CODE:- AG-TS-4-9999 पजियन क्रमांक **REGNO:-TMC -D/79/89/36**

GENERAL INSTRUCTIONS :

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four sections A,B,C and D. Section – A comprises of 8 question 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 10 questions of 4 marks each.
3. Question numbers 1 to 8 in Sections – A are multiple choice questions where you are to select one correct option out of the given four.
4. 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 mark each. You have to attempt only one lf the alternatives in all such questions.
5. Use of calculator is not permitted.

सामान्य निर्देश :

1. सभी प्रश्न अनिवार्य हैं।
2. इस प्रश्न पत्र में 34 प्रश्न है, जो चार खण्डों में अ, ब, स व द में विभाजित है। खण्ड – अ में 8 प्रश्न हैं और प्रत्येक प्रश्न 1 अंक का है। खण्ड – ब में 6 प्रश्न हैं और प्रत्येक प्रश्न 2 अंको के हैं। खण्ड – स में 10 प्रश्न हैं और प्रत्येक प्रश्न 3 अंको का है। खण्ड – द में 10 प्रश्न हैं और प्रत्येक प्रश्न 4 अंको का है।
3. प्रश्न संख्या 1 से 8 बहुविकल्पीय प्रश्न हैं। दिए गए चार विकल्पों में से एक सही विकल्प चुनें।
4. इसमें कोई भी सर्वोपरि विकल्प नहीं है, लेकिन आंतरिक विकल्प 1 प्रश्न 2 अंको में, 3 प्रश्न 3 अंको में और 2 प्रश्न 4 अंको में दिए गए हैं। आप दिए गए विकल्पों में से एक विकल्प का चयन करें।
5. कैलकुलेटर का प्रयोग वर्जित है।
6. इस प्रश्न–पत्र को पढ़ने के लिऐ 15 मिनिट का समय दिया गया है। इस अवधि के दौरान छात्र केवल प्रश्न–पत्र को पढेंगे और वे उत्तर–पुस्तिका पर कोई उत्तर नहीं लिखेंगें।

PRE-BOARD EXAMINATION 2012 -13

MATHEMATICS ***CLASS X*** ***(SA- 2)***

Time : 3 to $3\frac{1}{4}$ Hours — अधिकतम समय : 3 से $3\frac{1}{4}$

Maximum Marks : 90 — अधिकतम अंक : 90

Total No. Of Pages : 4 — कुल पृष्ठों की संख्या : 4

NOTE : -THE QUESTION PAPER WILL INCLUDE QUESTION(S) BASED ON VALUES TO THE EXTENT OF 3-5 MARKS.

SECTION A

Q.1 If one root of the equation $ax^2 + bx + c = 0$ is three times the other, then
(a) $2b^2 = 9ac$ (b) $b^2 = 16ac$ (c) $b^2 = ac$ (d) $3b^2 = 16ac$. Ans d

Q.2 All Aces, Jacks and Queens are removed from a deck of playing cards. One card is drawn at random from the remaining cards. then the probability that the card drawn is not a face card.
(A) 1/10 (B) 1/9 (C) $\frac{9}{10}$ (D) none Ans c

Q.3 Two tangents TP and TQ are drawn from an external point T to a circle with centre at O, as shown in Fig. 2. If they are inclined to each other at an angle of 80° then what is the value of ∠POQ?

