



CHENNAI SAHODAYA SCHOOL COMPLEX
COMMON EXAMINATION
CLASS 10- SET 2 Marking Scheme
MATHEMATICS STANDARD (041)
SECTION A

1. c) - 16
2. b) 2 : 1
3. d) 0
4. d) $(\sqrt{2}x + \sqrt{3})^2 = 2x^2 - 3x$
5. b) a
6. I d) $x = 3, y = 4$
7. c) 6.5 cm
8. c) $2\sqrt{3}$ cm
9. a) 12
10. a) 2
11. d) $\frac{1}{2}$
12. a) 30°
13. c) 14 cm
14. c) 8 cm
15. c) $4\pi r^2$
16. b) 14
17. c) $\frac{3}{17}$
18. b) 15 cm
19. (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
20. (c) Assertion is correct but Reason is incorrect.

SECTION B

21. Solve for x and y : $49x + 51y = 499$; $51x + 49y = 501$

Sol : Adding eq 1 and 2

$$100x + 100y = 1000$$

$$x + y = 10$$

Subtracting eq 1 and 2

$$2x - 2y = 2$$

$$x - y = 1$$

Solving the 2 equations
 $X = 11/2$; $y = 9/2$

22. **Sol :** $OA = OB = \text{Radius}$

$$OA^2 = OB^2$$

using distance formula, we get

$$(-1-2)^2 + [y - (-3y)]^2 = (5-2)^2 + [7 - (-3y)]^2$$

$$9 + 16y^2 = 9 + (7 + 3y)^2$$

$$16y^2 = 49 + 42y + 9y^2$$

$$7y^2 - 42y - 49 = 0$$

$$7(y^2 - 6y - 7) = 0$$

$$y^2 - 7y + y - 7 = 0$$

$$y(y-7) + 1(y-7) = 0$$

$$(y+1)(y-7) = 0$$

Therefore, $y = 7$ or $y = -1$

23. **Sol :** Total number of products = $6 \times 6 = 36$ ----- (1/2 m)

Number of odd products = 9

Probability that product is odd = $9/36 = 1/4$ ----- (1 1/2 m)

[OR]

Sol : possible numbers (805, 815, 825, 835, 845, 855, 865, 875, 885, 895). ----- (1/2 m)

The total number of three-digit numbers ranges from 100 to 999 = 900 possible numbers.

Probability = $10/900 = 1/90$. ----- (1 1/2 m)

24. **Sol :** Length of the yard = 18 m 72 cm = 1872 cm

Breadth of the yard = 13 m 20 cm = 1320 cm

The size of the square tile of same size needed to pave the rectangular yard is equal to the HCF of the length and breadth of the rectangular yard.

$$1872 = 2^4 \times 3^2 \times 13$$

$$1320 = 2^4 \times 3 \times 11$$

$$\text{HCF} = 2^3 \times 3 = 24$$
 ----- (1 m)

$\therefore$ Length of side of the square tile = 24 cm

Number of tiles required = Area of the courtyard / Area of each tile

$$= 1872 \times 1320 / 24 \times 24 = 4290$$
 ----- (1/2 + 1/2)

[OR]

Prove that $5 - \sqrt{7}$ is irrational, given that $\sqrt{7}$ is irrational

25. **Sol :** Squaring $4x^2 = \operatorname{cosec}^2 \theta$; $4/x^2 = \cot^2 \theta$

$$\operatorname{cosec}^2 \theta - \cot^2 \theta = 4(x^2 - 1/x^2)$$

$$1 = 4(x^2 - 1/x^2)$$

$$\frac{1}{2} = 2(x^2 - 1/x^2)$$

SECTION C

26. **Sol :**

$$\alpha + \beta = -5/5 = -1$$

$$\alpha\beta = 1/5$$

$$\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\alpha\beta} = \frac{\alpha + \beta}{\alpha\beta} + \frac{1}{\alpha\beta} = -5 + 5 = 0$$

