CBSE 2012

केन्द्रीय माध्यमिक शिक्षा बोर्ड, दिल्ली

Central Board of Secondary Education, Delhi

(परीक्षार्थी भरें To be filled in by the candidate)

(परीक्षार्थी प्रशन-पत्र के ऊपर लिखे कोड को दर्शाये गये बॉक्स में लिखें
Candidate should write code no. as written on the top of the question paper in this box → 30/2

अतिरिक्त उत्तर-पुस्तिका (ओं) की संख्या
No. of supplementary answer-book (s) used →

परीक्षा का नाम Name of the examination AISSE - 2012

कक्षा Class X

विषय Subject Mathematics code - 041

परीक्षा का दिन एवं तिथि
Day & Date of the Examination Friday 2/3/12

उत्तर देने का माध्यम Medium of answering the paper English

किसी शारीरिक अक्षमता से प्रभावित हो तो सम्बन्धित वर्ग में ✓ का निशान लगायें

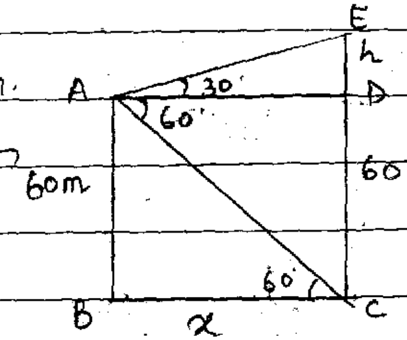
B	D	H	S	C

B = दृष्टिहीन, D = मूक एवं बधिर, H = शारीरिक रूप से विकलांग, S = स्पास्टिक, C = डिस्लेक्सिक
If Physically challenged, tick the category
B = Blind, D = Deaf & Dumb, H = Physically Handicapped, S = Spastic, C = Dyslexic

क्या लेखन-लिपिक उपलब्ध करवाया गया हां / नहीं
Whether write provided Yes / No. NO.

Section-D

29. Let AB be 60 m high ~~Kvg~~ building and EC be lighthouse of height $60+h$ m. and distance b/w building & lighthouse be x m



In Δ ABC

$$\tan 60° = \frac{P}{B}$$

$$\sqrt{3} = \frac{60}{x} \Rightarrow x = \frac{60}{\sqrt{3}} \text{ or } \frac{60}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{60\sqrt{3}}{3} \Rightarrow 20\sqrt{3} \text{ — (1)}$$

$$x = 20\sqrt{3} \text{ m.}$$

In Δ AED

$$\tan 30° = \frac{h}{x}$$

put value of x from (1)

$$\frac{1}{\sqrt{3}} = \frac{h}{20\sqrt{3}}$$

$$\Rightarrow 20\sqrt{3} = h\sqrt{3}$$

$$\Rightarrow h = \frac{20\cancel{\sqrt{3}}}{\cancel{\sqrt{3}}} \Rightarrow h = 20 \text{ m.}$$

Height of lighthouse $= 60 + 20 = 80$ m.

(i) The difference b/w heights of lighthouse & building is 80-60 = 20m

(ii) The distance b/w lighthouse & building is $20\sqrt{3}$ m.

30\. H of tent = 8.25 m.
H of cylinder = 5.5 m
Radius of cylinder = $\frac{30}{2}$ = 15m.

Height of cone = 8.25 - 5.5 = 2.75m
Radius of cone = 15 m.
Let Length of canavas = l m
Breadth of canavas = 1.5m.
Area of canavas = CSA of cone + CSA of cylinder
$\Rightarrow \pi r l + 2\pi r h$
$\Rightarrow \pi r (l + 2h)$
$\Rightarrow \pi \times 15 (15.25 + 2 \times 5.5)$
$\Rightarrow \pi \times 15 \times 26.25$ cm²

$l \times b = \pi \times 15 \times 26.25$

$l = \frac{\pi \times \cancel{150}^{10} \times 26.25}{\cancel{15}}$

$l = 262.5 \times \pi$

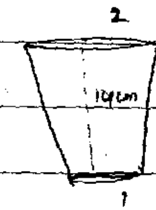
$l = \frac{\cancel{262.5}^{375}}{10} \times \frac{22}{\cancel{7}} \Rightarrow \frac{8250}{10}$

$\Rightarrow 825m.$

$\therefore$ Length of canavas = 825m

31. H of frustum of cone = 14 cm.

Upper radius (R) = $\frac{4}{2} = 2$ cm.



