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Marking Scheme (class – X)

Mathematics

SECTION A

1. The number given = .

LCM of 125 = 5^3

∴ It is terminating. (∵ Any denominator no. that can be expressed in the form of 2^m x 5^n is terminating)

2. AP: 3, 8, 13, …, 253

a = 3, d = 5, l = 253

∴ From the last term:

a' = 253, d'= -5, l' = 253

∴ a'_{10} (from last) = a' + (n-1)d'

= 253 + 9(-5)

=253 -45

= 208

3. f(x) = kx(x-2) + 6 = 0

= kx^2 – 21x +6 = 0

f(x) have equal and real roots

∴ D = 0

b^2 – 4ac = 0

$(-2k)^2$ – 4.k.6 = 0

$4k^2$ = 24k

k = 6

4. The point is (5, -2)

The point on y-axis : (0 , y)

∴ The point (0,-2) is nearest to te point (5, -2) on y-axis.

5. Given, LM||CB , LN||CD, ABCD is a quadrilateral.

To prove:

Proof: In $\triangle$ABC , LM||BC

$\because \frac{AL}{LC} = \frac{AM}{MB}$ ($\because$ BPT) ……….(i)

In $\triangle$ADC,

$\frac{AL}{MD} = \frac{AN}{ND}$($\because$ BPT) ……….(ii)

6. Sin 67^0 + cos 75^o

⇨ Sin (90 – 23)^o + cos (90 – 15k)^o

⇨ Cos 23^o + sin 15^o

7. p = a^2b^3, q=a^3b

L.C.M => a^3b^3

HCF => a^2b

LCM X HCF = pq

a^3b^3 x a^2b = a^2b^3 x a^3b

⇨ $a^3b = a^3b$

⇨ 1=1 (proved)

8. When no solution:

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

3+-1=0

(2-1)+(-1)-(2+1)=0

$_1$=3 ; $_1$=1 ; $_1$=-1

$_2$=(2-1) ; $_2$=(-1) ; $_2$=-(2+1)

$\frac{3}{2k-1} = \frac{1}{k-1} / \frac{1}{2k+1}$

_1

3-3 = 2-1

=2

9) =3+2 ; $_2$=3+4 =>7

$_1$= 3+2

$_1$=5

=5 ; =2

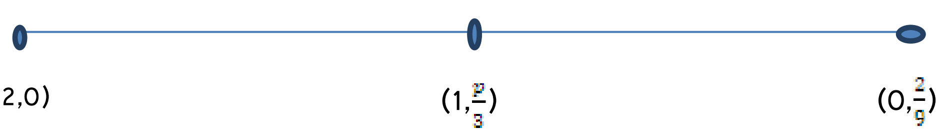
$_2$=13

$_2$ = $\frac{24}{2}(10+23.12)$

= 12(10+46)

= 672

10)



1=$\frac{0+1}{2}$; $\frac{p}{3} = \frac{\frac{2}{9}+0}{2}$

$\frac{p}{3} = \frac{2}{9\,X\,2}$

$P = \frac{1}{3}$

O(-1,3) => (-1,1)

, = -1 ; =1

5+3+2= 0

-5+3+2= 0

-5+5 = 0 ( )

11) 0 100 7 14. , 7 100-14=86

, = $\frac{86}{100}$ = $\frac{43}{50}$

12) 5 .

‘’

, = +5

: $3\left(\frac{5}{5+x}\right) = \frac{x}{x+5}$

$\frac{15}{5+x}$ = $\frac{x}{x+5}$

, =15

, 15.

13. a=bq+r , $a \leq r < b$

b=3 => r=0,1,2

r=0, => n=3q, 3q+2, 3q+4

r=1, => n=3q+1, 3q+3, 3q+5

r=2, => n=3q+2, 3q+4, 3q+6

Exactly one in the above 3 sets is divisible by 3.