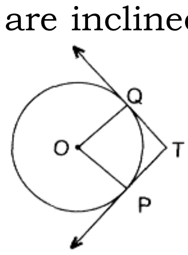

Fig. 2

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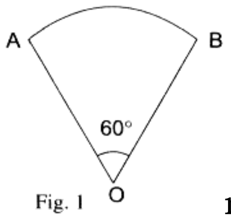
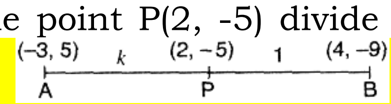
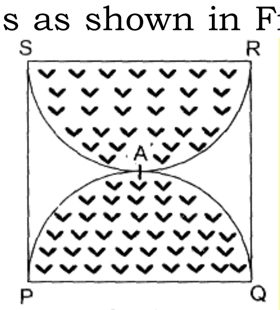
	(A) 60° (B) 110° (C) 100° (D) 80° Ans C
Q.4	If the numbers a, b, c, d, e form an AP , then the value of $a-4b+6c-4d+e$ is (a) 1 (b) 2 (c) 0 (d) none of these Ans : c
Q.5	What is the distance between two parallel tangents of a circle of radius 4 cm? (A) 12 cm (B) 4 cm (C) 8 cm (D) none Ans c
Q.6	If Figure is a sector of a circle of radius 10.5 cm, find the perimeter of the sector. (Take π = 22/7)  Fig. 1 n (A) 32 cm (B) 11 cm (C) 66 cm (D) none Ans a
Q.7	An electrician has to repair an electric fault on a pole of height 6 m. he needs to reach a point 2.54 m below the top of the pole. What should be the length of ladder that he should use which when inclined at an angle of 60^0 to the horizontal would enable him to reach the desired point? (take $\sqrt{3}=1.73$) (a) 3.46 m (b) 4 m (c) 5.19 m (d) 7.5 m Ans.b
Q.8	The length of the tangent from a point A at a distance of 5 cm from the centre of the circle is 4 cm. What will be the radius of the circle? (A) 3 cm (B) 4 cm (C) 3 m (D) none Ans a
	SECTION B
Q.9	In what ratio does the point P(2, -5) divide the line segment joining A(-3, 5) and B(4,-9)? **Sol.**  Let AP : PB = k : 1 Coordinates of P = Coordinates of P $\left(\frac{4k-3}{k+1}, \frac{-9k+5}{k+1}\right)$ = (2, - 5) .. .(Using Section formula) $\therefore \frac{4k-3}{k+1}=\frac{2}{1}$ ⇒ 4k - 3 = 2k + 2⇒ *4k* - *2k* = *2* + *3* ⇒2k = 5⇒ *k* = 5/2 ∴ Required Ratio = k : 1 = 5/2 **: 1 = 5 : 2**
Q.10	PQRS is a square land of side 28 m, Two semicircular grass covered portions are to be made on two of its opposite sides as shown in Figure 4. How much  area will be left uncovered? (Take π= 22/7) Fig. 4 **Sol.** Area left uncovered = Area (square PQRS) - 2 Area (semicircle PAQ) $= (28 \times 28)\ \text{m}^2 - 2\left(\frac{\pi}{2}(14)^2\right)\text{m}^2$ $= \left(784 - \frac{22}{7} \times 14 \times 14\right)\text{m}^2$ $= (784 - 616)\ \text{m}^2$ $= \mathbf{168\ m^2}$ $\left[\begin{array}{l} \because \text{Ar. of Square} = (\text{side})^2 \\ \text{Ar. of Circle} = \pi r^2 \\ \text{Side} = 28\ \text{m} \\ \text{Radius} = r = \frac{28}{2} = 14\ \text{m} \end{array}\right]$
Q.11	Prove that the point (a, 0), (0, b) and (1, 1) are collinear if $\frac{1}{a}+\frac{1}{b}=1$. **OR** Find a point on the y-axis which is equidistant from the points A(6,5) and B(-4, 3).Sol. Let (0, *y)* be a point on the y-axis equidistant from A (6, 5) and B (-4, 3)

