Model Question Paper

Subject;Mathematics-2018-19

Total no of questions:40 Subject code:81E

Time:3 hours Max marks:80

Four alternates are given to each question. Choose appropriate answer. Write it along with its alphabet 8X1=8

1) By the Fundamental Theorem of Arithmetic

HCF (a, b) × LCM (a, b) =------------------------

A) A x B B)A/B C) A + B D) A-B

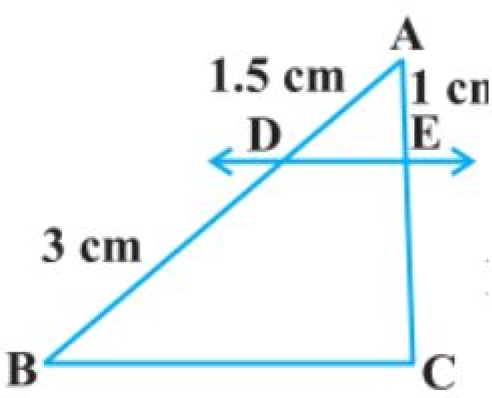
2)In a circle what is the number of tangents parallel secant.

A) 1 B) 2 C)3 D)4

3)For the AP 3,1,-1,-3 ------------------- the first term and the common difference.

A)3 and -2 B)3 and 1 C) 3 and 2 D)3 and -1

4) In Fig, DE || BC. Find EC



A) 2cm B) 3cm C)1.5cm D) 1cm

5)Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio

(A) 2 : 3 (B) 4 : 9 (C) 81 : 16 (D) 16 : 81

6)Area of a sector of angle p (in degrees) of a circle with radius r

A) 360/p X π r^2 B)p/ 360 X π r^2

C)p/360 D)π X r^2

7)The formula to find coordinates of the mid point p(x,y) joining the points A(x1,y1) and (x2,y2) in the ratio m:n

A)(mx2+nx1)/m+n , (my2+ny1)/m+n B)(mx1+mx2)/m+n, (my1+my2)/m+n,

C) (mx2+nx1), (my2+ny1) D)(mx1+mx2), (my1+my2)

8) If the L.C.M of x and y is z, what is their H.C.F

A) Xyz B)xy=z C)xy/z D)yz/x

1 X 8 = 8

9)If nth term of an arithmetic progression an= 24-3n, then find it's second term ..

10)State the Fundamental Theorem of Arithmetic

11)Find the number which, when divided by 7 gives quotient 8 and remainder 3.
12)Write the conditions for ratios of coefficients of linear equations representing parallel lines
13)A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm.Find the length of PQ

14)If the perimeter and the area of a circle are numerically equal, then what is the radius of the circle

15)If the ratio in which p(x,y) divides the AB is k:1 then find coordinates of the point p

16)Express 156 as product of its prime factors.

2 X 8 =16

17)Show that $5 + \sqrt{3}$ is irrational.

18)Solve the pair of linear equations x + y = 14 and x – y = 4

19) Find the area of a quadrant of a circle whose circumference is 22 cm

20)Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60°.

21)Find the area of the triangle whose vertices are : (2, 3), (–1, 0), (2, – 4)

22) If first term of an AP is -5 and common difference is 2 then find the sum of first 6 terms.

23)find the distance between the points (-5,7) and (-1,3)

24). Use Euclid's division algorithm to find the HCF of 135 and 225

3 X 9 =27

25)Prove that "The lengths of tangents drawn from an external point to a circle are equal"

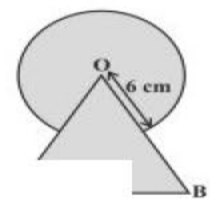
26)Construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it whose sides are 2/3 of the corresponding sides of the first triangle.

27)Find the ratio in which the line segment joining the points (– 3, 10) and (6, – 8) is divided by (– 1, 6)
28)Diagonals of a trapezium ABCD with AB || DC intersect each other at the point O.

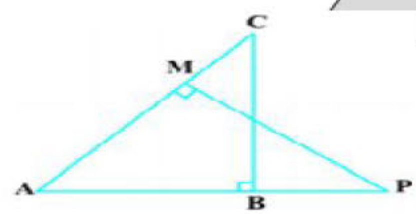
If AB = 2 CD, find the ratio of the areas of triangles AOB and COD.

