CBSE Sample Paper-05 (Solved)
SUMMATIVE ASSESSMENT –I
MATHEMATICS
Class – IX

Time allowed: 3 hours Maximum Marks: 90

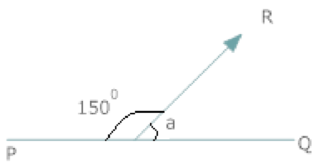
General Instructions:

a) All questions are compulsory.
b) The question paper consists of 31 questions divided into four sections – A, B, C and D.
c) Section A contains 4 questions of 1 mark each. Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 11 questions of 4 marks each.
d) Use of calculator is not permitted.

Section A

1. The $\frac{p}{q}$ form of the number 0.8 is

2. In figure the measure of $\angle a$ is



3. The distance of the point (-6, -2) from y-axis is

4. Two angles of triangles are 65^0 *and* 45^0 respectively. Find third angles.

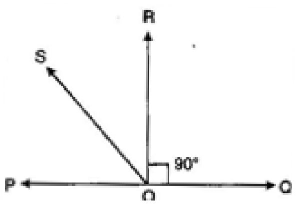
Section B

5. Write the following numbers in ascending order: $\sqrt[6]{6}, \sqrt[3]{7}, \sqrt[4]{8}$

6. Find the zeroes of the polynomial $p(x) = x^2 - 5x + 6$.

7. Find the remainder when $2x^4 + 6x^3 + 2x^2 - x + 2$ is divided by $(x+2)$.

8. In figure, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that: $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$



9. In a Δ ABC, 30A + 6B = 5C. Determine $\angle$A, $\angle$B and $\angle$C.

10. Draw a triangle ABC where vertices A, B and C are (0, 2), $(2,-2)$ and $(-2,2)$ respectively.

Section C

11. Find five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$.

12. Simplify: $\frac{1}{2}\sqrt{486}-\sqrt{\frac{27}{2}}$

Or

Simplify: $\frac{\sqrt{a^2-b^2}+a}{\sqrt{a^2+b^2}+b} \div \frac{\sqrt{a^2+b^2}-b}{a-\sqrt{a^2-b^2}}$

13. Divide $f(y)=3y^4-8y^3-y^2-5y-5$ by $y-3$.

14. If the polynomials px^3+4x^2+3x-4 and x^3-4x+p are divided by $x-3$, then the remainder in each case is the same. Find the value of p.

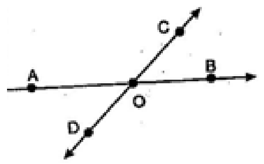
Or

What must be added to $(x^3-3x^2+4x-13)$ to obtain a polynomial which is exactly divisible by $(x-3)$?

15. Factorize: $a^2px+2a^2qx-2apy-4aqy+pz+2qz$

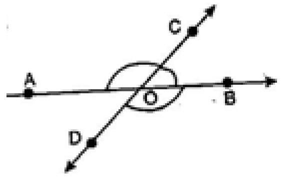
16. If a point C lies between two points A and B such that AC = BC, then point C is called the mid-point of line segment AB. Prove that every line segment has one and only one mid-point.

17. In the figure, if $\angle$AOC + $\angle$BOD = $266°$, then find all the four angles.



Or

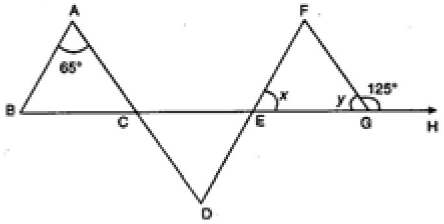
If the figure, if $\angle$AOC + $\angle$BOC = $\angle$BOD = $338°$, then find the all four angles.



18. If a line is perpendicular to one of the two given parallel lines then prove that it is also perpendicular to the other line.

19. In a triangle ABC, $\angle A + \angle B = 84°$ and $\angle B + \angle C = 146°$. Find the measure of each of the angles of the triangle.