27. **Sol:** (i) not from A, B and C = 6/23

(ii) Either from C or E = 9/23

(iii) Neither from A nor D = 17/23

28. $\sin \theta + \cos \theta = \sqrt{3}$

Squaring on both sides,

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

$$\sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cos \theta = 3$$

Using the identity $\sin^2 A + \cos^2 A = 1$,

$$1 + 2 \sin \theta \cos \theta = 3$$

$$2 \sin \theta \cos \theta = 3 - 1$$

$$2 \sin \theta \cos \theta = 2$$

$$\sin \theta \cos \theta = 1$$

$$\sin \theta \cos \theta = \sin^2 \theta + \cos^2 \theta$$

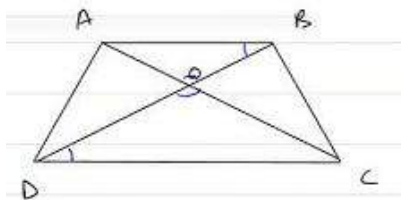
$$\Rightarrow (\sin^2 \theta + \cos^2 \theta) / (\sin \theta \cos \theta) = 1$$

$$\Rightarrow [\sin^2 \theta / (\sin \theta \cos \theta)] + [\cos^2 \theta / (\sin \theta \cos \theta)] = 1$$

$$\Rightarrow (\sin \theta / \cos \theta) + (\cos \theta / \sin \theta) = 1$$

$$\Rightarrow \tan \theta + \cot \theta = 1$$

29.



----- (fig ½ m)

In $\triangle AOB$ and $\triangle COD$

$\angle AOB = \angle COD$ (Vertically opposite angles)

$\angle ABD = \angle ODC$ (Alternate angles)

$$\begin{aligned}
&\therefore \triangle AOB \sim \triangle COD \text{ (AA similarity criterion)} && \text{----- (1 m)} \\
&\Rightarrow AB/CD = AO/OC = BO/OD \text{ [Corresponding sides of similar triangles are proportional.]} \\
&\Rightarrow AB/CD = BO/OD && \text{----- (1/2 m)} \\
&\Rightarrow AB/CD = 2/1 && \text{----- (1/2 m)} \\
&\Rightarrow AB = 2 CD && \text{----- (1/2 m)}
\end{aligned}$$

[OR]

$$\begin{aligned}
&\text{In } \triangle LPQ \text{ and } \triangle PQR \\
&\angle Q = \angle Q \text{ [Common]} \\
&\angle QPL = \angle PRQ \text{ [Given]} \\
&\therefore \triangle LPQ \sim \triangle PRQ \text{ [By A.A. axiom of similarity]} && \text{----- (2m)} \\
&\Rightarrow PQ/QR = QL/PQ \\
&\Rightarrow PQ^2 = QL \times QR && \text{----- (1 m)} \\
&\text{Hence, proved.}
\end{aligned}$$

30. Let the usual speed of plane be x km/hr and the reduced speed of the plane be $(x-200)$ km/hr
Distance = 600 km [Given]
, (time taken at reduced speed) - (Schedule time) = 30 minutes = 0.5 hours.
 $600/(x-200) - 600/x = 1/2$
 $x^2 - 200x - 240000 = 0$
 $x^2 - 600x + 400x - 240000 = 0$
 $x(x-600) + 400(x-600) = 0$
 $(x-600)(x+400) = 0$ $x = 600$ or $x = -400$
But speed cannot be negative. $\therefore$ The usual speed is 600 km/hr
duration of the flight is $600/600 = 1$ hour

31. **Sol :** $D = (3, -2)$ (using midpoint formula) ----- (1/2 m)

$$\begin{aligned}
&E = (-1, 0) && \text{----- (1/2 m)} \\
&DE = \sqrt{20} \text{ (using distance formula)} && \text{----- (1 m)} \\
&BC = \sqrt{80} = 2\sqrt{20} && \text{----- (1 m)}
\end{aligned}$$

(or)

Sol : P divides AB in the ratio 1:2

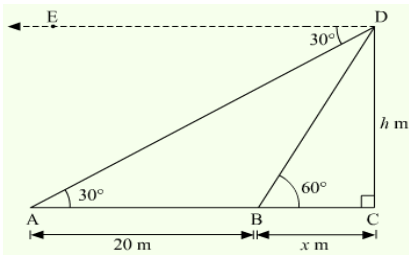
$$\begin{aligned}
&\therefore p = 1(2) + 2(3)/(1+2) \\
&p = 7/3 && \text{----- (1 1/2 m)}
\end{aligned}$$

Q divides AB in the ratio 2:1

$$\begin{aligned}
&q = 2(2) + 1 \times (-4)/(2+1) \\
&q = 0 && \text{----- (1 1/2 m)}
\end{aligned}$$

SECTION D

32. **Sol:**



Let CD be the tower.

