SAMPLE PAPER –2 (SA II)

MR SANDESH KUMAR BHAT KV 1 JAMMU

Mathematics

CLASS : X

Time: 3hrs Max. Marks: 90

General Instruction:-

1. All questions are Compulsory.

1. The question paper consists of 34 questions divided into 4 sections, A,B,C and D. Section – A comprises of 8 questions of 1 mark each. Section-B comprises of 6 questions of 2 marks each and Section- D comprises of 10 questions of 4 marks each.
2. Question numbers 1 to 8 in Section –A multiple choice questions where you are to select one correct option out of the given four.
3. There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.
4. Use of calculator is not permitted.

SECTION – A

Question number 1 – 8 are multiple choice type questions carrying 1 mark each. For each question four alternative choices have been given, of which only one is correct. You have to select the correct choice.

Q1.If x = -2 is the root of quadratic equation x^2-3x-a=0 then the value of a is

(a) -10 (b) 3 (c) 10 (d) -3

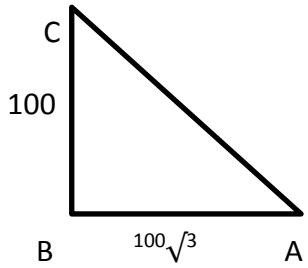
Q2. The missing term of the A.P:-3, □, 33, 48……is

(a) 12 (b) 15 (c) 18 (d) 21

Q3. If angle between two radii of a circle is 110° the angle between the tangents at the end of the radii is

(a) 70° (b) 50° (c) 10° (d) 40°

Q4.From the given figure find the angle of elevation 'A'



(a) 45° (b) 30° (c) 60° (d) 90°

Q5. If P (E) = 0.35 then the probability of not E is

(a) 0 (b) 0.45 (c) 0.65 (d) 0.53

Q6. The mid- point of a line segment joining the point A (-2, 8) and B (-6, -4) is

(a) (-4, -6) (b) (2, 6) (c) (4, 2) (d) (-4, 2)

Q7. If the perimeter and the area of a circle are numerically equal then the radius of the circle is

(a) 2 units (b) π units (c) 4 units (d) 7 units

Q8. Volume of two spheres is in ratio 64:27 the ratio of their radii is

(a) 3:4 (b) 4:3 (c) 9:16 (d) 16:9

SECTION – B

Question numbers 9 – 14 carry 2 marks each.

Q9. Find the value of K for which the equation $2x^2+Kx+3=0$ has two equal roots.

Q10. Find the roots of the quadratic equation $6x^2-x-2=0$ by factorization method.

Q11. Find the 10^{th} term of the A.P:- 2, 7, 12……

Q12. Two concentric circles of radii 5cm and 3cm. Find the length of the chord of the larger circle which touches the smaller circle.

Q13. Find a relation between x and y such that the point (x, y) is equidistant from the point (3, 6) and (-3, 4)

OR

Find the points on the x- axis which is equidistant from (2, -5) and (-2, 9)

Q14. In what ratio does the point (-4, 6) divide the line segment joining the points A (-6, 10) and B (3, -8).

SECTION – C

Question numbers 15 – 24 carry 3 marks each.

Q15. The sum of the 4^{th} and 8^{th} term of an A.P is 24 and the sum of the 6^{th} term and 10^{th} term is 44. Find the first three terms of the A.P .

Q16. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Q17. Draw a pair of tangents to the circle of radius 5cm which are inclined to each other at an angle of 60°.

Q18. The shadow of a tower standing on a level ground is found to be 40m longer when sun's altitude is 30° than when it is 60°. Find the height of the tower.

Q19. A child has a block in the shape of a cube with one word written on each face as.

learn	to	serve	go	come	to

(i) The block (cube) is thrown. What is the probability of getting word 'to'?

(ii) Use all words of the block (cube) to make a meaningful value base sentence

Q20. Find the value of k for which the points (7, -2), (5, 1) and (3, k) are collinear.

Q21. Show that the points (1, 7), (4, 2), (-1, -1) and (-4, 4) taken in order are the vertices of a square.

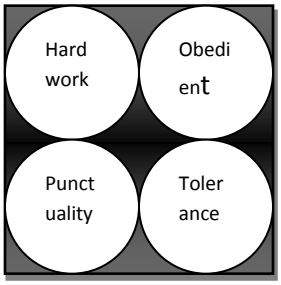
Q22. A toy is in the form of cone of radius 3.5cm mounted on a hemisphere of same radius.

The total height of the toy is 15.5cm. Find the total surface area of the toy.

Q23. (i) Find the area of the shaded region given in figure.

