MATHEMATICS

MODEL KEY ANSWER – ENGLISH MEDIUM

27-Jun-20

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10TH STANDARD ANNUAL EXAM -2020

Subject: Mathematics Subject code: 81E

Time : 3 hours **KEY ANSWER** Max.marks: 80

Choose the correct answer given below ------- 1x8=8

1. Equations have unique solution
2. 2
3. 1
4. $\frac{13}{12}$
5. 1:2
6. tangent
7. $\frac{\Theta}{360} x \prod r^2$
8. 220 cm^2

Answer the following questions --------------- 1x8=8

9. Here, q =20, which is in the form $2^n x 5^n$ = $2^2 x 5^1$ So, the rational number $\frac{23}{20}$ *is* a terminating decimal expansion.
10. 3
11. 1
12. $(\frac{x1+x2}{2}, \frac{y1+y2}{2})$
13. **Basic Proportionality Theorem** states that "If a line is drawn **parallel** to one side of a triangle to intersect the other two sides in distinct points, the other two sides are ***divided in the same ratio***".
14. 50^0
15. $x^2+x-2=0$
16. $\prod rl + \prod r^2$

Solve the following questions ------------- 2x8=16

17. 2x+y=11 & x+y=8 by elimination method

    2x+y=11

    2x+2y=16

    Y=5 & x= 3

18. Here a=5, d=3 & n=10 we have to find S_{10}, the formula is $S_n=\frac{n}{2}(2a+(n-1)d)$

$S_{10}=\frac{10}{2}(2(5)+(10-1)3)$

$=5(10+27)$

$S_{10}=185$

19. If the pair of linear equations are inconsistent then $\frac{a1}{a2}=\frac{b1}{b2}\neq\frac{c1}{c2}$

$a_1=2$, $a_2=2(k-4)$, $b_1=-3$ $b_2=-k$

$2x(-k)=-3(2k-8)$

$-2k=-6k+24$

$4k=24$

$K=6$

20. The equation is $2x^2-5x+3=0$, a=2, b=-5 & c=3

Nature of the roots will be depend on b^2-4ac

$b^2-4ac=25-4x2x3$

$=1 \ >0$

If $b^2-4ac>0$, then it will be two distinct real roots.

21. We know that sum of roots in a quadratic equation is given by

p+q=-b/a If p, q are roots

The quadratic equation is x^2-6x+k

One root is twice the other. So,

The roots are p, 2p

Comparing coefficients,

a=1,b=6,c=k

So, - b/a=p+2p

6/1=3p

6=3p

p=2

So the roots are 2 and 2(2)=4

Also we know that product of zeros=c/a

That is, pq=c/a

2×(4)=k/1

k=8

OR

Given $p(x)=x^3-2x^2+3x+4$ and $g(x)=x^2-3x+1$

By division algorithm, $g(x)=\frac{p(x)-r(x)}{q(x)}$, So. r(x) must be subtracted that result is exactly divisible by x^2-3x+1.

X+1

x^2-3x+1 | x^3-2x^2+3x+4

x^3-3x^2+1x

x^2+2x+4

x^2-3x+1

5x+5

r(x) is 5(x+1)

22. The distance formula is d=$\sqrt{(x2-x1)2+(y2-y1)2}$

d=$\sqrt{(4)2+(-4)2}$

d=$\sqrt{16+16}$

d=$\sqrt{32}$ =$\sqrt{2x16}$

d=4$\sqrt{2}$ units

OR

Given points are (x_1, y_1)= (1, 6)

(x_2, y_2)=(4, 3) and ratio m:n=1:2

The coordinates are x, y is ($\frac{mx1+nx2}{m+n}$, $\frac{my1+ny2}{m+n}$)

($\frac{1x1+2x4}{3}$, $\frac{1x6+2x3}{3}$)

($\frac{9}{3}$, $\frac{12}{3}$)

(3, 4)

23. The three points are A(1,1) , B(3,2) and C(5,3) We know that ,

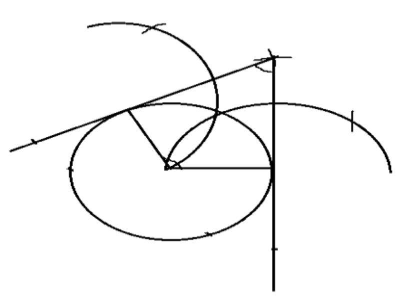
Thus , area of triangle A=$\frac{1}{2}$(1(2-3)+3(3-1)+5(1-2)

A=0

Since, if area of triangle is 0 square units , then its vertices will be collinear

Hence, A(1,1) , B(3,2) and C(5,3) are not the vertices of triangle

24.



