-:ಕರ್ನಾಟಕ ಶಾಲಾ ಪರೀಕ್ಷೆ ಮತ್ತು ಮೌಲ್ಯ ನಿರ್ಣಯ ಮಂಡಳಿ:-

ರಾಜ್ಯ ಮಟ್ಟದ ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ ಪೂರ್ವ ಸಿದ್ಧತಾ ಪರೀಕ್ಷೆ, ಫೆಬ್ರುವರಿ/ಮಾರ್ಚ್-2024

(KEY ANSWERS BY SHIVA.T)

CLASS: 10 | **SUBJECT: MATHEMATICS**

Subject code: 81E | **Date of exam: 29.02.2024**

MARKS: 80 | **Medium: ENGLISH** | **DURATION: 3 hours 15 min**

I.

1. (C) 2
2. (B) $\frac{4}{3}\pi r^3$ cubic units.
3. (D) $b^2-4ac > 0$
4. (A) $\frac{\sqrt{3}}{2}$
5. (A) 24
6. (C) Infinite solutions
7. (B) 13, 7
8. (A) 8cm

II.

9. We know that HCFxLCM=axb

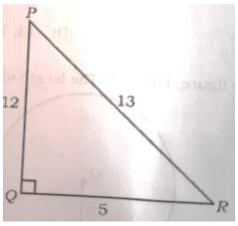
   HCFx72=24x36

   HCFx~~72~~=~~24~~x36

   HCF= 12
10. (x-1)=0 and (x+3)=0

    x=1 & x=-3
11. Volume of the frustum of a cone V=$\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_2 r_1)$
12. We know that the sum of the zeroes of the quadratic polynomial is $\alpha+\beta=-\frac{b}{a}$

    $=-\frac{7}{1}$ = -7
13. In the given figure,



$\frac{SinR}{CosR}=\frac{\frac{12}{13}}{\frac{5}{13}}=\frac{12}{5}$

14. P(E)=$\frac{n(E)}{n(S)}=\frac{0}{4}$ = 0
15. Area of ΔPQR=81 cm^2.
16. Sin(90-A)=cos60

    ~~Cos~~A=~~Cos~~60

    A=60

III.

17. Prove that 7+√5 is an irrational number.

Solution: Let us assume that 7+√3 is a rational number with p and q as co-prime integer and q ≠ 0

⇒ √5 = p / q

⇒ √5 = 7 - p / q

⇒ √5 = (7q - p) / 5q

⇒ (7q - p) / 5q is a rational number

However, √5 is in irrational number

This leads to a contradiction that 7+√5 is a rational number.

18. Find the roots of the quadratic equation $3x^2-6x+2=0$ using quadratic formula.

Solution: here a=3, b=-6 & c=2 .

Quadratic formula, x= $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Put all the values of a, b & c in above formula.

x= $\frac{6\pm\sqrt{6^2-4x3x2}}{2x3}$

$= \frac{6 \pm \sqrt{36-24}}{6}$

$= \frac{6 \pm \sqrt{12}}{2x1}$

$= \frac{6 \pm 2\sqrt{3}}{6}$

x= $\frac{6+2\sqrt{3}}{6}$ or x= $\frac{6-2\sqrt{3}}{6}$

x= or x=

19. Solve the equation by elimination method,

Solution: let two equations be 4x+y=15 ---------(1)

& x+y=6 ---------(2)

By elimination method,

Multiple 4 to equation (2) & 1 to equation (1)

We get 4x+y=15

4x+4y=24

-3y=-9

Y=3

Put this y value in any one equation we get x value.

