Sample Paper 10

ANSWERKEY																			
1	(c)	2	(b)	3	(a)	4	(b)	5	(c)	6	(d)	7	(d)	8	(b)	9	(a)	10	(d)
11	(b)	12	(d)	13	(a)	14	(a)	15	(b)	16	(d)	17	(b)	18	(c)	19	(b)	20	(d)
21	(b)	22	(c)	23	(d)	24	(d)	25	(b)	26	(b)	27	(d)	28	(c)	29	(a)	30	(b)
31	(a)	32	(a)	33	(d)	34	(c)	35	(a)	36	(b)	37	(b)	38	(c)	39	(a)	40	(d)
41	(c)	42	(c)	43	(c)	44	(d)	45	(c)	46	(c)	47	(a)	48	(d)	49	(a)	50	(b)

SOLUTIONS

1. **(c)** Let α and β be the zeroes of the quadratic polynomial.

we have $\alpha = 8$ and $\beta = 10$

Sum of zeroes = $\alpha + \beta = 8 + 10 = 18$

Product of zeroes = $\alpha\beta = 8 \times 10 = 80$.

$\therefore$ The required quadratic polynomial

$= x^2 -$ (Sum of the zeroes)x + Product of the zeroes

$= x^2 - 18x + 80$

Any other quadratic polynomial that fits these condition will be of the form

$k(x^2 - 18x + 80)$, where k is a real.

2. **(b)** A(3, –3), B(–3, 3), $\left(-3\sqrt{3}, -3\sqrt{3}\right)$

$$AB = \sqrt{(-6)^2 + (6)^2} = \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$$

$$BC = \sqrt{\left(-3\sqrt{3}+3\right)^2 + \left(-3\sqrt{3}-3\right)^2} = \sqrt{72} = 6\sqrt{2}$$

$$AC = \sqrt{\left(-3\sqrt{3}-3\right)^2 + \left(-3\sqrt{3}+3\right)^2} = \sqrt{72} = 6\sqrt{2}$$

$\therefore$ ΔABC is equilateral triangle.

3. **(a)** Let the two numbers be x and y (x > y). Then,

$x - y = 26$ ...(i)

$x = 3y$ ...(ii)

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

$3y - y = 26$

$2y = 26$

$y = 13$

Substituting value of y in (ii) $x = 3 \times 13 = 39$

Thus, two numbers are 13 and 39.

4. **(b)** Area of equilateral triangle $= \dfrac{\sqrt{3}}{4}a^2$

$\Rightarrow \dfrac{\sqrt{3}}{4}a^2 = 121\sqrt{3}$

$\Rightarrow a^2 = 484$

$\Rightarrow a = 22$ cm

Perimeter of equilateral $\Delta = 3a$

$= 3\,(22)$

$= 66$ cm

Since the wire is bent into the form of Q circle, So perimeter of circle = 66 cm

$\Rightarrow$ 2pr = 66

$\Rightarrow 2 \times \dfrac{22}{7} \times r = 66$

$\Rightarrow r = 66 \times \dfrac{1}{2} \times \dfrac{7}{22}$

$\Rightarrow r = 10.5$ cm

So Area enclosed by circle = πr^2

$= \dfrac{22}{7} \times 10.5 \times 10.5$

$= 22 \times 1.5 \times 10.5$

$= 346.5\ \text{cm}^2$

5. **(c)** 1st wheel makes 1 revolutions per sec

2nd wheel makes $\dfrac{6}{10}$ revolutions per sec

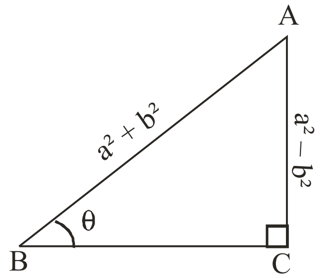
3rd wheel makes $\dfrac{4}{10}$ revolutions per sec

In other words 1st, 2nd and 3rd wheel take 1, $\dfrac{5}{3}$ and seconds respectively to complete one revolution.

L.C.M of 1, $\frac{5}{3}$ and $\frac{5}{2} = \frac{\text{L.C.M of } 1, 5, 5}{\text{H.C.F of } 1, 3, 2} = 5$

Hence, after every 5 seconds the red spots on all the three wheels touch the ground.