29)If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y

30) Find the area of the shaded region in Fig. where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



31) In Fig, ABC and AMP are two right triangles, right angled at B and M respectively.Prove that: ABC ~AMP



32)Diagonals AC and BD of a trapezium ABCD with AB || DC intersect each other at the point O.
Using a similarity criterion for two triangles, show that OA/ OC = OB/OD

33)The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP

4 X 4 = 16

34) 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

35)Solve graphically $X+3y=6$
$2x-3y=12$

36)Let ABC be a right triangle in which AB = 6 cm, BC = 8 cm and B = 90°. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.

37) an ap consists of 37 terms. the sum of the three middle most terms is 225 and the sum of the last three is 429. Find the AP.

5 X 1 = 5

38)Prove that"The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides"

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Key Answers of Model question paper 1
subject: mathematics-2019-20

Sl no	Answers	Marks
1	A) A x B	1
2	B) 2	1
3	A)3 and -2	1
4	A) 2cm	1
5	(A) 2 : 3	1
6	B)p/ 360 X π r^2	1
7	A)(mx2+nx1)/m+n , (my2+ny1)/m+n	1
8	C)xy/z	1
9	a_n= 24-3n a_2= 24-3(2) a_2= 24-6 a_2= 18	1
10	Every composite number can be expressed (factorized) as a product of primes, and this factorization is unique, apart from the order in which the prime factors occur	1

11	HCF × LCM = A x B HCF x z =x X y HCF = $\frac{xy}{z}$	**1**
12	$\frac{a1}{a2}$ = $\frac{b1}{b2} \neq \frac{c1}{c2}$	**1**
13	OQ^2 = + Qp^2 + Op^2 12^2 = QP^2 - 5^2 Qp^2 = 144-25 Op^2 =119 OP = $\sqrt{119}$ CM	**1**
14	Radius = r Perimeter =2 π r Area = π r^2 Perimeter =Area 2 π r = π r^2 2 =r	**1**

15	p(x,y)= [$\frac{()()+()()}{()+()}$, $\frac{()()+()()}{()+()}$] p(x,y)= [$\frac{(k)()+(1)()}{(k)+(1)}$, $\frac{(k)()+(1)()}{(k)+(1)}$] p(x,y)=)= [$\frac{(k)(x2)+(1)(x1)}{(k)+(1)}$, $\frac{(k)(y2)+(1)(y1)}{(k)+(1)}$]	**1**
16		**1**

	<table><tr><td>2)156(78 14 ------- 16 16 ----------- 00</td><td>2)78(39 6 ------- 18 18 --------- 00</td><td>3)39(13 3 -------- 09 9 --------- 0</td><td>13)13(1 13 ---------- 00</td></tr></table> 156=2x2x3 x 13	
17	Solution: Let us assume, that 5 –√(3) is not irrational number Then it is rational number, and there exist a and b such that 5-√3 = a/b a and b are co-prime and b≠0 Re arranging the equation, 5 - a/b = √3 LHS, 5 - a/b is rational So RHS, √3 is rational Which contracts the fact that √3 is irrational. So, 5 – √3 is irrational.	½ ½ ½ ½
18	x + y = 14 and x – y = 4 x + y = 14 x – y = 4 - + - ________________________________ 0x + 2y =10 Y = 10/2 =5	½

<table>
<tr><td></td><td>Substituting value of y in (1)