Solve the given problems --------- 3x9=27

25. Let us assume that $\sqrt{5}$ is a rational number. $\sqrt{5} = \frac{P}{q}$ ----→ (1)

= p, q ∈ z, q ≠ 0, H C F of (p, q) = 1

Equation 1, Squaring both side

We get $5 = \frac{P2}{q2}$

p2, q2 are not co-prime numbers.

This is contradictory to our assumption that P and q are co-prime.

⇒ Our assumption that $\sqrt{5}$ is a rational number is wrong.

∴ $\sqrt{5}$ is an irrational number.

OR

HCF of 24 & 40 is

24)40(1   40=24x1+16

24

16)24(1   24=16x1+8

16

8)16(2   16=8x2+0

16

HCF of 24 & 40 is 8

LCM of HCF (24, 40)& 20 is   4 | 8, 20

2 5 ==→ 4X2X5= 40

26. Distance =12km speed of A be xkm/hr and speed of B is (x+2)km/hr

The time taken by A is $t_1 = \frac{12}{x}$

The time taken by B is $t_2 = \frac{12}{x+2}$

By question $t_2 = t_1 - \frac{1}{2}$

$\frac{12}{x+2} = \frac{12}{x} - \frac{1}{2}$

Solving the equation we get

$x^2+2x-48=0$ this is quadratic equation solve this by using any method

we get x=6 or x=-8

therefore time taken by A is $t_1=\frac{12}{6}=2$ hours

OR

27. $X=p\tan\Theta+q\sec\Theta$ & $y=p\sec\Theta+q\tan\Theta$

To prove x^2-y^2

$(p\tan\Theta+q\sec\Theta)^2-(p\sec\Theta+q\tan\Theta)^2$

$=(p^2\tan^2\Theta+q^2\tan^2\Theta+2\ p\tan\Theta+q\sec\Theta)-(p^2\sec^2\Theta+q^2\tan^2\Theta+2\ p\sec\Theta+q\tan\Theta)$

$=p^2(\tan^2\Theta-\sec^2\Theta)+q^2(\sec^2\Theta-\tan^2\Theta)$

$=p^2(-1)+q^2(1)$

$=-p^2+q^2$

OR

$\frac{Cot2(90-\Theta)}{\tan2\Theta-1}+\frac{cosec2\Theta}{\sec2\Theta-\mathrm{cosec}2\Theta}=\frac{1}{\sin2\Theta-\cos2\Theta}$

$\frac{tan2\Theta}{\tan2\Theta-1}+\frac{cosec2\Theta}{\sec2\Theta-\mathrm{cosec}2\Theta}$

$\frac{sin2\Theta/cos2\Theta}{\sin2\Theta-\cos2\Theta/\cos2\Theta}+\frac{1/sin2\Theta}{\sin2-\cos2/\mathrm{sincos}}$

$\frac{sin2+cos2}{\sin2-\cos2}=\frac{1}{\sin2\Theta-\cos2\Theta}$

Hence proof

28.