6. **(d)** $\sin\theta = \frac{a^2 - b^2}{a^2 + b^2}$



Since, $\sin\theta = \frac{\text{perpendicular}}{\text{base}}$

$\therefore \frac{AC}{AB} = \frac{a^2 - b^2}{a^2 + b^2}$

Now in Δ ABC ,

$\angle B = \theta$ and $\angle C = 90°$

$(a^2 + b^2)^2 = BC^2 + (a^2 - b^2)^2$

$\therefore BC = 2ab$

$\text{cosec } \theta = \frac{a^2 + b^2}{a^2 - b^2}$,

$\cot\theta = \frac{BC}{AC} = \frac{2ab}{a^2 - b^2}$

$\text{cosec } \theta + \cot\theta = \frac{a^2 + b^2}{a^2 - b^2} + \frac{2ab}{a^2 - b^2} = \frac{a+b}{a-b}$

7. **(d)** P (7, –6) —1— R —2— Q (3,4)

Coordinate of R

$= \left(\frac{7\,(2) + 3\,(1)}{1+2}, \frac{-6(2) + 4(1)}{1+2}\right)$

$= \left(\frac{17}{3}, \frac{-8}{3}\right)$

Thus, the point R lies in IV quadrant.

8. **(b)** The sum of the two numbers lies between 2 and 12.

So the primes are 2, 3, 5, 7, 11.

No. of ways for getting 2 = (1, 1) = 1

No. of ways of getting 3 = (1, 2), (2, 1) = 2

No. of ways of getting 5 = (1, 4), (4, 1), (2, 3), (3, 2) = 4

No. of ways of getting 7 = (1, 6), (6, 1), (2, 5), (5, 2), (3, 4), (4, 3) = 6

No. of ways of getting 11 = (5, 6), (6, 5) = 2

No. of favourable ways = 1 + 2 + 4 + 6 + 2 = 15

No. of exhaustive ways = 6 × 6 = 36

Probability of the sum as a prime

$= \frac{15}{36} = \frac{5}{12}$

9. **(a)** Given, $AB = 2DE$ and $\Delta ABC \sim \Delta DEF$

Hence, $\frac{\text{area}(\Delta ABC)}{\text{area}(\Delta DEF)} = \frac{AB^2}{DE^2}$

or $\frac{56}{\text{area}(\Delta DEF)} = \frac{4DE^2}{DE^2} = 4$ [∵ AB = 2DE]

area $(\Delta DEF) = \frac{56}{4} = 14\,sq.cm.$

10. **(d)** Given : length of the sheet = 11 cm

Breadth of the sheet = 2cm

Diameter of the circular piece = 0.5 cm

Radius of the circular piece

$= \frac{0.5}{2} = 0.25$ cm

Now, area of the sheet = length × breadth

= 11 × 2 = 22 cm^2.

Area of a circular disc = πr^2

$= \frac{22}{7} \times (0.25)^2\ cm^2$

Number of circular discs formed

$= \frac{\text{Area of the sheet}}{\text{Area of one disc}}$

$= \frac{22}{\frac{22}{7} \times (0.25)^2} = \frac{22 \times 7}{22 \times 0.0625} = 112$

Hence, 112 discs can be formed.

11. **(b)** $a = x^3y^2$

$= x \times x \times x \times y \times y$

$b = xy^3$

$= x \times y \times y \times y$

$\Rightarrow$ HCF $(a, b) = xy^2$

12. **(d)** $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta}$

$= \frac{\frac{\sin\theta}{\cos\theta}}{1 - \frac{\cos\theta}{\sin\theta}} + \frac{\frac{\cos\theta}{\sin\theta}}{1 - \frac{\sin\theta}{\cos\theta}}$

$$= \frac{\sin\theta}{\cos\theta.\left(\frac{\sin\theta-\cos\theta}{\sin\theta}\right)} + \frac{\cos\theta}{\sin\theta.\left(\frac{\cos\theta-\sin\theta}{\cos\theta}\right)}$$

$$= \frac{\sin^2\theta}{\cos\theta(\sin\theta-\cos\theta)} + \frac{\cos^2\theta}{\sin\theta(\cos\theta-\sin\theta)}$$