x + y = 14

x + 2(5) = 5

x + 10 =5

x = 5-10

x =-5</td><td>½
½
½</td></tr>
<tr><td>19</td><td>Circumference = 22 cm 2Π r =22

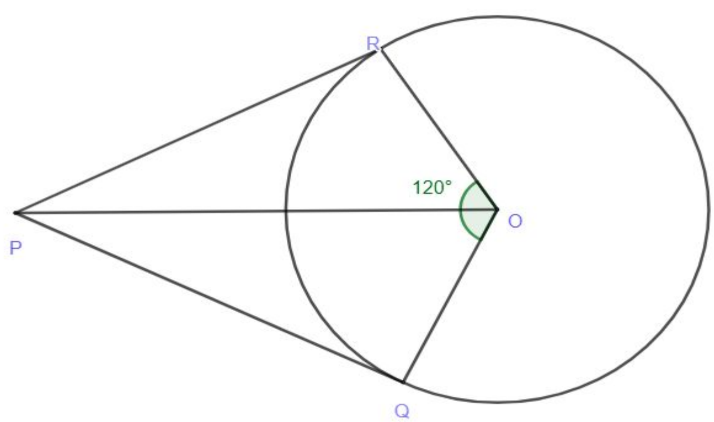
Π r =22/2Π =11/Π

Quadrant of circle = Π r^2 /4

= $\frac{\Pi X 11 X 11}{\Pi X \Pi X 4}$

= $\frac{11 X 11}{\Pi X 4}$

= $\frac{11 X 11 X 7}{22 X 4}$ =9.625 cm^2</td><td>½

½
½
½</td></tr>
<tr><td>20</td><td>
</td><td>½
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½</td></tr>
</table>

21	(2, 3), (-1, 0), (2, -4) Area of Triangle = 1/2[(x1)(y2-y3) + (x2) (y3-y1) +(x3) (y1-y2)] Area of Triangle = 1/2[(2)(y2-y3) + (-1) (y3-y1) +(2) (y1-y2)] Area of Triangle = 1/2[(2)(0+4) + (-1) (-4-3) +(2) (3-0)] Area of Triangle = 1/2[(2)(4) + (-1) (-7) +(2) (3)] Area of Triangle = 1/2[8 +7 +6] Area of Triangle= 1/2[21] =21/2	½ ½ ½ ½
22	S_n = n/2 [2a + (n-1)d] S_n = 6/2 [2(-5) +(6-1) 2] S_n = 3 [-10 + (5) (2)] S_n = 3 [-10 + 10] S_n = 3[0] S_n = 0	 **1** **1**
23	d = $\sqrt{(x2-x1)^2+(y2-y1)^2}$ **-5 7** **-1 3** **+ -** **----------------**	½ ½

	-4 +4 $d = \sqrt{(-4)^2 + (+4)^2}$ $d = \sqrt{16 + 16}$ $d = \sqrt{32}$ = $d = 4\sqrt{2}$	½ ½
24	Applying Euclid's Division Lemma First select bigger number 225, divide it by 135 Continue dividing divisor, by remainder until you get remainder zero. 135)225(1 / -135 / ---------- / 090 90)135 (1 / - 090 / ---------- / 045 45)90(2 / - 90 / ------ / 00 The value of divisor, for which remainder becomes zero is HCF HCF of 135 and 225 =45	½ ½ ½ ½

Division steps:

135)225(1	90)135 (1	45)90(2
-135	- 090	- 90
----------	----------	------
090	045	00

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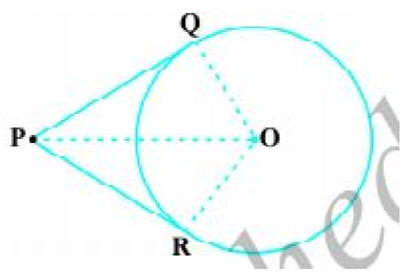
<tr><td></td><td></td><td></td></tr>
<tr><td>25</td><td>
The lengths of tangents drawn from an external point to a circle are equal


Given: O is the circle , P is a point lying outside the circle, PQ and PR are two tangents on the circle from P .
To prove : PQ = PR.
Construction:we join OP, OQ and OR
Proof:
<table>
<tr><td>Statement</td><td>Reasons</td></tr>
<tr><td>In Δ OQP and Δ ORP</td><td></td></tr>
<tr><td><OQP = <ORP = 90</td><td>angles between the radii and tangents</td></tr>
<tr><td>In right triangles OQP and ORP
OQ = OR
OP = OP
Therefore, Δ OQP ≅ Δ ORP</td><td>Radii of the same circle
Common
RHS</td></tr>
<tr><td>PQ = PR</td><td>CPCT</td></tr>
</table>
</td><td>½
½
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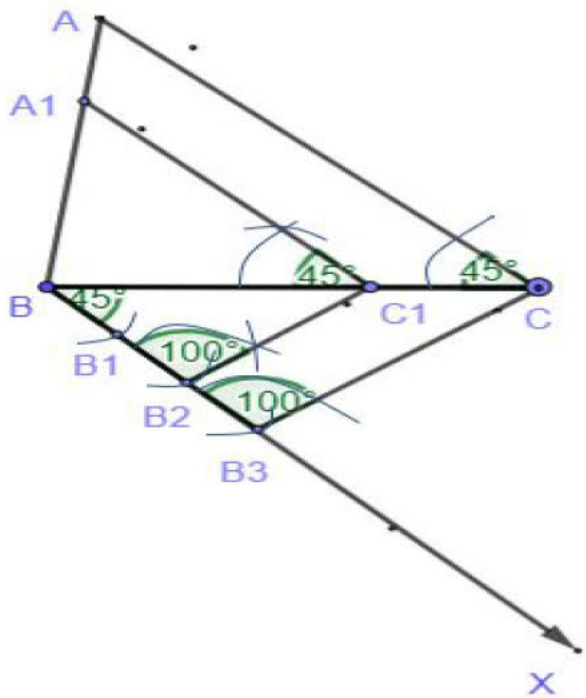
½
½
½</td></tr>
</table>