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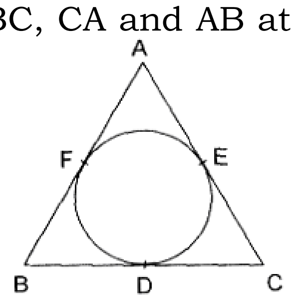
	$\Rightarrow$ $PA = \sqrt{(6-0)^2 + (5-y)^2} = \sqrt{y^2 - 10y + 61}$ ... [Using Distance formula] $PB = \sqrt{(-4-0)^2 + (3-y)^2} = \sqrt{y^2 - 6y + 25}$ Now, PA = PB $\Rightarrow (PA)^2 = (PB)^2$ ...(Squaring both sides) $\Rightarrow y^2 - 10y + 61 = y^2 - by + 25 \Rightarrow y^2 - 10y - y^2 + 6y = 25 - 61 \Rightarrow -4y = -36$ $\Rightarrow y = 9$ $\therefore$ Required point is (0, 9)
Q.12	A bag contains 5 red balls, 8 green balls and 7 white balls. One ball is drawn at random from the bag. Find the probability of getting : (i) a white ball or a green ball. (ii) neither a green ball nor a red ball.**Sol.** Total number of balls = 5 + 8 + 7 = 20 (i)P (white or green ball) $= \frac{15}{20} = \frac{3}{4}$ *(ii)* P (neither green nor red) $= \frac{7}{20}$
Q.13	Solve for x : $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3} (x \neq 2,4)$. Ans $x = 5, \frac{5}{2}$
Q.14	Determine an A.P. whose 3rd term is 16 and when 5th term is subtracted from the 7th term, we get 12.**Sol.** Let the A.P. be *a, a + d, a + 2d,.........a* is the first term and *d* is the common difference . Using $a_n = a + (n-1)d$ **A.T.Q.** $a + 2d = 16 (a_3 = 16)$...(ii) $(a + 6d) - (a + 4d) = 12 (a_7 - a_5 = 12)$ ...(ii) From (ii), $a + 6d - a - 4d = 12$. $2d = 12 \Rightarrow d = 6$ Putting the value of *d* in (i), we get $a = 16 - 2d \Rightarrow a = 16 - 2(6) = 4$ $\therefore$.Required A.P. = 4,10,16,22,.........
	SECTION C
Q.15	A circle touches the side BC of a ΔABC at a point P and touches AB and AC when produced at Q and R respectively. Show that: AQ $= \frac{1}{2}$(Perimeter of ΔABC) . OR In Fig. 3 the in-circle of ΔABC touches the sides BC, CA and AB at D, E, and F respectively. If AB = AC, prove that BD = CD.  **Sol.** **Given :** The incircle of ΔABC touches the sides BC, CA and AB at D, E and F respectively. AB = AC **To prove :** BD = CD **Proof**: Since the lengths of tangents drawn from an external point to a circle are equal $\therefore$ We have AF = AE ...(i)BF = BD ...(ii)CD = CE ...(iii) Adding (i), (ii) and *(iii)*, we get AF + BF + CD = AE + BD + CE $\Rightarrow$AB+CD= AC + BD But AB=AC, .(Given) $\therefore$ CD = BD
Q.16	A vertical tower stands on a horizontal plane and is surmounted by vertical flag staff of height 5 meters. At a point on the plane, the angle of elevation of the bottom and the top of the flag staff are respectively 30^0 and 60^0 find the height of tower. ANS :Let AB be the tower of height h metre and BC be the height of flag staff surmounted on the tower, Let the point of the place be D at a distance x meter from the foot of the tower in ΔABD

