X

H.W-20

1) Rahim tosses two different coins simultaneously. Find the probability of getting atleast one tail.

2) A die is thrown once. Find the probability of getting
(a) a composite number (b) a prime number.

3) A bag contains white, black and red balls only. A ball is drawn at random from the bag. The probability of getting a white ball is $3/10$ and that of a black ball is $2/5$. Find the probability of getting a red ball. If the bag contains 20 black balls, then find the total no. of balls in the bag.

4) A bag contains 8 red, 7 orange and 9 green balls. A ball is drawn at random from the bag. Find the probability that the drawn ball is
(a) orange or green (b) not orange (c) neither green nor red.

5) A card is drawn at random from a pack of 52 playing cards. Find the probability that the card drawn is neither a black nor a king card.

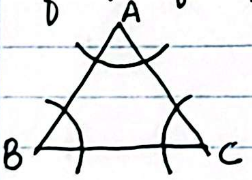
6) Red queens and black jacks are removed from a pack of 52 playing cards. A card is drawn at random from the remaining cards, after reshuffling them. Find the probability that the drawn card is (i) a king (ii) of red colour (iii) a face card (iv) a queen.

7) A die is rolled twice. Find the probability that
(i) 5 will not come up either time (ii) 5 will come up exactly one time

8) Three coins are tossed simultaneously. What is the probability of getting
(i) atleast one head? (ii) exactly two tails? (iii) atmost one tail?

9) If the median is 32.5, find the values of f_1 and f_2.

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
f	f_1	5	9	12	f_2	3	2	40

10) 

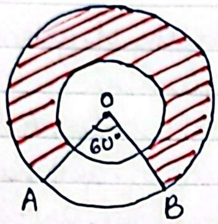
With vertices A, B and C of ΔABC as centres, arcs are drawn with radius 14 cm and the three portions of the Δ so obtained are removed. Find the area of the removed portion.

11) A piece of wire 22 cm long is bent into the form of an arc of a circle subtending an angle of 60° at centre. Find the radius.

12) Find the area between inscribed and circumscribed circles of a square of side 10 cm.

13) From a window 15 m high above the ground in a street, the angles of elevation and depression of the top and the foot

of another house on the opposite side of the street are 30° and 45° respectively. find the height of the opposite house.

14) 

Two concentric circles with centre O have radii 21cm and 42cm. If $\angle AOB = 60^\circ$, find the area of the shaded region.

15) Prove that :-

(i) $(1+\cot\theta+\tan\theta)(\sin\theta-\cos\theta) = \frac{\sec\theta}{\operatorname{cosec}^2\theta} - \frac{\operatorname{cosec}\theta}{\sec^2\theta}$

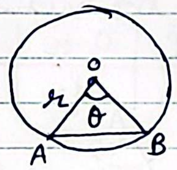
(ii) $\frac{\tan\theta-\cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \operatorname{cosec}^2\theta$

(iii) $\sqrt{\sec^2\theta+\operatorname{cosec}^2\theta} = \tan\theta+\cot\theta$

(iv) $\frac{1}{\cos A+\sin A-1} + \frac{1}{\cos A+\sin A+1} = \operatorname{cosec} A+\sec A$

(v) $(\sec\theta-\tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$

16) (in whats app)
(i) area of a minor sector =
(ii) area of major sector =
(iii) area of minor segment =
(iv) area of major segment =
(v) when $\theta = 60^\circ$, area($\triangle AOB$) =
$\theta = 90^\circ$, area($\triangle AOB$) =
$\theta = 120^\circ$, area($\triangle AOB$) =



(vi) length of an arc =
(vii) area of sector interms of length of corresponding arc =
(viii) Formula for mean (a) direct method
(b) assumed mean method
(c) step-deviation method
(ix) Mode =
(x) Median =
(xi) Empirical Formula
(xii) angle subtended by the minute hand in 1min = ___
(xiii) No. of complete rotation made in 1 day by (a) short-hand
(b) long hand

X H·W-20 (Answers)

1) Possible outcomes = {HH, HT, TH, TT}

Total no. of outcomes = 4

$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$

favourable outcome = {HT, TH, TT}

$\therefore$ P(getting atleast one tail) = $\frac{3}{4}$

2) Possible outcomes = {1, 2, 3, 4, 5, 6}

Total no. of outcomes = 6

$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$

(a) favourable outcomes = {4, 6}

$\therefore$ P(getting a composite number) = $\frac{2}{6} = \frac{1}{3}$

(b) favourable outcomes = {2, 3, 5}

$\therefore$ P(getting a prime number) = $\frac{3}{6} = \frac{1}{2}$

3) P(getting a red ball) = 1 − [P(getting a white ball) + P(getting a black ball)]