<table>
<tr><td>26</td><td>
</td><td>½
½
½
½
½
½</td></tr>
<tr><td>27</td><td>$-1,6= \left[\frac{(m)()+(n)()}{(m)+(n)}, \frac{(m)()+(n)()}{m()+(n)}\right]$

$-1,6= \left[\frac{(m)(6)+(n)(-3)}{(m)+(n)}, \frac{(m)(-8)+(n)(10)}{(m)+(n)}\right]$

$\frac{(m)(6)+(n)(-3)}{(m)+(n)}$ =-1 => 6m-3n =-m-n =>7m=2n =>m/n =2/7</td><td>½

½
½
½
½
½</td></tr>
<tr><td>28</td><td><table>
<tr><td>Statements</td><td>Reasons</td></tr>
<tr><td>In Δ AOB & ΔCOD</td><td></td></tr>
<tr><td><AOB = <COD</td><td>Vertically opposite angles</td></tr>
</table></td><td>½</td></tr>
</table>

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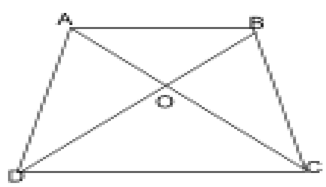
<tr>
<td></td>
<td>
<table>
<tr><td><DCO = <BAO</td><td>Alternate angles</td></tr>
<tr><td><OAB = <OCD</td><td>Vertically opposite angles</td></tr>
<tr><td>ΔAOB~ ΔCOD</td><td>AAA Similarity criteria</td></tr>
</table>
If two Areas of triangles are similar,the ratio of areas is equal to the square of the ratio of corresponding sides
Hence, $\frac{ar\ of\ \Delta\ AOB}{ar\ of\ \Delta COD} = [\frac{AB}{CD}]^2$
$\frac{ar\ of\ \Delta\ AOB}{ar\ of\ \Delta COD} = [\frac{2CD}{CD}]^2$
$\frac{ar\ of\ \Delta\ AOB}{ar\ of\ \Delta COD} = [\frac{2}{1}]^2$
$\frac{ar\ of\ \Delta\ AOB}{ar\ of\ \Delta COD} = [\frac{4}{1}]$
</td>
<td>½
½
½
½
½</td>
</tr>
<tr>
<td>29</td>
<td>
Midpoint M1 ={ $\frac{1+x}{2}$, $\frac{2+6}{2}$ }
Midpoint ={ $\frac{1+x}{2}$, $\frac{8}{2}$ }
Midpoint ={ $\frac{1+x}{2}$, 4}
Midpoint M1 ={ $\frac{3+4}{2}$, $\frac{5+y}{2}$ }
Midpoint ={ $\frac{7}{2}$, $\frac{5+y}{2}$ }
$\frac{1+x}{2} = \frac{7}{2}$ $4 = \frac{5+y}{2}$
1+x =7   8 = 5 + y
x=6   y =3
</td>
<td>1
1
1</td>
</tr>
<tr>
<td>30</td>
<td>Area of a sector = $\frac{p}{360}$ X πr^2</td>
<td>½</td>
</tr>
</table>

