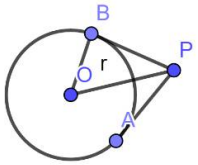
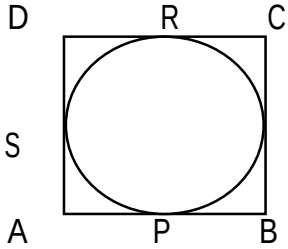
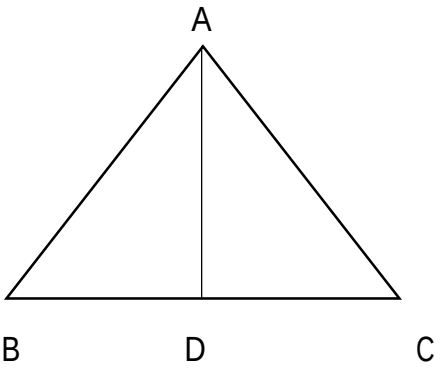
Class X
Mathematics (Standard)
SQP Marking Scheme (2019-20)

Section-A		
1	(c) 3 decimal places	1
2	(a) 165	1
3	(c) 20	1
4	(a) all real values except 10	1
5	(d) not defined	1
6	(a) $\sqrt{2}-1$	1
7	(d) 30°	1
8	(d) IV quadrant	1
9	(c) 4	1
10	(a) -12	1
11	$\pi rl + 2\pi rh + \pi r^2$	1
12	4 **OR** 5	1 1
13	49 : 81	1
14	14, 38	$\frac{1}{2}+\frac{1}{2}$
15	$\frac{3}{11}$	1
16	Rational number= 0.30 Irrational number = 0.3010203040… Or any other correct rational and irrational number	$\frac{1}{2}$ $\frac{1}{2}$
17	$\Delta ACB \sim \Delta ADC$ (AA criterion)	$\frac{1}{2}$

	$\Rightarrow \frac{AC}{AD} = \frac{AB}{AC}$ $\therefore$ AB = 12 cm	$\frac{1}{2}$
18	 In $\Delta OBP, \frac{OB}{OP}$ = sin 30° $\therefore OP$ = 2r **OR** Length of Tangent = $2 \times \sqrt{5^2 - 4^2}$ = $2 \times 3\,cm$ = $6\,cm$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$
19	b, c and $2b$ are in A.P $\Rightarrow c = \frac{3b}{2}$ $\therefore b : c$ = 2 : 3	$\frac{1}{2}$ $\frac{1}{2}$
20	$D = (2\sqrt{2}k)^2 - 4(1)(18) = 0 \Rightarrow$ k = ±3	$\frac{1}{2}+\frac{1}{2}$
	Section-B	
21	110, 120, 130, … , 990 a_n = 990 $\Rightarrow$ 110 + (n – 1) × 10 = 990 $\therefore n$ = 89	1 1
22	 AP = AS, BP= BQ, CR= CQ and DR= DS $\Rightarrow$AP + BP + CR + DR = AS + BQ + CQ + DS $\Rightarrow$ AB + CD = AD + CB But AB = CD and AD = CB $\therefore$ AB = AD Hence, ABCD is a square.	1 1
23	$\Delta ADE \sim \Delta GBD$ and $\Delta ADE \sim \Delta FEC$ $\Rightarrow \Delta GBD \sim \Delta FEC$ (AA Criterion) $\Rightarrow \frac{GD}{FC} = \frac{GB}{FE} \Rightarrow$ GD × FE = GB × FC or $FG^2 = BG \times FC$ **OR**	1 1

	 $AD \perp BC \therefore$ In $\Delta ABD, AB^2 = AD^2 + BD^2$ $\Rightarrow AB^2 = AD^2 + \frac{BC^2}{4}$ or $4AB^2 = 4AD^2 + BC^2$ $\Rightarrow 3AB^2 = 4AD^2$	$\frac{1}{2}$ 1 $\frac{1}{2}$
24	(i) $\cos(90^\circ - \theta) = \cos(3\theta - 30^\circ)$ $\Rightarrow 90^\circ - \theta = 3\theta - 30^\circ \Rightarrow \theta = 30^\circ$ (ii) $\frac{AB}{AC} = \sin 30^\circ$ $\therefore$ Length of rope = $AC = 400\,m$	1 1
25	For Jayanti, Favourable outcome is (6,6) i.e, 1 Probability(getting the number 36) = $\frac{1}{36}$ For Pihu, Favourable outcome is 6 i.e, 1 Probability(getting the number 36) = $\frac{1}{6}$ $\therefore$ Pihu has the better chance. **OR** Total number of integers = 29 (i) Prob.(prime number) = $\frac{6}{29}$ (ii) Prob.(number divisible by 7) = $\frac{4}{29}$	1 1 1 1