20. In the figure, find x and y, if AB || DF and AD || FG.



Section D

21. Represent $\sqrt{5}$ on number line.

22. Rationalize the denominator of $\frac{1}{\sqrt{2}+\sqrt{3}+\sqrt{10}}$.

Or

Simplify: $$\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$$

23. Ram has two rectangles in which their areas are given:

(a) $25a^2 - 35a + 12$ (b) $35y^2 + 13y - 12$

(i) Give possible expressions for the length and breadth of each of the rectangles.

(ii) Which mathematical concept is used in this problem?

(iii) Which value is depicted in this problem?

24. Factorize $x^3 - 23x^2 + 142x - 120$, if $x - 1$ is a factor of it.

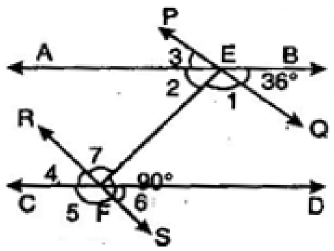
Or

Factorize by using factor theorem: $y^3 - 7y + 6$

25. Factorize : $x^3 + \frac{1}{x^3} - 2$

26. If lines AB, AC, AD and AE are parallel to a line l, then points A, B, C. D and E are collinear.

27. In the figure, AB || CD and PQ || RS, find the angles marked.



28. Two plane mirrors are placed perpendicular to each other, as shown in the figure. An incident ray AB to the first mirror is first reflected in the direction of BC and then reflected by the second mirror in the direction of CD. Prove that AB || CD.
29. In the figure, it is given that $\angle A = \angle C$ and AB = BC. Prove that $\Delta ABD \cong \Delta CBE$.
30. Draw the graph of linear equation: $8x - 3y + 4 = 0$
31. The side of a square exceeds the side of another square by 4 cm and the sum of the areas of the two squares is 400 sq. cm. Find the dimensions of the squares.

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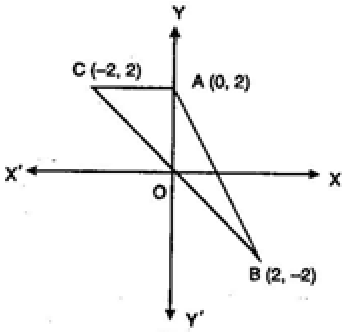
(Solutions)

SECTION-A

1. $\frac{8}{10}$
2. 30^0
3. 6 units
4. $70°$
5. L.C.M. of 6, 3 and 4 is 12.
   $\Rightarrow \quad \sqrt[6]{6} = \sqrt[12]{36} \qquad \sqrt[3]{7} = \sqrt[12]{2401} \qquad$ and $\qquad \sqrt[4]{8} = \sqrt[12]{512}$
   $\Rightarrow \quad 36 < 512 < 2401 \qquad \Rightarrow \quad \sqrt[12]{36} < \sqrt[12]{512} < \sqrt[12]{2401}$
   $\therefore \quad \sqrt[6]{6} < \sqrt[4]{8} < \sqrt[3]{7}$
6. $x^2 - 5x + 6 = 0 \qquad \Rightarrow \quad x^2 - 3x - 2x + 6 = 0$
   $\Rightarrow \quad x(x-3) - 2(x-3) = 0 \qquad \Rightarrow \quad (x-3)(x-2) = 0$
   $\therefore$ Zeroes are 2 and 3.
7. By remainder theorem,
   $$f(-2) = 2(-2)^4 + 6(-2)^3 + 2(-2)^2 - (-2) + 2$$
   $$\Rightarrow \quad f(-2) = 32 - 48 + 8 + 2 + 2 = -4$$
8. $\angle QOS - \angle POS = (\angle QOR + \angle ROS) - \angle POS$
   $= 90^\circ + \angle ROS - \angle POS$
   $= (90^\circ - \angle POS) + \angle ROS$
   $= (\angle ROP - \angle POS) + \angle ROS$
   $= 2\angle ROS$
   Hence, $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$
9. Given 30A = 6B = 5C
   $\Rightarrow \quad \frac{A}{1} = \frac{B}{5} = \frac{C}{6}$ [Dividing by 30]
   $\Rightarrow \quad \angle A : \angle B : \angle C = 1 : 5 : 6$
   Let $\angle A = x$, $\angle B = 5x$ and $\angle C = 6x$
   $\Rightarrow \quad x + 5x + 6x = 180° \qquad \Rightarrow \quad 12x = 180° \qquad \Rightarrow \quad x = 15°$
   Hence $\angle A = 15°$, $\angle B = 75°$ and $\angle C = 90^\circ$

10.