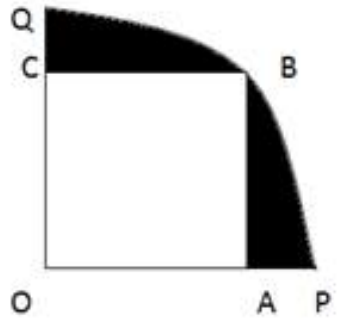
(ii) Write the four values given in the figure. Which value you consider important in student's life and Why?

14cm



14cm

Q24.In a fig. a square OABC is inscribed in a quadrant OPBQ. If OA=20cm. Find the area of the shaded region.



SECTION – D

Question numbers 25 to 34 carry 4 marks each

Q25.A plane left 30 minutes later than the schedule time and in order to reach its destination 1500km away in time. It has to increase its speed by 250km/h from its usual speed. Find its usual speed.

Q26. Sum of the areas of two squares is 468m^2. If the difference of their perimeter is 24m. Find the sides of the two Squares.

Q27. A sum of Rs 700 is to be used for giving seven cash prizes to students of a school for their overall academics performance. If each prize is Rs 20 less than its preceding prize. Find the value of each prizes.

Q28. Prove that the length of tangents drawn from an external point to a circle is equal.

Q29. Construct a triangle similar to a given triangle ABC with its sides equal to ¾ of the corresponding sides of the triangle ABC (i.e., of scale factor

.Q30. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30˚ which is approaching the foot of the tower with a uniform speed. Six seconds later the angle of depression of a car is found to be 60˚. Find the time taken by the car to reach the foo of the tower from this point.

Q31. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting.

(i) A king of red colour.
(ii) A face card.
(iii) A spade.
(iv) A black face card.

Q32. A car has two wipers which do not overlap. Each wiper has blade of length 25cm sweeping through an angle of 115˚. Find the total area cleaned at each sweep of the blades.

Q33. Water in a canal 6m wide 15m deep is flowing with a speed of 10km/h. how much area will it irrigate in 30 minutes? If 8cm of standing water is needed.

Q34. An open metal bucket is in theshape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet (see Fig. 13.23). The diameters of the two circular ends of the bucket are 45 cm and 25 cm, the total vertical height of the bucket is 40 cm and that of the cylindrical base is 6 cm. Find the area of the metallic sheet used to make the bucket, where we do not take into account the handle of the bucket. Also, find the volume of water the bucket can hold. (Take = 22/7)

SOLUTION SAMPLE PAPER 2

Section A

1. X^2-3x-a=0

Put X= -2

$(-2)^2$-(3)(-2)-a=0

4+6-a=0

10-a=0

a=10

2. Let missing term be x

-3,x,33,48,……a_n are in A.P

There for $a_2-a_1 = a_3- a_2$

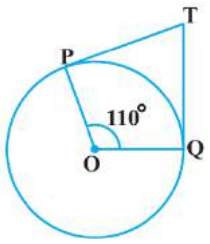
So, x-(-3)=33-x

=> x+3=33-x

=> 2x= 33-3

=> x= $\frac{30}{2} = 15$

Q 3.



In quad. . In Quad. In POQT .

$\angle P+\angle Q+\angle T+\angle O=360°$

$90^0 + 90^0 +\angle T +110^o = 360^o$

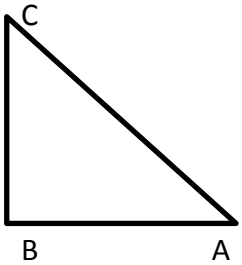
$\angle T= 70^o$

4.In ΔABC

$\tan A = \frac{BC}{AB} = \frac{100}{100\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\tan 30 = \tan A$

$\Rightarrow \angle A = 30^0$



5.P (E) = 0.35,

As we know that

⇨ P(not E) + P (E) = 1

⇨ P(not E) = 1- P (E)

= 1-0.35

So, = 0.65

Q6. Let P(x,y) be a mid point

Then by mid point formula.

