Kendriya Vidyalaya Jalipa Cantt.Barmer
2nd Pre- Board Examination 2009-10
Class – X
Subject – Maths

Time: 3 hrs Marks: 80

General Instructions:

(I) All questions are compulsory.

(ii) The question paper consists of 30 questions divided into four sections –A, B, C and D. Section A contains 10 questions of 1 mark each, Section B is of 5 Questions of 2 marks each, Section C is of 10 questions of 3 marks each and Section D is of 5 questions of 6 marks each.

. (iii) There is no overall choice. However, an internal choice has been provided in one question of two marks each, three questions of three marks each and two Questions of six marks each.

(iv) In question on construction, the drawing should be neat and exactly as per the given measurements.

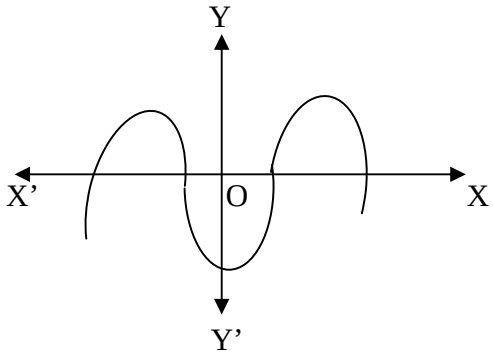
(v) Use of calculator is not permitted.

SECTION A

(Qns 1 – 10 carry 1 mark each)

1. The prime factorization of 2310 is 2 x 3 x a x 7 x b. Find a and b.

2. The graph of y = p(x) is given in fig below. Find the number of zeros.



3. One of the roots of the quadratic equation $x^2 - px + 2 = 0$ is 2, find P.

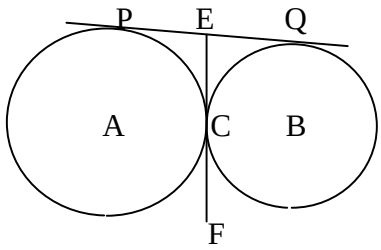
4. If $\cos^4 A - \sin^4 A = 1$, find the value of $\cos^2 A - \sin^2 A$.

5. Find the value of k for which 2k + 7, 6k – 2, 8k + 4 form the three consecutive terms of an A.P.

6. An arc of a circle having measure 18^0, has length 22cm. Find the radius of the circle.

7. The perimeters of two similar triangles are 36cm and 48cm respectively. If one side of the first triangle is 9cm, what is the corresponding side of the other triangle?

8. In fig. PQ and EF are two common tangents of two circles. If EC = 3cm, find PQ.



9. Find the probability a number is selected from the numbers 1 to 25 is not an odd number when each of the given numbers is equally likely to be selected.

10. Find $\bar{x}$, if a = 40, $\sum fd$ = - 300 and $\sum f$ = 60.

SECTION B

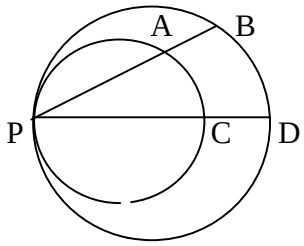
(Qns 11 – 15 carry 2 marks each)

11. Find the value of 'p' for which the system of equation has no solution.
$3x - 4y + 7 = 0$
$px + 3y - 5 = 0$

12. If $x = a \sin\theta$, $y = b \tan\theta$; then prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$

13. Show that the points (1, 2), (2, 0) and (3, - 2) are collinear.

14. In fig. PAB and PCD are lines, PCD passes through the centre of the circles. Show that PA/AB = PC/CD



15. Two black kings are removed from a pack of 52 cards and a card is drawn. Find the probability of getting (i) a spade (ii) a king

OR

A bag contains 8 red, 6 white and 4 black balls. A ball is drawn t random from the bag. Find the probability that drawn ball is (i) red or white (ii) neither white nor black.

SECTION- C

(Qns 16 – 25 carry 3 marks each)

16. Use Euclid's division algorithm to find the H.C.F of 135 and 225.

OR

Prove that $\sqrt{5} + \sqrt{3}$ is an irrational number.

17. '1' and – 3 are the zeros of the polynomials $x^3 - ax^2 - 13x + b$, find the values of a and b.