Equation (2) becomes x+y=6

X+3=6

X=6-3

X=3

20. Find the sum of first 20 terms of the A.P 4, 9, 14, ………..

Solution: Given data here a=4 d=9-4 n=20

d=5

We are going to find S_{20}

We know $S_n=\frac{n}{2}\{2a+(n-1)d\}$

$S_{20}=\frac{20}{2}\{2x4+(20-1)5\}$

$=10\{8+(19)5\}$

$=10x103$

$=1030.$

OR

Find the sum of first 40 positive integers which are divisible by 6

Solution: the number which are divisible by 6 are 6, 12, 18, …………

Given data here a=6 d=12-6 n=40

d=6

We are going to find S_{40}

We know $S_n=\frac{n}{2}\{2a+(n-1)d\}$

$S_{40}=\frac{40}{2}\{2x6+(40-1)6\}$

$=20\{12+(39)6\}$

$=20x246$

$=4920.$

21. Find the coordinates of the point which divides the line segment joining the points (1, 5) and (-4, 0) in the ratio of 2:3.

Solution: Here, $x_1 = 1,\ y_1 = 5,\ x_2 = -4\ and\ y_2 = 0$ and m:n=2:3

w.k.t, by section formula formula (x, y) = $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$

$= \left(\frac{-8+3}{5}, \frac{0+15}{5}\right)$

$= \left(\frac{\cancel{-5}\ ^1}{\cancel{5}\ _1}, \frac{\cancel{15}\ ^3}{\cancel{5}\ _1}\right)$ = (x, y) = (-1, 3)

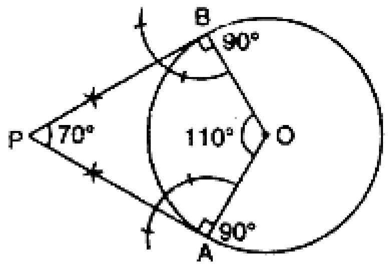
22. If P(A)=$\frac{3}{4}$ then, show that P(A_)≠$\frac{1}{2}$

Solution: given that P(A)=$\frac{3}{4}$ and we know P(A)+P(A_)=1

$\frac{3}{4}$ +P(A_)=1 , P(A_)=1-$\frac{3}{4}$ = $\frac{1}{4}$ Hence the proof

23. Draw a circle of radius 3.5cm, then construct a pair of tangents to the circle which are inclined to each other at an angle of 70^0.

Solution:



24. Find the value of : $\frac{cos45.sin45}{sec30-cot60}$

Solution: we have $\frac{cos45.sin45}{sec30-cot60} = \frac{\frac{1}{\sqrt{2}}x\frac{1}{\sqrt{2}}}{\frac{2}{\sqrt{3}}-\frac{1}{\sqrt{3}}} = \frac{\frac{1}{2}}{\frac{1}{\sqrt{3}}} = \frac{\sqrt{3}}{2}$

OR

Prove that $\frac{CosA}{1+sinA} + \frac{1+sinA}{CosA}$

Solution: $\frac{Cos2A+(1+sinA)2}{(1+sinA)CosA} = \frac{1+1+2sinA}{CosA(1+sinA)} = \frac{2\cancel{(1+sinA)}}{CosA\cancel{(1+sinA)}}$ = 2 SecA

III.

25. Given that p(x)=$3x^3+4x^2-11x+35$ by g(x)=x^2-2x+3

x^2-2x+3) $3x^3+4x^2-11x+35$ (3x+10

$3x^3-6x^2+9x$

$10x^2-20x+35$

$10x^2-20x+30$

5

Therefore q(x)= 3x+10 and r(x)= 5

OR

Given that sum = -3 and product = 2

We know that x^2-(sum)x+product

$x^2-(-3)x+2$

x^2+3x+2

by factorization method we have $x^2+2x+1x+2$

x(x+2)x+1(x+2)

(x+2) (x+1)

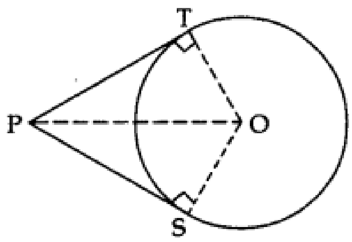
Therefore zeroes of the polynomial are -2 and -1.