11. A rational number between r and s is $\frac{r+s}{2}$.

Therefore a rational number between $\frac{3}{5}$ and $\frac{4}{5}$ = $\frac{1}{2}\left(\frac{3}{5}+\frac{4}{5}\right)=\frac{7}{10}$

A rational number between $\frac{3}{5}$ and $\frac{7}{10}=\frac{1}{2}\left(\frac{3}{5}+\frac{7}{10}\right)=\frac{13}{20}$

Hence five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$ are $\frac{5}{8},\frac{13}{20},\frac{27}{40},\frac{7}{10},\frac{31}{40}$.

12. $\frac{1}{2}\sqrt{486}-\sqrt{\frac{27}{2}}=\frac{1}{2}\sqrt{9^2\times 6}-\sqrt{\frac{54}{4}}$

$= \frac{1}{2}\sqrt{9^2}\times\sqrt{6}-\sqrt{\frac{3^2\times 6}{2^2}}$ $= \frac{1}{2}\times 9\times\sqrt{6}-\frac{3}{2}\sqrt{6}$ $= \sqrt{6}\left(\frac{9}{2}-\frac{3}{2}\right)$ $= 3\sqrt{6}$

Or

$$\frac{\sqrt{a^2-b^2}+a}{\sqrt{a^2+b^2}+b}\times\frac{a-\sqrt{a^2-b^2}}{\sqrt{a^2+b^2}-b} = \frac{a^2-\left(a^2-b^2\right)}{\left(a^2+b^2\right)-b^2}$$

$= \frac{b^2}{a^2}$

13.

$$\begin{array}{r|l}
 & 3y^3+y^2+2y+1 \\ \hline
y-3 & 3y^4-8y^3-y^2-5y-5 \\
 & 3y^4-9y^3 \\
 & -\quad + \\ \hline
 & \quad y^3-y^2-5y-5 \\
 & \quad y^3-3y^2 \\
 & \quad -\quad + \\ \hline
 & \qquad 2y^2-5y-5 \\
 & \qquad 2y^2-6y \\
 & \qquad -\quad + \\ \hline
 & \qquad\quad y-5 \\
 & \qquad\quad y-3 \\
 & \qquad\quad -\quad + \\ \hline
 & \qquad\qquad -2
\end{array}$$

14. Let $A(x) = px^3 + 4x^2 + 3x - 4$

$B(x) = x^3 - 4x + p$

$g(x) = x - 3$

According to question, $A(3) = B(3)$

$\Rightarrow \quad p(3)^3 + 4(3)^2 + 3(3) - 4 = (3^3) - 4(3) + p$

$\Rightarrow \quad 27p + 41 = 15 + p$

$\Rightarrow \quad 27p - p = 15 - 41$

$\Rightarrow \quad p = -1$

Or

Let $f(x) = x^3 - 3x^2 + 4x - 13$ and $g(x) = x - 3$

Let k be added to $f(x)$ so that it may be exactly divisible by $(x-3)$.

$\therefore \quad p(x) = (x^3 - 3x^2 + 4x - 13) + k$

$\therefore \quad p(3) = (3)^3 - 3(3)^2 + 4(3) - 13 + k = 0$

$\Rightarrow \quad 27 - 27 + 12 - 13 + k = 0$

$\Rightarrow \quad -1 + k = 0 \qquad \Rightarrow \quad k = 1$

15. $a^2px + 2a^2qx - 2apy - 4aqy + pz + 2qz$

$= (a^2px + 2a^2qx) + (-2apy - 4aqy) + (pz + 2qz)$

$= a^2x(p + 2q) - 2ay(p + 2q) + z(p + 2q)$

$= (p + 2q)(a^2x - 2ay + z)$

16. Given AC = BC ....(i)

If possible let D be another mid-point of AB

∴ AD = DB ....(ii)

Subtracting eq. (i) from eq. (ii), we get

AD – AC = DB – CB

$\Rightarrow$ – CD = CD

$\Rightarrow$ 2CD = 0

$\Rightarrow$ CD = 0

∴ C and D coincide.

