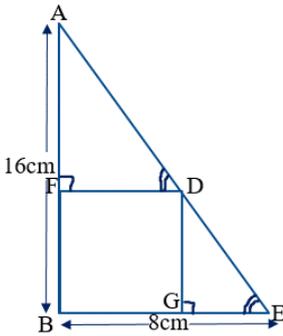
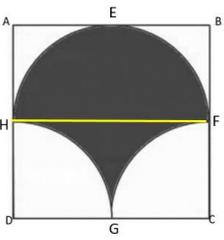


**Marking Scheme**  
**Class- X Session- 2021-22**  
**TERM 1**  
**Subject- Mathematics (Standard)**

SECTION A			
QN	Correct Option	HINTS/SOLUTION	MARKS
1	(b)	Least composite number is 4 and the least prime number is 2. LCM(4,2) : HCF(4,2) = 4:2 = 2:1	1
2	(a)	For lines to coincide: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ so, $\frac{5}{15} = \frac{7}{21} = \frac{-3}{-k}$ i.e. k= 9	1
3	(b)	By Pythagoras theorem The required distance = $\sqrt{(200^2 + 150^2)}$ = $\sqrt{(40000+ 22500)} = \sqrt{(62500)} = 250\text{m.}$ So the distance of the girl from the starting point is 250m.	1
4	(d)	Area of the Rhombus = $\frac{1}{2} d_1 d_2 = \frac{1}{2} \times 24 \times 32 = 384 \text{ cm}^2$ . Using Pythagoras theorem side <sup>2</sup> = $(\frac{1}{2}d_1)^2 + (\frac{1}{2}d_2)^2 = 12^2 + 16^2 = 144 + 256 = 400$ Side = 20cm Area of the Rhombus = base x altitude 384 = 20 x altitude So altitude = 384/20 = 19.2cm	1
5	(a)	Possible outcomes are (HH), (HT), (TH), (TT) Favorable outcomes(at the most one head) are (HT), (TH), (TT) So probability of getting at the most one head = 3/4	1
6	(d)	Ratio of altitudes = Ratio of sides for similar triangles So AM:PN = AB:PQ = 2:3	1
7	(b)	$2\sin^2\beta - \cos^2\beta = 2$ Then $2\sin^2\beta - (1 - \sin^2\beta) = 2$ $3\sin^2\beta = 3$ or $\sin^2\beta = 1$ $\beta$ is $90^\circ$	1
8	(c)	Since it has a terminating decimal expansion, so prime factors of the denominator will be 2,5	1
9	(a)	Lines x=a is a line parallel to y axis and y=b is a line parallel to x axis. So they will intersect.	1
10	(d)	Distance of point A(-5,6) from the origin(0,0) is $\sqrt{(0+5)^2 + (0-6)^2} = \sqrt{25+36} = \sqrt{61}$ units	1
11	(b)	$a^2 = 23/25$ , then $a = \sqrt{23}/5$ , which is irrational	1
12	(c)	LCM X HCF = Product of two numbers $36 \times 2 = 18 \times x$ $x = 4$	1
13	(b)	$\tan A = \sqrt{3} = \tan 60^\circ$ so $\angle A = 60^\circ$ , Hence $\angle C = 30^\circ$ . So $\cos A \cos C - \sin A \sin C = (1/2) \times (\sqrt{3}/2) - (\sqrt{3}/2) \times (1/2) = 0$	1
14	(a)	$1x + 1x + 2x = 180^\circ$ , $x = 45^\circ$ . $\angle A$ , $\angle B$ and $\angle C$ are $45^\circ$ , $45^\circ$ and $90^\circ$ resp. $\frac{\sec A}{\operatorname{cosec} B} - \frac{\tan A}{\cot B} = \frac{\sec 45}{\operatorname{cosec} 45} - \frac{\tan 45}{\cot 45} = \frac{\sqrt{2}}{\sqrt{2}} - \frac{1}{1} = 1 - 1 = 0$	1