$= 1 - \left(\frac{3}{10} + \frac{2\times 2}{5\times 2}\right) = 1 - \frac{7}{10}$

$= \frac{3}{10}$

No. of black balls = 20

P(getting a black ball) = $\frac{\text{no. of black balls}}{\text{Total no. of balls}}$

$\Rightarrow \frac{\cancel{2}^{1}}{5} = \frac{\cancel{20}^{10}}{\text{total no. of balls}}$

$\therefore$ Total no. of balls in the bag = 50 balls

4) Total no. of outcomes = 8 + 7 + 9 = 24

$$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$$

(a) no. of favourable outcomes = 7 + 9 = 16

$\therefore$ P(drawing orange or green ball) $= \frac{16}{24} = \frac{2}{3}$

(b) no. of favourable outcomes = 8 + 9 = 17

$\therefore$ P(drawing a ball not orange) $= \frac{17}{24}$

(c) no. of favourable outcomes = 7

$\therefore$ P(drawing neither green nor red) $= \frac{7}{24}$

5) ~~Ab~~ Total no. of outcomes = 52

$$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$$

P(neither a black nor a king) = 1 − P(either a black or king)

$= 1 - \left(\frac{26+2}{52}\right)$

$= 1 - \frac{\cancel{28}\,7}{\cancel{52}\,13}$

$= \frac{6}{13}$

6) Total no. of outcomes = 52 − 2 − 2 = 52 − 4 = 48

$$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$$

(i) no. of favourable outcomes = 4

$\therefore$ P(drawing a king) $= \frac{4}{48} = \frac{1}{12}$

(ii) no. of favourable outcomes = 26 − 2 = 24

$\therefore$ P(drawing a red card) $= \frac{\cancel{24}\,3}{\cancel{48}\,6} = \frac{1}{2}$

(iii) no. of favourable outcomes = 1[illegible] − 2 = 12 − 4 = 8

$\therefore$ P(drawing a face card) $= \frac{[illegible]}{48} = \frac{1}{6}$

(iv) no. of favourable outcomes = 4 − 2 = 2

∴ P(drawing a queen) = $\frac{2}{48} = \frac{1}{24}$

7) Total no. of outcomes = $6^2 = 36$

$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$

(i) ~~Favourable outcomes are {(5,5)}~~

Favourable outcomes for 5 will come up either time

= {(1,5), (2,5), (3,5), (4,5),
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6),
(6,5)}

∴ P(5 will not come up either time) = 1 − P(5 will come up either time)

$= 1 - \frac{11}{36} = \frac{25}{36}$

(ii) Favourable outcomes = {(1,5), (2,5), (3,5), (4,5),
(5,1), (5,2), (5,3), (5,4), (5,6), (6,5)}

∴ P(5 will come up exactly one time) = $\frac{10}{36} = \frac{5}{18}$

8) Possible outcomes are {HHH, HHT, HTH, THH,
TTT, TTH, THT, HTT}

Total no. of outcomes = 8

$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$

(i) Favourable outcomes = {TTH, THT, HTT, HHT, HTH, THH, HHH}

∴ P(getting atleast one head) = $\frac{7}{8}$

(ii) Favourable outcomes = {TTH, THT, HTT}

∴ P(getting exactly two tails) = $\frac{3}{8}$

(iii) Favourable outcomes = {HHH, HHT, HTH, THH}

∴ P(getting atmost one tail) = 4 [illegible] 2

9)

C.I	f	C.f
0-10	f_1	f_1
10-20	5	$5+f_1$
20-30	9	$14+f_1$
30-40	12	$26+f_1$
40-50	f_2	$26+f_1+f_2$
50-60	3	$29+f_1+f_2$
60-70	2	$31+f_1+f_2$
	40	

$$31+f_1+f_2=40$$

$$f_1+f_2=9 \longrightarrow (1)$$

median = 32.5

median class is 30-40

$l=30,\ h=10,\ \frac{n}{2}=20,\ c.f=14+f_1,\ f=12$

$$\text{Median} = l+\frac{\frac{n}{2}-c.f}{f}\times h$$

$$32.5 = 30+\frac{20-14-f_1}{\cancel{12}_{6}}\times \cancel{10}^{5}$$

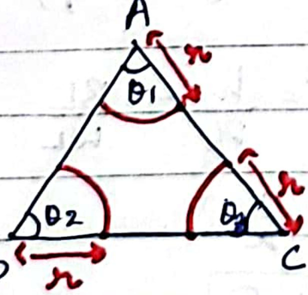
$$\cancel{2.5}^{0.5}\times\frac{6}{\cancel{5}_1} = 6-f_1$$

$$3 = 6-f_1$$

$$f_1 = 6-3 = 3$$

$$f_2 = 6 \quad [\text{from eq: (1)}]$$

10)



