Sample Papers Mathematics SA II

Paper:	**X Mathematics SA II Sample Paper 1**
Total marks of the paper:	90
Total time of the paper:	3.5 hrs

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 questions 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 Section - 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 marks each. You have to attempt only one of the alternatives in all such questions.

5. Use of calculator is not permitted.

6. An additional 15 minutes has been allotted to read this question paper only.

Questions:

1]

The distance between two parallel tangents to a circle of radius 5 cm [Marks:1]

is

A. 10cm

B. 5cm

C. 8cm

D. 9cm

2] The probability of occurrence of event A is denoted by P(A) so the range of P(A) is [Marks:1]

A. $0<P(A)<1$

B. $0\leq P(A)<1$

C. $0<P(A)\leq 1$

D. $0\leq P(A)\leq 1$

3] A tree is broken by the wind. The top struck the ground at an angle of 30^{o} and at a distance of 30 metres from the foot of the tree. The height of the tree in metres is [Marks:1]

A. $25\sqrt{3}$

B. $30\sqrt{3}$

C. $35\sqrt{3}$

D. $40\sqrt{3}$

4] AB is divided in 3 equal parts at P and Q. If AB = x AQ, then x = [Marks:1]

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $\frac{2}{3}$

D. $\frac{1}{3}$

5] If the perimeter and area of a circle are numerically equal, then the [Marks:1] radius of the circle is

A. 2 units

B. π units

C. 4 units

D. 7 units

6]

The ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube is [Marks:1]

A. π :8

B. π : 6

C. 8: π

D. 6: π

7]

The first and last terms of an AP are 1 and 11. If the sum of all its terms is 36, then the number of terms will be [Marks:1]

A. 5

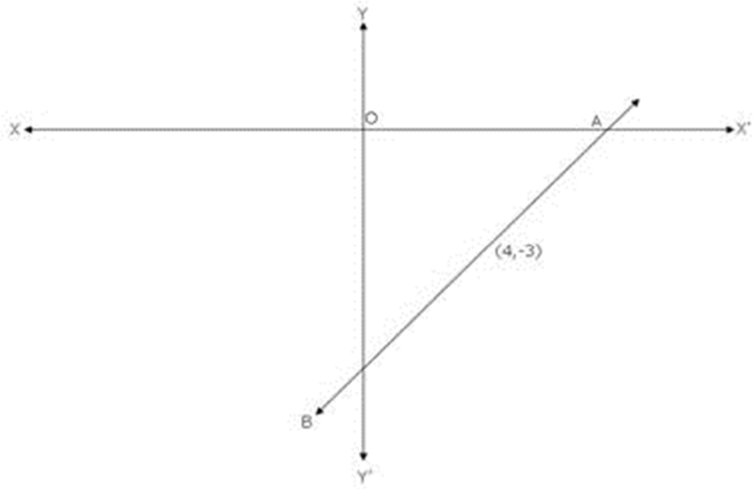
B. 6

C. 7

D. 8

8]

The mid-point of the line segment AB in given figure is (4,-3). The respective coordinates of A and B are [Marks:1]



A. (8,0) and (0,6)

B. (-8,0) and (0,6)

C. (6,0) and (0,8)

D. (8,0) and (0,-6)

9]

Find the roots of the quadratic equation $2x^2 - \sqrt{5}\, x - 2 = 0$ using the quadratic formula. [Marks:2]

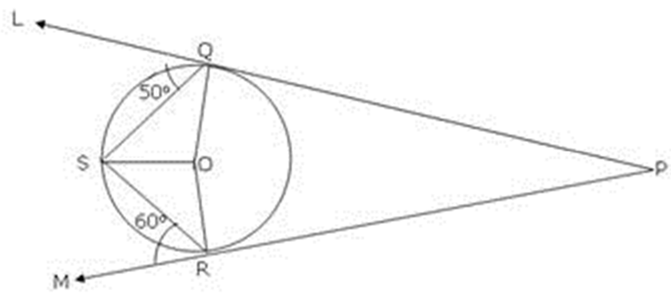
10]

In given figure, PQL and PRM are tangents to the circle with centre O

at the points Q and R respectively. S is a point on the circle such

that $\angle SQL = 50^o$ and $\angle SRM = 60^o$. Find the value of $\angle QSR$.