14. The roots given $\sqrt{2}$ and - $\sqrt{2}$

$\therefore$ (x- $\sqrt{2}$) and (x + $\sqrt{2}$)

$\therefore$ (x- $\sqrt{2}$) (x+ $\sqrt{2}$)

$= (x)^2 - (\sqrt{2})^2$

$= x^2 - 2$

$\therefore$ The other zeros are

$x^2 - 2$) $2x^4 - 3x^3 - 3x^2 + 6x - 2$ ($2x^2 - 3x + 1$

$2x^4 \quad - 4x^2$

\- +

$-3x^3 + x^2 + 6x - 2$

$-3x^3 \quad + 6x$

\+ -

$x^2 - 2$

$x^2 - 2$

x

$\therefore$ $2x^2 - 3x + 1$

$= 2x^2 - 2x - x + 1$

$= 2x(x-1) - 1(x-1)$

$= (2x-1)(x-1)$

$\therefore$ The total zeros are

$\frac{1}{2}$, 1, $\sqrt{2}$, $-\sqrt{2}$

15. Let the total rows be x

Let the total columns be y.

ATQ

$\therefore$ xy= (x+3) (y-1)

xy = xy - x + 3y - 3

3= -x + 3y ..... (I)

$\therefore$ xy =(x – 3) (y +2)

xy = xy + 2x – 3y - 6

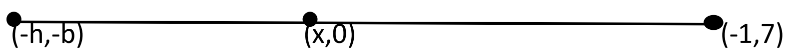
6 = 2x – 3y ……. (II)

-x + 3y = 3
2x - 3y = 6
x=9

∴ -9 + 3y = 3
3y = 12
y=4

The total rows is 9 The total columns is 4.

16.



$0 = \frac{7k-6}{2}$

6 FTk

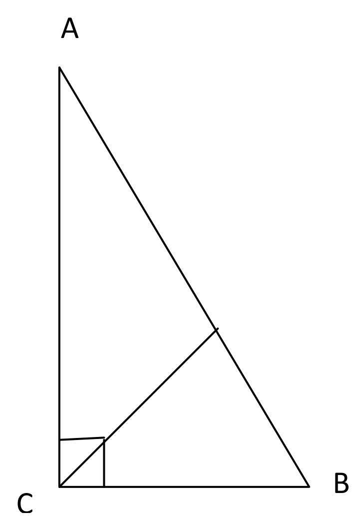
$k=\frac{6}{7}$ …… (II)

∴ Ratio is 6:7

∴ $x = \frac{-6-28}{13}$

$x = \frac{-34}{13}$

$= \frac{-34}{13}$



17. Area of$\triangle$ABC=½ cp =1/2ab

Or, pc = ab

Or, 1/p = c/ab

Or, $1/p^2 = c^2/a^2b^2 = a^2 + b^2/a^2b^2$

$= 1/a^2 + 1/b^2$

18. Given : XY X´Y´

AB are tangent.

To prove : $\angle$ADB = 90^o

Proof :

In Δ POA and Δ OAC

$\angle OPA = \angle OCA = 90^o$

OR

18. $\angle PAC + \angle QBA = 180°$ [Cointerior angles]

$\Delta POA \cong \Delta COA$ [By]

19.XY || AC

$\angle BXY = \angle A \& \angle BYX = \angle C$

$\triangle ABC \sim \triangle XBY$ [By AA]

$$\frac{AR.\ \Delta ABC}{AR.\ \Delta XBY} = \frac{AB^2}{XB^2}$$

$$AR.\Delta ABC = 2.AR.\Delta XBY$$

$$\frac{AR.\ \Delta ABC}{AR.\Delta XBY} = \frac{2}{1}$$

$$\left(\frac{AB}{XB}\right)^2 = \frac{2}{1}$$

$$\frac{AB}{XB} = \sqrt{2}$$

$$\frac{XB}{AB} = \frac{1}{\sqrt{2}}$$

$$1 - \frac{XB}{AB} = 1 - \frac{1}{\sqrt{2}}$$

$$\frac{AB - XB}{AB} = \frac{\sqrt{2} - 1}{\sqrt{2}}$$

$$\frac{AX}{AB} = \frac{\sqrt{2} - 1}{\sqrt{2}}$$

$$\frac{AX}{AB} = \frac{2 - \sqrt{2}}{2}$$

OR

19. $\frac{\cos^2 35° + \cos^2 55°}{cosec^2 15° - \tan^2 75°} + \sqrt{3}(\tan 13° \tan 23° \tan 30° \tan 67° \tan 77°)$