18. Solve the system of linear equations graphically:
$x + y = 4$; $3x - 2y = -3$
Shade the region bounded by the lines representing the above equations and x - axis.

19. A sum of Rs 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is Rs 20 less than its preceding prize, find the value of each of the prizes.

20. Prove the following identity:
$$\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2\operatorname{cosec} A$$

OR

Evaluate without using trigonometric tables:

$$\tan 11^0 . \tan 31^0 . \tan 60^0 . \tan 59^0 . \tan 79^0 + \frac{\tan 36^0}{\cot 54^0} + \cos 20^0 . \operatorname{cosec} 70^0 - 2$$

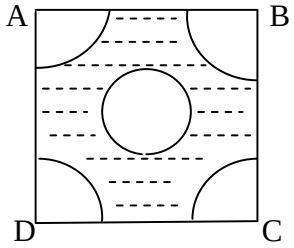
21. The line joining the points (2, 1) and (5, - 8) is trisected at the points P and Q. If the point p lies on the line $2x - y + k = 0$, find the value of k.

22. The vertices of a triangle are A (3, 4), B (7, 2) and C (- 2, 5). Find the length of the median through the vertex A.

23. Construct a triangle similar to a given triangle with sides 6cm, 7cm and 8cm and whose sides are $7/5^{th}$ of the corresponding sides of the given triangle.

24. Prove that the parallelogram circumscribing a circle is a rhombus.

25. From each corner of a square of side 4cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2cm is cut as shown in fig. Find the area of the remaining portion of the square.



OR

The decorative block is made of two solids- a cube and a hemisphere. The base of the block is a cube with edge 5cm, and the hemisphere fixed on the top has diameter of 4.2 cm. Find the total surface area of the block.

SECTION D

(Qns 26 – 30 carry 6 marks each)

26. Some students planned a picnic. The budget for food was Rs 480. But 8 of these failed to go and thus the cost of food for each member increased by Rs 10. How many students went on the picnic?

OR

The difference of the squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.

27. A pole projected outwards from a window 10m above the ground of a building makes an angle of 30^0 with the wall. The angles of elevations of the bottom and top of the pole from a point on the ground are 30^0 and 60^0 respectively. Find the length of the pole.

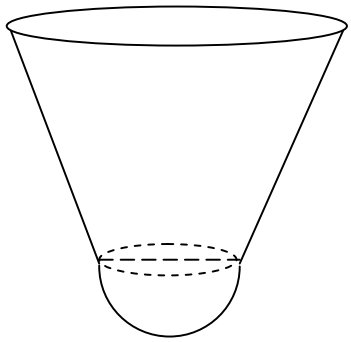
OR

An aeroplane when flying at a height of 4000m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60^0 and 45^0 respectively. Find the distance between the aeroplanes at that instant.

28. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.
Using the above do the following:
A ladder 13m long, placed against a wall reached a window 12m above the

ground. Due to some fault, the foot of the ladder slipped 7m. How high above the ground is the other end of the ladder now?

29. A shuttle cock used for playing badminton has the shape of a frustum of a cone mounted on a hemisphere. The external diameters of the frustum are 5cm and 2cm, the height of the entire shuttle cock is 7cm. Find its external surface area.



30. The lengths of 40 leaves of a plant are measured correct to the nearest mm, and the data obtained is represented in the following table.

Length (in mm)	Number of leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

Find the median length of the leaves.

2nd Pre- Board Examination 2009-10
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(Marking Scheme)

SECTION-A

1. a=5, b=11
2. 4
3. P=3
4. 1
5. 2
6. 70cm
7. 12
8. 6cm
9. 12/25
10. 35

1 x 10 = 10 Marks

SECTION-B

11. 3x -4y+7=0, px+3y-5=0

$a_1=3, b_1=-4, c_1=7$;
$a_2=P, b_2=3, c_2=-5$

$\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ — $\frac{1}{2}$ mark

$\frac{a1}{a2} = \frac{b1}{b2}; \frac{3}{p} = \frac{-4}{3}$ — 1 mark

P=-9/4 — $\frac{1}{2}$ mark

12. L.H.S. = $a^2/ a^2\sin^2\theta - b^2/b^2\tan^2\theta$ — 1 mark

= $\text{Cosec}^2\theta - \cot^2\theta = 1$ = RHS — 1 mark

13. Area of a triangle = $\frac{1}{2}[x_1(y_2- y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)]$ — $\frac{1}{2}$ mark