[Marks:2]

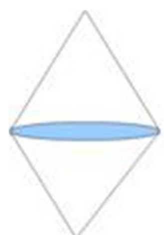


11] Find the value of k for which 2k + 7, 6k - 2 and 8k + 4 form 3 consecutive terms of an AP. [Marks:2]

12] If d_1,d_2 ($d_2>d_1$) are the diameters of two concentric circles and c is the length of a chord of a circle which is tangent to the other circle, then prove that $d_2^2= c^2+d_1^2$. [Marks:2]

13] In a circle of radius 10cm, an arc subtends an angle of 90^o at the centre. Find the area of the major sector. [Marks:2]

14] Calculate the area of the shaded region in the given figure, which is common between the two quadrants of circles of radius 8 cm each. [Marks:2]



15] Find the values of k for which the given equation has real and equal roots: [Marks:3]

$2x^2-10x+k=0$.

16] What is the probability of having 53 Thursdays in a non-leap year? [Marks:3]

17] If the points A(7,-2), B(5,1) and C(3,k) are collinear, the find the value of k. [Marks:3]

18] If A (-2,-1) ,B (a,0), C (4,b) and D(1,2) are the vertices of parallelogram, find the values of a and b. [Marks:3]

OR

If the mid point of the line segment joining the points A (3,4) and B (k, 6) is P (x,y) and x+y-10=0, then find the value of k.

19] [Marks:3]

Find three terms in AP such that their sum is 3 and product is -8.

20] [Marks:3]

A circle touches the side BC of a triangle ABC at P and the extended sides AB and AC at Q and R respectively. Prove that AQ = $\frac{1}{2}$ (BC+CA+AB)

21] [Marks:3]

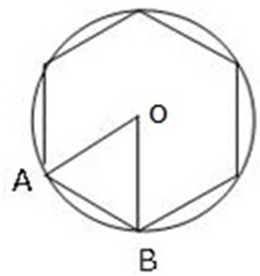
At a point on level ground, the angle of elevation of a vertical tower is found to be such that its tangent is $\frac{5}{12}$. On walking 192 metres towards the tower, the tangent of the angle of elevation is $\frac{3}{4}$. Find the height of the tower.

OR

The horizontal distance between two towers is 140 m. The angle of elevation of the top of the first tower when seen from the top of the second tower is 30°. The height of the second tower is 60 m find the height of the first tower.

22] [Marks:3]

A round table cover has six equal designs as shown in the figure. If the radius of the cover is 28 cm, find the cost of making the design at the rate of Rs. 0.35 per cm^2.



23] [Marks:3]

A cone of maximum size is carved out from a cube of edge 14cm.

Find the surface area of the cone and of the remaining solid left out after the cone is carved out.

24] A canal is 300 cm wide and 120 cm deep. The water in the canal is flowing with a speed of 20km/h. How much area will it irrigate in 20 minutes if 8 cm of standing water is desired? [Marks:3]

25] A takes 6 days less than B to finish a piece of work. If both A and B together can finish the work in 4 days, find the time taken by B to finish the work. [Marks:4]

26] Prove that the lengths of tangents drawn from an external point to a circle are equal. [Marks:4]

27] Given a rhombus ABCD in which AB=4cm and $\angle$ABC=60, divide it into two triangles say, ABC and ADC. Construct the triangle AB'C' similar to ΔABC with scale factor $\frac{2}{3}$. Draw a line segment C'D' parallel to CD where D' lies on AD. Is AB'C'D' a rhombus? Give reasons. [Marks:4]

28] How many terms of the sequence 13,11,9 ….. make the sum 45? Explain the answer. [Marks:4]

29] A container is in the form of a frustum of a cone of height 30 cm with radii of its lower and upper ends as 10 cm and 20 cm respectively. Find the capacity and surface area of the container. Also, find the cost of the milk which can completely fill the container, at the rate of Rs 25 per litre (use π = 3.14). [Marks:4]

30] A round balloon of radius r subtends an angle θ at the eye of the observer while the angle of elevation of its centre is φ. Prove that the [Marks:4] height of the centre of the balloon is $r \times \sin\varphi \times \operatorname{cosec}\frac{\theta}{2}$.

