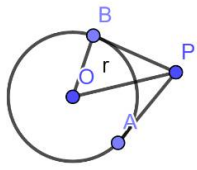
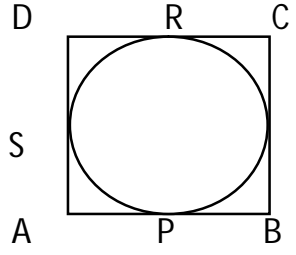
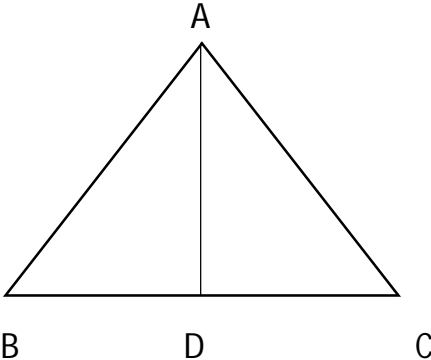


Class X
Mathematics (Standard)
SQP Marking Scheme (2019-20)

| <u>Section-A</u> | | |
|------------------|--|------------------------------------|
| 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 | 1 |
| | OR | |
| | 5 | 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) | $\frac{1}{2}$ |

| | | |
|-------------------------|--|--|
| | $\Rightarrow \frac{AC}{AD} = \frac{AB}{AC}$ | $\frac{1}{2}$ |
| | $\therefore AB = 12 \text{ cm}$ | |
| 18 |  <p>In ΔOBP, $\frac{OB}{OP} = \sin 30^\circ$ $\therefore OP = 2r$</p> <p style="text-align: center;">OR</p> <p>Length of Tangent = $2 \times \sqrt{5^2 - 4^2} = 2 \times 3 \text{ cm} = 6 \text{ cm}$</p> | $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ |
| 19 | $b, c \text{ and } 2b \text{ are in A.P.} \Rightarrow c = \frac{3b}{2}$ $\therefore b : c = 2 : 3$ | $\frac{1}{2}$ $\frac{1}{2}$ |
| 20 | $D = (2\sqrt{2}k)^2 - 4(1)(18) = 0 \Rightarrow k = \pm 3$ | $\frac{1}{2} + \frac{1}{2}$ |
| <u>Section-B</u> | | |
| 21 | $110, 120, 130, \dots, 990$ $a_n = 990 \Rightarrow 110 + (n - 1) \times 10 = 990$ $\therefore n = 89$ | 1 1 |
| 22 |  <p> $AP = AS, BP = BQ, CR = CQ \text{ and } DR = DS$ $\Rightarrow AP + BP + CR + DR = AS + BQ + CQ + DS$ $Q \Rightarrow AB + CD = AD + CB$ But $AB = CD \text{ and } AD = CB$ $\therefore AB = AD$ Hence, ABCD is a square. </p> | 1 1 |
| 23 | $\Delta ADE \sim \Delta GBD \text{ and } \Delta ADE \sim \Delta FEC$ $\Rightarrow \Delta GBD \sim \Delta FEC \text{ (AA Criterion)}$ $\Rightarrow \frac{GD}{FC} = \frac{GB}{FE} \Rightarrow GD \times FE = GB \times FC \text{ or } FG^2 = BG \times FC$ | 1 1 |
| | OR | |

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

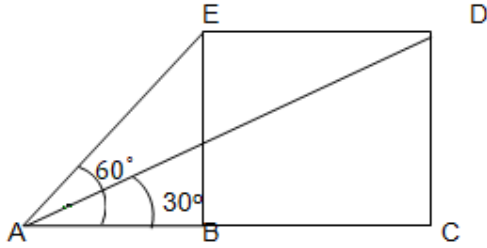
| | | |
|--------------------|--|--|
| | | |
| 26 | <p>Capacity of first glass = $\pi r^2 H - \frac{2}{3}\pi r^3$ $= \pi \times 9(10 - 2) = 72\pi cm^3$</p> <p>Capacity of second glass = $\pi r^2 H - \frac{1}{3}\pi r^2 h$ $= \pi \times 3 \times 3(10 - 0.5) = 85.5\pi cm^3$</p> <p>∴ Suresh got more quantity of juice.</p> | <p>1</p> <p>1</p> |
| Section - C | | |
| 27 | <p>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 $q \neq 0$ $\Rightarrow \sqrt{5} = \frac{p+3q}{2q} \dots (1)$</p> <p>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</p> <p>Hence our assumption is wrong and hence $2\sqrt{5} - 3$ is an irrational number.</p> <p style="text-align: center;">OR</p> <p>$180 = 144 \times 1 + 36$ $144 = 36 \times 4 + 0$ $\therefore \text{HCF}(180, 144) = 36$</p> <p>$36 = 13m - 16$ Solving, we get $m = 4$</p> | <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p> |
| 28 | <p>$S_m = S_n \Rightarrow \frac{m}{2}[2a + (m - 1)d] = \frac{n}{2}[2a + (n - 1)d]$ $\Rightarrow 2a(m - n) + d(m^2 - m - n^2 + n) = 0$ $\Rightarrow (m - n)[2a + (m + n - 1)d] = 0$ or $S_{m+n} = 0$</p> | <p>1</p> <p>1</p> <p>1</p> |
| 29 | <p>$x + y = 7$ and $2(x - y) + x + y + 5 + 5 = 27$ $\therefore x + y = 7$ and $3x - y = 17$</p> <p>Solving, we get, $x = 6$ and $y = 1$</p> | <p>$\frac{1}{2} + 1$</p> <p>$\frac{1}{2}$</p> <p>1</p> |