Suppose BC = x m and CD = h m.

Given, $\angle ADE = 30^\circ$ and $\angle CBD = 60^\circ$.

$\angle DAC = \angle ADE = 30^\circ$ (Alternate angles)

In $\triangle ACD$,

$$\tan 30 = \frac{CD}{AC}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{20+x}$$

In $\triangle BCD$,

$$\tan 60 = \frac{CD}{BC}$$

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

From (1) and (2), we have

$$\therefore 20 + x = 3x$$

$$\Rightarrow 2x = 20$$

$$\Rightarrow x = 10$$

$\therefore$ Height of the tower =

Distance of tower from A = AC = (20 + x) m = (20 + 10) m = 30 m

33. The following distribution gives the marks scored by of 40 students of a class :

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50
Number of students	9	19	27	35	40
f	9	10	8	8	5

Median : l = 20 ; f = 8 ; cf = 19 ; h = 10

Median = 21.25

Mode : f₁ = 10 ; f₀ = 9 ; f₂ = 8 ; h = 10

Mode = 30

34. **Sol :** Volume of cylinder = $3.14 \times 4 \times 4 \times 11 = 552.64$ cu cm ----- (2 m)

Volume of 2 hemispheres = $2 \times \frac{2}{3} \times 3 \times 3 \times 3 = 113.04$ cu cm ----- (2 m)

$$\text{Volume of water left} = 552.64 - 113.04 = 439.6 \text{ cu. Cm} \quad \text{----- (1 m)}$$

[OR]

Sol : the diameter of the half cylinder is 7 m and its height is 15 m.

$$\begin{aligned} \text{required volume} &= \text{volume of the cuboid} + 1/2 \text{ volume of the cylinder} \\ &= 15 \times 7 \times 8 + 1/2 \times 22/7 \times 7/2 \times 7/2 \times 15 = 1128.75 \quad \text{----- (2 m)} \\ &= 1128.75 \text{m}^3 \quad \text{----- (} \frac{1}{2} \text{ m)} \end{aligned}$$

$$\begin{aligned} \text{Amount of metal required} &= \pi r h + \pi r^2 + 2h(l + b) + lb \\ &= 11 \times 15 + 38.5 + 16 \times 22 + 15 \times 7 \\ &= 165 + 38.5 + 352 + 85 \quad \text{----- (2m)} \\ &= 640.5 \text{ sq cm} \quad \text{----- (} \frac{1}{2} \text{ m)} \end{aligned}$$

35. OS = OT = OU = 6 cm (Radii of the circle)

QT = 12 cm and TR = 9 cm

QR = QT + TR = 12 cm + 9 cm = 21 cm

Now, QT = QS = 12 cm (Tangents from the same point)

TR = RU = 9 cm

Let PS = PU = x cm

Then, PQ = PS + SQ = (12 + x) cm and PR = PU + RU = (9 + x) cm

It is clear that

ar (ΔOQR) + ar (ΔOPR) + ar (ΔOPQ) = ar (ΔPQR)

$Ar(PQR) = Ar(POR) + Ar(QOR) + Ar(POQ)$

$$\Rightarrow 189 = \frac{1}{2} \times OU \times PR + \frac{1}{2} \times OT \times QR + \frac{1}{2} \times OS \times PQ$$

$$\Rightarrow 189 = \frac{1}{2} [(6) \times (x+9) + (6) \times (12+9) + (6) \times (12+x)]$$

$$\Rightarrow 189 \times 2 = [(6) \times (x+9) + (6) \times (12+9) + (6) \times (12+x)]$$

$$\Rightarrow 378 = 6 \times (x+9) + 6 \times (21) + 6 \times (12+x)$$

$$\Rightarrow 63 = x + 9 + 21 + x + 12 \quad \text{----- (3 m)}$$

$$X = 21/2 = 10.5 \quad \text{----- (1 m)}$$

$$\text{Thus, PQ} = (12 + 10.5) \text{ cm} = 22.5 \text{ cm} \quad \text{----- (} \frac{1}{2} \text{ m)}$$

$$\text{PR} = 9 + 10.5 = 19.5 \text{ cm} \quad \text{----- (} \frac{1}{2} \text{ m)}$$

[OR]

Length of two tangents drawn from the same point to the circle are equal.