31] A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number. [Marks:4]

32] A copper wire of 4 mm diameter is evenly wound about a cylinder whose length is 24 cm and diameter 20 cm so as to cover whole surface. Find the length and weight of the wire assuming the density to be 8.68 gm/cm^3. [Marks:4]

33] [Marks:4]

34] Find the area of triangle formed by joining the mid-points of the sides of triangle whose vertices are (0, -1), (2, 10) and (0, 3). Find the ratio of this triangle with given triangle. [Marks:4]

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Solutions:

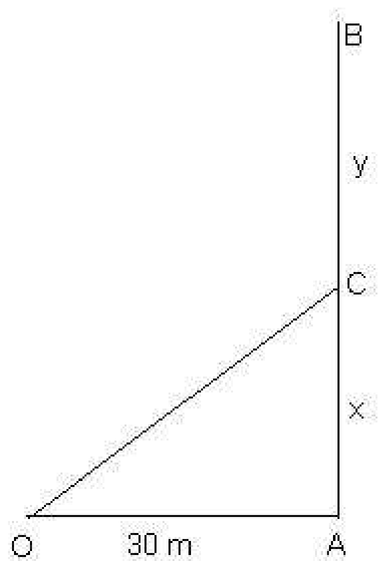
1]

Two tangents of a circle are parallel if they are drawn at the end points of a diameter. Therefore, distance between them is the diameter of the circle = 2x5 cm =10cm

2]

The range of P(A) is 0â‰¤P(A)â‰¤1.

3]



Let AB be the tree broken at a point C such that the broken part CB takes the position CO and touches the ground at O. OA=30m , $\angle$AOC = 30^o. Let AC = x and BC=CO=y.

In DAOC,

$\tan 30^o = \frac{AC}{OA}$

$\frac{1}{\sqrt{3}} = \frac{x}{30}$

$x=10\sqrt{3}$

Again, in ΔAOC,

$\cos 30^o = \frac{OA}{OC}$

$\frac{\sqrt{3}}{2} = \frac{30}{y}$

$y=20\sqrt{3}$

Height of the tree = (x+y)

$= 10\sqrt{3} + 20\sqrt{3}$

$= 30\sqrt{3}$ metres

4] AB is divided in 3 equal parts at P and Q.

$\therefore$ AB: AQ = 3: 2

$\Rightarrow$ AB = $\frac{3}{2}$ AQ

Thus, the value of x is $\frac{3}{2}$.

5]

Given, $2\pi r = \pi r^2$

r=2

Thus, the radius of the circle is 2 units.

6]

Let x be the edge of the cube. Then, x is also the diameter of the sphere.

Ratio of the volume of the cube to that of the sphere

$= x^3 : \frac{4}{3} \times \pi \times \frac{x^3}{8}$

$= 1 : \frac{4\pi}{24} = 6 : \pi$

7]

Given that the first and last terms of an AP are 1 and 11 i.e. a=1 and l =11.

Let the sum of its n terms is 36, then,

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

$36 = \frac{n}{2} \times (1+11)$

$n = \frac{36}{6} = 6$

Thus, the number of terms in the AP is 6.

8]

The points A and B respectively lie on x and y axis. Let the coordinates of A and B be (x,0) and (0,y) respectively.

It is given that (4,-3) is the mid-point of AB. By mid-point formula,

$4 = \frac{(x+0)}{2}$ and $-3 = \frac{(0+y)}{2}$

x=8 and y=-6

Thus, the respective coordinates of points A and B are (8,0) and (0,-6).

9]

The given quadratic equation is $2x^2 - \sqrt{5}x - 2 = 0$.

$b^2 - 4ac = 5 - 4 \times 2 \times (-2) = 21$

The roots of the given equation are given as:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{\sqrt{5} \pm \sqrt{21}}{4}$$

Thus, the roots of the given equation are $\frac{\sqrt{5} + \sqrt{21}}{4}$ and $\frac{\sqrt{5} - \sqrt{21}}{4}$

10]

In given figure, O is the centre of the circle.

Therefore, ÐOQL=ÐORM $=90^o$

(radius is perpendicular to tangent at the point of contact)

ÐOSQ=ÐOQS= 90°-50°=40°

ÐRSO=ÐSRO=90°-60°=30°

Thus , ÐQSR = ÐOSQ+ÐOSR = 40°+30°=70°

11]

We know that three terms p,q,r form consecutive terms of AP if and only if 2q = p+r

Thus, 2k + 7, 6k - 2 and 8k + 4 will form consecutive terms of an AP is 2(6k-2) = (2k+7) + (8k+4)

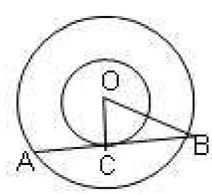
Now, 2(6k-2) = (2k+7) + (8k+4)

$\Rightarrow$ 12k - 4 = 10k + 11

$\Rightarrow$ 2k = 15

$\Rightarrow k = \frac{15}{2}$

12]



Let AB = c be a chord of the larger circle, of diameter d_2, which

touches the other circle at C. Then ΔOCB is a right triangle.