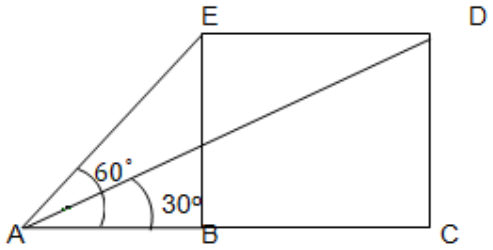
26	Capacity of first glass = $\pi r^2 H - \frac{2}{3}\pi r^3$ $= \pi \times 9(10-2) = 72\pi cm^3$ Capacity of second glass = $\pi r^2 H - \frac{1}{3}\pi r^2 h$ $= \pi \times 3 \times 3(10-0.5) = 85.5\pi cm^3$ ∴Sureshgot more quantity of juice.	1 1
	Section - C	
27	Let us assume, to the contrary, that $2\sqrt{5}-3$ is a rational number $\therefore 2\sqrt{5}-3 = \frac{p}{q}$, where p and q are integers and $q \neq 0$ $\Rightarrow \sqrt{5} = \frac{p+3q}{2q}$....(1) Since p and q are integers $\therefore \frac{p+3q}{2q}$ is a rational number $\therefore \sqrt{5}$ is a rational number which is a contradiction as $\sqrt{5}$ is an irrational number Hence our assumption is wrong and hence $2\sqrt{5}-3$ is an irrational number. **OR** 180 = 144 × 1 + 36 144 = 36 × 4 + 0 ∴ HCF(180, 144) = 36 $36 = 13m - 16$ Solving, we get $m = 4$	1 1 1 2 1
28	$S_m = S_n \Rightarrow \frac{m}{2}[2a + (m-1)d] = \frac{n}{2}[2a + (n-1)d]$ $\Rightarrow 2a(m-n) + d(m^2 - m - n^2 + n) = 0$ $\Rightarrow (m-n)[2a + (m+n-1)d] = 0$ or $S_{m+n} = 0$	1 1 1
29	$x + y = 7$ and $2(x-y) + x + y + 5 + 5 = 27$ $\therefore x + y = 7$ and $3x - y = 17$ Solving, we get, $x = 6$ and $y = 1$	$\frac{1}{2} + 1$ $\frac{1}{2}$ 1

	OR Let $\frac{1}{x} = a$ and $\frac{1}{y} = b$ $\Rightarrow$ 21a + 47 b = 110 and $47a + 21b = 162$ Adding and subtracting the two equations, we get $a + b = 4$ and $a - b = 2$ Solving the above two equations, we get $a = 3$ and $b = 1$ $\therefore$ x = $\frac{1}{3}$ and $y = 1$	1 1 1
30	$p(x) = x^4 + 4x^3 - 2x^2 - 20x - 15$ $x^2 - 5$ is factor of $p(x)$ $\therefore p(x) = (x^2 - 5)(x^2 + 4x + 3)$ Or $p(x) = (x^2 - 5)(x + 3)(x + 1)$ So, all the zeroes of $p(x)$ are $\sqrt{5}, -\sqrt{5}, -3$ and -1	2 1
31	(i) A(1,7), B(4,2) C(-4,4) Distance travelled by Seema = $\sqrt{34}$ units Distance travelled by Aditya = $\sqrt{68}$ units $\therefore$ Aditya travels more distance (ii) Coordinates of D are $\left(\frac{1+4}{2}, \frac{7+2}{2}\right) = \left(\frac{5}{2}, \frac{9}{2}\right)$ (iii) ar(ΔABC) = $\frac{1}{2}[1(2-4) + 4(4-7) - 4(7-2)]$ = 17 sq. units	1 1 1
32	$\sin\theta + \cos\theta = \sqrt{3} \Rightarrow (\sin\theta + \cos\theta)^2 = 3$ $\Rightarrow 1 + 2\sin\theta\cos\theta = 3 \Rightarrow \sin\theta\cos\theta = 1$ $\therefore \tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = 1$	1 1 1