Lower radius (r) = $\frac{2}{2} = 1$ cm.

Volume of frustum of cone = $\frac{\pi h}{3}(R^2 + r^2 + Rr)$

$$\frac{22}{\cancel{7}} \times \frac{\overset{2}{\cancel{14}}}{3}\left((2)^2 + (1)^2 + (2 \times 1)\right)$$

$$\Rightarrow \frac{22 \times 2}{3}(4 + 1 + 2)$$

$$\Rightarrow \frac{22 \times 2}{3} \times 7 \Rightarrow \frac{44 \times 7}{3}$$

$$\Rightarrow \frac{308}{3} \Rightarrow 1{\cdot}02{\cdot}66 \text{ cm}^3$$

∴ Capacity of glass = 102.66 cm³

32(ii) Let speed of aircraft be x km/h.

Distance = 2800

when speed is $(x - 100)$ km/h Time is increased by $\frac{30}{60}$ hr

$= \frac{1}{2}$ hr Time = $\frac{\text{Dis.}}{\text{Speed}}$

ATQ. $\frac{2800}{x-100} - \frac{2800}{x} = \frac{1}{2}$

$\Rightarrow \frac{2800 \times x - 2800 \times (x-100)}{(x-100)(x)} = \frac{1}{2}$

$\Rightarrow \frac{2800x - 2800x + 280000}{x^2 - 100x} = \frac{1}{2}$

$x^2 - 100x = \cancel{420000}$ 560000

$x^2 - 100x - 560000 = 0$

$x^2 - 800x + 700x - 560000 = 0$

$x(x-800) + 700(x-800) = 0$

$(x+700)(x-800) = 0$

if $x + 700 = 0 \Rightarrow x = -700$ X (speed can't be negative) if $x - 800 = 0$

$x = 800$

$\therefore$ Speed of aircraft is 800 km/h.

original duration $\Rightarrow \frac{\text{Distance}}{\text{speed}}$

$= \frac{\cancel{2800}}{\cancel{800}} \Rightarrow \frac{7}{2} \Rightarrow 3\frac{1}{2}$

$\Rightarrow$ 3 hr. 30 min Ans.

33. $S_7 = 119$

$S_{17} = 714$

$S_n = ?$ $\quad S_n = \frac{n}{2}(2a + (n-1)d)$

$S_7 = \frac{7}{2}(2a + (7-1)d)$

$\Rightarrow \cancel{119}^{17} = \frac{\cancel{7}}{2}(2a + 6d)$

$\Rightarrow 17 = \frac{1 \times \cancel{2}}{\cancel{2}}(a + 3d) \Rightarrow a + 3d = 17$ —(1)

$S_{17} = \frac{17}{2}(2a + (17-1)d)$

$42 \cancel{714} = \frac{\cancel{17}}{2}(2a + 16d)$

$\Rightarrow 42 = \frac{1}{\cancel{2}} \times \cancel{2}\,(a + 8d)$

$\Rightarrow a + 8d = 42$ — (ii)

Solving (i) & (ii)

$a + 8d = 42$

$a + 3d = 17$

$-\quad\quad -$

$\cancel{5}d = \cancel{25}\ 5$

$d = 5$ put in (i)

$a + 3 \times 5 = 17$

$a = 17 - 15 = 2$

$a = 2$ and $d = 5$

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

$$\Rightarrow S_n = \frac{n}{2}(2 \times 2 + (n-1)5)$$

$$\Rightarrow S_n = \frac{n}{2}(4 + 5n - 5)$$

$$\Rightarrow S_n = \frac{n}{2}(5n - 1)$$

$$\Rightarrow S_n = \frac{5n^2 - n}{2}$$

$\therefore$ Sum of first n terms = $\frac{5n^2 - n}{2}$ Ans.