$\therefore CF = CD = 6 \text{ cm}$

$\therefore BE = BD = 8 \text{ cm}$

$\therefore AE = AF = x$

$AB = AE + EB = x + 8$

$BC = BD + DC = 8 + 6 = 14$

$CA = CF + FA = 6 + x$

Let perimeter of triangle ABC be s.

$$\Rightarrow 2s = AB + BC + CA$$

$$= x + 8 + 14 + 6 + x$$

$$= 28 + 2x$$

$$\Rightarrow s = 14 + x$$

$$\text{Area of } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{(14+x)(14+x-14)(14+x-x-6)(14+x-x-8)}$$

$$= \sqrt{(14+x)(x)(8)(6)}$$

$$= \sqrt{(14+x)48x} \dots (i)$$

$$\text{Also, area of } \Delta ABC = 2 \times (\text{area of } \Delta AOF + \Delta COD + \Delta DOB)$$

$$= 2 \times [(1/2 \times OF \times AF) + (1/2 \times CD \times OD) + (1/2 \times DB \times OD)]$$

$$= 2 \times 1/2 (4x + 24 + 32) = 56 + 4x \dots (ii)$$

Equating equations (i) and (ii) we get,

$$\sqrt{(14+x)48x} = 56 + 4x$$

Squaring both sides,

$$48x(14+x) = (56+4x)^2$$

$$\Rightarrow 48x = [4(14+x)]^2(14+x)$$

$$\Rightarrow 48x = 16(14+x)$$

$$\Rightarrow 48x = 224 + 16x$$

$$\Rightarrow 32x = 224$$

$$\Rightarrow x = 7 \text{ cm}$$

$$\text{So, } AB = x + 8 = 7 + 8 = 15 \text{ cm}$$

$$CA = 6 + x = 6 + 7 = 13 \text{ cm.}$$

$$\text{Hence, } AB = 15 \text{ cm, } CA = 13 \text{ cm}$$

SECTION E

36.

(i) Find the angle subtended by one slice in pizza marked I and II - 60° and 45°

(ii) Find the area of one slice of pizza marked (I) $77/3$ sq cm

(iii) 4 : 3

$$37. a, a+d, a+2d, \dots, a+30d = 527$$

$$\Rightarrow S_n = 527$$

$$\Rightarrow 3122a + 30d = 527$$

$$\Rightarrow 31a + 15d = 527$$

$$\Rightarrow a + 15d = 17 \dots (1)$$

As the length of the largest side is sixteen times the smallest. So,

$$a + 30d = 16a$$

$$\Rightarrow 30d = 15a$$

$$\Rightarrow a = 2d \dots (2)$$

Substitute (2) in (1) to determine the value of d.

$$(2d) + 15d = 17$$

$$\Rightarrow 17d = 17$$

$$\Rightarrow d = 1$$

Substitute the value of d in (2) to determine the value of a.

$$a=2(1)$$

$$\Rightarrow a=2$$

Therefore, the smallest side is of length 2 cm and the common difference is 1 cm.

$$\text{Smallest side} = 2 \text{ cm}$$

$$\text{Largest side} = 32 \text{ cm}$$

$$\text{Sum} = 34 \text{ cm}$$

[OR]

$$6: 22 = 3 : 11$$

38 [i] $\text{length} = 2x - 10$

[ii] $x^2 - 5x - 300 = 0$

[iii] $\text{breadth} = 20 \text{ m} ; \text{length} = 30 \text{ m}$ $\text{Area} = 600 \text{ sq m}$

[OR]

$$\text{perimeter of the field} = 2(20 + 30) = 100 \text{ m}$$

***** End of the Paper *****