$$= \frac{\sin^2\theta}{\cos\theta(\sin\theta-\cos\theta)} - \frac{\cos^2\theta}{\sin\theta(\sin\theta-\cos\theta)}$$

$$= \frac{\sin^2\theta\times\sin\theta-\cos^2\theta\times\cos\theta}{\sin\theta\cos\theta(\sin\theta-\cos\theta)}$$

$$= \frac{\sin^3\theta-\cos^3\theta}{\sin\theta\cos\theta(\sin\theta-\cos\theta)}$$

$$= \frac{(\sin\theta-\cos\theta)(\sin^2\theta+\cos^2\theta+\sin\theta\cos\theta)}{\sin\theta\cos\theta(\sin\theta-\cos\theta)}$$

$$= \frac{1+\sin\theta\cos\theta}{\sin\theta\cos\theta} \qquad = 1+\sec\theta\,\mathrm{cosec}\,\theta$$

So, $\frac{-k}{2} = 1$

$\therefore$ k = 2

13. **(a)** Let present age of Nuri = x years

Let present age of Sonu = y years

Five years ago,

x – 5 = 3(y – 5)

x – 5 = 3y – 15

x – 3y = –10 ...(i)

Ten years later,

(x + 10) = 2(y + 10)

x + 10 = 2y + 20

x – 2y = 10 ...(ii)

Subtracting (ii) from (i), we get

– y = – 20

⇒ y = 20

Substituting y = 20 in (ii), we get

x – 2 × 20 = 10

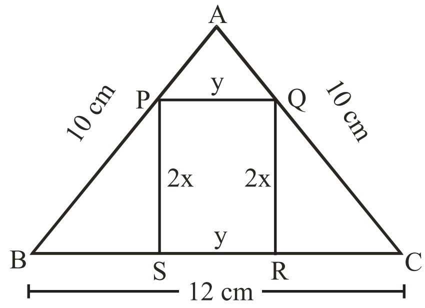
⇒ x = 50

So, present age of Nuri is 50 years and present age of Sonu is 20 years

14. **(a)** Using Pythagoras theorem in ΔABL we have AL = 8cm,

Also, ΔBPQ ~ ΔBAL

$$\therefore \frac{BQ}{PQ} = \frac{BL}{AL} \Rightarrow \frac{6-x}{y} = \frac{6}{8} \quad \text{or} \quad x = 6 - \frac{3}{4}y$$



15. **(b)** Let the common factor be x – k

we have,

f(k) = g(k) = 0

⇒ $k^2 + 5k + p = k^2 + 3k + q$

$k = \frac{q-p}{2}$

substituting "k" in $x^2 + 5x + p = 0$

$x^2 + 5x + p = 0$

$$\left(\frac{q-p}{2}\right)^2 + \left(\frac{q-p}{2}\right) + p = 0$$

$\therefore (p - q)^2 = 2\,(3p - 5q)$

16. **(d)** X = (April, June, September, November)

Hence, n(X) = 4

17. **(b)** $x^2 = \frac{5}{9} \Rightarrow x = \pm\left(\frac{1}{3}\right)\left(\sqrt{5}\right)$ = irrational

18. **(c)** PQ = 13 ⇒ $PQ^2 = 169$

⇒ $(x - 2)^2 + (-7 - 5)^2 = 169$

⇒ $x^2 - 4x + 4 + 144 = 169$

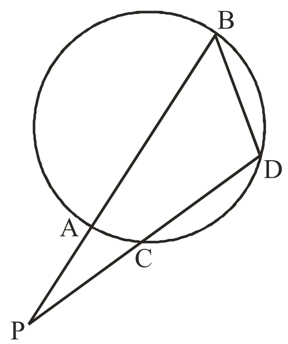
⇒ $x^2 - 4x - 21 = 0$

⇒ $x^2 - 7x + 3x - 21 = 0$

⇒ (x – 7) (x + 3) = 0

⇒ x = 7, –3

19. **(b)**



We have two chord AB and CD when produced meet outside the circle at P.

Since in a cyclic quadrilateral the exterior angle is equal to the interior opposite angle,

$\therefore$ ∠PAC = ∠PDB ....(i)

From (1) and (2) and using AA similarity we have ΔPAC ~ ΔPDB

$\therefore$ Their corresponding sides are proportional.