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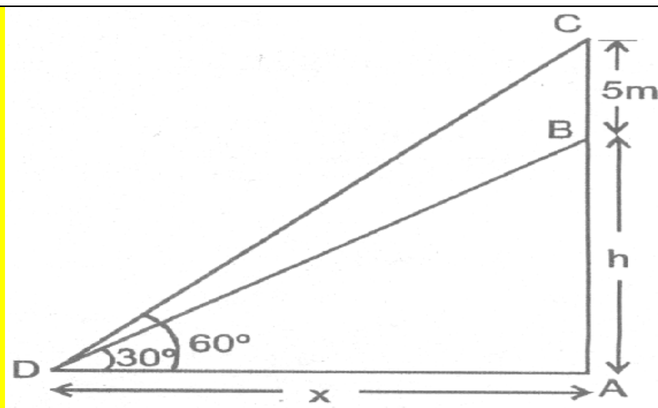
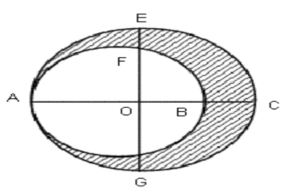
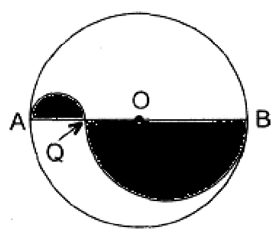
	 $\tan 30^0 = \frac{AB}{AD}$ $\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x} \Rightarrow x = \sqrt{3}h$ …..(i) In ΔABD $\tan 60^0 = \frac{AC}{AD}$ $\Rightarrow \sqrt{3} = \frac{5+h}{x} \Rightarrow x = \frac{5+h}{\sqrt{3}}$ …….(ii)From (i) and (ii) $\Rightarrow \sqrt{3}h \frac{5+h}{\sqrt{3}} \Rightarrow 3h = 5+h \Rightarrow 2h = 5 \Rightarrow h = \frac{5}{2} = 2.5m$ So, the height of tower = 2.5 m
Q.17	In the given figure, O is the centre of the bigger circle and AC is its diameter. Another circle with AB as diameter is drawn. If AC=54 cm and BC=10 cm, Find the area of the shaded region.  Ans 770cm **OR** Find the area of the shaded region of Fig. 8, if the diameter of the circle with centre O is 28 cm and AQ = $\frac{1}{4}$AB.  Fig. 8 Sol. Diameter AQ = 1/4 x 28= 7cm $\Rightarrow r = \frac{7}{2}$cm . Diameter QB = $\frac{3}{4}$ x 28 = 21 cm $\Rightarrow$ R = $\frac{21}{2}$ cm Area of shaded region = $\frac{1}{2}(\pi r^2 + \pi R^2)$ = $\frac{\pi}{2}(r^2 + R^2) = \frac{1}{2} \cdot \pi\left[\left(\frac{7}{2}\right)^2 + \left(\frac{21}{2}\right)^2\right] = \frac{1}{2} \times \frac{22}{7} \times \left(\frac{49}{4} + \frac{441}{4}\right) = \frac{1}{2} \times \frac{22}{7} \times \left(\frac{49+441}{4}\right) = \frac{11}{7} \times \frac{490}{4} = \frac{770}{4}$ = 192.5 cm^2.
Q.18	The Points A(2, 9), B(a, 5), C(5, 5) are the vertices of a triangle ABC right angled at B. Find the value of ‘a’ and hence the area of ΔABC .Ans Δ ABC is right angled triangle ; right angled at B, BY pythagoras theorem , we get $(AC)^2 = (AB)^2 + (BC)^2$ Using distance formula , we have $\{(5-2)^2 + (5-9)^2\} = \{a-2)^2 + (5-9)^2\} + \{(5-a)^2 + (5-5)^2\}$ 9 + 16 = $a^2 + 4 - 4a + 16 + 25 + a^2 - 10a$ $25 = 2a^2 - 14a + 45$ $2a^2 - 14a + 20 = 0 = a^2 - 7a + 10 = 0$ $a^2 - 5a - 2a + 10 = 0$ $a(a-5) - 2(a-5) = 0 \Rightarrow (a-2)(a-5) = 0 \Rightarrow$ Either a – 2 = 0 or a -5 = 0.a = 2 or a = 5 but a cannot be 5 . [if a =5, then point B and C coincides a=2 Now $area(\Delta ABC) = \frac{1}{2} \times AB \times BC = \frac{1}{2}\sqrt{[(2-2)^2 + (9-5)^2]} \times \sqrt{[(5-2)^2 + (5-5)^2]} =$ $\frac{1}{2} \times 4 \times 3 = 6 sq.units$
Q.19	If the 10th term of an A.P. is 47 and its first term is 2, find the sum of its first 15 terms. **Sol.** Let a be the first term and d be the common difference of an A.P. $a_{10} = 47$, $a = 2$ (Given) , …(i) $\Rightarrow a + 9d = 47$ [$\because a_n = a + (n-1)d$] $\Rightarrow 47 =$

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2 +(10 - 1)d ⇒47 = 2 + 9d ⇒ *9d = 47 - 2 = 45*∴*d* = $\frac{45}{9}$ = 5 $S_n = \frac{n}{2}$ [2*a* + (*n*-1)*d*] ∴ $S_{15} = \frac{15}{2}$ [2 (2)+ (15-1) (5)] ⇒ $S_{15} = \frac{15}{2}$ [4+ (14) (5)] ⇒ $S_{15} = \frac{15}{2}$[4 + 7C] ⇒ $S_{15} = \frac{15}{2}$[74]. ∴ S_{15}= 15 (37) = 555

Q.20 The coordinates of the vertices of ΔABC are A (4,1), B (-3, 2) and C (0, *k*). Given that the area of ΔABC is 12 units², find the value of *k*. **Sol.** Ar (ΔABC) = 12 units² (Given)