34. Given ⇒ AB is tangent to circle at point P

To prove ⇒ $OP \perp AB$

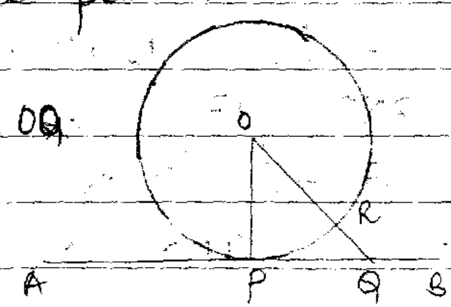
Cons ⇒ Take a point Q on AB and join OQ.

Proof ⇒ OP is radius

OQ lies outside circle

& and intersect circle at R.

$OR < OQ$



But $OP = OR$ (radius of circle)

$\therefore$ $OP < OQ$.

Thus, OP is shorter than any other point ~~P~~ on AB join too.

$\therefore$ OP is shortest distance b/w O and AB

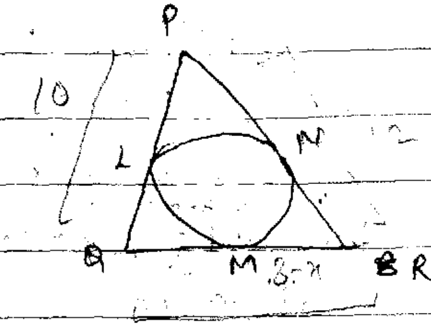
But we know the shortest distance b/w a line & point is perpendicular distance.

$\therefore$ $OP \perp AB$

(Hence Proved)

Section-c

19. $PQ = 10cm$
$QR = 8cm$
$PR = 12cm$
$QM = ?$ $RN = ?$ $PL = ?$



Let QM be x $QM = QL = x$ — (i) (tangents from external point)

The $MR = 8-x$ $(QR-QM)$

We know that tangents from external point are equal.

$\therefore$ $RN = MR$ — (ii)

$RN = 8-x$

$PN = PR - RN = 12 - (8-x)$
$= 4+x$

$PN = PL = 4+x$ — (iii) (tangent from outside)

Using (i) & (iii)

$PL + QL = PQ$

$4+x+x = 10$

$4+2x = 10$

$2x = 6 \Rightarrow x = 3.$

$QM = x$ (using ①)

$QM = \underline{\underline{3}}$

$RN = 8 - x$ (using ①)

$\cancel{P} = 8 - 3$

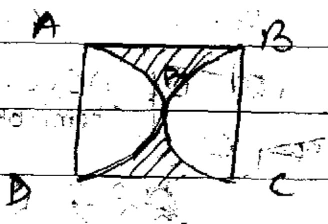
$RN \Rightarrow \underline{\underline{5}}$

$PL = 4 + x$ (using ⓘⓘⓘ)

$PL = 4 + 3$

$PL = \underline{\underline{7}}$

20 ⓘⓘ Area of shaded = Ar of square − Ar of semicircle APD + Ar of semicircle BPC



$\Rightarrow a \times a - \left(\frac{\pi r^2}{2} + \frac{\pi r^2}{2}\right)$ — ①

Side of square = 14 — ⓘⓘ ~~put~~

then d = side of square

∴ radius of circle = $\frac{14}{2} = 7$ cm. — ⓘⓘⓘ

put value of ⓘⓘ & ⓘⓘⓘ in ①

$\therefore 14 \times 14 - \left(\frac{\cancel{2}\pi r^2}{\cancel{2}}\right)$

$\Rightarrow 196 - \frac{22}{\cancel{7}} \times 7 \times \cancel{7}$

$\Rightarrow 196 - 154$

$\Rightarrow 42\ cm^2$

$\therefore$ Ar of shaded $= 42\ cm^2$.