$\Rightarrow \frac{PA}{PD} = \frac{PC}{PB}$

$\Rightarrow$ PA.PB = PC.PD.

20. (d) we have, $\tan\theta = \frac{a\sin\phi}{1 - a\cos\phi}$

$\Rightarrow \cot\theta = \frac{1}{a\sin\phi} - \cot\phi$

$\Rightarrow \cot\theta + \cot\phi = \frac{1}{a\sin\phi}$ ...(i)

$\tan\phi = \frac{b\sin\theta}{1 - b\cos\theta}$

$\Rightarrow \cot\phi = \frac{1}{b\sin\theta} - \cot\theta$

$\Rightarrow \cot\phi + \cot\theta = \frac{1}{b\sin\theta}$ ...(ii)

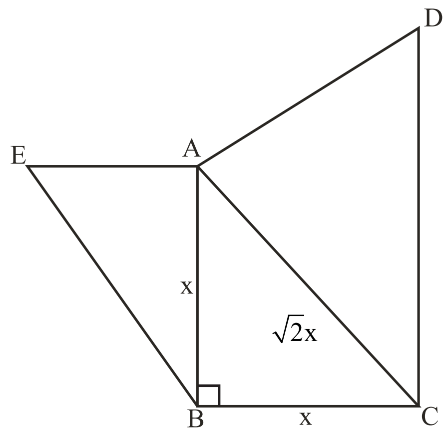
From (i) and (ii), we have

$\frac{1}{a\sin\phi} = \frac{1}{b\sin\theta}$

$\Rightarrow \frac{a}{b} = \frac{\sin\theta}{\sin\phi}$

21. (b) Let $f(x) = x^n + y^n$.
Divisible by (x + y) means f(–y) = 0.
So, $(-y)^n + y^n = 0$.
This is possible only when "n" is an odd number.

22. (c)



Let AB = BC = x.
Since ΔABC is right-angled with
$\angle B = 90°$

$\therefore$ $AC^2 = AB^2 + BC^2 = x^2 + x^2 = 2x^2$

$\Rightarrow AC = \sqrt{2}x$

Since ΔABE ~ ΔACD

$\therefore \frac{\text{Area}(\Delta ABE)}{\text{Area}(\Delta ACD)} = \frac{AB^2}{AC^2} = \frac{x^2}{2x^2} = \frac{1}{2}.$

Thus $\frac{\text{Area}(\Delta ABE)}{\text{Area}(\Delta ACD)} = \frac{1}{2}$

Thus reqd. ratio is 1 : 2.

23. (d) Area of circle A = 3.14 × 10 × 10 = 314
Area of circle B = 3.14 × 8 × 8 = 200.96

Area of Q = $\frac{1}{8}$ × Area of B

$= \frac{1}{8} \times 200.96 = 25.12$

Now, $= \frac{\text{Area of P}}{\text{Area of Q}}$

$\Rightarrow$ Area of P = $\frac{5}{4}$ × Area of Q

$= \frac{5}{4} \times 25.12 = 31.4$

Area of square = 7 × 7 = 48
Required Area
= (314 + 200.96 + 49 – 25.12 – 31.4)
= 507.44 cm^2

24. (d) All the properties are satisfied by real numbers.

25. (b) A(0, 4), B(0, 0), C(3, 0)

$AB = \sqrt{(0-0)^2 + (0-4)^2} = 4$

$BC = \sqrt{(3-0)^2 + (0-0)^2} = 3$

$CA = \sqrt{(0-3)^2 + (4-0)^2} = 5$

AB + BC + CA = 12

26. (b) Let the two parts be x and y.
We have,

x + y = 62 ...(i)

$\frac{\frac{x}{4}}{\frac{2y}{5}} = \frac{2}{3}$

15x – 16y = 0 ...(ii)

By solving (i) and (ii) we get x = 32, y = 30

27. (d) Here, $(p+2)\left(q - \frac{1}{2}\right) = pq - 5$ ...(i)

$\Rightarrow pq - \frac{1}{2}p + 2q - 1 = pq - 5$ ...(ii)

$\Rightarrow -\frac{p}{2} + 2q = -4$ ...(iii)