15	(d)	Number of revolutions = $\frac{\text{total distance}}{\text{circumference}} = \frac{176}{2 \times \frac{22}{7} \times 0.7} = 40$	1
16	(b)	$\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{BC}{EF}$ $\frac{7.5}{\text{perimeter of } \triangle DEF} = \frac{2}{4}$ . So perimeter of $\triangle DEF = 15\text{cm}$	1
17	(b)	Since $DE \parallel BC$ , $\triangle ABC \sim \triangle ADE$ (By AA rule of similarity) So $\frac{AD}{AB} = \frac{DE}{BC}$ i.e. $\frac{3}{7} = \frac{DE}{14}$ . So $DE = 6\text{cm}$	1
18	(a)	Dividing both numerator and denominator by $\cos \beta$ , $\frac{4 \sin \beta - 3 \cos \beta}{4 \sin \beta + 3 \cos \beta} = \frac{4 \tan \beta - 3}{4 \tan \beta + 3} = \frac{3-3}{3+3} = 0$	1
19	(d)	$-2(-5x + 7y = 2)$ gives $10x - 14y = -4$ . Now $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} = -2$	1
20	(a)	Number of Possible outcomes are 26 Favorable outcomes are M, A, T, H, E, I, C, S probability = $8/26 = 4/13$	1
<b>SECTION B</b>			
21	(c)	Since HCF = 81, two numbers can be taken as $81x$ and $81y$ , ATQ $81x + 81y = 1215$ Or $x + y = 15$ which gives four co prime pairs- 1, 14 2, 13 4, 11 7, 8	1
22	(c)	Required Area is area of triangle $ACD = \frac{1}{2}(6)2 = 6$ sq units	1
23	(b)	$\tan \alpha + \cot \alpha = 2$ gives $\alpha = 45^\circ$ . So $\tan \alpha = \cot \alpha = 1$ $\tan^{20} \alpha + \cot^{20} \alpha = 1^{20} + 1^{20} = 1 + 1 = 2$	1
24	(a)	Adding the two given equations we get: $348x + 348y = 1740$ . So $x + y = 5$	1
25	(c)	LCM of two prime numbers = product of the numbers $221 = 13 \times 17$ . So $p = 17$ & $q = 13$ $\therefore 3p - q = 51 - 13 = 38$	1
26	(a)	Probability that the card drawn is neither a king nor a queen $= \frac{52-8}{52} = \frac{44}{52} = 11/13$	1
27	(b)	Outcomes when 5 will come up at least once are- $(1,5), (2,5), (3,5), (4,5), (5,5), (6,5), (5,1), (5,2), (5,3), (5,4)$ and $(5,6)$ Probability that 5 will come up at least once = $11/36$	1
28	(c)	$1 + \sin^2 \alpha = 3 \sin \alpha \cos \alpha$ $\sin^2 \alpha + \cos^2 \alpha + \sin^2 \alpha = 3 \sin \alpha \cos \alpha$ $2 \sin^2 \alpha - 3 \sin \alpha \cos \alpha + \cos^2 \alpha = 0$ $(2 \sin \alpha - \cos \alpha)(\sin \alpha - \cos \alpha) = 0$ $\therefore \cot \alpha = 2$ or $\cot \alpha = 1$	1
29	(a)	Since ABCD is a parallelogram, diagonals AC and BD bisect each other, $\therefore$ mid point of AC = mid point of BD	1

		$\left(\frac{x+1}{2}, \frac{6+2}{2}\right) = \left(\frac{3+4}{2}, \frac{5+y}{2}\right)$ <p>Comparing the co-ordinates, we get,  <math>\frac{x+1}{2} = \frac{3+4}{2}</math>. So, <math>x=6</math>            Similarly, <math>\frac{6+2}{2} = \frac{5+y}{2}</math>. So, <math>y=3</math>  <math>\therefore (x, y) = (6,3)</math></p>	
30	(c)	$\triangle ACD \sim \triangle ABC$ (AA) $\therefore \frac{AC}{AB} = \frac{AD}{AC}$ (CPST) $8/AB = 3/8$ This gives $AB = 64/3$ cm. So $BD = AB - AD = 64/3 - 3 = 55/3$ cm.	1
31	(d)	Any point $(x, y)$ of perpendicular bisector will be equidistant from A & B. $\therefore \sqrt{(x-4)^2 + (y-5)^2} = \sqrt{(x+2)^2 + (y-3)^2}$ Solving we get $-12x - 4y + 28 = 0$ or $3x + y - 7 = 0$	1
32	(b)	$\frac{\cot y^\circ}{\cot x^\circ} = \frac{AC/BC}{AC/CD} = CD/BC = CD/2CD = 1/2$	1
33	(a)	The smallest number by which $1/13$ should be multiplied so that its decimal expansion terminates after two decimal points is $13/100$ as $\frac{1}{13} \times \frac{13}{100} = \frac{1}{100} = 0.01$ Ans: $13/100$	1
34	(b)	 <p><math>\triangle ABE</math> is a right triangle &amp; <math>FDGB</math> is a square of side <math>x</math> cm  <math>\triangle AFD \sim \triangle DGE</math> (AA)  <math display="block">\therefore \frac{AF}{DG} = \frac{FD}{GE}</math> (CPST)  <math display="block">\frac{16-x}{x} = \frac{x}{8-x}</math> (CPST)  <math>128 = 24x</math> or <math>x = 16/3</math>cm</p>	1
35	(a)	Since P divides the line segment joining $R(-1, 3)$ and $S(9,8)$ in ratio $k:1$ $\therefore$ coordinates of P are $\left(\frac{9k-1}{k+1}, \frac{8k+3}{k+1}\right)$ Since P lies on the line $x - y + 2 = 0$ , then $\frac{9k-1}{k+1} - \frac{8k+3}{k+1} + 2 = 0$ $9k - 1 - 8k - 3 + 2k + 2 = 0$ which gives $k = 2/3$	1
36	(c)	<p>Shaded area = Area of semicircle + (Area of half square – Area of two quadrants)            = Area of semicircle + (Area of half square – Area of semicircle)            = Area of half square            = <math>\frac{1}{2} \times 14 \times 14 = 98</math>cm<sup>2</sup></p> 	1