21. Radius of hemisphere $= 9$ cm. (R)
~~Ra~~ " " cylinder $= 6$ cm. (r)
H of cylinder $= ?$
when contents of bowl is empted are vessel then,
Vol. of bowl (hemisphere) $=$ Vol. of vessel (cylindrical)

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

$$\Rightarrow \frac{2 \times \cancel{9}^3 \times 9 \times 9}{\cancel{3}} = 6 \times 6 \times h$$

$$\Rightarrow h = \frac{\cancel{2} \times \cancel{3} \times 9 \times 9}{\cancel{6}_{\cancel{3}} \times 6} \Rightarrow \frac{81}{6} \Rightarrow 13.5 \text{ cm}$$

$\therefore$ Height of water in cylindrical vessel $= 13.5$ cm.

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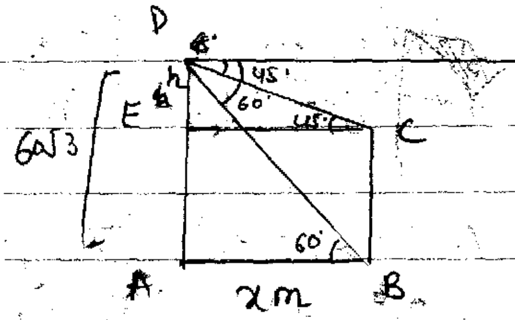
22. Let AD be cliff of height $60\sqrt{3}$ m
& BC be tower of height $(60\sqrt{3}-h)$ m.
and ED be h m & AB be x m.



In Δ ABD

$$\tan\theta = \frac{AD}{AB}$$

$$\tan 60 = \frac{60\sqrt{3}}{x} \Rightarrow \sqrt{3} = \frac{60\sqrt{3}}{x}$$

$$x = \frac{60\cancel{\sqrt{3}}}{\cancel{\sqrt{3}}} \Rightarrow 60 \quad -(1)$$

AB = EC = 60

in Δ EDC

$$\tan 45 = \frac{ED}{EC}$$

$$\tan 45 = \frac{h}{x} \Rightarrow 1 = \frac{h}{x}$$

$h = x$ put value of x from (1)

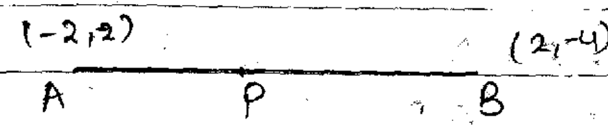
$h = 60$

Height of tower $= 60\sqrt{3} - 60$

$60(\sqrt{3}-1)$ m.

Q23.(i) A $(-2, -2)$ (x_1, y_1)

B $(2, -4)$ (x_2, y_2)



$AP = \frac{3}{7} AB$

$\Rightarrow \frac{AP}{AB} = \frac{3}{7}$

$\Rightarrow \frac{AP}{AB - AP} = \frac{3}{7-3}$

$\Rightarrow \frac{AP}{PB} = \frac{3}{4}$

$AP : PB = 3:4$. $(m:n)$

Let Cordinates of P (x, y)

$$x = \frac{m x_2 + n x_1}{m+n} \qquad y = \frac{m y_2 + n y_1}{m+n}$$

$$x = \frac{3 \times 2 + 4 \times -2}{3+4} \qquad y = \frac{3 \times -4 + 4 \times -2}{3+4}$$

$$x = \frac{6-8}{7} \qquad y = \frac{-12-8}{7}$$

$$x = \frac{-2}{7} \qquad y = \frac{-20}{7}$$

$\therefore$ Coordinates of $P = \left(\frac{-2}{7}, \frac{-20}{7}\right)$

24(i) Let two natural no. be x and y.

ATQ $\quad x + y = 8$ — (i) and $xy = 15 \Rightarrow x = \frac{15}{y}$ — (ii)

put value of x from (ii) in (i)

$$\frac{15}{y} + y = 8$$

$$\Rightarrow \frac{15+y^2}{y} = 8 \Rightarrow 15+y^2 = 8y$$

$y^2 - 8y + 15 = 0$

$y^2 - 3y - 5y + 15 = 0$

$y(y-3) - 5(y-3) = 0$

$(y-5)(y-3) = 0$

if $y - 3 = 0$ then $y = 3$

if $y - 5 = 0$ then $y = 5$

If $y = 3$ $x = \frac{15}{3} = 5$

If $y = 5$ $x = \frac{15}{5} = 3$.