$\frac{1}{2}$ [4 (2-k) + (-3) (k - 1) + 0(1 -2)]= 12units²

$\frac{1}{2}$ [8-4k-3k + 3]=±24 11 - 7*k* = ± 24 -7*k* = ± 24 - 11

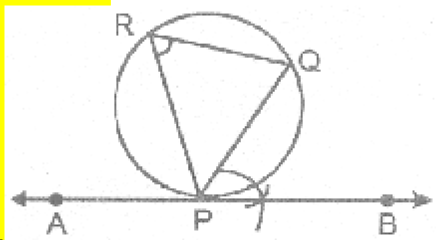
$k = \frac{\pm 24 - 11}{-7}$

$k = \frac{24-11}{-7}$, $k = \frac{+13}{-7}$, ∴ $k = \frac{-13}{7}$

$k = \frac{-24-11}{-7}$, $k = \frac{-35}{-7}$, ∴ $k = 5$

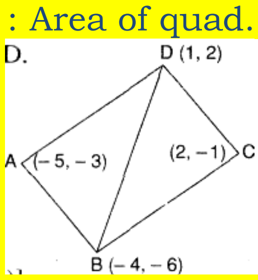
Q.21 Draw a circle of radius 4.5 cm. Take a point P on it. Construct a tangent at the point P without using the centre of the circle. Write the steps of construction . ANS : **Steps of Construction**

(i) Draw a circle of radius = 4.5 cm.
(ii) Draw a chord PQ, from the given point P on the circle.
(iii) Take a point R on the circle and joint PR and QR.
(iv) Draw ∠QPB = ∠PRQ on the opposite side of the chord PQ.



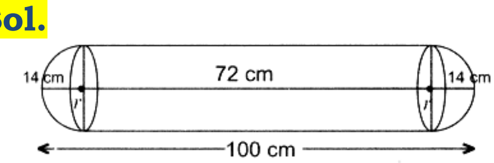
(v) Produce BP to A. Thus, APB is the required tangent.

Q.22 Find the area of the quadrilateral whose vertices taken in order are A (- 5, - 3), B (- 4, - 6), C (2, - 1) and D (1, 2).**Sol. Construction : Join B** Proof : Area of quad. ABCD = Area of ΔABD + Area of ΔBCD Using area of Δ



= $\frac{1}{2}$[$x_1(y_2-y_3)$ + $x_2(y_3$ - $y_1)$+$x_3(y_1$ - $y_2)$] ar(ΔABD) =$\frac{1}{2}$ [-5(-6-2)-4 (2 + 3)+1(-3+6)] = $\frac{1}{2}$-[-5(-8)-4(5)+1(3)] = $\frac{1}{2}$(40 - 20 + 3) = $\frac{1}{2}$(23) = $\frac{23}{2}$ units² ar(ABCD) =$\frac{1}{2}$[-4(-1-2)+2(2+6)+1 (-6+1)] =$\frac{1}{2}$[4(-3)+2(8)+1(-5)] = $\frac{1}{2}$(12+ 16-5)= $\frac{1}{2}$(23) = $\frac{23}{2}$units²∴ Area of quad. ABCD =$\left(\frac{23}{2}+\frac{23}{2}\right)$=23 units²

Q.23 A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 100 cm and the diameter of the hemispherical ends is 28 cm, find the cost of polishing the surface of the solid at the rate of 5 paise per sq cm.**Sol.**



Radius of hemisphere, *r* = 14 cm .Length of cylindrical part (h) = [100 - 2 (14)] = 72 cm . Radius of cylindrical part = Radius of hemispherical ends, *r* = 14 cm Total area to be polished = 2 (C.S.A. of hemispherical end) + C.S.A. of cylinder $2(2\pi r^2) + 2\pi rh = 2\pi r(2r + h)$ = 2x$\frac{22}{7}$x 14 (2 × 14+ 72) = 88 (28 + 72) = 8800 cm² Cost of polishing the surface = 8800 × 0.05 = Rs. **440**

OR

The interior of a building is in the form of a right circular cylinder of radius 7 m and height 6m, surmounted by a right circular cone of same radius and of vertical angle 60°. Find the cost of painting the building from inside at the rate of Rs. 30/m². **Sol.** Internal curved surface area of cylinder = 27 πrh = (2π ×7 × 6)m²