	$= \frac{60}{360} \times \frac{22}{7}\, 6^2$	
	$= \frac{1}{6} \times \frac{22}{7}\, 6 \times 6$	½
		½
	= 132/7 cm^2	
	Area of circle $= \pi r^2$	½
	$= \frac{22}{7}\, 6^2$	
	$= \frac{22}{7}\, 6 \times 6$	½
	= 792/7 cm^2	
	Area of Triangle $= \frac{\sqrt{3}}{4} \times a^2$	
		½
	$= \frac{\sqrt{3}}{4} \times 12^2$	
	$= 36\sqrt{3}$ cm^2	
	Area of shaded region = Area of triangle + area of Circle -Area sector	½
	$= 36\sqrt{3}$ + 792/7 - 132/7	
	=($36\sqrt{3}$ + 660/7)cm^2	

<table>
<tr>
<td>31</td>
<td>
<table>
<tr><th>Statement</th><th>reason</th></tr>
<tr><td>In ΔABC andΔ AMP</td><td></td></tr>
<tr><td><A = < A</td><td>Common angle</td></tr>
<tr><td><ABC = <AMP</td><td>Each 90</td></tr>
<tr><td>∴ΔABC~ ΔAMP</td><td>AA criteria</td></tr>
</table>
As, ABC AMP (By AA criteria)
If two triangles are similar, then the corresponding sides are equal.
Hence CA/PA = BC/MP
</td>
<td>½

½

½

½
1</td>
</tr>
<tr>
<td>32</td>
<td>


<table>
<tr><th>Statements</th><th>Reasons</th></tr>
<tr><td>In Δ DOC & ΔBOA</td><td></td></tr>
<tr><td><CDO = <ABO</td><td>Alternate angles</td></tr>
<tr><td><DCO = <BAO</td><td>Alternate angles</td></tr>
<tr><td><DOC = <BOA</td><td>Vertically opposite angles</td></tr>
<tr><td>ΔDOC~ ΔBOA</td><td>AAA Similarity criteria</td></tr>
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+
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1</td>
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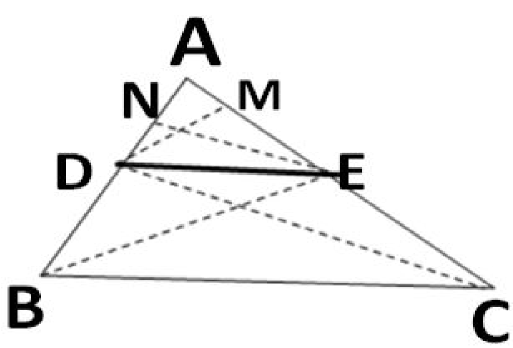
</table>

	∴ Do/ OB=CO/ OA — Corresponding sides ⇒ OA/ OC = OB/ OD	
33	a + 3d + a + 7d = 24 a + 5d + a + 9d = 44 ________________________ 2a + 10d =24 2a + 14d =44 - - - _____________ -4d = -20 d = 20/4 =5 2a + 10(5) =24 2a = 24-50 2a =-26 a = -13 -13, -8, -3 ------------------	1 1 1
34	 Given:In Δ ABC, if the line DE is drawn parallel to side BC of Δ ABC to intersect the AB and AC sides at distinct points D and E. To prove: AD/DB =AE/EC Construction: Join BE, and CD then Draw DM ⊥AC, and EN⊥ AB Proof:	1 1

STATEMENTS	REASONS	
In ADE, Area of ADE =½ AD X EN	Area of Δ = ½ X Base X Hei -----------------------(1)	
IN BDE, Area of BDE = ½ DB X EN	Area of Δ = ½ X Base X Hei ----------------------(2)	
$\frac{\Delta ADE}{\Delta BDE} = \frac{\frac{1}{2} AD \times EN}{\frac{1}{2} DB \times EN}$ $= \frac{AD}{DB}$	Divide (1) by (2) **-----------------------(3)**	1
Similarly, In ADE , Area of ADE = ½ AE X DM	Area of Δ = ½ X Base X Hei ----------------(4)	
In DEC Area of DEC = ½ EC X DM	Area of Δ =½ X Base X Hei ----------------(5)	
$\frac{\Delta ADE}{\Delta DEC} = \frac{\frac{1}{2} AE \times DM}{\frac{1}{2} EC \times DM}$ $= \frac{AE}{EC}$	Divide (4) by (5) ------- --------(6)	
Two triangles BDE And DEC are on the same base DE and between parallel lines BC and DE. **So, ar(BDE) = ar(DEC)**	-----------------(7)	
From (3) ,(6) AND (7) WE GET		

