of a secondary school in Krishnagar have been allotted a rectangular plot of a land for gardening activity. Saplings of Gulmohar are planted on the boundary at a distance of 1m from each other. There is a triangular grassy lawn in the plot as shown in the fig. The students are to sow seeds of flowering plants on the remaining area of the plot.



Considering A as origin, answer question (i) to (v)

i) Considering A as the origin, what are the coordinates of A?

- a) (0,1) b) (1,0) c) (0,0) d) (-1, -1)

ii) What are the coordinates of P?

- a) (4,6) b) (6,4) c) (4,5) d) (5,4)

iii) What are the coordinates of R?

- a) (6,5) b) (5,6) c) (6,0) d) (7,4)

iv) What are the coordinates of D?

- a) (16,0) b) (0,0) c) (0,16) d) (16,1)

v) What are the coordinate of P if D is taken as the origin?

- a) (12,2) b) (-12,6) c) (12,3) d) (6,10)

QUESTION 42

Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

OR

A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?