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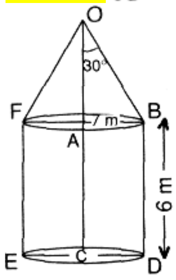
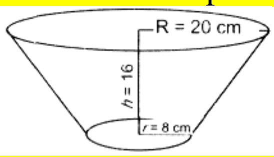
	$=\left(2\times\frac{22}{7}\times7\times6\right)m^2$ $= 264\ m^2$ In right ΔOAB, $\frac{AB}{OB}$ = sin 30° Slant $\frac{7}{OB}=\frac{1}{2}$ height of cone (OB) = 14 m  Internal curved surface area of cone = $\pi rl = \frac{22}{7}\times 7\times 14 = 308 m^2$ Total area to be painted = (264 + 308) = 572 m^2 Cost of painting @ Rs. 30 per m^2 = Rs. (30 × 572) = Rs. 17,160
Q.24	All Aces, Jacks and Queens are removed from a deck of playing cards. One card is drawn at random from the remaining cards. Find the probability that the card drawn is : *(a)* a face card *(b)* not a face card. **Sol.** Total number of cards = 52 Cards removed (all Aces, Jacks and Queens) = 12 ∴Remaining cards (Total) = 52 - 12 = 40 . Remaining face cards = 4 (all four kings) P (event) = $\frac{\text{Total number of favourable outcomes}}{\text{Total number of possible outcomes}}$ P (getting a face card) = $\frac{4}{40}=\frac{1}{10}$ P (not getting a face card) = $1-\frac{1}{10}$ $\left[\because P(\text{not }A) = 1-P(A)\right]$ = $\mathbf{\frac{9}{10}}$.
	SECTION D
Q.25	A container (open at the top) made up of a metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find : *(i)* the cost of milk when it is completely Filled with milk at the rate of Rs. 15 per litre. *(ii)* the cost of metal sheet used, if it costs Rs. 5 per 100 cm^2. (Take π = 3.14) Sol. The container is in the shape of a frustum of a cone . *h* = 16 cm, *r* = 8 cm, R = 20 cm  Volume 0f the container = $\frac{1}{3}\times\pi h$ $(R^2 + Rr + r^2)$ = $\frac{1}{3}$ x 3.14 x 16 $[(20)^2 + 20(8) + (8)^2]\ cm^3$ = $\frac{1}{3}$ x 3.14 x 16 (400 + 160 + 64) cm^3 $=\left(\frac{1}{3}\times3.14\times16\times624\right)cm^3$ $= (3.14\times3328)\ cm^3$ $= 10449.92\ cm^3$ $=\frac{10449.92}{1000}$ litres $\left[1\text{ litre} = 1000\ cm^3,\ 1\ cm^3 = \frac{1}{1000}\text{ lts}\right]$ = 10.45 litres (approx.) (i) Cost of milk = 10.45 x Rs. 15 = Rs. 156.75 Now, slant height of the frustum of cone . L = $\sqrt{h^2+(R-r)^2}$ = $\sqrt{16^2+(20-8)^2}$ = $\sqrt{256+144}$ = $\sqrt{400}$ =20 cm. Total surface area of the container= $[\pi l\ (R + r) + \pi r^2]$= $[3.14 \times 20\ (20 + 8) + 3.14\ (8)^2]\ cm^2$ = 3.14 [20x28 + 64] cm^2 = 3.14 x 624 cm^2 = 1959.36 cm^2 (ii) Cost of metal sheet used= Rs. $\left[1959.36\times\frac{5}{100}\right]$ = $\frac{9796.8}{100}$ =Rs. 97.968= Rs. 98 (approx.)
Q.26	From the top and foot of a tower 40 m high, the angle of elevation of the top of a lighthouse is found to be 30° and 60° respectively. Find the height of the lighthouse. Also find the distance of the top of the lighthouse from the foot of the tower. **Sol.** Let AE = *h* m and BE = CD = x m ∴ $\frac{x}{h}$ = cot 30° ⇒ $\frac{x}{h}=\sqrt{3}$ ⇒ x = h√3 ...(i)⇒ BE = CD = *h* √3 m In rt. ΔADC, $\frac{AD}{CD}$ = tan 60°⇒ $\frac{h+40}{x}=\sqrt{3}$ ⇒h + 40 = √3 x