C.I	f	fc
20-40	7	7
40-60	15	22
60-80	20	42
80-100	8	50

N=50

N/2=25, fc=22, h=20, LRL=60 and f=20

Median=LRL+$\frac{\frac{N}{2}-Fc}{f}$ x h

$=60+\frac{25-22}{20}X20$

$=63$

C.I	f	
1-3	6	
3-5	9	f0
5-7	15	f1
7-9	9	f2
9-11	1	

Mode = LRL+ $\left(\frac{f1-f0}{2f1-f0-f2}\right)$xh

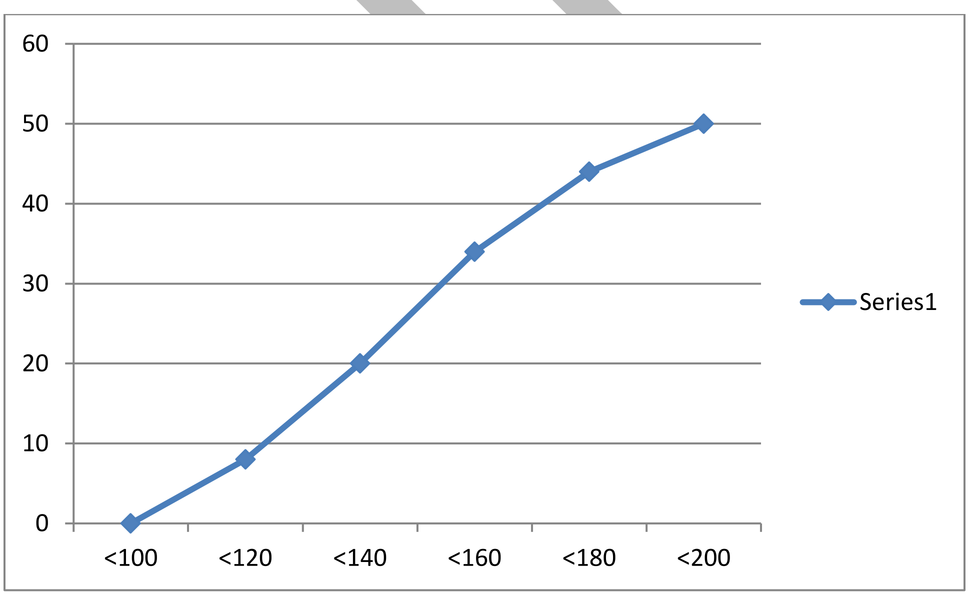
$=5+\left(\frac{15-9}{30-9-9}\right)x2$

=5+12/12

=6

29.

Daily income	no.of workers
<100	0
<120	8
<140	20
<160	34
<180	44
<200	50



30. N(s)=n(R)+n(W)+n(B)

=3+5+8

=16

a)red ball, the probability is p(a)=$\frac{3}{16}$

b)not a white ball means, red+blue =11

the probability is p(a)=$\frac{11}{16}$

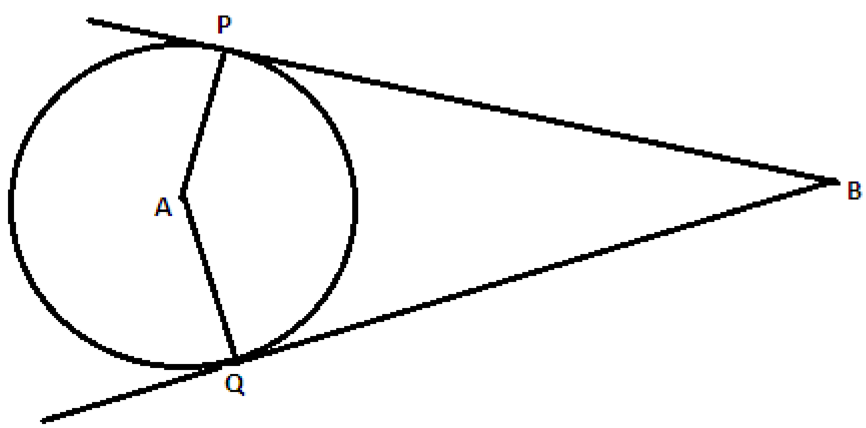
31.

Theorem: The tangents drawn from an external point to a circle

(a) are equal

(b) subtend equal angles at the centre

(c) are equally inclined to the line joining the centre and the external point



Data : A is the centre of the circle. B is an external point.

BP and BQ are the tangents.

AP, AQ and AB are joined.