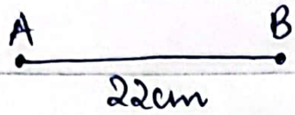
$r=14cm$; $\theta_1+\theta_2+\theta_3=180°$ (angle sum property)

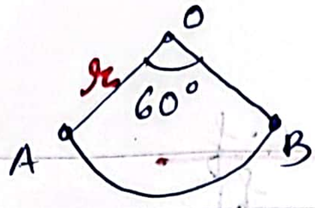
Area of removed portion = area of a semi-circle

$$=\frac{\pi r^2}{2}$$

$$=\frac{22}{\cancel{7}_1}\times\frac{1}{\cancel{2}_1}\times\cancel{14}^{7}\times\cancel{14}^{2}$$

$$=\underline{308cm^2}$$

11) 



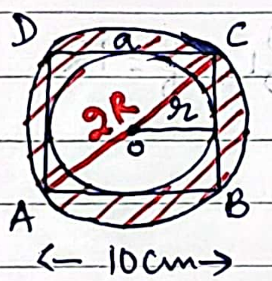
length of an arc = 22cm

$\Rightarrow \frac{\theta}{360°} \times 2\pi r = 22$

$\Rightarrow \frac{\cancel{60°}^{1}}{\cancel{360°}_{6}} \times 2 \times \frac{\cancel{22}^{1}}{7} \times r = \cancel{22}^{1}$

$\Rightarrow r = \frac{42}{2}$

$\therefore$ Radius, $r = 21cm$

12) 

$a = 10cm$

$r = \frac{10}{2} = 5cm$

$2R = \sqrt{2}a$

$\Rightarrow \cancel{2}R = \sqrt{2} \times \cancel{10}^{5}$

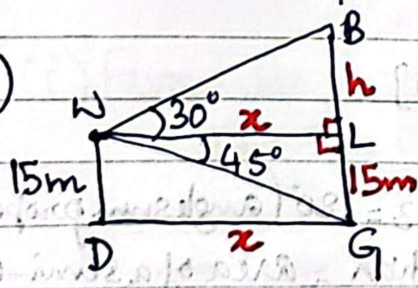
$R = 5\sqrt{2}cm$

$\therefore$ Area between inscribed and circumscribed circles

$= \pi R^2 - \pi r^2$

$= \pi(R^2 - r^2) = \frac{22}{7}\left((5\sqrt{2})^2 - (5)^2\right) = \frac{22}{7}(50 - 25)$

$= \frac{22 \times 25}{7} = \frac{550}{7} = \underline{78.57 cm^2}$

13) 

Let BG be the height of the opposite house.

In rt. $\triangle BLW$, $\tan 30° = \frac{h}{x} = \frac{BL}{WL}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{x}$

$\Rightarrow \boxed{x = h\sqrt{3}}$

In rt. $\triangle WLG$, $\tan 45° = \frac{LG}{WL}$

$\Rightarrow 1 = \frac{15}{x} \Rightarrow \boxed{x = 15m}$

$\therefore h\sqrt{3}$

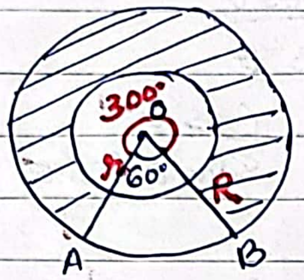
$\frac{15 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = 5\sqrt{3}m$

$= 5 \times 1.732$

$= \underline{8.66\ m}$

$\therefore$ Height of the opposite house $= 15 + h = 15 + 8.66$

$= \underline{\underline{23.66 m}}$

14) 

reflex $\angle AOB = 360° - 60° = 300°$

$r = 21 cm$

$\therefore R = 42 cm$

Area of shaded region

= Area of outer major sector − area of inner major sector

$= \frac{\theta}{360°} \times \pi R^2 - \frac{\theta}{360°} \times \pi r^2$

$= \frac{\theta}{360°} \times \pi (R^2 - r^2) = \frac{\cancel{300}^{10}}{\cancel{360}_{6}} \times \frac{\cancel{22}^{11}}{7} (42^2 - 21^2)$