= $\frac{1}{2}[1(0+2) + 2(-2-2) + 3(2-0)]$ — 1 mark

= $\frac{1}{2}[2-8+6] = 0$ — $\frac{1}{2}$ mark

14. Const. : Join A to C & B to D — $\frac{1}{2}$ mark

$\angle PAC = \angle PBD = 90^0$ — $\frac{1}{2}$ mark

So, AC II BD [Corr.Angs.] $\frac{1}{2}$ mark

$SO, \frac{PA}{AB} = \frac{PC}{CD}$ $\frac{1}{2}$ mark

15. i) $\frac{13}{50}$ 1 mark

ii) $\frac{2}{50}$ 1 mark

SECTION –C

16. 225=135 X 1 + 9 1 mark
135= 90 X 1 + 45 1 mark
90 = 45 X 2 + 0 $\frac{1}{2}$ mark

$\therefore$ Here, H.C.F. of 135 & 225 is 45. $\frac{1}{2}$ mark

17. $x^3 - ax^2 - 13x + b$
To find a & b

Sol. - P (1) = $(1)^3 - a(1)^2 - 13(1) + b = 0$ $\frac{1}{2}$ mark
= 1-a-13+b = 0
= - a-12+b = 0
= b = 12 + a $\frac{1}{2}$ mark

P (-3) = $(-3)^3 - a(-3) - 13(-3) + (12 + a) = 0$ 1 mark
= -27- 9a + 39 + 12 + a = 0
= 24 - 8a = 0
=> 8a = 24
=> a = 3 $\frac{1}{2}$ mark

b = 12 + a = 12 + 3 = 15 $\frac{1}{2}$ mark

18. For correct graph 3 marks

19. Let the first price be x

A.P. will be = x, x-20, x-40, x-60, x-80, x-100, x-120... $\frac{1}{2}$ mark

d=(x-20) – x = - 20 $\frac{1}{2}$ mark

n =7

$S_n = \frac{n}{2}[2a + (n-1)d]$ $\frac{1}{2}$ mark

$\frac{7}{2}$[2x+ (6)-20] = 700 $\frac{1}{2}$ mark
7[2x-120] = 1400
14x-840 = 1400
14x =2240

x = 160 $\frac{1}{2}$ mark

1st prize = x=160, 2nd prize=140, 3rd prize=120, 4th prize=100, $\frac{1}{2}$ mark

5th prize = 80, 6th prize = 60, 7th prize = 40.

20. L.H.S. = $\frac{tanA(secA+1)+tanA(secA-1)}{sec^2A-1}$ 1 mark

$= \frac{tanAsecA+tanAsecA}{tan^2A}$ 1 mark

$= \frac{2tanAsecA}{tan^2A} = 2\frac{1}{sinA}$ = 2cosecA = R.H.S 1 mark

21. P divides AB = $\frac{1}{2}$ $\frac{1}{2}$ mark

x = $\frac{1X5+2X2}{3} = \frac{5+4}{3} = \frac{9}{3}$ = 3 $\frac{1}{2}$ mark

y = $\frac{1X8+2X1}{3} = \frac{-8+2}{3}$ = -2 $\frac{1}{2}$ mark

=> 2x-y+K= 0

=>2(3)-(-2) + K=0 $\frac{1}{2}$ mark

=>6+4+K=0

=>10+K=0 $\frac{1}{2}$ mark

=> K=-10 $\frac{1}{2}$ mark

22. CONST:-Median AD

Sol: Coordinates of point D

x=$(\frac{7-2}{2})$; y= $(\frac{2+5}{2})$ 1 mark

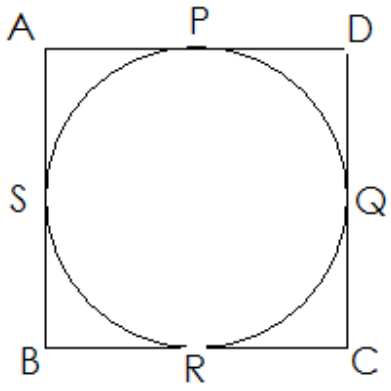
x=$\frac{5}{2}$; y=$\frac{7}{2}$ $\frac{1}{2}$ mark