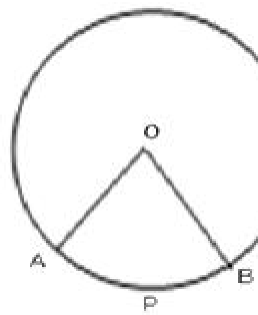
By Pythagoras theorem,

$OC^2+BC^2=OB^2$

i.e. , $\left(\frac{1}{2}d_1\right)^2 + \left(\frac{1}{2}c\right)^2 = \left(\frac{1}{2}d_2\right)^2$ (as C bisects AB)

Therefore, $d_2^2= c^2+d_1^2$

13]



Area of sector OAPB = $\frac{\pi r^2\theta}{360} = \frac{22}{7} \times \frac{10\times10\times90}{360} = \frac{550}{7}$

Area of major sector = area of circle - area of sector OAPB

$= \pi r^2 - \frac{550}{7}$

$= \frac{22}{7}$ x10x10 - $\frac{550}{7}$

$= \left(\frac{2200}{7} - \frac{550}{7}\right) = \frac{1650}{7}$ cm^2

14]

Required shaded region = area of two quadrants - area of square

$$=2\left(\frac{1}{4}\cdot\pi\cdot 8^2\right)-8\cdot 8$$

$= \frac{1}{2}\left(\frac{22}{7} \times 64\right) - 64$

$= \frac{4}{7} \times 64 = \frac{256}{7}$ cm^2

15]

The given quadratic equation is $2x^2-10x+k=0$.

Here, a=2, b=-10 and c=k

Therefore, $D=b^2-4ac = (-10)^2 - 4x2xk = 100-8k$

The equation will have real and equal roots, if

D=0 100-8k = 0 $K=\frac{100}{8}=\frac{25}{2}$

16]

In a non- leap year, there are 365 days, i.e. 52 weeks.

52 weeks = 364 days

1year = 52weeks and 1 day

This extra one day can be mon,tue,wed,thu,fri,sat,or sun.

Total number of outcomes = 7

Number of favourable outcomes =1

P(having 53 Thursdays) = $\frac{1}{7}$

17]

If three points A, B and C are collinear, then the area of triangle ABC = 0.

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

7-7k+5k+10-9=0

-2k+8=0

k=4

Thus, the given points are collinear for k=4.

18]

We know that the diagonals of a parallelogram bisect each other, i.e., the mid point of AC will be the same as that of BD.

\ $\left[\left(\frac{-2+4}{2}\right),\left(\frac{-1+b}{2}\right)\right]=\left[\left(\frac{a+1}{2}\right),\left(\frac{0+2}{2}\right)\right]$

$$\Rightarrow \left[1, \left(\frac{b-1}{2}\right)\right] = \left[\left(\frac{a+1}{2}\right), 1\right]$$

$$\Rightarrow \left(\frac{a+1}{2}\right) = 1 \text{ and } \left(\frac{b-1}{2}\right) = 1$$

a = 1 and b = 3

OR

Coordinates of the mid point of the line segment joining A (3,4) and B (k,6) =

$$\left(\frac{3+k}{2}, \frac{4+6}{2}\right) = \left(\frac{3+k}{2}, 5\right)$$

\ $\left(\frac{3+k}{2}, 5\right)$ = (x,y)

$\left(\frac{3+k}{2}\right)$ =x and 5=y

Since, x+y-10=0

So, $\frac{3+k}{2} + 5 - 10 = 0$

3+k=10

k = 7

19]

Let a - d, a and a + d be three terms in AP.