26.

Given: PT and PS are tangents from an external point P to the circle with centre O.

To prove: PT = PS

Construction: Join O to P, T and S.



Proof: In ΔOTP and ΔOSP.

OT = OS …[radii of the same circle]

OP = OP …[common]

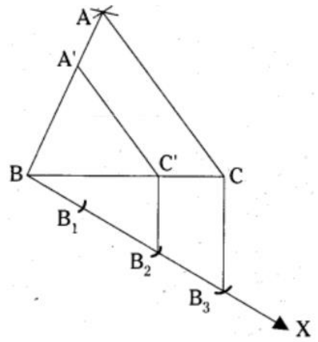
∠OTP = ∠OSP …[each 90°]

ΔOTP = ΔOSP …[R.H.S.]

PT = PS …[c.p.c.t.]

27.

Solution:



28. Find the mean for the following data by direct method.

c.i	F	X	fx
2-6	4	4	16
6-10	8	8	64
10-14	2	12	24
14-18	1	16	16
18-22	5	20	100
	N=20		$\sum fx = 220$

Mean by direct method, x= $\frac{\sum fx}{n} = \frac{220}{20} = 11$

OR

c.i	F	
5-15	4	f_0
15-25	8	f_1
25-35	2	f_2
35-45	5	
45-55	1	

Here LRL=15, f_1=8, f_0=4, f_2=2 and h=10

Mode= LRL+ $\left\{\frac{f1-f0}{2f1-f0-f2}\right\}$x h

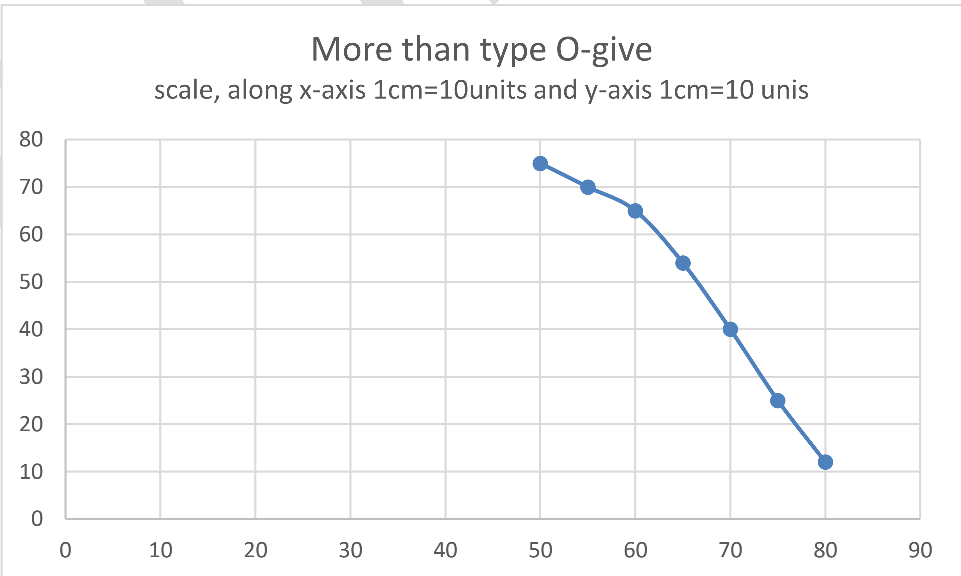
= 15+$\left\{\frac{8-4}{16-4-2}\right\}$x 10

= 15+4

Mode=19

29. O-give graph

Solution:



30. Find the area of the triangle whose vertices are A(-5, -1), B(3, -5) & C(5, 2).

Solution: (x1, y1)= (-5, -1), (x2, y2)= (3, -5) and (x3, y3)= (5, 2)

We have Area of $\Delta^{le} = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