Distance of AD = $\sqrt{(\frac{5}{2}-3)^2+(\frac{7}{2}-4)^2}$ 1 mark

$= \sqrt{\frac{1}{4}+\frac{1}{4}} = \sqrt{\frac{2}{4}} = \frac{\sqrt{2}}{2}$ $\frac{1}{2}$ mark

23. Const. of triangle 3 mark

24. For Given, To prove, diagram 1 mark



Proof: AP= AS [tangents from point A]..... (1)
BR = BS [tangents from point B]..... (2)
CR =QC [tangents from point C]..... (3)
PD =DQ [tangents from point D]..... (4) 1 mark
ADDING ALL EQUTION

AP+PD+CR+BR=AS+BS+QC+DQ $\frac{1}{2}$ mark

=> AD + BC = AB + DC
=>2 AD = 2 AB
=>AD = AB

∴ AB = AD = CD =BC $\frac{1}{2}$ mark

∴ ABCD is a rhombus.

25. Area of shaded region = Area of square – Area of two circles $\frac{1}{2}$ mark

= $(side)^2 - 2\pi r^2$ 1 mark

= 4x4 – 2x $\frac{22}{7} X\ (1)^2$ $\frac{1}{2}$ mark

= 16 - $\frac{44}{7}$ $\frac{1}{2}$ mark

= $\frac{112-44}{7} = \frac{68}{7}$ = 9.71 Sq cm $\frac{1}{2}$ mark

OR

TSA of block = TSA of cube + CSA of hemisphere – Area of circle $\frac{1}{2}$ mark

= $6a^2 + 2\pi r^2 - \pi r^2$ 1 mark

= $6a^2 + \pi r^2$ $\frac{1}{2}$ mark

= $6x5^2 + \frac{22}{7} X\ 2.1\ X\ 21$ $\frac{1}{2}$ mark

= 150 + 13.86 = 163.86 Sq cm $\frac{1}{2}$ mark

26. Cost for each member = $\frac{480}{x}$ $\frac{1}{2}$ mark

Cost for each member after reduction of 8 members = $\frac{480}{x-8}$ $\frac{1}{2}$ mark