According to the question,

a - d + a + a + d = 3

3a = 3 or a = 1

(a - d) (a) (a + d) = -8

$a(a^2 - d^2) = -8$

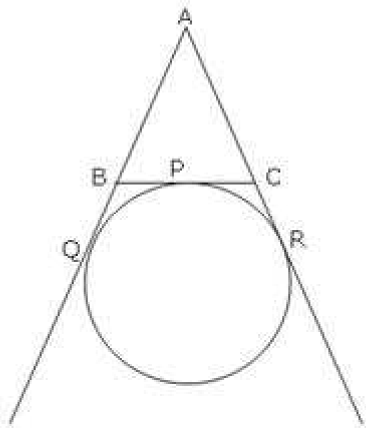
Putting the value of a = 1, we get,

$1 - d^2 = -8$

$d^2 = 9$ or $d = \pm 3$

Thus, the required three terms are -2, 1, 4 or 4,1,-2.

20]



BQ = BP (lengths of tangents drawn from an external point to a circle are equal)

Similarly, CP=CR , and AQ=AR

2AQ = AQ+AR

= (AB+BQ) + (AC+CR)

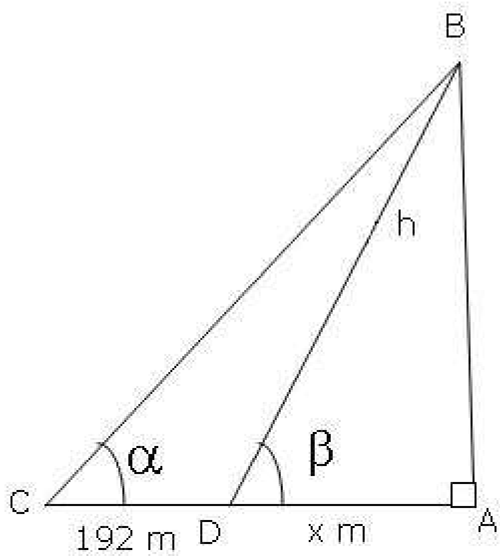
= AB+BP+AC+CP

= (BP+CP) +AC+AB

2AQ = BC+CA+AB

AQ = $\frac{1}{2}$ (BC+CA+AB)

21]



Let AB be the tower of height h metres. Let AD=x metres, CD=192 metres.

$\tan\alpha = \frac{5}{12}$, $\tan\beta = \frac{3}{4}$

In ΔBAC,

$\tan\alpha = \frac{AB}{AC} \Rightarrow \frac{5}{12} = \frac{h}{(x+192)}$ ……………………. (i)

In ΔDAB,

$\tan\beta = \frac{AB}{AD} \Rightarrow \frac{3}{4} = \frac{h}{x}$ or $x = \frac{4h}{3}$ ……………………… (ii)

Using (ii) in (i)

$\frac{5}{12} = \left(\frac{h}{192 + \frac{4h}{3}}\right)$

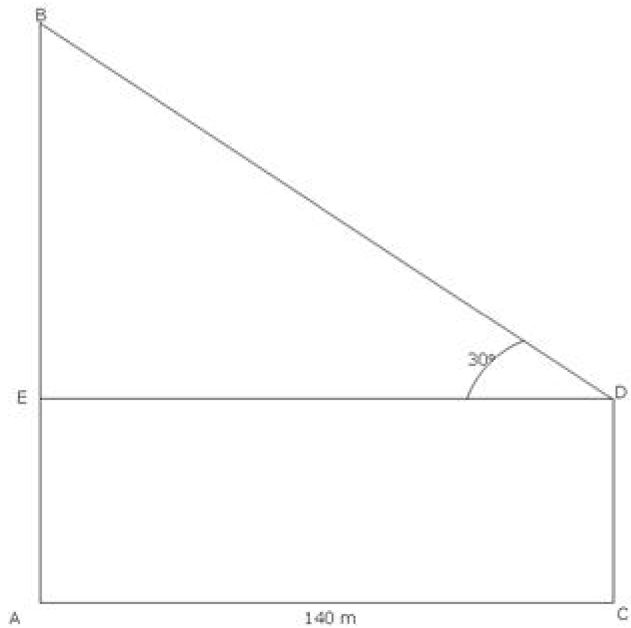
$5\left(192 + \frac{4h}{3}\right) = 12h$

2880 +20h =36h

16h = 2880 or h= 180

Hence, the height of the tower is 180 metres.

OR



Let AB and CD be two towers of height h m and 60 m respectively.

AC=140m and ÐBDE =30^0.