X= $\frac{-6-2}{2} = -4$

Y= $\frac{8-4}{2} = 2$

Q7. Let 'r' is the radius of circle

Area of circle = Perimeter of circle

$\Pi r^2 = 2\Pi r$

r =2 units

Q8. Let 'r' be the radius of small sphere. And volume is 'v'

Therefore $v = 4/3\pi r^3$

Let 'R'be the radius of largest sphere and Volume is 'V'

$V = 4/3\pi R^3$

Now= $\frac{V}{v} = \frac{64}{27}$

= $=> \frac{R}{r} = \frac{4}{3}$

Section B

Q.9 As we know that

For equal and real roots

$b^2-4ac=0$

$k^2-24=0$

$k^2=24$

=> k= $\pm\sqrt{24}$ or $\pm 2\sqrt{6}$

Q.10 As $6x^2+3x-4x-2=0$

=> 3x (2x+1)-2(2x+1)=0

=> (3x-2)(2x+1)=0

=> X=3/2 or x=-1/2

Q11. It is given that a=2, n=10 and

$d=a_2-a_1$

⇨ 7-2=5

And

$A_n=a+(n-1)d$

⇨ $A_n = a+9d$

⇨ 2+9(5)

=> 2+45=47

Q.12

As AB is a tangent of the inner circle

$$\therefore OD \text{ perpendicular to } AB$$

$$\therefore AD = BD$$

From fig. $BD^2 + OD^2 = OB^2$

- ⇨ $BD^2 + 9 = 25$
- ⇨ $BD^2 = 25 - 9$
- ⇨ $BD^2 = 16$
- ⇨ $\therefore BD = \sqrt{16} = 4$ cm

Q.13 Let C (x,y) be a point. And it is given that A (3, 6) &B (-3, 4)

- ⇨ $AC^2 = CB^2$
- ⇨ $[(x-3)^2+(y-6)^2] = [(x+3)^2+(y-4)^2]$
- ⇨ $12x+4y-20=0$ or $3x+y-5=0$

OR

A (2,-5) B(-2,9)

Let P(x, 0) is the point on x –axis

So, PA=PB

By Distance formula

- ⇨ $\sqrt{(x-2)^2 + (0+5)^2} = \sqrt{(x+2)^2 + (0-9)^2}$
- ⇨ $\sqrt{(x-2)^2 + 25} = \sqrt{(x+2)^2 + 81}$
- ⇨ $X^2+4-4x+25 = x^2+4+4x+81$

So, x=-7

Q.14 Let line segment A (-6,10) and B (3,-8) is divided by (-4,6) in k:1

=> $-4 = 3k-6/k+1$

=> $-4k-4 = 3k-6$

=> $-4k-3k = -6+4$

=> $-7k = -2$

=> $k = 2/7$

So,

k:1 = -2:7

Or

Let ratio = k :1

By using y coordinate of $\left[\frac{m_2 x_1 + m_1 x_2}{m_1+m_2} , \frac{m_2 y_1 + m_1 y_2}{m_1+m_2}\right]$

We get

- ⇨ $6 = 10-8k/k+1$
- ⇨ $6k+6 = 10-8k$

  => $6k+8k = 10-6$
- ⇨ $14k = 4$
- ⇨ $K = 2/7$

Therefore

K: 1=2:7 result

SECTION C

Q.15 Let 'a' be the first term and 'd' is common difference

So accordind to statement

- ⇨ $a_4+a_8=24$ and $a_6+a_{10}=44$
- ⇨ $2a+10d=24$ _____(1)
- ⇨ $2a+14d=44$ _____(ii)

By subtraction (i) from (ii) we get, d =5, and put the value of 'd' in (i) we get a=-13 .

There fore

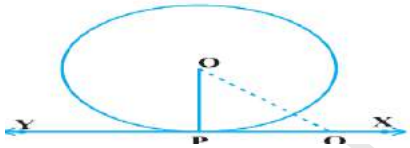
A.P is : -13,-8,-3 …….

Q.16

Solution: Take a point Q on XY other than P and join OQ

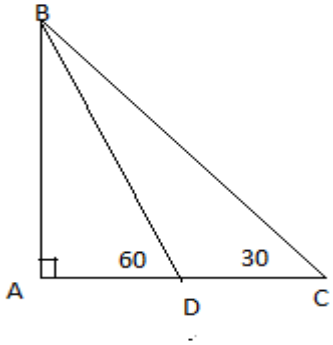
The point Q must lie outside the circle.

Note that if Q lies inside the circle, XY will become a secant and not a tangent to the circle). Therefore, OQ is longer than the radius OP of the circle. That is,



OQ > OP.

Since this happens for every point on the line XY except the point P, OP is the shortest of all the distances of the point O to the points of XY. So OP is perpendicular to XY.



Q.17 . In Quad. In AOBP .

