JAIPUR EDUCATION PLUS

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TIME ALLOWED : 3 HRS **M.M. = 90**

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 34 questions divided into four sections A, B, C and D.

(iii) Section A contains 8 questions of 1 marks each, which are MCQ. Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 10 questions of 4 marks each.

(iv) There is no overall choice in the paper. However, internal choice is provided in one question of 2 marks, three question of 3 marks and two questions of 4 marks.

(v) Use of calculator is not permitted.

SECTION – A

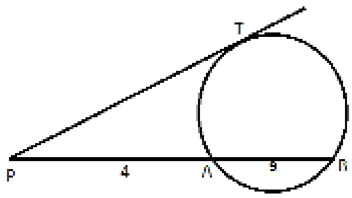
Choose the correct option

1. The roots of a quadratic equation $px^2 + 6x + 1 = 0$ have real roots then value of p is
(A) $p \geq 9$ (B) $p < 9$ (C) $p \leq 9$ (D) None of these

2. The number of terms in the AP 7,13, 19, …………., 205 are
(A) 35 (B) 36 (C) 38 (D) 34

3. For what value of k, 10, k-2 are in A.P.
(A) k=4 (B) k=3 (C) k=2 (D) k=1

4. In the figure given, PA= 4 cm, AB= 9 cm, then value of PT is



(A) 9 cm (B) 4 cm (C) 6 cm (D) None of these

5. The height of a tower is $\sqrt{3}$ times of its shadow. The angle of elevation of the source of height is
(A) 30^0 (B) 60^0 (C) 45^0 (D) None of these

6. The probability of selecting a queen of hearts is
(A) $\frac{1}{4}$ (B) $\frac{1}{52}$ (C) $\frac{1}{13}$ (D) $\frac{12}{13}$

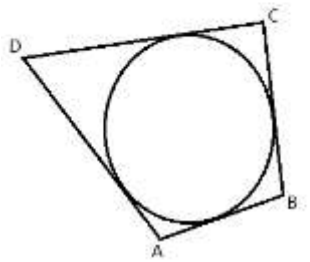
7. If the points P(1,2), Q(0,0) and R(a,b) are collinear, then
(A) a=b (B) a=2b (C) 2a=b (D) a= - b

8. A cone , a hemisphere and a cylinder stand on equal bases and have the same height then their volumes are in the ratio of
(A) 3:1:2 (B) 1:2:3 (C) 2:1:3 (D) 3:2:1

SECTION – B

9. Find the value of k, so that the quadratic equation kx(x-2) + 6 = 0 has two equal roots.

10. In the figure, a circle touches all the four sides of a quadrilateral ABCD whose sides are AB= 6 cm, BC = 9 cm and CD = 8 cm. Find the length of side AD.

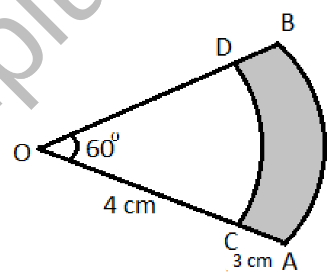


11. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

12. Draw a line segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that $\frac{AP}{AB} = \frac{3}{5}$

13. Two cubes each of volume 64 cm3 are joined end to end. Find the surface area of the resulting cuboid.
OR
A sphere of radius 8 cm is melted and recast into a right circular cone of height 32 cm. Find the radius of the base of the cone.

14. Calculate the area of the shaded region shown in the figure.

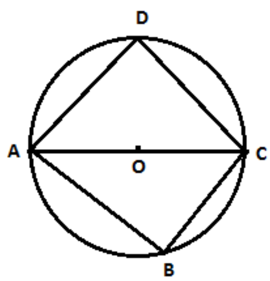


SECTION – C

15. Find the roots of the quadratics equation $3x^2 - 4\sqrt{3}x + 4 = 0$

16. The sum of three numbers of AP is 3 and their product is -35. Find the numbers.
OR
Which term of the AP 3, 10, 17, ……….. will be 84 more than its 13^{th} term?

17. In the given figure, AOC is a diameter of the circle. If AB= 7cm, BC = 6 cm and CD = 2cm. Find the perimeter of the cyclic quadrilateral ABCD.



18. Draw a pair of tangents to a circle of radius 3 cm, which are inclined to each other at an angle of 60^0.
OR
Draw a right triangle in which the sides(other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{3}{5}$ times the corresponding sides of the given triangle.

19. The shadow of a tower standing on a level ground is found to be 40m longer when the sun's altitude is 30^0 than when it is 60^0. Find the height of the tower.

20. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, determine the number of blue balls in the bag.
OR
What is the probability that a leap year, selected at random will contain 53 Sundays?

21. Find the ratio in which the segment joining the points (-3,10) and (6,-8) is divided by (-1,6)

22. Find the area of the quadrilateral whose vertices taken in order are (-4,-2); (-3,-5); (3,-2);(2,3)

23. The circumference of a circle is 88 cm. Find the area of the sector, whose angle at the centre is 45^0.

24. A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

SECTION – D

25. Solve for x.
$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, \quad a+b \neq 0$$
OR
A plane left 30 minutes later than the schedule time and in order to reach its destination 1500 km away in time, it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.

26. Find the sum of all natural numbers between 250 and 1000 which are exactly divisible by 3.

27. Which term of the sequence 20, $19\frac{1}{4}$, $18\frac{1}{2}$, $17\frac{3}{4}$,... is the first negative term?

28. A circle is touching the side BC of ΔABC at P and touching AB and AC produced at Q and R respectively. Prove that AQ = $\frac{1}{2}$ (Perimeter of ΔABC)
OR
If all the side of a parallelogram touch a circle, show that the parallelogram is a rhombus.

29. From the top of a building 60m. high the angles of depression of the top and the bottom of a tower are observed to be 30^0 and 60^0. Find the height of the tower.

30. The king, queen and jack of clubs are removed from a deck of 52 playing cards and the well shuffled. One card is selected from the remaining cards. Find the probability of getting
(i) a king (ii) a heart (iii) a club (iv) the '10' of hearts.

31. Find the value of 'k' for the points (7,-2);(5,1);(3,k); are collinear

32. A gulab jamun, contains sugar syrup up to about 30% of its volume . Find approximately, how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm.

33. Water is flowing at the rate of 5 km/hr through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Determine the time in which the level of the water in the tank will rise by 7 cm.

34. A toy is in the form of a cone mounted on hemisphere of diameter 7 cm. The total height of the toy is 14.5 m. Find the volume and the total surface area of the toy.

SA-II

MARKING SCHEME

CLASS-X (MATHS)

EXPECTED ANSWERS/VALUE POINTS

MARKING SCHEME FOR SA-2

SECTION-A

Q. No.	Solution	Marks
1.	(C)	1
2.	(D)	1
3.	(A)	1
4.	(C)	1
5.	(B)	1
6.	(B)	1
7.	(C)	1
8.	(B)	1

SECTION - B

Q. No.	Solution	Marks
9.	Since, we know that for equal roots	1
	D=0	
	Or, $b^2-4ac=0$	
	Or, $(-2k)^2-4 \times k \times 6=0$	
	Or, $4k^2-24k=0$	1
	Or, $4k(k-6)=0$	
	Or, $4k=0$, or $k-6=0$	
	Or, $k=0$, or $k=6$	
	Or, $k=0, 6$ Ans.	
10.	Here the circle touches the all sides of the Quadrilateral	1
	So, AB+CD=AD+BC	
	Or, 6+8=AD+9	1
	Or, AD=14 – 9 = 5cm Ans.	
11.	Required Fig., Given and to prove	1
	Proof:	1
12.		1
	Drawing $\overline{AB}$=7cm	
	Correct division by any method	
	Correct location of point i.e; AP/AB=3/5	1
13.	∵ vol. of the cube=side^3	1
	or, 64 = side^3	
	∴ side of the cube= $\sqrt[3]{64}$ =4cm	
	Now S.A of the resultant cuboid=2(lb+bh+hl)	1
	=2(8x4+4x4+4x8)	
	=2(32+16+32)	
	=2(80)	
	=160 cm^2 Ans.	
	Or	1
	By question	
	Vol.of the cone = vol.of the sphere	
	Or, $1/3\pi r^2h = 4/3\pi R^3$	
	Or, $r^2 \times 32 = 4 \times 8 \times 8 \times 8$	1
	∴ r = 8cm	
	so, the radius of the base of the cone=8cm Ans.	
14.	Ar. of the shaded portion $=\frac{\theta}{360} \times \pi(R^2-r^2)$	1
	$=(60/360) \times (22/7)(7^2-4^2)$	

$=1/6 \times 22/7 \times 33$ 1

$= 17.28cm^2$ Ans.