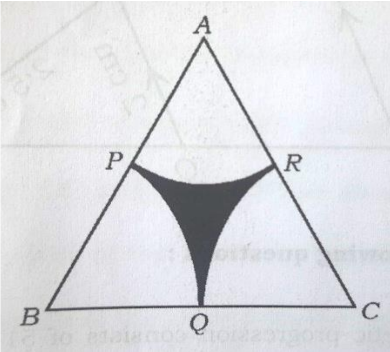
Area of $\Delta PQR = \frac{1}{2}[-5(-5-2) + 3(2+1) + 5(-1+5)]$

$= \frac{1}{2}[35 + 9 + 20]$

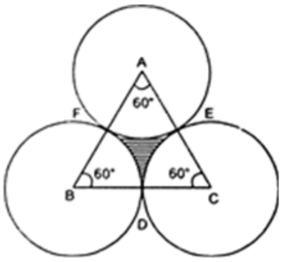
$= \frac{1}{2}[64] = \frac{1}{2_1} \times \overset{32}{64}$

∴ **Area** $\Delta =$ $\boldsymbol{32\ sq.units}$

31. Solution:



Just assume that



Area of triangle is $49\sqrt{3}$cm^2

$\frac{\sqrt{3}}{4}a^2 = 49\sqrt{3} \Longrightarrow a = 14$cm

The area of 3 circles is= $\frac{\theta}{360} x \pi r^2$.

$= \frac{60}{360} x \frac{22}{7} x7x7$

$= 77$ cm^2.

Area of remaining part is

$49\sqrt{3} - 77 = 84.868 - 77 = 7.868$ cm^2.

Perimeter of 1 arc = $\frac{\theta}{360} x2\pi r$

$= \frac{60}{360} 2x \frac{22}{7} x7 = \frac{22}{3} cm.$

Such 3 arcs = $3x\frac{22}{3}$*cm. = 22cm.*

32. Solution:

Let speed of the stream be xkm/hr

Speed of the boat upstream = speed of the boat in still water – speed of the stream

Speed of the boat upstream = (11-x)km/hr

Speed of the boat downstream = speed of the boat in still water + speed of the stream

Speed of the boat downstream = (11+x)km/hr

It is mentioned that the boat can go 12 km upstream and return downstream to its original point in 2 hr 45 min.

⇒ One-wayDistance traveled by boat (d) = 12 km

⇒ $T_{upstream} + T_{downstream}$ = 2 hr 45 min = (2 + 3/4) hr = 11/4 hr

⇒ [distance / upstream speed] + [distance / downstream speed] = 11/4

⇒ [12/ (11-x)] + [12/ (11+x)] = 11/4

⇒ 12 [1/ (11-x) + 1/(11+x)] = 11/4

⇒ 12 [{11 - x + 11 + x} / {121 - x^2}] = 11/4

⇒ 12 [{22} / {121 - x^2}] = 11/4

⇒ 12 [2 / {121 - x^2}] = 1/4

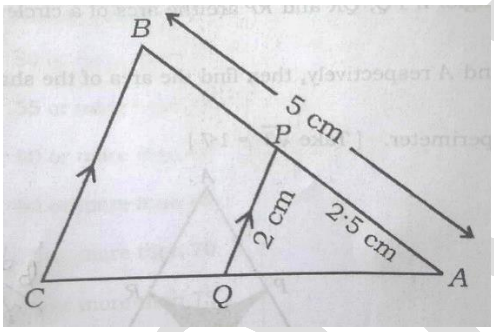
⇒ 24 / {121 - x^2} = 1/4

⇒ 24 (4) = {121 - x^2}
⇒ 96 = 121 - x^2
⇒ x^2 = 121 - 96
⇒ x^2 = 25
⇒ x = + 5 or -5
As speed to stream can never be negative, we consider the speed of the stream(x) as 5 km/hr.