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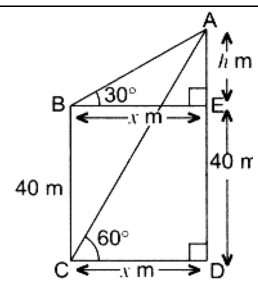


$\Rightarrow h + 40 = \sqrt{3} \times h\sqrt{3}$ ... [From(i)$\Rightarrow 40 = 3h - h \Rightarrow 2h = 40 \Rightarrow h = 20$m $\therefore$ Height of lighthouse = 20 + 40 = 60 m . Inrt. ΔADC, $\frac{AD}{AC} = \sin 60°$ $\frac{60}{AC} = \frac{\sqrt{3}}{2} \Rightarrow \sqrt{3}AC = 60 \times 2 \Rightarrow AC - 60 \times 2/\sqrt{3}$ $\Rightarrow AC = 60 \times \frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \Rightarrow AC = \frac{60 \times 2 \times \sqrt{3}}{3}$ $\Rightarrow AC = 40\sqrt{3}$m. Hence the distance of the top of lighthouse from the foot of the tower = $40\sqrt{3}$m

Q.27 Prove that sum of n term of A . P . is $S_n = \frac{n}{2}[2a + (n-1)d]$.

OR

A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows : Rs. 200 for first day, Rs. 250 for second day, Rs. 300 for third day and so on. If the contractor pays Rs. 27,750 as penalty, find the number of days for which the construction work is delayed. Sol. Let the delay in construction work be for n days. Here a = 200, d = 250 - 200 = 50, S_n = 27,750 . $S_n = \frac{n}{2}[2a + (n-1)d]$ $\therefore$ 27,750$=\frac{n}{2}$[2 × 200 + (n- 1) 50] 27,750= $\frac{50n}{2}$ [8 + (n - 1)] $\Rightarrow \frac{27,750}{25}$ = n(8 + n - 1) $\Rightarrow$ 1110 = n(n +7) $\Rightarrow$ 0 = n^2 + 7n-1110 $\Rightarrow n^2 + 7n$ - 1110 = 0 $\Rightarrow n^2 + 31n$ - 30n- 1110 = 0 $\Rightarrow$n(n + 37)-30(n + 37) = 0 $\Rightarrow$(n + 37) (n - 30) = 0 $\Rightarrow n$ + 37 = 0 *or* n - 30 = 0 Rejecting n = - 37, n = 30 ($\therefore$ Number of days can not be negative) $\therefore$ Construction work was delayed for 30 days

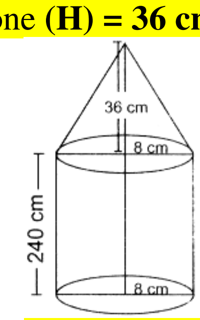
Q.28 If two tangents are drawn to a circle from an external point, then
(i) They subtend equal angles at the centre.
(ii) They are equally inclined to the segment, joining the centre to that point.

Q.29 Solve for x: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x} : a \neq 0, b \neq 0, x \neq 0$. Ans = - a & - b

OR

A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs. 90 find the number of articles produced and the cost of each article. Ans. Articles 6,15

Q.30 An iron pillar has lower part in the form of a right circular cylinder and the upper part in the form of a right circular cone. The radius of the base of each of the cone and the cylinder is 8 cm. The cylindrical part is 240 cm high and the conical part is 36 cm high. Find the weight of the pillar if 1 cm^3 of iron weighs 7.5 grams.(Take $\pi = 22/7$). **Sol.** Radius of base the cylinder, (r) = 8 cm Radius of base of the cone, *(r)* = 8 cm Height of cylinder, *(h)* = 240 cm Height of cone **(H) = 36 cm**



Total volume of the pillar = Volume of cylinder + Volume of cone

$= \pi r^2 h + \frac{1}{3}\pi r^2 H = \pi r^2 \left(h + \frac{1}{3}H\right) = \frac{22}{7} \times 8 \times 8\left(240 + \frac{1}{3}(36)\right) \Rightarrow \frac{1408}{7}(240 + 12)\ cm^3\ \frac{1408}{7} \times 252 = 50688\ cm^3$

$\therefore$ Weight of the pillar = 50688 x $\frac{7.5(\text{gms.})}{1000}$ kg $\frac{380160}{1000}$ = **380.16 kg**

Q.31 Two concentric circles are of radii 5 cm and 3 cm and centre at O. two tangents PA and PB are drawn to two circles from an external point P such that AP = 12 cm (see figure).