	AD/DB = AE/EC	
35		1+1 +1

x	1	2	3
y	5/3=1.6	4/3 =1.3	1

x	1	2	3
y	-10/3=-3.3	-8/3=-2.6	-6/3 =-2

X+3y =6

3y =6-x

Y = $\frac{6-x}{3}$ Y = $\frac{6-x}{3}$ Y = $\frac{6-x}{3}$

= $\frac{6-1}{3}$ = $\frac{6-2}{3}$ = $\frac{6-3}{3}$

= $\frac{5}{3}$ = $\frac{4}{3}$ = $\frac{3}{3}$

2x -3y =12

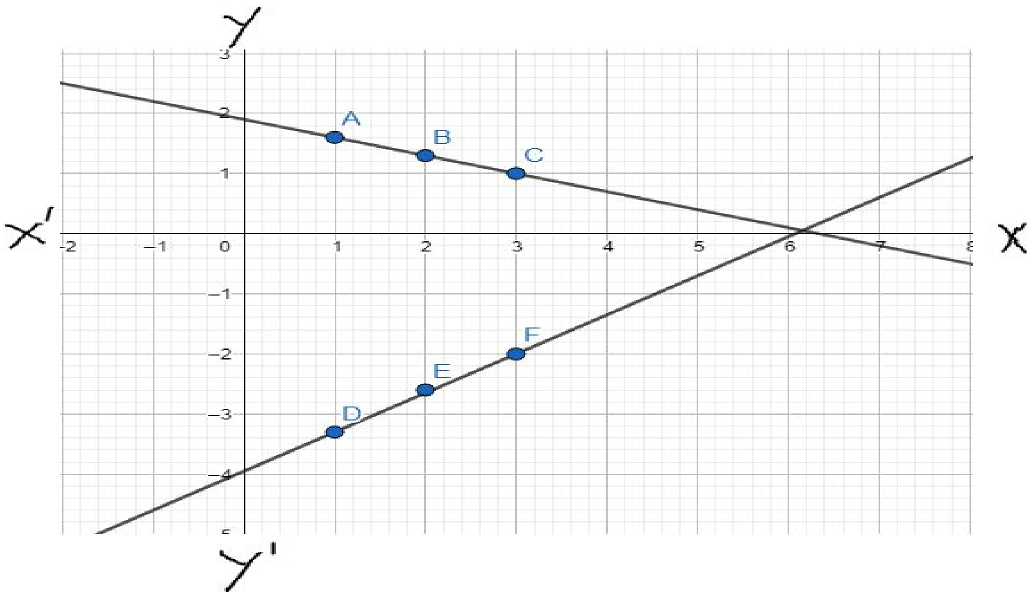
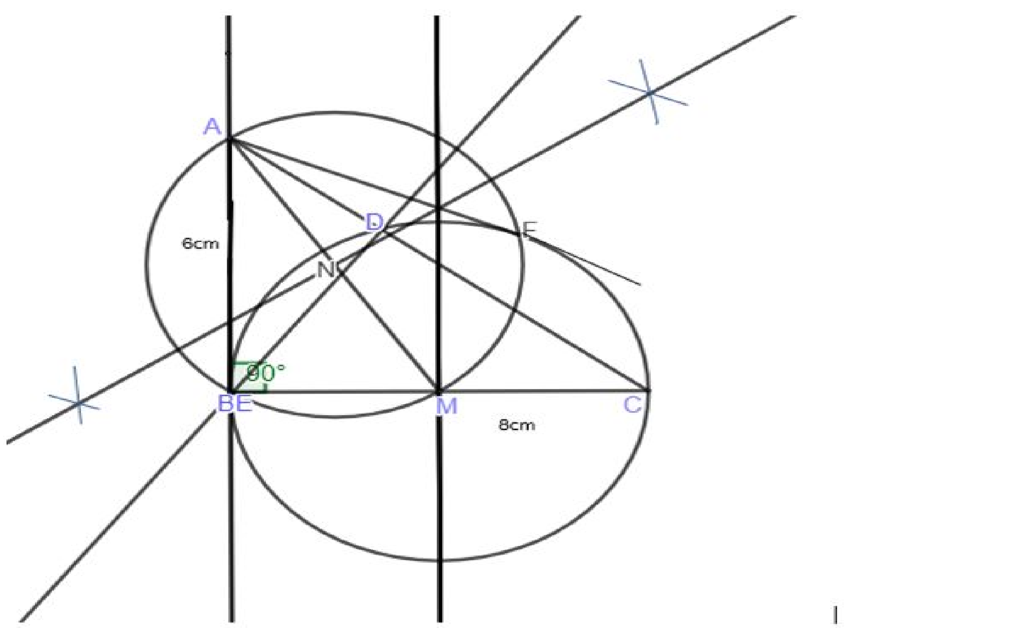
-3y =12-2x