$\Rightarrow \frac{p}{2} - 2q = 4$

also, $(p-2)\left(q - \frac{1}{2}\right) = pq - 5$

$\Rightarrow \quad pq-\frac{1}{2}p-2q+1=pq-5$

$\Rightarrow \quad -\frac{1}{2}p-2q=-6$ ...(iv)

By adding (iii) and (iv), we get

p = 10

$= \quad \frac{p}{2}-2q=4$

or $\frac{10}{2}-2q=4$

$\Rightarrow \quad 5-4=2q \quad \Rightarrow \quad q=\frac{1}{2}$

Hence, solution set (p,q) = $\left(10,\frac{1}{2}\right)$

28. **(c)** Let $\cos\theta+\sqrt{3}\sin\theta=2\sin\theta$

Multiplying both sides by $2+\sqrt{3}$, we get

$\Rightarrow \cos\theta=2\sin\theta-\sqrt{3}\sin\theta=(2-\sqrt{3})\sin\theta$

$(2+\sqrt{3})\cos\theta=(2+\sqrt{3})(2-\sqrt{3})\sin\theta$

$\Rightarrow (2+\sqrt{3})\cos\theta=\{(2)^2-(\sqrt{3})^2\}\sin\theta$

$\Rightarrow 2\cos\theta+\sqrt{3}\cos\theta=(4-3)\sin\theta$

$\Rightarrow 2\cos\theta+\sqrt{3}\cos\theta=(4-3)\sin\theta$

$\Rightarrow \sin\theta-\sqrt{3}\cos\theta=2\cos\theta$

29. **(a)** Substituting the given zeros in (x – a) (x – b), we get

$\left(x-\frac{1}{3}\right)\left(x+\frac{2}{5}\right)$

$=\frac{1}{15}\left[15x^2+x-2\right]$

30. **(b)** S = {(1, 1), ..., (1, 6), (2, 1),.....,(2, 6), (3, 1), ..., (3, 6), (4, 1), ..., (4, 6), (5, 1),...., (5, 6), (6, 1),....., (6, 6)}

n(S) = 36

Let E be the event that both dice show different numbers.

E {(1, 2), (1, 3),...., (1, 6), (2, 1), (2, 3), (2, 4),...., (2, 6), (3, 1), (3, 2), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (4, 5)}

n(E) = 30

$P(E)=\frac{n(E)}{n(S)}=\frac{30}{36}=\frac{5}{6}$

31. **(a)** A (3p, 4) —— P (5, p) —— B (–2, 2q)

Since, P (5, p) is the mid point of AB

$\therefore \quad 5=\frac{3p-2}{2}$ and $p=\frac{4+2q}{2}$

p = 4 and 2q = 2p – 4

$\Rightarrow$ 2q = 8 – 4 = 4

Now, q = 2

$\Rightarrow$ p + q = 4 + 2 = 6

$\Rightarrow$ p – q = 4 – 2 = 2

32. **(a)** An irrational number.

33. **(d)** $\frac{\cos^2\theta}{\cot^2\theta-\cos^2\theta}=3 \quad \Rightarrow \frac{\cos^2\theta}{\frac{\cos^2\theta}{\sin^2\theta}-\cos^2\theta}=3$

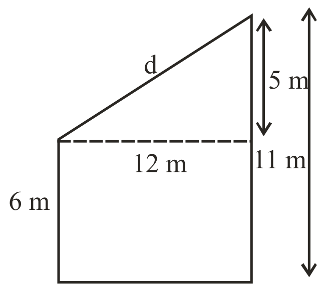
$\Rightarrow \frac{\cos^2\theta\times\sin^2\theta}{\cos^2\theta-\sin^2\theta\cos^2\theta}=3$

$\Rightarrow \frac{\sin^2\theta\cos^2\theta}{\cos^2\theta(1-\sin^2\theta)}=3$

$\Rightarrow \frac{\sin^2\theta}{\cos^2\theta}=3 \quad \Rightarrow \tan^2\theta=3 \Rightarrow \tan\theta=\sqrt{3}$

tan θ = tan 60º ⇒ θ = 60º (acute angle)

34. **(c)**



Using pythagoras theorem,

$d=\sqrt{12^2+5^2}=\sqrt{144+25}=\sqrt{169}$

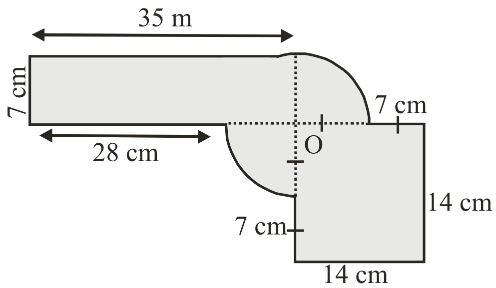
$\therefore \quad d = 13$ m

So, distance between the tops of poles is 13 m.