OR

Let the present age of Person be x.
Three years ago, Person age =x−3
Five years hence, Person age =x+5
It is given that, sum of the reciprocals of Person ages 3 years ago and 5 years from now is 13.
⇒1x−3+1x+5=1/3
⇒x+5+x−3(x−3)(x+5)=1/3
⇒2x+2(x−3)(x+5)=1/3
⇒3(2x+2)=(x−3)(x+5)
⇒6x+6=x^2+2x−15
⇒x^2+2x−6x−15−6=0
⇒x^2−4x−21=0
⇒x^2−7x+3x−21=0
⇒(x−7)(x+3)=0
⇒x−7=0 or x+3=0
⇒x=7 or x=−3
So, x can be 7 or −3.
Since, the age of a person cannot be negative.
Hence, Person present age is 7 years.

33. Given:



In triangle APQ and ABC,
AP=2.5cm, AB=5cm and PQ=2cm.
A=A common
⌊ABC= ⌊APQ
⌊AQP= ⌊ACB (corresponding sides)
By AA similarity
$\frac{AP}{AB}=\frac{PQ}{BC}$
$\frac{2.5}{5}=\frac{2}{BC}$ hence BC=4cm
By theorem, $\frac{ar\ of\ \Delta APQ}{ar\ of\ \Delta ABC} = \frac{PQ^2}{AB^2} = \frac{2^2}{4^2} = \frac{1}{2}$ Hence the proof

34. Given:
n=51, d=5 and 20th term from the last term is (51+1)-20 = 32nd term.
a_{32}=157
a+31d=157
a+31x5=157
a=157-155
a=2
this A.P is a, a+d, a+2d
2, 2+5, 2+10
2, 7, 12, ………..

OR

Given: $a_2+a_4=22$ $S_{11}=253$

$a+d+a+3d=22$

$2a+4d=22$ -----→(1)

$S_{11}=\frac{11}{2}\{2a+(11-1)d\}=253$

$\frac{11}{2}\{2a+10d\}=253$

$2a+10d=46$ -----→(1)

Subtract above two equations we get $6d=24$

$d=4$

hence common difference is 4 and a=3

A.P is 3, 7, 11…………..

If last term is 67, an=67 we have to find n here.