Hence every line segment has one and only one mid-point.

17. $\angle$AOC + $\angle$BOD = 266° ....(i)

But $\angle$BOD = $\angle$AOC [Vertically opposite]

∴ $\angle$AOC + $\angle$AOC = 266°

Now $\angle AOC + \angle BOC = 180°$ [Linear pair]

$\Rightarrow$ $133° + \angle BOC = 180°$

$\Rightarrow$ $\angle BOC = 47°$

$\Rightarrow$ $\angle AOD = \angle BOC$

$\Rightarrow$ $\angle AOD = 47°$

Or

$\angle AOC + \angle BOC + \angle BOD = 338°$ ....(i)

$\angle AOC + \angle BOC + \angle BOD + \angle AOD = 360°$ ....(ii)

From eq. (i) and eq. (ii), we get,

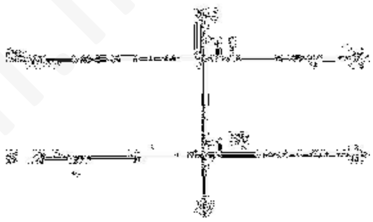
$338° + \angle AOD = 360°$

$\Rightarrow$ $\angle AOD = 22°$

$\therefore$ $\angle BOC = 22°, \angle BOD = 158°$ and $\angle AOC = 158°$

18. Given : l, m, n are three lines such that $m \parallel n$ and $l \perp m$.

To prove: $l \perp n$



Proof : Since $l \perp m$

$\Rightarrow$ $\angle 1 = 90^\circ$ ....(i)

Now, $m \parallel n$ and transversal intersects them.

$\Rightarrow$ $\angle 2 = \angle 1$ ....(ii)

[Corresponding angles]

From eq. (i) and (ii), we get,

$\angle 2 = \angle 1 = 90^\circ$ $\Rightarrow$ $\angle 2 = 90^\circ$

$\therefore$ $l \perp n$

19. Given $\angle A + \angle B = 84°$ ....(i)

And $\angle B + \angle C = 146°$ ....(ii)

Adding eq. (i) and (ii), we get,

$\angle A + \angle B + \angle B + \angle C = 230°$

$\Rightarrow$ $(\angle A + \angle B + \angle C) + \angle B = 230°$

$\Rightarrow$ $180° + \angle B = 230°$

$\Rightarrow$ $\angle B = 50°$

Putting the value of $\angle B$ in eq. (i), we get,

$\angle A + 50° = 84°$ $\Rightarrow$ $\angle A = 34°$

Putting the value of $\angle B$ in eq. (ii), we get,

$50° + \angle C = 146°$ $\Rightarrow$ $\angle C = 96°$

20. $\angle y + 125° = 180°$ [Straight angle]

$\Rightarrow$ $\angle y = 55°$ ....(i)

Now AB is parallel to FD and transversal AD cuts them.

$\angle D = \angle A$ [Alternate angles]

$\angle D = 65°$

Again AD || FG, transversal FD cuts them.

$\angle F = \angle D$

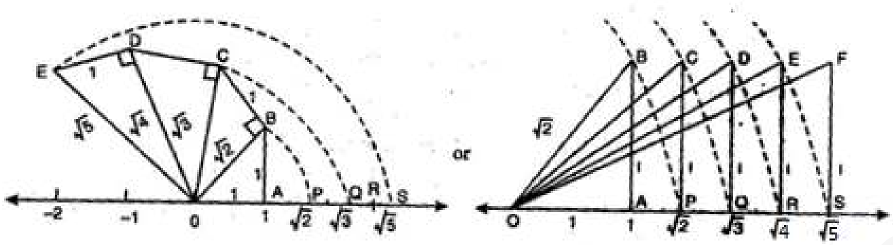
$\angle F = 65^\circ$ ....(ii)

In triangle EFG, $\angle x + \angle F + \angle y = 180^\circ$

$\Rightarrow$ $\angle x + 65^\circ + 55^\circ = 180^\circ$

$\Rightarrow$ $\angle x = 60^\circ$

21.