| | | |
|----|---|---|
| | OR | |
| | <p>Let $\frac{1}{x} = a$ and $\frac{1}{y} = b$ $\Rightarrow 21a + 47b = 110$ and $47a + 21b = 162$</p> | 1 |
| | <p>Adding and subtracting the two equations, we get $a + b = 4$ and $a - b = 2$</p> | 1 |
| | <p>Solving the above two equations, we get $a = 3$ and $b = 1$ $\therefore x = \frac{1}{3}$ and $y = 1$</p> | 1 |
| 30 | <p>$p(x) = x^4 + 4x^3 - 2x^2 - 20x - 15$ $x^2 - 5$ is factor of $p(x)$ $\therefore p(x) = (x^2 - 5)(x^2 + 4x + 3)$</p> <p>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</p> | 2 |
| 31 | <p>(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</p> <p>(ii) Coordinates of D are $\left(\frac{1+4}{2}, \frac{7+2}{2}\right) = \left(\frac{5}{2}, \frac{9}{2}\right)$</p> <p>(iii) $\text{ar}(\Delta ABC) = \frac{1}{2}[1(2 - 4) + 4(4 - 7) - 4(7 - 2)]$ $= 17$ sq. units</p> | 1 |
| 32 | <p>$\sin \theta + \cos \theta = \sqrt{3} \Rightarrow (\sin \theta + \cos \theta)^2 = 3$ $\Rightarrow 1 + 2 \sin \theta \cos \theta = 3 \Rightarrow \sin \theta \cos \theta = 1$ $\therefore \tan \theta + \cot \theta = \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = 1$</p> | 1 |
| | | 1 |

| | | |
|------------------|--|---|
| | OR | |
| | $\frac{\cos^2(45^\circ+\theta)+\cos^2(45^\circ-\theta)}{\tan(60^\circ+\theta)\times\tan(30^\circ-\theta)} + (\cot 30^\circ + \sin 90^\circ) \times (\tan 60^\circ - \sec 0^\circ)$ $= \frac{\cos^2(45^\circ+\theta)+\sin^2(45^\circ+\theta)}{\tan(60^\circ+\theta)\times\cot(60^\circ+\theta)} + (\sqrt{3} + 1) \times (\sqrt{3} - 1)$ $= 1 + 2 = 3$ | 2 1 |
| 33 | <p>Required Area = Area of triangle - Area of 3 sectors</p> <p>Area of Triangle = $\frac{1}{2} \times 24 \times 7 = 84 \text{ m}^2$</p> <p>Area of three sectors = $\frac{\pi r^2}{360^\circ} \times (\text{sum of three angles of triangle})$</p> $= \frac{22 \times 7 \times 7 \times 180^\circ}{7 \times 2 \times 2 \times 360^\circ} = \frac{77}{4} \text{ or } 19.25 \text{ m}^2$ <p>\therefore Required Area = $\frac{259}{4} \text{ or } 64.75 \text{ m}^2$</p> | 1 1 1 |
| 34 | <p>(i) Curve 1 - Less than ogive, Curve2 - More than ogive</p> <p>(ii) Median Rainfall = 21 cm</p> <p>(iii) 3 Median = Mode + 2 mean</p> <p>\therefore Mode = 16.2 cm</p> | 1 1 1 |
| Section-D | | |
| 35 | <p>Correct construction of given triangle</p> <p>Correct construction of similar Δ with scale factor $\frac{3}{4}$</p> <p style="text-align: center;">OR</p> <p>Correct construction of given circle</p> <p>Correct construction of two tangents</p> | 1 3 1 3 |
| 36 | <p>For correct given, to prove, const. and figure</p> <p>For correct proof</p> | $(4 \times \frac{1}{2})$ $= 2)$ 2 |
| 37 | <p>Let the original speed of the train be x km/h</p> $\therefore \frac{360}{x} - \frac{360}{x+5} = \frac{48}{60}$ $\Rightarrow x^2 + 5x - 2250 = 0$ | 2 1 |

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

39



Correct figure

$$\text{In } \triangle ABE, \frac{BE}{AB} = \tan 60^\circ$$

$$\Rightarrow AB = 3000 \text{ m}$$

$$\text{In } \triangle DAC, \frac{DC}{AC} = \tan 30^\circ$$

$$\Rightarrow AC = 9000 \text{ m}$$

$$BC = AC - AB = 6000 \text{ m}$$

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

1

1

1

 $\frac{1}{2}$ $\frac{1}{2}$

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 |

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

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

2

1

1