15. $\because x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ and putting the correct value 1

$= \frac{-(-4\sqrt{3}) \pm \sqrt{(-4\sqrt{3})^2 - 4 \times 3 \times 4}}{2 \times 3}$ 1

$= \frac{4\sqrt{3} \pm 0}{6}$ 1

$= \frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}$ Ans

16. Let the three nos. of the AP are 1

$\alpha-\beta, \alpha, \alpha+\beta$

By queston, 1

$\alpha-\beta+\alpha+\alpha+\beta = 3$

or, $3\alpha = 3$

$\therefore \alpha = 1$

And $(\alpha-\beta) \times \alpha \times (\alpha+\beta) = -35$ 1

or, $\alpha(\alpha^2-\beta^2) = -35$

Putting the value of $\alpha=1$ then

$1(1-\beta^2) = -35$

or, $-\beta^2 = -36$

or, $\beta = \pm 6$

hence the no. are 7,1,-5,or,-5,1,7 respectively. Ans.

Or

Here $t_{13} = a+12d$ 1

$= 3+12(7)$

$= 87$

Let $t_n = t_{13}+84$ 1

or, $a+(n-1)d = 87+84$

or, $3 + (n-1)7 = 171$

or, $(n-1) = 168/7 = 24$ 1

or, $n = 25$

$\therefore$ the required term=25^{th} Ans.

17. Since, AOC is a diameter of the circle. 1

$\therefore \angle ABC = 90^0$

so, in right triangle ABC

$AC^2 = 7^2+6^2$

$= 85$

Similarly, $\angle ADC = 90^0$ 1

So, in right triangle ADC

$AD^2 = AC^2 - CD^2$

$= 85-4$

$= 81$

$\therefore$ AD=9 cm

So, the perimeter of the cyclic Quad.ABCD=(7+6+2+9) cm 1

=24cm Ans.

18. Constructing 120^0 at the centre with radii 1

Drawing tangents at the end of radii 1

Angle 60^0 between both tangents at the intersection point 1

Or

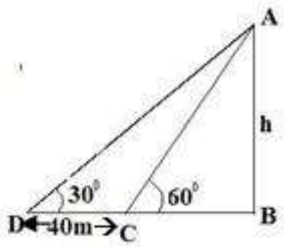
For drawing correct triangle 1

For correct construction steps for making similar triangle 1

Required triangle whose sides are 3/5 times the corresponding sides 1

19. 1

For correct figure.



In triangle ABC, $\tan 60^0 \frac{AB}{BC}$ 1

Or $\sqrt{3} = \frac{h}{BC}$

$\sqrt{3} = \frac{h}{x}$

$\therefore$ h $=\sqrt{3}\,x$

Now in triangle ABD 1

$\tan 30^0 = \frac{h}{40+x}$

or, $\frac{1}{\sqrt{3}} = \frac{\sqrt{3}x}{40+x}$

or, $x = 20$

$\therefore$ h$=20\sqrt{3}$m Ans.

20 Here , no. Of red balls=5 1

let no. Of blue balls = x

$\therefore Total\ no. of\ balls = (5 + x)$

By question, 1

P(B) = 2P(R)

or, $\frac{x}{5+x} = 2\left(\frac{x}{5+x}\right)$

or, $x = 10$ 1

so, No. Of blue balls=10 Ans.

or

In a leap year =366 days= 52 weeks and 2 days 1

The remaining two days can be

(i) SUN, MON (v) THU, FRI

(ii) MON, TUE (vi) FRI, SAT

(iii) TUE, WED (vii) SAT, SUN

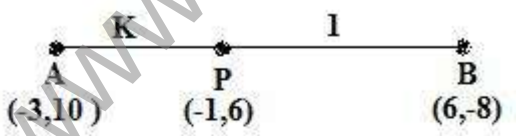
(iv) WED, THU

There are total seven possibilities i.e. n (s) = 7 1

and n(E) = 2 i.e. SUN, MON & SAT, SUN

$\therefore$ P(E)$= \frac{n(E)}{n(s)} = \frac{2}{7}$ Ans. 1

21. 1

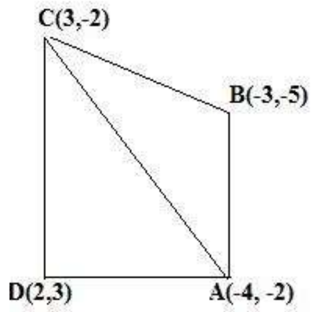


By question, $-1 = \frac{6k-3\,X1}{k+1}$ 1

k $= \frac{2}{7}$ 1

Hence required ration is 2:7

22.