In ΔDEB,

tan 30° = $\frac{BE}{DE}$

$\frac{1}{\sqrt{3}} = \frac{BE}{140}$ (DE=AC=140m)

BE = $\frac{140}{\sqrt{3}}$ = 80.83m

Thus, the height of the first tower is

AB= AE+BE = CD+BE =60+80.83 = 140.83m

22]

Area of one design = $\frac{\pi r^2\theta}{360}$ = $\frac{60}{360}$ x π x 28^2 - area of △ OAB

$= \pi \times \frac{28^2}{6} - \frac{\sqrt{3}}{4} \times 28^2$

$= 28^2 \left(\frac{11}{21} - \frac{17}{40}\right) cm^2$

Total cost of making the design = Rs $6 \times 28^2 \left(\frac{11}{21} - \frac{17}{40}\right) \times 0.35$

= Rs $28 \times 28 \times \frac{83}{400}$ = Rs. 162.68

23]

The cone of maximum size that is carved out from a cube of edge 14 cm

cm will be of base radius 7 cm and the height 14 cm.

Total Surface area of the cone = $\pi rl + \pi r^2$

$= \frac{22}{7} \times 7 \times \sqrt{7^2 + 14^2} + \frac{22}{7} (7)^2$

$= \frac{22}{7} \times 7 \times \sqrt{245} + 154 = \left(154\sqrt{5} + 154\right) cm^2 = 154\left(\sqrt{5} + 1\right) cm^2$

Surface area of the cube = $6 \times (14)^2 = 6 \times 196 = 1176\ cm^2$

So, surface area of the remaining solid left out after the cone is carved out

= Surface area of the cube - surface area of the circle + Curved surface area of the cone

$= \left(1176 - 154 + 154\sqrt{5}\right) cm^2 = 1022 + 154\sqrt{5}\ cm^2$

24]

Volume of water that flows in the canal in one hour

= width of the canal x depth of the canal x speed of the canal water

$= 3 \times 1.2 \times 20 \times 1000 m^3 = 72000 m^3$

In 20 minutes the volume of water in the canal

$= 72000 \times \frac{20}{60}\ m^3 = 24000 m^3$

Area irrigated in 20 minutes, if 8 cm, i.e., 0.08 m standing water is required

$= \frac{24000}{0.08}$ $m^2 = 300000\ m^2 = 30$ hectares

25] Suppose B alone takes x days to finish the work. Then, A alone can finish it in (x - 6) days.

Now, (A's one day's work) + (B's one day's work) = $\frac{1}{x} + \frac{1}{x-6}$

(A + B)'s one day's work = $\frac{1}{4}$

Therefore, $\frac{1}{x} + \frac{1}{x-6} = \frac{1}{4}$

$\frac{x-6+x}{x(x-6)} = \frac{1}{4}$

$8x - 24 = x^2 - 6x$

$x^2 - 14x + 24 = 0$

$x^2 - 12x - 2x + 24 = 0$

$(x - 12)(x - 2) = 0$

$x = 12$ or $x = 2$

But, x cannot be less than 6. So, x = 12.

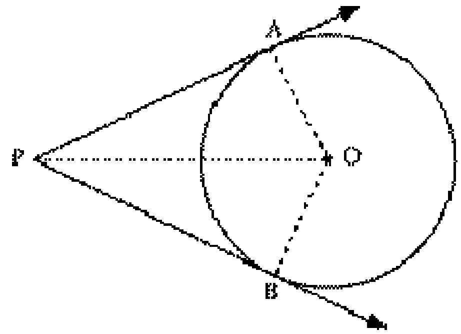
Hence, B alone can finish the work in 12 days.

26]

Given: A circle with centre O; PA and PB are two tangents to the circle drawn from an external point P.

To prove: PA = PB

Construction: Join OA, OB, and OP.



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

OA $\perp$ PA and OB $\perp$ PB ... (1)

In $\triangle$OPA and $\triangle$OPB:

$\angle$OAP = $\angle$OBP = 90°(Using (1))

OP = PO (Common side)

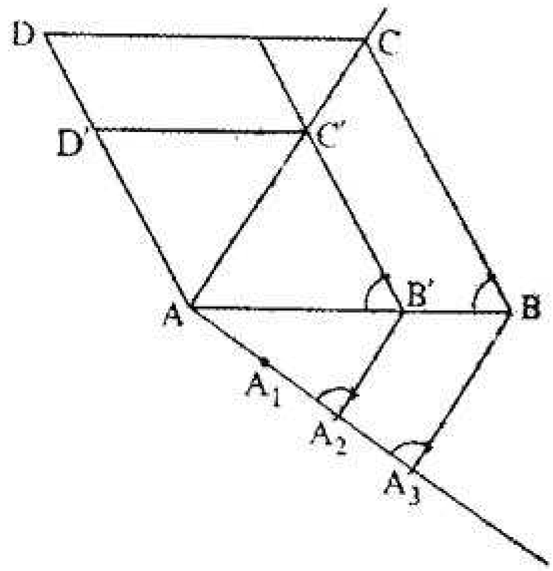
OA = OB (Radii of the same circle)