No. are ~~50~~ 3 and 5 or 5 and 3.

25 (i) perfect square = ~~2~~ ~~4~~ 1, 4, 9, 16, 25, 36, 49, 64 = 8

Total ~~no~~ sample = 70.

P of perfect square = $\frac{\text{No. of F}}{\text{No. of S}}$

$= \frac{8}{70}$

(ii) No. divisibly by 2 and 3

6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66 = 11

Total sample = 70

P of no. divisible by 6 = $\frac{11}{70}$.

26. A (6, −1) B (k, −6) C (0, −7)

If points are are collinear ~~the~~ area = 0.

$x_1 = 6$ $x_2 = k$ $x_3 = 0$ and $y_1 = -1$ $y_2 = -6$ $y_3 = -7$.

$\frac{1}{2}(x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)) = 0$

$$\frac{1}{2}\left(6(-6-(-7)) + k(-7-(-1)) + 0(-1-(-6)\right) = 0$$

$$\Rightarrow 6(-6+7) + k(-7+1) + 0(-1+6) = 0$$

$$\Rightarrow 6(1) + k(-6) + 0 = 0$$

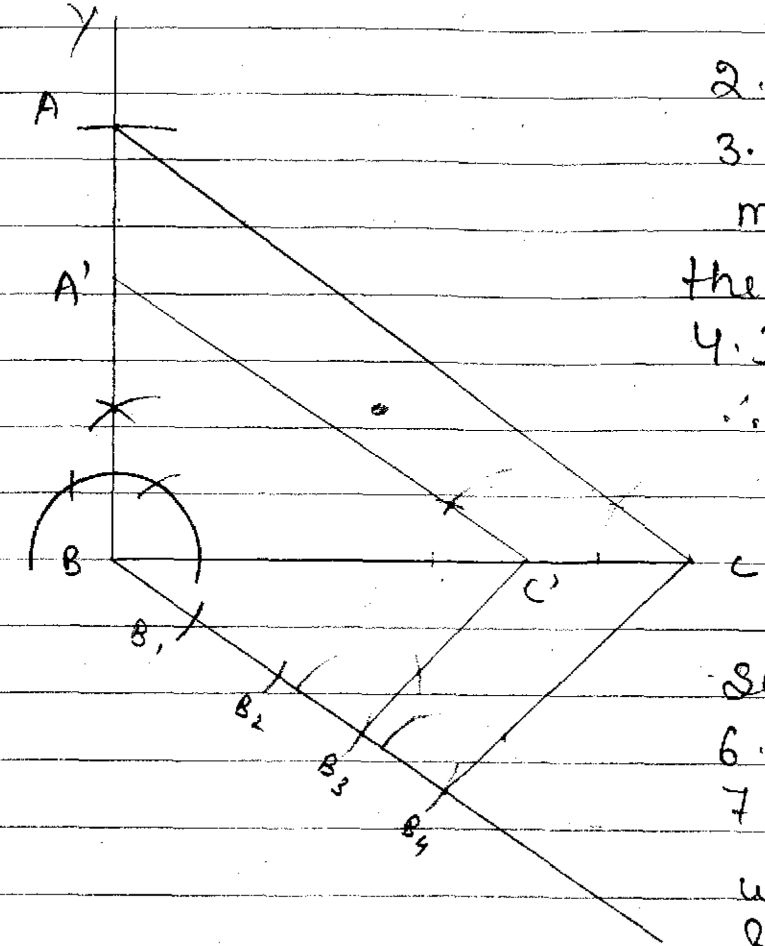
$$\Rightarrow 6 - 6k = 0$$

$$6 = 6k$$

$$k = 1$$

if points are collinear then $k=1$ Ans

27.



Steps.