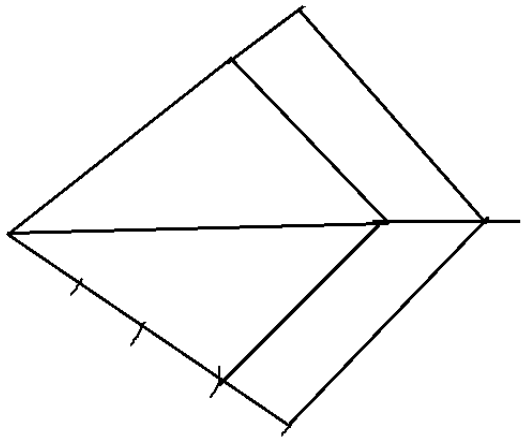
To prove : (a) BP = BQ

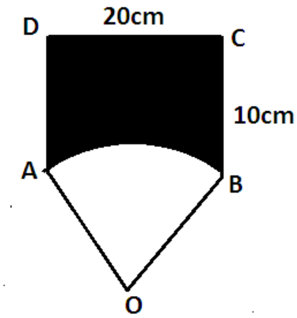
(b) ∠PAB = ∠QAB

(c) ∠PBA = ∠QBA

Proof: Statement	Reason
In ΔAPB and ΔAQB	
AP = AQ	radii of the same circle
∠APB = ∠AQB = 90°	Radius drawn at the point of contact
hyp AB = hyp AB	Common side
∴ΔAPB ≅ ΔAQB	RHS Theorem
∴ (a) PB = QB	CPCT
(b) ∠PAB = ∠QAB	
(c) ∠PBA = ∠QBA	QED

32.





33.

Area of rectangle is =20x10=200 cm^2.

Here AOB= 90^0, OAEB is an sector of radius OA=OB=$10\sqrt{2}$

Area of sector $=\frac{1}{2} r^2\Theta$.

$=\frac{1}{2} \times 10\sqrt{2} \times 10\sqrt{2} \times \frac{\Pi}{2}$

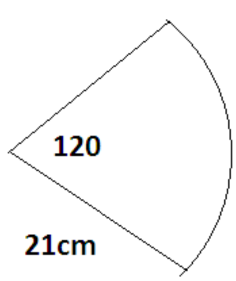
=157.14 cm^2.

Area of shaded region = area of rectangle – (area of sector-area of AOB)

=200-(157.14-100)

=142.85cm^2.

OR



Area of cloth used = $\frac{\Theta}{360} x \prod r^2$

$= \frac{120}{360} x22/7(21)^2$

$=462 \text{ cm}^2$.

Length of the metallic wire is $\frac{\Theta}{360} x2 \prod r$

$= \frac{\Theta}{360} x2 \prod r$

$= \frac{120}{360} x2x3.14x21$

$= 44$cm.

=44+21+21 = 86cm

Solve ------------------------------ 4x4=16

34.

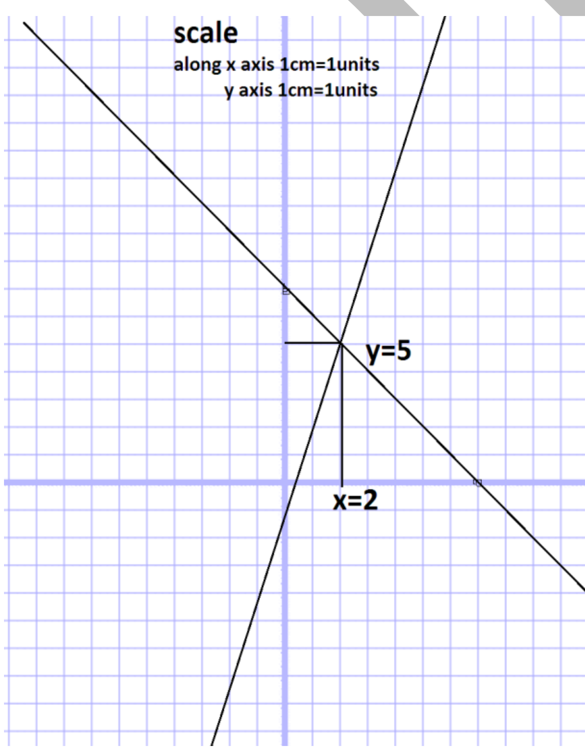
Graphical method The equations are x+y=7 & 3x-y=1

x+y=7

x	0	7
y	7	0

3x-y=1

x	0	0.33
y	-1	0



35. Let the terms be a-2d, a-d, a, a+d, a+2d

According to first condition sum of its terms is 55

So a-2d+a-d+a+a+d+a+2d=55

5a=55

a=11

according to 2nd condition $a_4=a_1+a_2+5$

a+d=a-2d+a-d+5

4d=16

d=4

therefore the terms are a-2d, a-d, a, a+d, a+2d

3, 7, 11, 15 & 19

OR

According to first condition $a_6=2(a)_3+1$

a+5d=2(a+2d)+1

a-d=-1 ----------------→ (1)