$= \frac{\cos^2 35° + \sin^2 35°}{\sec^2 75° - \tan^2 75°} + \sqrt{3}(\tan 13° \tan 77° \tan 23° \tan 67° \tan 30°)$

$= \frac{1}{1} + \sqrt{3}(\cot 77° \tan 77° \cot 67° \tan 67° \tan 30°)$

$= 1 + \sqrt{3}\left(\frac{1}{\tan 77°} \times \tan 77° \times \frac{1}{\tan 67°} \times \tan 30°\right)$

$= 1 + \sqrt{3} \times \frac{1}{\sqrt{3}}$

$= 1 + 1$

$= 2$

20. $BC^2 = AC^2 + AB^2$

$= 14^2 + 14^2$

⇨ 312

⇨ BC = 14

⇨ $r_2 = 7$

Given , ABPC is a quadrant,

AC = AB= 14 cm = r_1

$\theta = 90°$

Area of shaded region =

$AR.\Delta ABC + AR\ of\ semicircle - AR.\ quadrant\ ABPC$

$= \frac{1}{2} \times AB \times AC + \frac{\pi r_2^2}{2} - \frac{\theta}{360}\pi r_1^2$

$= \frac{1}{2} \times 14 \times 14 + \frac{\frac{22}{7} \times 7\sqrt{2} \times 7\sqrt{2}}{2} - \frac{90}{360} \times \frac{22}{7} \times 14 \times 14$

$= 98 + 154 - 154$

=252 -154

= 98 cm^2

21. Given,

length of the roof(l) = 22m

breadth of the roof(b) = 20m

height of the roof (h_1) = ?

base diameter of tank = 2m

base radius of tank (r) = 1m

h_2= 3.5m

Therefore,

Vol. of tank = vol. of roof

Or, $\pi r^2 h_2 = l.b.h_1$

Or, $\frac{22}{7} \times 1 \times 1 \times 3.5 = 22 \times 20 \times h_1$

Or, h_1 = 2.2cm

Views:

a. Water is very necessary to carry out daily activities.

b. We should not waste water as our lives depend on it.

OR

21. TSA of the solid = CSA of the hemisphere + TSA of Cube – Area of the Top

$= 2\pi r^2 + 6a^2 - a^2$

$= 2\pi r^2 + 5a^2$

= 2 x 3.14 x 5 x 5 + 5 x 10 x 10

= 657cm^2

Therefore, cost @ Rs5/100cm^2 $= \frac{5}{100} \times 657$

= Rs 32.85

22. Here modal class: 60 – 80

l = 60, f_1= 29, f_2= 17, f_0 = 21, h = 20

$\therefore \text{Mode} = l + (\frac{f_1 - f_0}{2f_1 - f_0 - f_2})n$

$= 60 + (\frac{29-21}{58-21-17})n$

$= 60 + \frac{8}{20} \times 20$

$=68$

Now,

$3\text{Median} = \text{Mode} + 2\text{Mean}$

$= 68 + 2(53)$

$= 68 + 106$

$=174$

$\text{Median} = \frac{174}{3} = 58$

$\therefore$Median=58

23. For real roots, $D \geq 0$

$\therefore$ $D = (-6)^2 - 4 \times 5 \times (-2)$

$= 76 \geq 0$

So, the Eqn. has real roots.

OR

23. Let, The usual speed be 'x' km/hr.

$\frac{1600}{x} - \frac{1600}{x+400} = \frac{2}{3}$

Or, 800 $\left(\frac{x+400-x}{x(x+400)}\right) = \frac{1}{3}$

Or, x= $\frac{-400 \pm \sqrt{(1600+3840000)}}{2}$

$= \frac{-400 \pm \sqrt{(200)}}{2}$

= 800 km/hr.