Y = $\frac{12-2x}{-3}$ Y = $\frac{12-2x}{-3}$ Y = $\frac{12-2x}{-3}$

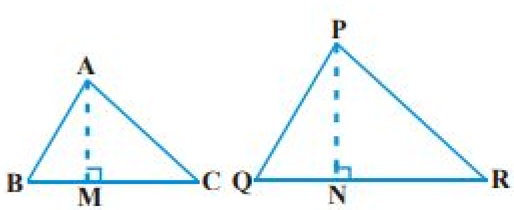
Y = $\frac{12-2(1)}{-3}$ Y = $\frac{12-2(2)}{-3}$ Y = $\frac{12-2(3)}{-3}$

Y = $\frac{12-2}{-3}$ Y = $\frac{12-4}{-3}$ Y = $\frac{12-6}{-3}$

Y = $\frac{10}{-3}$ Y = $\frac{8}{-3}$ Y = $\frac{6}{-3}$

		
36		**11/2** **11/2**
37	Sum of three terms in middle a + 17d a + 18 d + a + 19d = 225 3a +54 d = 225----------------------(1) 3a + 3(18) d =225 3[a + 18d] = 225	**1**

	a + 18 =225/3	
	a + 18 = =75----------------------------(1)	
	Sum of last three terms a + 34d + a + 35d + a + 36d =429	1
	3a + 105 d = 429	
	3a + 3 (35) d = 429	
	3[a + 35d] = 429	
	a + 35d = 429/3	
	a + 35d = 143----------------------(2)	
	a + 18 d= =75	1
	a + 35d = 143	
	- - -	

	17d = 68	
	d=68/17	1
	d = 4	
	a + 18 d =75	
	a + 18(4) =75	
	a + 72 =75	
	a = 75-72	
	a = 3	
	3,7,11---------------------------------	
38		1

Given: ABC and PQR are similar triangles such that

$\Delta ABC \sim \Delta PQR$

To prove: $\frac{ar(ABC)}{ar(PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{CA}{RP}\right)^2$

1

Construction;Draw altitudes AM and PN

Proof:

STATEMENTS	REASONS	Marks
Area of ABC = ½ BC X AM	Area of Δ =½ X Base	
Area of PQR = ½ QR X PN	Area of Δ =½ X Base X	1
$\frac{ar\,\Delta ABC}{ar\,\Delta PQR} = \frac{½\, BC X\, AM}{½\, QR\, X\, PN}$ $= \frac{BC\, X\, AM}{QR\, X\, PN}$	------------(1)	1
In Δ ABM , and Δ PQN <B = <Q	$\Delta ABC \sim \Delta PQR$	
<AMB = <PNQ	Each angle is 90	1
$\Delta ABM \sim \Delta PQN$	AA criteria	
Therefore, AM/PN = AB/PQ also, $\Delta ABC \sim \Delta PQR$ so,AB/PQ = BC/QR=CA/RP	 -----------------(2) Given -------------------(3)	

	$\frac{ar\ \Delta ABC}{ar\ \Delta PQR} = \frac{AB X\ AM}{PQ\ X\ PN}$ $= \frac{AB\ X\ AB}{PQ\ X\ PQ}$ $=(\frac{AB}{PQ})^2$	-------FROM (1)AND (2)	1
	Now using (3), we get $\frac{ar(ABC)}{ar(PQR)} = (\frac{AB}{PQ})^2 = (\frac{BC}{QR})^2 = (\frac{CA}{RP})^2$		