1. Draw a line segment BC = 8cm.
2. Draw a right angle on B ∠CBY
3. with as centre and 6 as centre mark an arc on BY which intersect the line at A
4. Join AC

∴ Δ ABC is obtained

5. Now, draw an acute ∠CBX
6. Mark 4 equal point on BX Such than $BB_1 = B_1B_2 = B_2B_3 = B_3B_4$
6. Join B_4 to C
7. From B_3 draw a line ∥ to B_4C which intersect BC at C'
8. From C' draw line ∥ to AC which intersect AB at A'
9. Hence Δ A'BC' is similar to Δ ABC whose sides is $\frac{3}{4}$ times corresponding sides of Δ ABC.

28. Multiple of 8 lying b/w 201 and 950 are.

208, 216, 224 - - - - - 944.

$a = 208$

$d = 216 - 208 = 8.$

$a_n = 944$

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

$944 = 208 + (n-1)8$

$944 - 208 = (n-1)8$

$\Rightarrow \frac{736}{8} = n - 1$

$\Rightarrow 92 = n - 1$

$\Rightarrow n = 93.$

~~S_{93}~~ $S_n = \cancel{\frac{n}{2}(2a+(n-1)d)}$

$S_n = \frac{n}{2}(a + l)$

$$S_{93} = \frac{93}{2}\left(\cancel{2220}\ 208 + 944\right)$$

$$S_{93} = \frac{93}{\cancel{2}} \times \cancel{1152}\ 576$$

$$= 53568.$$ Ans.

Section - B.

11. (i) ~~Prob~~ P of a red king $= \dfrac{\text{No. of F}}{\text{No. of S}}$

$$= \frac{2}{52} = \frac{1}{26}$$

(ii) P of a queen or a jack $= \dfrac{\text{No. of F}}{\text{No. of S}}$

$$= \frac{8}{52} = \frac{\cancel{2}\,4}{26}$$

12. $AB = 8$ cm.

$BC = 6$ cm.

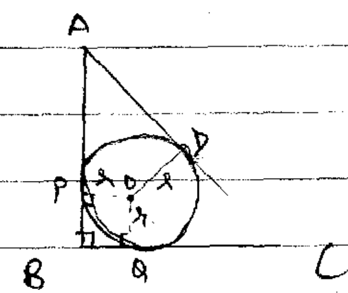
In right triangle ~~A~~ABC

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

$AC^2 = 8^2 + 6^2$

$AC^2 = 64 + 36$

$AC = \sqrt{100} = 10$ cm. — (1)



Join OP & OQ $\cancel{\ }$ $OP \perp AB$ & $OQ \perp BC$ (tangent is $\perp$ to radius)

~~Inequad. OPBQ~~ $\therefore$ $\angle OPB = 90°$ and $\angle OQB = 90°$

in quad. $OPBQ$

$\angle P = \angle B = \angle Q = 90°$

and $PO = OQ$.

$\therefore$ it is square. $\therefore$ $OP = PB = BQ = OQ$

then $PB = BQ = r$.

$BC - BQ = QC$

$6 - \cancel{x} = QC$

But $QC = CD$ (tangent from external point)

$QC = CD = 6 - r$ — (ii)

$AB - PB = AP$

$8 - r = AP$

But $AP = AD$ (tangent from external point)

$AP = AD = 8 - r$ — (iii)

$AD + CD = AC$

$8 - r + 6 - r = 10$ (from (i) & (ii) & (iii))

$14 - 2r = 10$

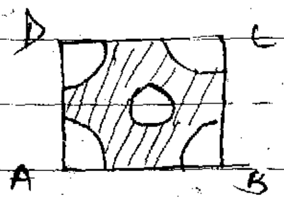
$4 = 2r$

$r = 2$

$r = 2cm$

13(i) Side of square = 4 cm

r of quad = 1 cm   r of circle = 1 cm.



area of shaded = ~~Arof~~

Ar of square − (Ar of 4 quad + area of circle)

$4 \times 4 - \left(\cancel{4} \times \frac{\pi r^2}{\cancel{4}} + \pi r^2\right)$

$\Rightarrow 4 \times 4 - (2\pi r^2)$

$\Rightarrow 16 - 2 \times 3.14 \times 1 \times 1$

$\Rightarrow 16 - 2 \times 3.14$

$\Rightarrow 16 - 6.28 \Rightarrow 9.72$

$\therefore$ Area of shaded = 9.72 cm^2.