$\angle A+\angle B+\angle P+\angle O=360°$

$\angle APB + \angle AOB= 180°$

$\angle AOB=120°$

Construction of tangents

1.Draw a circle with radius =5cm

2. Draw angle $\angle$ AOB=120 at O.

3. At A and B draw perpendiculars intersecting each other at P. h

Q.18

Let height of tower AB =h and AD = x

$\tan 30°=h/(x+40)$

$1/\sqrt{3}=h/(x+40)$

$\tan 60°=h/x$

$\sqrt{3} = h/x$

$h=\sqrt{3}x$

$\sqrt{3}\times\sqrt{3}x=x+40$

$2x=40$

$x=20$

$h=2\sqrt{3}m$

Q.19

P (E) = favorable outcomes/total outcomes

$P(E) = \frac{2}{6} = \frac{1}{3} =$

Come to learn go to serve

Q.20 A (7,-2) B (5, 1) C (3,3k)

=> Condition of collinear points

=> Ar. ΔABC=0

=> $1/2[x_1(y_2-y_3) +x_2(y_3-y_1) +x_3(y_1-y_2)]=0$

=> $[7(1-3k) +5(3k+2) +3(-2-1)]=0$

=> $7-21k+15k+10-9 =0$

=> $8-6k=0$

Therefore $K=4/3$

D(-4,4) C(-1,-1)

Q.21 diagonals of a square are equal.

AC = $\sqrt{(1+1)^2 + (7+1)^2} = \sqrt{68}$

BD = $\sqrt{(4+4)^2 + (2-4)^2} = \sqrt{68}$

$AB^2 + BC^2 = AC^2$

$(\sqrt{(1-4)^2 + (7-2)^2})^2 + (\sqrt{(4+1)^2 + (2+1)^2}$ [illegible]

$34 + 34 = 68$

By the converse of Pythagoras

$\angle B = 90^0$

Therefore quad. ABCD is a square.

Q.22 For cone

r=3.5 cm, h=12 cm

$l=\sqrt{3.5^2+12^2}$

$=12.5cm^2$

Total surface area=$\pi rl+2\pi r^2$

$=22/7+3.5*12.5+2*22/7*3.5$

$=214.5cm^2$

Q.23 Side of square = 14 cm,

Therefore area = side× side= 14 × 14 = 196 cm^2

Diameter of circle = 7 cm

Radius = 3.5 cm

Area of 4 circles = $4\times\pi r^2 = 4\times22/7 \times 3.5 \times3.5 =$ 154 cm^2

There fore area of shaded portion = area of sq.-area of 4 circles= 196-154= 42 cm^2

All the four values are important in students life because these are bases for successful life.

Q.24 Join OB , In right angled triangle OAB

=> $OB^2 = OA^2 + AB^2 = (20)^2 + (20)^2$

=> $OB^2 = 800$

=> OB = $\sqrt{800} = 20\sqrt{2}$

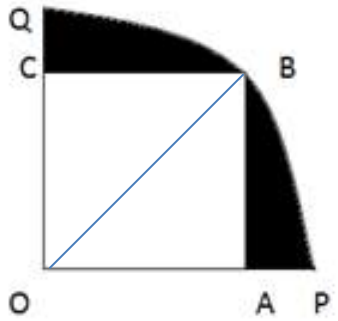
Area of sector= $\frac{90}{360} \times \pi r^2$

$= \frac{1}{4} \times \frac{22}{7} \times \left(20\sqrt{2}\right)^2$

$= 628\ cm^2$

Area of shaded region = Area of sector – area of square

= 628- 400



$= 228\ cm^2$

Section D

Let original speed = x km/h

Increase speed =(x+250) km/h

Acc. to question

1500/x-1500/(x+250)=1/2

X^2+250x=750000

X^2+250x-750000=0

X^2+1000x-750x-750000 =0

X(x+1000)-750(x+1000)=0

(x+1000)(x-750)=0

So, X= -1000, 750

Rejecting –ve speed of 1000 km/h

Therefore speed = 750 km/h

Q.26 Let side of smaller square =x

Perimeter= 4x

Perimeter of larger square =24+4x

Side=6+x

ATQ

$x^2 + (6+x)^2 = 468$

$x^2 + 36 + x^2 + 12x - 468 = 0$

$x^2 + 6x - 216 = 0$

$x^2 + 18x - 12x - 216 = 0$

$x(x+18) - 12(x+18) = 0$

$(x+18)(x-12) = 0$

$x = -18$ or 12

Reject -18

Sides 12m and 18m

Q.27 Let the first prize be of Rs x

The next prize will be Rs (x-20),(x-40)

x,(x-20),(x-40)…….

a=x d=-20

Sn=n/2[2a+ (n-1) d]

$S_7 = 7/2[2a-120] = 700$

a=160

The prizes are Rs160, Rs140, Rs120,

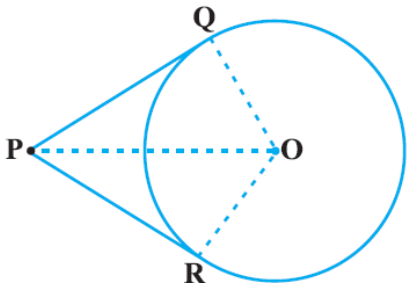
Rs100, Rs80, Rs60, Rs40

Q.28 Given: a circle ,with centre o. in which PQ, and PR are two tangents.