35. **(a)** Radius of circle = 14 cm ÷ 2 = 7 cm

One side of the figure opposite to

35cm = 35cm –7cm = 28cm



Perimeter of the two sectors of circle

$=\frac{1}{2}\times\frac{22}{7}\times 14\text{cm}=22\text{cm}$

$\therefore$ Total perimeter = 134 cm

The perimeter of the given figure is 134 cm.

36. **(b)** Product of zeroes = $\frac{161}{23} = 7$

$\Rightarrow$ 2 × product of zeroes = 14p

$\Rightarrow$ 2 × 7 = 14p

$\therefore$ $p = \frac{14}{14} \Rightarrow p = 1$

37. **(b)** Suppose the required ratio is $m_1 : m_2$ Then, using the section formula, we get

$$-2 = \frac{m_1(4) + m_2(-3)}{m_1 + m_2}$$

$$\Rightarrow -2m_1 - 2m_2 = 4m_1 - 3m_2$$

$$\Rightarrow m_2 = 6m_1 \Rightarrow m_1 : m_2 = 1:6$$

38. **(c)** If the sum of 3 prime is even, then one of the numbers must be 2.
Let the second number be x. Then as per the given condition,
x + (x + 36) + 2 = 100 $\Rightarrow$ x = 31
So, the number are 2, 31, 67.
Hence largest number is 67.

39. **(a)** $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{BC^2}{EF^2}$

$$\Rightarrow ar(\Delta ABC) = \left(\frac{2.1}{2.8}\right)^2 \times ar(\Delta DEF) = 9cm^2$$

40. **(d)** $\frac{k}{6} \neq \frac{-1}{-2} \Rightarrow k \neq 3$.

41. **(c)** H.C.F. = 16 and Product = 3072

L.C.M. = $\frac{\text{Product}}{\text{H.C.F.}} = \frac{3072}{16} = 192$

42. **(c)** H.C.F. of two numbers is 27
So let the numbers are 27a and 27b
Now 27a + 27b = 135
$\Rightarrow$ a + b = 5 ...(i)
Also 27a × 27b = 27 × 162.
$\Rightarrow$ ab = 6 ...(ii)
$(a - b)^2 = (a + b)^2 - 4ab$
$\Rightarrow$ a – b = 1
Solving (i) and (iii), we get
a = 3, b = 2
So numbers are 27 × 3, 27 × 2 i.e., 81, 54

43. **(c)** H.C.F. of two co-prime natural number is 1.

44. **(d)** LCM =HCF
$\Rightarrow$ two numbers are equal.

45. **(c)** Clearly, LCM = (LCM of p and p^3)
(LCM of q^2 and q) = p^3q^2

46. **(c)** Area of minor sector OAPB

$$= \frac{\theta}{360} \times \pi r^2 = \frac{90}{360} \times 3.14 \times (10)^2$$

= 78.5 cm^2

47. **(a)** Area of minor segment APB

$$= \left(\frac{\pi\theta}{360} - \sin\frac{\theta}{2}\cos\frac{\theta}{2}\right)r^2$$

$$= \left(3.14 \times \frac{90}{360} - \sin 45° \cos 45°\right) (10)^2$$

= 28.5 cm^2

48. **(d)** Area of the major sector OAQB
= Area of circle – Area of minor sector OAPB.
= (314 – 78.5)cm^2 = 235.5 cm^2

49. **(a)** Area of major segment AQB
= Area of the circle – Area of the minor segment APB
= (3.14 × 10 × 10 – 28.5) cm^2
= 285. 5 cm^2

50. **(b)** Length of arc APB

$$= \frac{90}{360} \times 2 \times \frac{22}{7} \times 10$$

= 15.71 cm