37	(d)	 <p>Let O be the center of the circle. <math>OA = OB = AB = 1\text{cm}</math>.            So <math>\Delta OAB</math> is an equilateral triangle and <math>\therefore \angle AOB = 60^\circ</math>            Required Area = <math>8 \times</math> Area of one segment with <math>r=1\text{cm}</math>, <math>\theta = 60^\circ</math></p> $= 8 \times \left( \frac{60}{360} \times \pi \times 1^2 - \frac{\sqrt{3}}{4} \times 1^2 \right)$ $= 8(\pi/6 - \sqrt{3}/4)\text{cm}^2$	1
38	(b)	Sum of zeroes = $2 + \frac{1}{2} = -5/p$ i.e. $5/2 = -5/p$ . So $p = -2$ Product of zeroes = $2 \times \frac{1}{2} = r/p$ i.e. $r/p = 1$ or $r = p = -2$	1
39	(c)	$2\pi r = 100$ . So Diameter = $2r = 100/\pi =$ diagonal of the square. $\text{side}\sqrt{2} =$ diagonal of square = $100/\pi$ $\therefore \text{side} = 100/\sqrt{2}\pi = 50\sqrt{2}/\pi$	1
40	(b)	$3^{x+y} = 243 = 3^5$ So $x+y = 5$ ------(1) $243^{x-y} = 3$ $(3^5)^{x-y} = 3^1$ So $5x - 5y = 1$ ------(2) Since : $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ , so unique solution	1
<b>SECTION C</b>			
41	(c)	Initially, at $t=0$ , Annie's height is 48ft So, at $t=0$ , $h$ should be equal to 48 $h(0) = -16(0)^2 + 8(0) + k = 48$ So $k = 48$	1
42	(b)	When Annie touches the pool, her height = 0 feet i.e. $-16t^2 + 8t + 48 = 0$ above water level $2t^2 - t - 6 = 0$ $2t^2 - 4t + 3t - 6 = 0$ $2t(t-2) + 3(t-2) = 0$ $(2t+3)(t-2) = 0$ i.e. $t = 2$ or $t = -3/2$ Since time cannot be negative, so $t = 2$ seconds	1
43	(d)	$t = -1$ & $t = 2$ are the two zeroes of the polynomial $p(t)$ Then $p(t) = k(t - (-1))(t - 2)$ $= k(t + 1)(t - 2)$ When $t = 0$ (initially) $h_1 = 48\text{ft}$ $p(0) = k(0^2 - 0 - 2) = 48$ i.e. $-2k = 48$ So the polynomial is $-24(t^2 - t - 2) = -24t^2 + 24t + 48$ .	1
44	(c)	A polynomial $q(t)$ with sum of zeroes as 1 and the product as -6 is given by $q(t) = k(t^2 - (\text{sum of zeroes})t + \text{product of zeroes})$ $= k(t^2 - 1t + -6)$ .....(1) When $t=0$ (initially) $q(0) = 48\text{ft}$	1

		$q(0)=k(0^2-1(0)-6)=48$ i.e. $-6k=48$ or $k=-8$ Putting $k=-8$ in equation (1), reqd. polynomial is $-8(t^2-1t-6)$ $=-8t^2+8t+48$	
45	(a)	When the zeroes are negative of each other, sum of the zeroes = 0 So, $-b/a=0$ $-\frac{(k-3)}{-12}=0$ $+\frac{k-3}{12}=0$ $k-3=0,$ i.e. $k=3.$	1
46	(a)	Centroid of $\Delta E H J$ with $E(2,1), H(-2,4)$ & $J(-2,-2)$ is $(\frac{2+-2+-2}{3}, \frac{1+4+-2}{3}) = (-2/3, 1)$	1
47	(c)	If P needs to be at equal distance from $A(3,6)$ and $G(1,-3)$ , such that A,P and G are collinear, then P will be the mid-point of AG. So coordinates of P will be $(\frac{3+1}{2}, \frac{6+-3}{2}) = (2, 3/2)$	1
48	(a)	Let the point on x axis equidistant from $I(-1,1)$ and $E(2,1)$ be $(x,0)$ then $\sqrt{(x+1)^2+(0-1)^2} = \sqrt{(x-2)^2+(0-1)^2}$ $x^2+1+2x+1 = x^2+4-4x+1$ $6x=3$ So $x=1/2.$ $\therefore$ the required point is $(1/2, 0)$	1
49	(b)	Let the coordinates of the position of a player Q such that his distance from $K(-4,1)$ is twice his distance from $E(2,1)$ be $Q(x, y)$ Then $KQ : QE = 2 : 1$ $Q(x, y) = (\frac{2 \times 2 + 1 \times (-4)}{3}, \frac{2 \times 1 + 1 \times 1}{3})$ $= (0, 1)$	1
50	(d)	Let the point on y axis equidistant from $B(4,3)$ and $C(4,-1)$ be $(0,y)$ then $\sqrt{(4-0)^2+(3-y)^2} = \sqrt{(4-0)^2+(y+1)^2}$ $16+y^2+9-6y = 16+y^2+1+2y$ $-8y=-8$ So $y=1.$ $\therefore$ the required point is $(0, 1)$	1