Therefore, $\triangle$OPA $\cong$ $\triangle$OPB (RHS congruency criterion)

Therefore, PA = PB (Corresponding parts of congruent triangles are equal)

Thus, it is proved that the lengths of the two tangents drawn from an external point to a circle are equal.

27]



From the figure

$\frac{AB'}{AB} = \frac{2}{3} = \frac{A'C'}{AC}$

Also, $\frac{AC'}{AC} = \frac{C'D'}{CD} = \frac{AD'}{AD} = \frac{2}{3}$

Therefore, AB' =B'C' =C'D' =AD' = $\frac{2}{3}$ AB

Thus, AB'C'D' is a rhombus.

28]

Let the sum of first n terms be 45. Then,

$S_n = 45$

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

$\Rightarrow \frac{n}{2}[2x13 +(n-1)(-2)] =45$

$\Rightarrow \frac{n}{2}[26-2(n-1)]=45$

$\Rightarrow 13n - n(n - 1) =45$

$\Rightarrow n^2 - 14n + 45 = 0$

$\Rightarrow (n - 9)(n - 5) = 0$

$\Rightarrow n = 5$ or 9

Hence, the sum of first 5 or the first 9 terms is 45.

29]

Capacity (or volume) of the container = $\frac{\pi h}{3}[r^2_1 + r^2_2 + r_1r_2]$

Here, h = 30 cm, r_1 = 20 cm and r_2 = 10 cm

So, the capacity of container = 3.14 x $\frac{30}{3}[20^2 + 10^2 + 20 \times 10]$ cm^3

= 21.980 liters

Cost of 1 litre of milk = Rs 25

Cost of 21.980 litres of milk = Rs 21.980 x 25 = Rs 549.50

Surface area of the bucket = curved surface area of the bucket + surface area of the bottom

= $\pi l(r_1 + r_2) + \pi r^2_2$

Now, l= $\sqrt{h^2+(r_1-r_2)^2}$

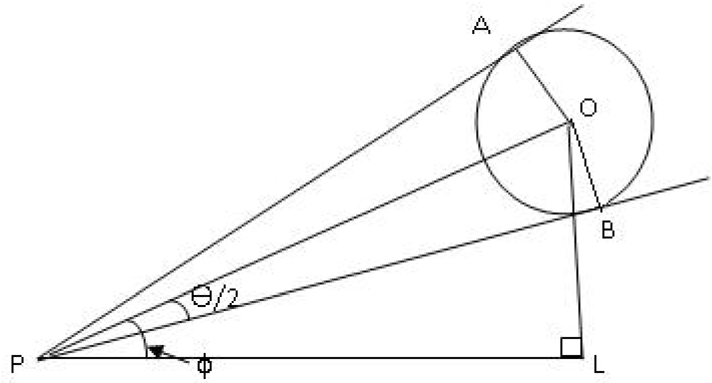
l = $\sqrt{900+100}$ cm = 31.62 cm

Therefore, surface area of the bucket

= 3.14 x 31.62 (20+10) + 3.14x(10)^2

= 3.14 x 1048.6 cm^2 = 3292.6 cm^2(approx.)

30]



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Let O be the centre of the balloon of radius r and P the eye of the observer. Let PA and PB be tangents from P to the balloon. $\angle APB = \theta$.

Therefore, $\angle APO = \angle BPO = \dfrac{\theta}{2}$

Let OL be perpendicular from O to the horizontal.

$\angle OPL = \varphi$

In ΔOAP,

$\sin\frac{\theta}{2} = \frac{OA}{OP} = \frac{r}{OP}$

$\Rightarrow$ OP= r cosec $\frac{\theta}{2}$ …(i)

In ΔOPL,

$\sin\phi = \frac{OL}{OP}$

$\Rightarrow$ OL=OP sinϕ

$\Rightarrow$ OL = r sinϕ cosec $\frac{\theta}{2}$ (from (i))

Thus, the height of the centre of the balloon is r sinϕ cosec $\frac{\theta}{2}$.