14. P(2,4) A(5,k) B(k,7)

ATQ PA = PB

$$\sqrt{(2-5)^2+(4-k)^2} = \sqrt{(2-k)^2+(4-7)^2}$$

Sq. both side

$$(-3)^2+(4-k)^2 = (2-k)^2+(-3)^2$$

$$\cancel{9} + 16 + k^2 - 8k = 4 + k^2 - 4k + \cancel{9}$$

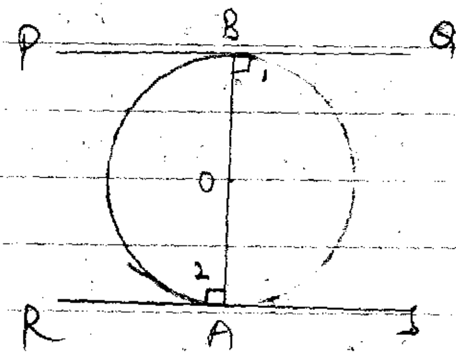
$$16 + \cancel{k^2} - 8k = 4 + \cancel{k^2} - 4k$$

$$31\cancel{2} = 4k$$

$k = 3$. Ans.

15. Given ⇒ AOB is diameter and PQ, RS are tangents to circle at poin B, A respectively

To prove ⇒ PQ ∥ RS



Let ∠QBA = 1

and ∠RAB = 2.

Proof ⇒ PQ is tangent and OA is radius
∴ AO ⊥ PQ (tangent is ⊥ to radius)
∴ ∠1 = 90° — (I)

RS is tangent and OB is radius
∴ ∠2 = 90° (II)
from (I) & (II)

∠1 = ∠2 = 90°
But they are alternate angles
∴ PQ ∥ RS.

16. Radius of sphere = 10.5 (R)
Radius of cone = 3.5 cm
Height of cone = 3 cm

If sphere is recast into smaller cones then.
No. of cones = $\frac{\text{Vol. of Sphere}}{\text{Vol. of 1 cone}}$

$$\frac{\frac{4}{\cancel{3}}\cancel{\pi}R^3}{\frac{1}{\cancel{3}}\cancel{\pi}r^2h}$$

$$\Rightarrow \frac{4 \times 10.5 \times \cancel{10.5} \times \cancel{10.5}\ 3}{\cancel{3.5} \times \cancel{3.5} \times 3 \times 10}$$

$$\Rightarrow \frac{2\ \cancel{4} \times \cancel{10.5}^{21} \times 3 \times \cancel{3}}{\cancel{3} \times \cancel{10}\ \cancel{5}}$$

$\Rightarrow 21 \times 6$

$\Rightarrow 126$ cones

17. $kx(3x-4)+4=0$ $\qquad D=0$ (given)

$3kx^2 - 4kx + 4 = 0$

$D = b^2 - 4ac = \cancel{0}$

$(-4k)^2 - 4 \times 3k \times 4$

$16k^2 - 48k = 0$

$16k(k-3) = 0$

if $16k = 0 \Rightarrow k = 0$ (Rejected)

if $k - 3 = 0 \Rightarrow k = 3$ Ans

18. Three digit no. which are divisible by 11 are

$110, 121 \ldots 990$

$a = 110$

$d = 121 - 110 = 11$

$a_n = 990$

$n = ?$

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

$990 = 110 + (n-1)11$

$990 - 110 = (n-1)11$

$80\ \cancel{\frac{880}{11}} = n - 1$

$n = 81.$

∴ There are 81 (3 digit no) which are divisible by 11.

Section A

1. (C) (4)
2. (A) (7.5)
3. (A) $\left(\frac{1}{2}\right)$
4. (C) (5)
5. (B) (15)
6. (B) $\left(2, -\frac{3}{2}\right)$
7. (C) (-4)
8. (C) $\frac{77}{8}$
9. (D) 1 : 8
10. (B) (30°)