22. $\dfrac{1}{\sqrt{2}+\sqrt{3}+\sqrt{10}} . \times \dfrac{\left(\sqrt{2}+\sqrt{3}\right)-\sqrt{10}}{\left(\sqrt{2}+\sqrt{3}\right)-\sqrt{10}}$

$= \dfrac{\sqrt{2}+\sqrt{3}-\sqrt{10}}{\left(\sqrt{2}+\sqrt{3}\right)^2-\left(\sqrt{10}\right)^2} = \dfrac{\sqrt{2}+\sqrt{3}-\sqrt{10}}{2\sqrt{6}-5}$

$= \dfrac{\sqrt{2}+\sqrt{3}-\sqrt{10}}{2\sqrt{6}-5} \times \dfrac{2\sqrt{6}+5}{2\sqrt{6}+5} = \dfrac{\left(\sqrt{2}+\sqrt{3}-\sqrt{10}\right)\left(2\sqrt{6}+5\right)}{\left(2\sqrt{6}\right)^2-(5)^2}$

$= \dfrac{2\sqrt{12}+5\sqrt{2}+2\sqrt{18}+5\sqrt{3}-2\sqrt{60}-5\sqrt{10}}{24-25} = -4\sqrt{3}-5\sqrt{2}-6\sqrt{2}-5\sqrt{3}+4\sqrt{15}+5\sqrt{10}$

$= -11\sqrt{2}-9\sqrt{3}+5\sqrt{0}+4\sqrt{15}$

Or

$\dfrac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} \times \dfrac{\sqrt{10}-\sqrt{3}}{\sqrt{10}-\sqrt{3}} - \dfrac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} \times \dfrac{\sqrt{6}-\sqrt{5}}{\sqrt{6}-\sqrt{5}} - \dfrac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}} \times \dfrac{\sqrt{15}-3\sqrt{2}}{\sqrt{15}-3\sqrt{2}}$

$= \dfrac{7\sqrt{30}-21}{10-3} - \dfrac{2\sqrt{30}-10}{6-5} - \dfrac{3\sqrt{30}-18}{15-18}$

$= \sqrt{30}-3-2\sqrt{30}+10+\sqrt{30}-6$

$= \left(\sqrt{30}-2\sqrt{30}+\sqrt{30}\right)+(-3+10-6)$

$= 1$

23. (i) (a) Area $= 25a^2-35a+12 = 25a^2-15a-20a+12$

$= 5a(5a-3)-4(5a-3) = (5a-3)(5a-4)$

So possible length and breadth are $(5a-3)$ and $(5a-4)$ units respectively.

(b) Area = $35y^2+13y-12 = 35y^2+28y-15y-12$

$= 7y(5y+4)-3(5y+4) = (7y-3)(5y+4)$

So possible length and breadth are $(7y-3)$ and $(5y+4)$.

(ii) Factorization of Polynomials.

(iii) Expression of one's desires and news is very necessary.

24. Let us divide $x^3-23x^2+142x-120$ by $x-1$ to get the other factors.

$$
\begin{array}{r|l}
 & x^2-22x+120 \\
\hline
x-1 & x^3-23x^2+142x-120 \\
 & x^3-x^2 \\
 & -\quad + \\
\hline
 & -22x^2+142x-120 \\
 & -22x^2+22x \\
 & +\qquad - \\
\hline
 & 120x-120 \\
 & 120x-120 \\
 & -\qquad + \\
\hline
 & 0
\end{array}
$$

$x^3-23x^2+142x-120 = (x-1)(x^2-22x+120)$

$= (x-1)(x^2-12x-10x+120)$

$= (x-1)[x(x-12)-10(x-12)]$

$= (x-1)(x-12)(x-10)$

Or

Let $f(y)=y^3-7y+6$

The constant term in $f(y)$ is 6 and its factors are $\pm1, \pm2, \pm3, \pm6$.