31]

Let unit place digit = x and ten's place digit = $\frac{18}{x}$

∴ Number = (1) (x) + (10) $\left(\frac{18}{x}\right) = x + \frac{180}{x}$ …(i)

Interchanged Number = 10x + 1 $\left(\frac{18}{x}\right)$

Given, $\left(x + \frac{180}{x}\right) - 63 = 10x + \frac{18}{x}$

$\Rightarrow \frac{x^2 + 180 - 63x}{x} = \frac{10x^2 + 18}{x}$

$\Rightarrow \frac{x^2 + 180 - 63x}{x} - \frac{10x^2 + 18}{x} = 0$

$\Rightarrow x^2 + 180 - 63x - 10x^2 - 18 = 0$

$\Rightarrow -9x^2 - 63x + 162 = 0$

$\Rightarrow x^2 + 7x - 18 = 0$

$\Rightarrow (x+9)(x-2) = 0 \Rightarrow x = -9$ or 2

$\Rightarrow x = 2$ (Rejecting x = -9 as digit is not -ve)

From (i), Number = x + $\frac{180}{x} = 2 + \frac{180}{2} = 2 + 90 = 92$

32]

Length of the cylinder = 24 cm

diameter of copper wire = 4 m

one round of the wire will cover the surface of cylinder by 4 mm

Therefore, the number of rounds of wire to cover the length of

cylinder $= \frac{\text{length of cylinder}}{\text{thickness of wire}} = \frac{24\text{ cm}}{4\text{ mm}} = \frac{240}{4} = 60$

Now, distance of cylinder = 20 cm

Therefore, length of wire in one round

= circumference of base of the cylinder = 2πr $= \frac{22}{7} \times 20 = \frac{440}{7}$ cm

Length of wire for covering the whole surface of cylinder = length of wire in 60 rounds $= 60 \times \frac{40}{7} = 3771.428$ cm

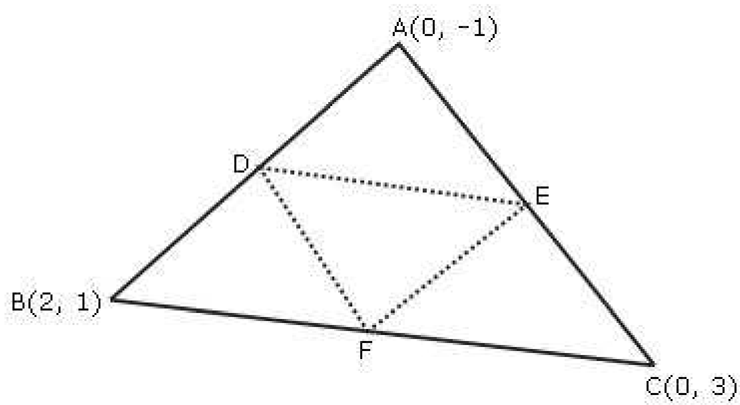
Radius of copper wire = $\frac{0.4}{2}$ = .2 cm

Therefore, volume of wire = $\pi r^2 h$ $= \frac{22}{7} \times (.2)^2 \times 3771.428$ = 474.122 cu cm

Weight of wire = volume × density = 474.122 × 8.68 = 4115.37 gm = 4.11537 kg

33]

34]



D, E and F are mid-points of AB, BC and CA respectively.

Therefore, coordinates of D = $\left[\frac{0+2}{2}, \frac{-1+1}{2}\right] = (1, 0)$

Coordinates of E = $\left[\frac{2+0}{2}, \frac{1+3}{2}\right] = (1, 2)$

Coordinates of F = $\left[\frac{0+0}{2}, \frac{3-1}{2}\right] = (0,1)$

Since, area of a triangle = $\frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$

Therefore, area Δ ABC = $\frac{1}{2}[0(1-3)+2(3+1)+0(-1-1)]$ = $\frac{1}{2}[0+8+0]$ = 4 sq. units

Now, area Δ DEF = $\frac{1}{2}[1(2-1)+1(1-0)+0(0-2)]$ = $\frac{1}{2}[1+1+0]$ = 1 sq. unit

Therefore, $\frac{\text{area } \Delta ABC}{\text{area } \Delta DEF} = \frac{4}{1}$ = 4 : 1