Ar. Of $\Delta ABC = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

$= \frac{1}{2}[-4(-5+2) + (-3)(-2+2) + (-4)(-2-3]$

$= \frac{21}{2}\ unit^2$

Ar. Of $\Delta CDA = \frac{1}{2}[3(3+2) + 2(-2+2) + (-4)(-2-3]$ 1

$= \frac{35}{2}\ unit^2$

so, Ar. Of qua. ABCD = $\frac{21}{2} + \frac{35}{2} = 28\ unit^2$ Ans. 1

23. Since, the Circumference of the circle = 88 cm 1

or, $2\pi r = 88$

$\therefore r = \frac{88\ X\ 7}{44} = 14\ cm$

So, Ar. of the required sector = $\frac{\theta}{360}\pi r^2$ 1

$= \frac{45}{360}\ X\ \frac{22}{7}\ X\ 14\ X\ 14$ 1

$= 77\ cm^2$

24. Vol. Of Glass (Shaped frustum of a cone) = $\frac{1}{3}\pi(R^2 + r^2 + Rr)h$ 1

$= \frac{1}{3}\ X\ \frac{22}{7}\ (2^2 + 1^2 + 2\ X\ 1)14$ 1

$= \frac{1}{3}\ X\ \frac{22}{7}\ X\ 7\ X\ 14$ 1

=102.67 cm^3

SECTION - D

25. $\frac{1}{a+b+x} - \frac{1}{x} = \frac{1}{a} + \frac{1}{b}$ 1

or, $\frac{x-(a+b+x)}{x\ (\ a+b+x)} = \frac{a+b}{ab}$ 1

or, $\frac{-(a+b)}{x\ (\ a+b+x)} = \frac{a+b}{ab}$ 1

or, $x(a+b+c) + ab = 0$

or, $x^2 + ax + bx + ab = 0$

or, $x(x+a) + b(x+a) = 0$ 1

or, $(x+a)(x+b) = 0$

$\therefore$ $x = -a$ or $x = -b$ Ans.

Or

Let the usual speed of the plane be x km/hr. 1

Then, By question,

$\frac{1500}{x} - \frac{1500}{x+250} = \frac{1}{2}$

or, $x^2 + 250x - 750000 = 0$ 1

or, $(x+1000)(x-7500 = 0$ 1

Or, $x = -1000\ (rejected)\ or,\ \ x = 750$ 1

Hence, the usual speed of the plane is 750 km/hr. Ans.

26. Required nos. are 252,255, 258, ……..999 1

Here, a + (n-1)d=999 1

or, 252 + (n-1)3=999 1

$\therefore n = 250$

So, Required sum = $s_n = \frac{n}{2}\{a + l\} = \frac{250}{2}(252 + 999) = 156375.$ Ans. 1

27. Let the n^{th} term of the given AP be the first negative term. 1

Then $a_n < 0$

or, a +(n-1)d<0 1

or, 20 +(n-1) $(-\frac{3}{4}) < 0$

or, 83 -3n <0 1

or, 3n > 83

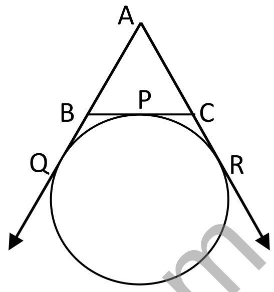
or, $n > \frac{83}{3}$

or, $n > 27\frac{2}{3}$ 1

$\therefore n \geq 28$

Thus, 28[th] term of the given sequence is the first negative term. Ans.

28. Required fig. 1



Since, tangents from an external point to a circle are equal in length 1

$\therefore$ BP = BQ -----------(i)

CP = CR -----------(ii)

And, AQ =AR -----------(iii)

or, AB + BQ = AC + CR 1

or, AB + BP = AC + CP

Now, Perimeter of $\Delta\, ABC = AB + BC + AC$ 1

= AB + (BP +PC) + AC

= (AB + BP) + (AC +PC)

= 2 (AB+BP)

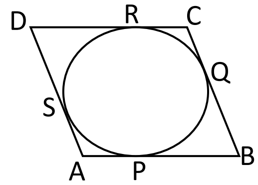
= 2(AB+BQ)

= 2AQ

$\therefore AQ = \frac{1}{2}(Perimeter\ of\ \Delta ABC)$ Proved.

Or

Required fig. 1



We know that the tangents to a circle from an external point are equal in length. 1

$\therefore AP = AS$ --------------(i)

BP = BQ -------------(ii)

CR = CQ -----------(iii)

DR =DS ------------(iv)

Adding (i), (ii), (iii) & (iv), we get 1

(AP+BP) + (CR+DR)= (AS+DS) + (BQ+CQ)

or, AB + CD = AD +BC

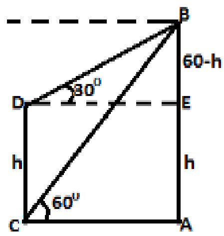
or, 2AB = 2BC 1

or, AB = BC

so, AB = BC = CD = AD

⇨ ABCD is a rhombus. Proved.