$5x^2 - 6x - 2 = 0$

⇨ $x - \frac{2}{5} = 0$

⇨ $\frac{5}{0}\Big)^2 - \left(\frac{6}{10}\right)^2 - \frac{2}{5} = 0$

⇨ $= \pm\sqrt{\frac{19}{5}}$

$\therefore$ x=$\frac{3\pm\sqrt{19}}{5}$

24. Given ratio of the nth term of 2 A.P.s is 7n+1:4n+27

So, $\frac{\frac{n}{2}(2a_1+(n-1)d_1)}{\frac{n}{2}(2a_2+(n-1)d_2)} = \frac{7n+1}{4n+27}$

⇨ $\frac{(\frac{n-1}{2})d)}{(\frac{n-1}{2})d)} = \frac{7n+1}{4n+27}$

⇨ $\frac{\frac{-1}{2})d_1}{\frac{-1}{2})d_2)} = \frac{7n+1}{4n+27}$

Now, ratio of 9th term = $\frac{a_1+(9-1)d_1}{a_2+(9-1)d_2}$

$= \frac{a_1+8d_1}{a_2+8d_2}$

Comparing both equation,

$\frac{n-1}{2} = 8$

n-1 = 16 ; n=17

So, Ratio of 9th term = $\frac{7(17)+1}{4(17)+27} = \frac{120}{95} = \frac{24}{19}$

26 . Correct Statement $\frac{1}{2}$

Figure Given $\frac{1}{2}$

To prove $\frac{1}{2}$

Construction $\frac{1}{2}$

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

Or

Same.

26. Correct $\triangle$ ABC

Correct a $\triangle$ A´B´C´

27. L.H.S $= \frac{\cos A+\operatorname{cosec} A-1}{\cot A-\operatorname{cosec} A+1}$ (dividing the numerator & denominator by sin A)

$= \frac{\cos A+\operatorname{cosec} A-(\operatorname{cosec} A+\cot A)(\operatorname{cosec} A-\cot A)}{\cot A-\operatorname{cosec} A+1}$

$= \operatorname{cosec} A + \cot A$

28. $\frac{x}{75} = \cot 45°$

Or x= 75

$\frac{x+y}{75} = cot30°$

Or, x+y = $75\sqrt{3}$

Or, y=$75(\sqrt{3}-1)$

29. Height of the mug = 14cm =1.4dm

Diameter = 7cm = 0.7dm

Radius = 3.5cm = 0.35dm

Actual volume of the milk in the mug = volume of the cylinder – volume of the raised hemispherical bottom

Now,

Volume of the cylinder = $\pi r^2 h$

$= \frac{22}{7} \times \frac{0.35}{100} \times \frac{0.35}{100} \times \frac{1.4}{10}$

= 0.5390 dm^3

Volume of the hemispherical bottom = $\frac{2}{3}\pi r^3$

$= \frac{2}{3} \times \frac{22}{7} \times \frac{0.35}{100} \times \frac{0.35}{100} \times \frac{0.35}{100}$

$= 0.0898333 dm^3$

So, Actual volume of the milk in the mug = 0.5390 – 0.08983

$= 0.44917 dm^3$

Volume of the milk = 0.44917

The price of one litre = Rs. 80

The price of 0.44917 litres = 80 $\times$ 0.44917

= Rs. 27.93 $\cong$ 28

According to the dairy B, the price of the milk should be Rs. 28 approximately.

The dairy owner B is a humane person with morals. He believes in serving people at fair price and does not deceive people unlike dairy owner A.

30.

Number of Apples	Class mark	Frequency	Cumulative frequency
25-30	27.5	20	20
30-35	32.5	67	87
35-40	37.5	f1	87+f1
40-45	42.5	f2	87+f1+f2
45-50	47.5	125	212+f1+f2
50-55	52.5	35	247+f1+f2
55-60	57.5	25	$\frac{272 + f1 + f2}{550}$

Median = 42

Median of the data = l + $\left(\frac{\frac{n}{2}+cf}{f}\right) \times h$

Accordingly,

$42 = 55 + \left(\frac{275-(247+f1+f2)}{25}\right) \times 5$

$= 55 + \left(\frac{275-275-247-f1-f2}{5}\right) \times 5$

$= 55 + \left(\frac{28-f1-f2}{5}\right)$

⇨ $42 = \frac{f1-f2}{}$

⇨ 210 = 275 +28-f1-f2

⇨ f1+f2 = 303 – 210

= 93 (1)

Now, The total number of boxes = 550

So, 272+f1+f2 = 550

30.

Class Interval	F	Cf	Type
0-10	10	100	More than 0
10-20	18	90	More than 10
20-30	40	72	More than 20
30-40	20	32	More than 30
40-50	12	12	More than 40