$= \frac{\cancel{10}^{5} \times 11 \times 63 \times \cancel{21}^{3}}{\cancel{6} \times \cancel{7}}$

$= 5 \times 11 \times 63 = \underline{\underline{3465 cm^2}}$

15) Prove that $(1 + \cot\theta + \tan\theta)(\sin\theta - \cos\theta) = \frac{\sec\theta}{\csc^2\theta} - \frac{\csc\theta}{\sec^2\theta}$

LHS, $\left(1 + \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}\right)(\sin\theta - \cos\theta)$

$= \frac{(\overset{ab}{\sin\theta\cos\theta} + \overset{b^2}{\cos^2\theta} + \overset{a^2}{\sin^2\theta})(\overset{a}{\sin\theta} - \overset{b}{\cos\theta})}{\sin\theta\cos\theta}$

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

$= \frac{\sin^{\cancel{3}\,2}\theta}{\cancel{\sin\theta}\cos\theta} - \frac{\cos^{\cancel{3}\,2}\theta}{\sin\theta\cancel{\cos\theta}}$

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

$= \frac{\sec\theta}{\csc^2\theta} - \frac{\csc\theta}{\sec^2\theta}$, RHS

(ii) prove that $\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \csc^2\theta$.

LHS, $\frac{\frac{\sin\theta}{\cos\theta} - \frac{\cos\theta}{\sin\theta}}{\sin\theta\cos\theta} = \frac{\sin^2\theta - \cos^2\theta}{\sin\theta\cos\theta} \times \frac{1}{\sin\theta\cos\theta}$ $\left[\tan\theta = \frac{\sin\theta}{\cos\theta}, \cot\theta = \frac{\cos\theta}{\sin\theta}\right]$

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

$= \frac{\cancel{\sin^2\theta}}{\cancel{\sin^2\theta}.\cos^2\theta} - \frac{\cancel{\cos^2\theta}}{\sin^2\theta.\cancel{\cos^2\theta}}$

$= \sec^2\theta - \csc^2\theta$, RHS $\left[\sec\theta = 1/\cos\theta, \csc\theta = 1/\sin\theta\right]$

(iii) prove that $\sqrt{\sec^2\theta + \csc^2\theta} = \tan\theta + \cot\theta$

LHS, $\sqrt{1+\tan^2\theta + 1+\cot^2\theta}$

$= \sqrt{\tan^2\theta + \cot^2\theta + 2}$

$= \sqrt{\tan^2\theta + \cot^2\theta + 2\tan\theta.\cot\theta}$ $[\because \tan\theta.\cot\theta = 1]$

$= \sqrt{(\tan\theta + \cot\theta)^2} = \tan\theta + \cot\theta$, RHS

(iv) Prove that $\frac{1}{\cos A + \sin A - 1} + \frac{1}{\cos A + \sin A + 1} = \csc A + \sec A$

LHS, $\frac{\cos A + \sin A + \cancel{1} + \cos A + \sin A - \cancel{1}}{(\cos A + \sin A)^2 - 1^2}$

$= \frac{2\sin A + 2\cos A}{\sin^2 A + \cos^2 A + 2\sin A\cos A - 1}$

$= \frac{2(\sin A + \cos A)}{\cancel{1} + 2\sin A\cos A - \cancel{1}}$ $[\because \sin^2 A + \cos^2 A = 1]$

$= \frac{\sin A + \cos A}{\sin A\cos A} = \frac{\cancel{\sin A}}{\cancel{\sin A}\cos A} + \frac{\cancel{\cos A}}{\sin A\cancel{\cos A}} = \sec A + \csc A$, RHS

$[\sec A = 1/\cos A, \csc A = \frac{1}{\sin A}]$

(v) Prove that $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$

LHS, $\left(\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}\right)^2 = \frac{(1-\sin\theta)^2}{\cos^2\theta} = \frac{(1-\sin\theta)^2}{1-\sin^2\theta}$

$= \frac{(1-\sin\theta)\cancel{(1-\sin\theta)}^{1}}{(1+\sin\theta)\cancel{(1-\sin\theta)}_{1}} = \frac{1-\sin\theta}{1+\sin\theta}$, RHS