$a+(n-1)d=67$

$3+4n-4=67$

$4n=68$

$n=17$

therefore number of terms is 17

35. Given equations are $2x+y=8$ and $x+y=5$

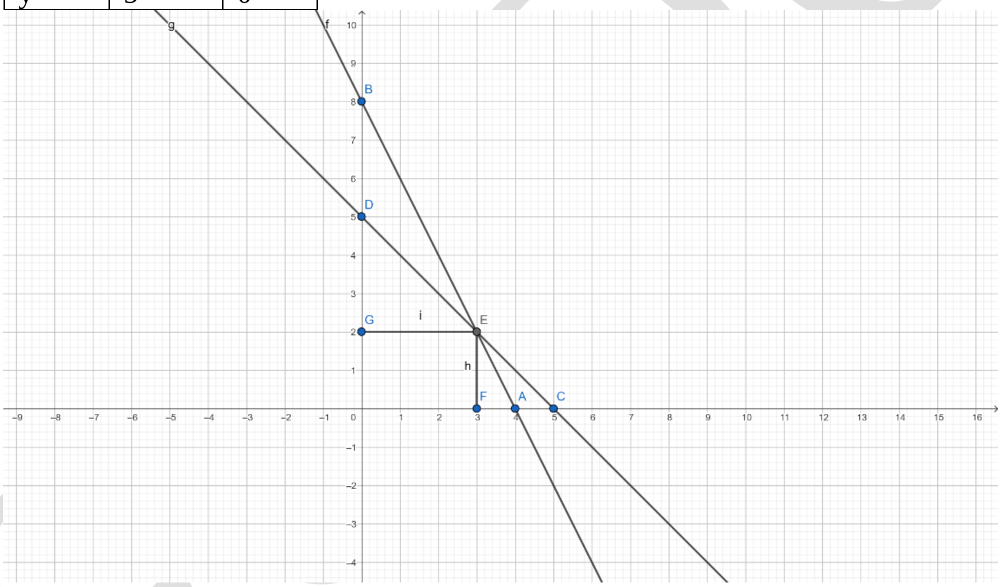
We have to make table for this

$2x+y=8$

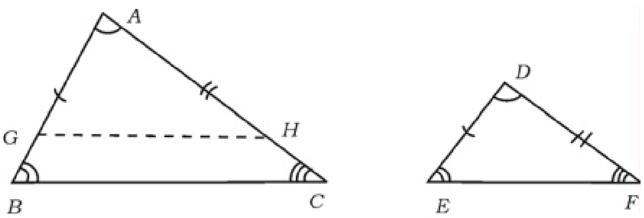
x	0	4
y	8	0

$x+y=5$

x	0	5
y	5	0



36.



Given: ∠BAC=∠EDF

∠ABC=∠DEF

To prove: $\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}$

Construction: Mark points G and H on the side AB and AC such that

AG=DE , AH=DF

proof: in triangle AGH and DEF

AG=DE.....by construction

AH=DF ..... by contsruction

∠GAH=∠EDF...Given

therefore ,

$\triangle AGH \cong \triangle FED$ by SAS congruency thus

∠AGH=∠DEF ....by CPCT

but∠ABC=∠DEF

∠AGH=∠ABC

Thus GH∥BC

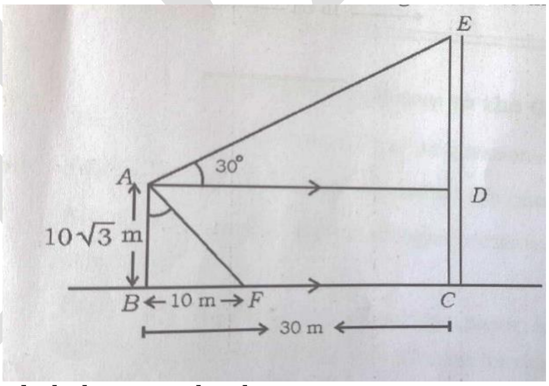
Now , In triangle ABC

$\frac{AB}{AG} = \frac{BC}{GH} = \frac{CA}{HA}$

Hence , $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

hence proved .

37.



in the given figure,

let h be the height of the tower CE=h

then DE=h-10$\sqrt{3}$m

in triangle ADE, tan30=$\frac{h-10\sqrt{3}}{30}$

$\frac{1}{\sqrt{3}} = \frac{h-10\sqrt{3}}{30}$

$\sqrt{3}$h-10=30 ==➔ h=$\frac{40}{\sqrt{3}}$ = 23.12m

We have to find angle of depression formed from the top of the light house to the ship, it means at A.

In triangle ABF, tanϴ=$\frac{10}{10\sqrt{3}} = \frac{1}{\sqrt{3}}$ hence ϴ=60^0.

38. Given:

Cylinder: r=8cm & height h=45-15 = 30cm

Cone: r=8cm and h=15cm we have to find l=$\sqrt{h^2+r^2}$

=$\sqrt{15^2+8^2}$

= $\sqrt{225+64}$

= $\sqrt{289}$

l=17cm

Total surface area of wooden solid= C.Surface area of cone +C.surface area of cylinder+area of base.

= $\pi rl+2\pi rh+\pi r^2$.

= πr(l+2h+r)

= $\frac{22}{7}$x8(17+60+8)

= $\frac{22}{7}$x8x85

= 2137.14 cm^2.

Volume of the wooden solid = volume of cone+volume of cylinder.

= $\frac{1}{3}\pi r^2h+ \pi r^2H$

= $\pi r^2(\frac{1}{3}h+H)$

= $\frac{22}{7}$x8x8(15+30)

= $\frac{1}{3}$x $\frac{22}{7}$x8x8x45

= 7039.99 cm^3.