To prove : PQ= PR

Construction : Join OP ,OQ and OR **.**

Proof : We are given a circle with centre O, a point P lying outside the circle and two tangents



PQ, PR on the circle from P . We are required to prove that PQ = PR.

For this, we join OP, OQ and OR. Then

∠ OQP and ∠ ORP are right angles, because these are angles between the radii and tangents, and according to Theorem 10.1 they are right angles. Now in right triangles OQP and ORP,

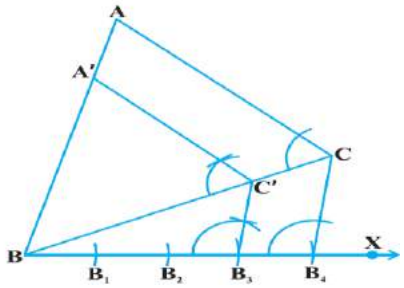
OQ = OR (Radii of the same circle)

OP = OP (Common)

Therefore, Δ OQP ≅ Δ ORP (RHS)

This gives PQ = PR (CPCT)

Q.29



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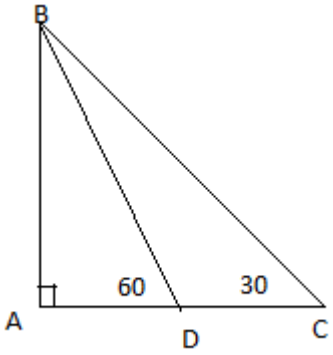
Steps of Construction

1. Draw any ray BX making an acute angle with BC on the side opposite to the vertex A.
2. Locate 4 (the greater of 3 and 4 in 3/4) points B_1, B_2, B_3 and B_4 on BX so that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.
3. Join B_4C and draw a line through B_3 (the 3rd point, 3 being smaller of 3 and 4 in 3/4) parallel to B_4C to intersect BC at C'.
4. Draw a line through $C^{/}$ parallel to the line CA to intersect BA at $A^{/}$

Then, triangle $A'BC^{'}$ is the required triangle.

Q.30

Let speed of the car=x m/sec
Let time taken to reach from D to A =v sec
Distance CD=6x
Distance AD=V x m
tan 30°=h/6x+vx
tan 60°=h/vx
(v+6)x /√3=vx√3
v=3
Time taken 3 seconds



Q.31 P (E) =favorable outcomes/total outcomes

P (E) =2/52=1/26

Sample space 4 kings + 4 queen + 4 jacks

P (fcard) 12/52=3/13

Favorable outcomes of spade=13

P (spade)=13/52=1/4

Black cards=03+03=6

P(E)=6/52=3/26

Q.32

Length of the blade **=** radius=25 cm

Sector angle=115°

Area swept by one blade=$\boldsymbol{\theta\pi}r^2/360$

So, Area swept by two wipers=(2×115×22×625)/360×7

=158125/126 cm^2 = 1254.96 cm^2

Q.33 Depth=1.5m

Width=6m

Volume=l×b×h

Speed=10km/h

=10,000m/h

Volume of water flowing in 1 Hour = Volume of cuboid of dimensions 10,000 m × 6m× 1.5 m

Now volume of water = l×b×h

=10,000×6×1.5 m^3 = 90,000 m^3

Volume of water flowing in canal in 30 minutes=45000m^3

Let area of the field being irrigated= x m^2

Area of field × height of water= 45000 m^3

⇨ Area of field ×8/100=45000

=> Area of field =5625900m^2

Q.34

The total height of the bucket = 40 cm, which includes the height of the base. So, the height of the frustum of the cone = (40 – 6) cm = 34 cm.

Therefore, the slant height of the frustum, $l = \sqrt{h^2 + (r_1 - r_2)^2}$

where r_1 = 22.5 cm, r_2 = 12.5 cm and h = 34 cm.

So, $l = \sqrt{34^2 + (22.5 - 12.5)^2}$

= 35.44 cm

The area of metallic sheet used = curved surface area of frustum of cone

+ area of circular base

+ curved surface area of cylinder

= [π × 35.44 (22.5 + 12.5) + π × $(12.5)^2$

+ 2π × 12.5 × 6] cm^2

= 22/7 (1240.4 156.25 150) cm^2

= 4860.9 cm^2