	OR $\frac{cos^2(45°+\theta)+ cos^2(45°-\theta)}{\tan(60°+\theta)\times \tan(30°-\theta)} + (cot30^\circ + sin\,90^\circ) \times (tan60^\circ - sec\,0^\circ)$ $= \frac{cos^2(45°+\theta)+ sin^2(45°+\theta)}{\tan(60°+\theta)\times \cot(60°+\theta)} + (\sqrt{3}+1) \times (\sqrt{3}-1)$ $= 1 + 2 = 3$	2 1
33	Required Area = Area of triangle - Area of 3 sectors Area of Triangle = $\frac{1}{2} \times 24 \times 7 = 84\,m^2$ Area of three sectors = $\frac{\pi r^2}{360^\circ}$ × (sum of three angles of triangle) $= \frac{22\times7\times7\times180^\circ}{7\times2\times2\times360^\circ} = \frac{77}{4}\,or\,19.25\,m^2$ ∴ Required Area = $\frac{259}{4}\,or\,64.75\,m^2$	1 1 1
34	(i) Curve 1 - Less than ogive, Curve2 - More than ogive (ii) Median Rainfall = 21 cm (iii) 3 Median = Mode + 2 mean ∴ Mode = 16.2 cm	1 1 1
	Section-D	
35	Correct construction of given triangle Correct construction of similar Δwith scale factor $\frac{3}{4}$ **OR** Correct construction of given circle Correct construction of two tangents	1 3 1 3
36	For correct given, to prove, const. and figure For correct proof	$(4 \times \frac{1}{2} = 2)$ 2
37	Let the original speed of the train be x km/h ∴ $\frac{360}{x} - \frac{360}{x+5} = \frac{48}{60}$ ⇒ $x^2 + 5x - 2250 = 0$	2 1

	$\Rightarrow (x + 50)(x - 45) = 0 \ \therefore x = 45$ Hence original speed of the train = 45km/h **OR** $\frac{1}{x} - \frac{1}{x-2} = 3$ $\frac{x-2-x}{x(x-2)} = \frac{3}{1}$ $3x^2 - 6x = -2$ $3x^2 - 6x + 2 = 0$ $x = \frac{6 \pm \sqrt{12}}{6}$ $= \frac{3+\sqrt{3}}{3}, \frac{3-\sqrt{3}}{3}$	1 1 1 1 1
38	Capacity of tank = $\frac{1}{3}\pi \times 20 \times (10^2 + 25^2 + 10 \times 25)m^3$ $= \pi \times 20 \times 325m^3 = \pi \times 20 \times 325\ l$ Cost of petrol = $\pi \times 20 \times 325 \times 70$ = ₹1430000 Slant height = $\sqrt{20^2 + (25-10)^2} = 25m$ Surface area of tank = $\pi \times 25(10 + 25)m^2 = 2750m^2$ **OR** Quantity of water flowing through pipe in 1 hour $= \pi \times \frac{7}{100} \times \frac{7}{100} \times 15000m^3$ Required time = $\left(50 \times 44 \times \frac{21}{100}\right) \div \left(\pi \times \frac{7}{100} \times \frac{7}{100} \times 15000\right)$ = 2 hours	$1\frac{1}{2}$ $\frac{1}{2}$ 1 1 2 2

39



1

Correct figure

In $\Delta ABE, \frac{BE}{AB} = \tan 60^\circ$ 1

$\Rightarrow$ AB = 3000 m

In $\Delta DAC, \frac{DC}{AC} = \tan 30^\circ$ 1

$\Rightarrow$ AC = 9000 m

$BC = AC - AB = 6000m$ $\frac{1}{2}$

$\therefore$ Speed of aeroplane = $\frac{6000}{30} m/s = 200 m/s$ $\frac{1}{2}$

40

Daily Wages(in Rs.)	Number of Workers(f_i)	x_i	u_i	$f_i u_i$
100-120	10	110	-3	-30
120-140	15	130	-2	-30
140-160	20	150	-1	-20
160-180	22	170	0	0
180-200	18	190	1	18
200-220	12	210	2	24
220-240	13	230	3	39
Total	110			1

2

Mean daily wages = $170 + \frac{1}{110} \times 20 =$ ₹170.19(approx.) 1

Mode = $160 + \frac{22-20}{44-20-18} \times 20 =$ ₹ 166.67(approx.) 1