according to 2nd condition $a_4+a_5=5(a_2)$

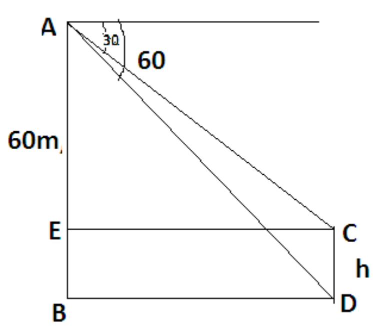
a+3d+a+4d=5a+5d

3a-2d=0 ---------→ (2)

Solve equation 1 and 2 we get

a=2 and d=3

36.



In triangle ABD, ∟D=60^0.

Tan $60^0=\frac{AB}{BD}$ =

$\sqrt{3} = \frac{60}{BD} \Rightarrow$ $BD = \frac{60}{\sqrt{3}}$ =EC

Similarly in triangle AEC, Tan $30^0 = \frac{AE}{EC}$

$$\frac{1}{\sqrt{3}} = \frac{AE}{60/\sqrt{3}}$$

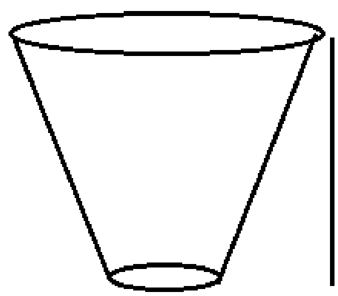
AE=20m.

Therefore height of the pole is CD=AB-AE

=60-20

= 40m.

37.



Volume $V = \frac{1}{3} \prod h(r_1^2 + r_2^2 + r_1.r_2)$

$= \frac{1}{3}$ x3.14x16(400+64+160)

$= \frac{3.14x16x624}{3}$

= 10449.92 cm^2.

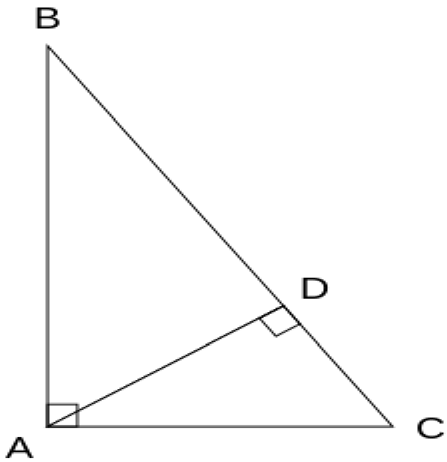
Convert this to the liter we get 10.44.

Therefore cost of the milk per liter is 10.44x20

Approximately Rs. 208.9 = Rs.209

38.Pythagoras Theorem

In a right angles triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.



Data : In ΔABC, ∠ABC = 90°

To Prove : $AB^2 + BC^2 = CA^2$

Construction : Draw BD ⊥ AC.

Proof : Statement	Reason
Compare ΔABC and ΔADB,	
∠ABC = ∠ADB = 90°	(∵ Data and construction)
∠BAD is common.	
∴ ΔABC ~ ΔADB	(∵ Equiangular triangles)
$\Rightarrow \frac{AB}{AD} = \frac{AC}{AB}$	(∵ A A similarity criteria)
∴ $AB^2 = AC.AD$ ...... (1)	
Compare ΔABC and ΔBDC,	
∠ABC =∠BDC =90°	(∵ Data and construction)
∠ACB is common	
∴ ΔABC ~ ΔBDC	(∵ Equiangular Triangles)
$\Rightarrow \frac{BC}{DC} = \frac{AC}{BC} \Rightarrow =$	(∵ AA similarity criteria)
$BC^2 = AC.DC$ .....(2)	

By adding (1) and (2) we get

$AB^2 + BC^2 = (AC.\ AD) + (AC.\ DC)$

$AB^2 + BC^2 = AC\ (AD + DC)$

$AB^2 + BC^2 = AC.\ AC = AC^2$ [∵ AD + DC = AC]

∴ $AB^2 + BC^2 = AC^2$