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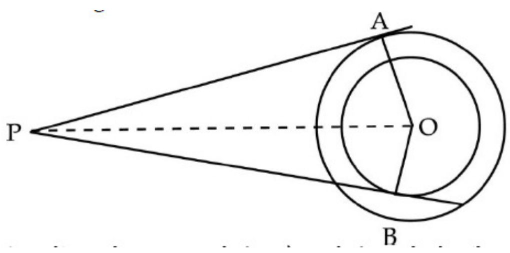


ANS: In ΔOAP, $OP^2 = OA^2 + AP^2$

$\Rightarrow OP = 13$ cm

In ΔOBP

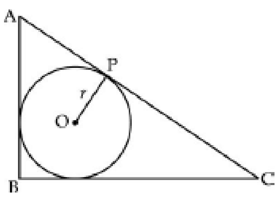
$OP^2 = OB^2 + BP^2$

$BP^2 = 13^2 - 3^2 = 160$

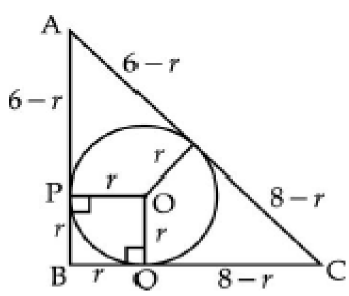
$\Rightarrow BP = 4\sqrt{10}$ cm

Q.32 An agriculture field is in the form of a rectangle of length 20m width 14m . A 10m deep well of diameter 7m is dug in a corner of the field and the earth taken out of the well is spread evenly over the remaining part of the field. Find the rise in its level. Ans $h = \frac{2 \times 385}{483} = \frac{770}{483} = 1.594\ m$

Q.33 In given figure, ΔABC is right angled at B. AB = 6 cm, BC = 8 cm. find the radius r of the circle inscribed



. ANS



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

$100 = AC^2 \Rightarrow AC = 10$ cm

In quad OPBQ, $OP \perp AB$, $OQ \perp BC$

(radii $\perp$ tangent)

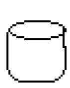
$\therefore$ 3 angles of OPBQ are 90°, by angle sum prop 4th $\angle$ is 90°. Adjacent sides OP and OQ are equal (to r). Hence OPBQ is a square

$\therefore PB = BQ = r$ (tangents from an external point are equal)

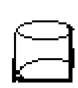
$AC = 10 = 6 - r + 8 - r$

$\Rightarrow 2r = 4 \quad \Rightarrow r = 2$ cm

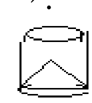
Q.34 Ramesh ,a jucie seller has set up his juice shop . He has three types of glasses of inner diameter 5 cm to serve the customers. The heights of the glasses is 10 cm (use $\pi = 3.14$).



TYPE A A glass with plane bottom .



TYPE B A glass with hemispherical raised bottom .



TYPE C A glass with conical raised bottom of height 1.5 cm .He decided to serve the customer in A type of glasses .(i)Find the volume of glass of type A . (ii) Which glass has the minimum capacity .(iii) Which mathematical concept is used in above problem (iv)By choosing the glass of type A , which value is depicted by juice seller ramesh ? ans : D = 5 cm ,R= 2.5cm , H= 10 cm . Volume of type of glass A = $\pi R^2 h$ = 196.25 Cubic cm . volume of hemisphere = $\frac{2}{3}\pi R^3$ **= 32.71 Cubic cm ,** Volume of type of glass B = 196 .25 – 32.71= 163 . 54 Cubic cm , volume of cone = $\frac{1}{3}\pi R^2 h$ **=9.81 cubic cm ,** Volume of type of glass C = 196.25 – 9.81 = 186.44 cubic cm (i) Volume of type of glass A = 196.25 Cubic cm (ii) the glass of type B has the minimum capacity of 163.54 cubic cm (iii) volume of solid figure (Menstruations) (iv) Honesty (***There can be multiple answers to the value based questions. Students may have their own opinion about answering them, there is no specific solution. Marks would be given for all sensible answers.)***.

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