29. For correct fig.



Let AB = Building, CD = Tower 1

In, $\Delta\, DEB$,

$\tan 30^0 = \frac{BE}{DE}$

or, $\frac{1}{\sqrt{3}} = \frac{60-h}{x}$

$\therefore\ x = (60-h)\sqrt{3} ------(i)$

In, ΔCAB, 1

tan60^0= $\frac{AB}{CA}$

or, $\sqrt{3} = \frac{60}{x}$

$\therefore x = \frac{60}{\sqrt{3}}$ -------------(ii)

By (i) & (ii) 1

(60-h)$\sqrt{3} = \frac{60}{\sqrt{3}}$

h=40 m

Thus, the height of the tower is 40m. Ans.

30 Here, n(s) =49 1

(i) P(E_1) = $\frac{n(E_1)}{n(s)} = \frac{3}{49}$

(ii) P(E_2) = $\frac{n(E_2)}{n(s)} = \frac{13}{49}$ 1

(iii) P(E_3) = $\frac{n(E_3)}{n(s)} = \frac{10}{49}$ 1

(iv) P(E_4) = $\frac{n(E_4)}{n(s)} = \frac{1}{49}$

31 Three points are collinear if $\frac{1}{2}[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)] = 0$ 1

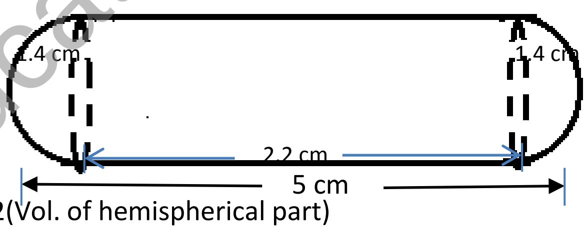
or, $\frac{1}{2}[7(1-k)+5(k+2)+3\,(-2-1)] = 0$ 1

or, -2k + 8 =0 1

or, k=4 1

$\therefore k = 4\ \ Ans.$

32. For correct Fig.



Vol. of 1 Gulab Jamun= Vol. of cylindrical part + 2(Vol. of hemispherical part) 1

$= \pi r^2 h + 2\left(\frac{2}{3}\pi r^3\right)$

$= \pi r^2 + \left(h + \frac{4}{3}r\ \right)$

= $\frac{22}{7}$x 1.4 x 1.4 [2.2 + $\frac{4}{3}$x 1.4]

= 25.05 cm^3

So, vol. of 45 gulab jamuns = 45 x 25.05 = 1127.28 cm^3

Hence, Vol. of sugar syrup = 30/100 x 1127.28 = 338.18 cm^3 = 338 cm^3 (approx.) 1

33 Let the level of the water in the tank will rise by 7cm in x hrs

So, vol of the water flowing through the cylindrical pipe in x hrs = $\pi r^2 h$ 1

$= \frac{22}{7} \times \left(\frac{7}{100}\right)^2 \times 5000\,x$ m^3

= 77 x m^3 1

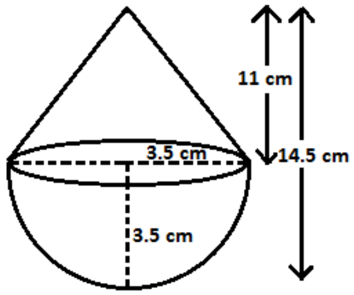
Also, Vol of water that falls into the tank in x hrs = 50 x 44 x $\frac{7}{100}$ m^3 = 154 m^3

By ques 77 x = 154

x = 2

So, the level of the water in the tank will rise by 7 cm in 2 hours 1

34



for correct figure 1 marks

Radius of hemisphere = 7/2 = 3.5 cm

Height of cone = (14.5 – 3.5)

=11cm

Slant height of cone = $\sqrt{r^2 + h^2}$

=$\sqrt{(3.5)^2 + (11)^2}$

=11.55 cm 1

Now, vol of toy = Vol of hemisphere + Vol of cone

= $\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$

=$\frac{1}{3}\pi r^2(2r + h)$

=$\frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}(2 \times \frac{7}{2} + 11)$ cm^3

= 231 cm^3 1

And, TSA of the Toy = SA of hemisphere + SA of cone

= 2 $\pi r^2 + \pi r l$

= $\pi r(2r + l)$

=$\frac{22}{7} \times \frac{7}{2}(2 \times \frac{7}{2} + 11.55)$

=204.05 cm^2 1