So, $\frac{480}{x-8} - \frac{480}{x} = 10$ 1 mark

$\frac{480x - 480(x-8)}{x(x-8)} = 10$ 1 mark

⇨ $x^2 - 8x - 384 = 0$ 1 mark

⇨ $x^2 - 24x + 16x - 384 = 0$ 1 mark

⇨ $(x - 24)(x - 16) = 0$ $\frac{1}{2}$ mark

⇨ $x = 24$ $\frac{1}{2}$ mark

OR

Let two numbers be x and y, where $x > y$

then, $x^2 - y^2 = 180$ 1 mark

But, $y^2 = 8x$ 1 mark

So, $x^2 - 8x = 180$

$x^2 - 8x - 180 = 0$

$x^2 - 18x + 10x - 384 = 0$ 1 mark

$(x - 18)(x + 10) = 0$ $\frac{1}{2}$ mark

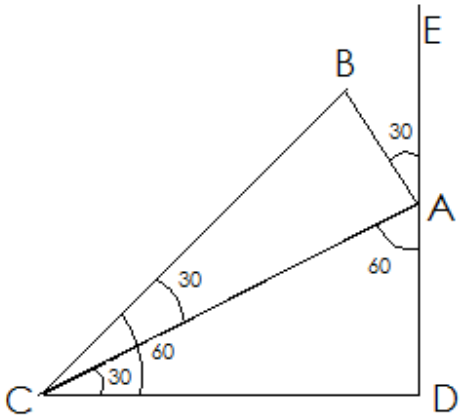
$x = 18, -10$ $\frac{1}{2}$ mark

then, $y = \sqrt{8(-10)}$ & $y = \sqrt{8(18)}$ 1 mark

So, $x = -10$ *is not possible* $\frac{1}{2}$ mark

& $y = \sqrt{8(18)} = \sqrt{144} = 12$ $\frac{1}{2}$ mark

27. For correct figure 2 marks



AB is the pole & AD = 10m

$\frac{AC}{AD} = Cosec\ 30^0$ => $\frac{AC}{10} = 2$ 1 mark

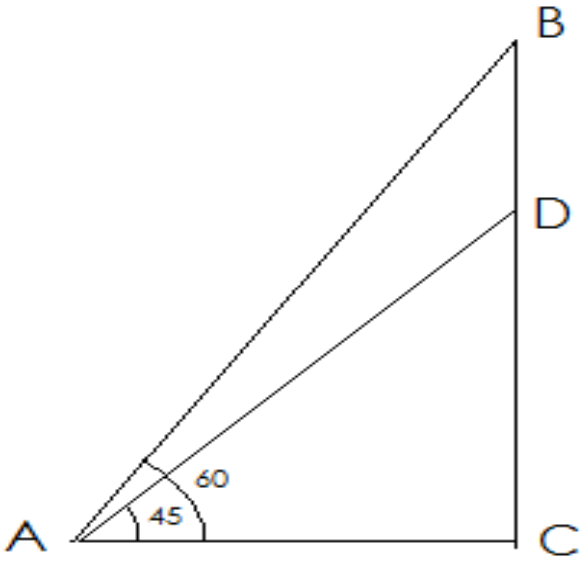
=> AC = 20 m 1 mark

$\frac{AB}{AC} = tan\ 30^0$ => $\frac{AB}{20} = \frac{1}{\sqrt{3}}$ 1 mark

=> AB = $\frac{20}{\sqrt{3}}$ m = $\frac{20\sqrt{3}}{3}$ m 1 mark

OR

For correct diagram 2 marks



BC = 4000 m, let $BD = x$

Then, DC = AC = 4000 – x [Angle DAC = 45^0] 1 mark

$\frac{AC}{BC} = cot\ 60^0$ => $\frac{AC}{BC} = \frac{1}{\sqrt{3}}$ 1 mark

$\frac{4000-x}{4000} = \frac{1}{\sqrt{3}}$ 1 mark

$\sqrt{3}\,(4000 - x) = 4000$ $\frac{1}{2}$ mark

$x = \frac{4000(\sqrt{3}-1)}{\sqrt{3}}$ m $\frac{1}{2}$ mark

28. For correct given, to prove, construction and figure $\frac{1}{2} \times 4 = 2$mark

For correct proof 2 mark

In the question given, the distance of the foot of ladder from the wall is = $\sqrt{13^2 - 12^2}$ = 5 m 1 mark

According to the new situation, the height of the other end of the ladder is = $\sqrt{13^2 - (5+7)^2}$ = 5 m 1 mark

29. $r_1 = 2.5\ cm$

$r_2 = 1\ cm$

height of the frustum = (7-1) cm 1 mark

Slant height = $\sqrt{h^2 + (r_1 - r_2)^2}$ 1 mark

= $\sqrt{6^2 + (2.5-1)^2}$

$= \sqrt{36 + 2.25}$

$= \sqrt{38.25} = 6.18$ 1 mark

CSA of frustum = $\pi l (r_1 + r_2) = \pi \times 6.18(2.5 + 1) = 21.63\pi$ cm^2 1 mark

CSA of hemisphere = $2\pi r^2$ $\frac{1}{2}$ mark

$= 2\pi(1)^2 = 2\pi$ cm^2 $\frac{1}{2}$ mark

Total surface area of shuttle cock = $21.63\pi + 2\pi$ $\frac{1}{2}$ mark

$= 74.26$ cm^2 $\frac{1}{2}$ mark

30. first make classes continuous 1 mark

Length(in mm)	No. of leaves(f)	cf
117.5 - 126.5	3	3
126.5 - 135.5	5	8
135.5 - 144.5	9	17
144.5 - 153.5	12	29
153.5 - 162.5	5	34
162.5 - 171.5	4	38
171.5-180.5	2	40

$\frac{n}{2} = 20$, median class=144.5 – 153.5, l = 144.5 1 mark

h= 9, f = 12, cf = 17

median = $l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$ 1 mark

$= 144.5 + \frac{(20-17)}{12} \times 9$ 1 mark

$= 144.5 + 2.25$ 1 mark

$= 146.25$ 1 mark