On putting $y=-1$ in given expression, we get,

$f(-1)=(-1)^3-7(-1)+6=-1+7+6\neq 0$

$f(+1)=(1)^3-7(1)+6=0$

So $(y-1)$ is a factor of $f(y)$.

Now we divide $f(y)=y^3-7y+6$ by $y-1$ to get other factors.

$$
\begin{array}{r|l}
 & y^2+y-6 \\
\hline
y-1 & y^3-7y+6 \\
 & y^3-y^2 \\
 & -\quad + \\
\hline
 & y^2-7y+6 \\
 & y^2-y \\
 & -\quad + \\
\hline
 & -6y+6 \\
 & -6y+6 \\
\hline
 & 0
\end{array}
$$

$\therefore \quad y^3-7y+6=(y-1)(y^2+y-6)$

$= (y-1)(y^2+3y-2y-6)$

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

$= (y-1)(y+3)(y-2)$

25. $x^3+\dfrac{1}{x^3}-2 = x^3+\left(\dfrac{1}{x}\right)^3+1-3$

$= x^3+\left(\dfrac{1}{x}\right)^3+(1)^3-3\times x\times\dfrac{1}{x}\times 1$

$= \left(x+\dfrac{1}{x}+1\right)\left[x^2+\left(\dfrac{1}{x}\right)^2+1-x\times\dfrac{1}{x}-\dfrac{1}{x}\times 1-1\times x\right]$

$= \left(x+\dfrac{1}{x}+1\right)\left(x^2+\left(\dfrac{1}{x}\right)^2+1-1-\dfrac{1}{x}-x\right)$

$= \left(x+\dfrac{1}{x}+1\right)\left(x^2+\dfrac{1}{x^2}-\dfrac{1}{x}-x\right)$

26. Given : Lines AB, AC, AD and AE are parallel to line l.

To prove: A, B, C, D and E are collinear.

Proof : Since AB, AC, AD and AE are all parallel to line l. Therefore point A is outside l and lines AB, AC, AE are drawn through A and each line is parallel to l.

But by parallel lines axiom, one and only one line can be drawn through A outside it and parallel to l.

This is possible only when A, B, C, D and E all lie on the same line. Hence A, B, C, D and E are collinear.

27. PQ || RS $\Rightarrow$ $\angle 1+\angle EFS = 180°$

[consecutive interior angles are supplementary when lines are parallel]

$\angle 1 = 90°$

$\angle 7 + \angle EFS = 180°$ [Linear pair]

$\Rightarrow$ $\angle 7 + 90° = 180°$ $\Rightarrow$ $\angle 7 = 90°$

$\angle 3 = \angle BEQ$ [Vertically opposite angles]

$\Rightarrow$ $\angle 3 = 36°$

$\angle 1 + \angle 2 + \angle 3 = 180°$ [Straight angles]

$\Rightarrow$ $90° + \angle 2 + 36° = 180°$ $\Rightarrow$ $\angle 2 = 54°$

$\angle EFD = \angle 2 = 54°$

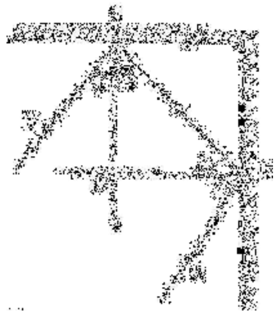
$\angle 6 + \angle EFD = 90°$ $\Rightarrow$ $\angle 6 + 54° = 90°$ $\Rightarrow$ $\angle 6 = 36°$

$\angle 4 = \angle 6 = 36°$ [Vertically opposite angles]

$\angle 4 + \angle 5 = 180°$ $\Rightarrow$ $\angle 5 = 144°$

28. Let BO and CO be the normals to the mirrors. As mirrors are perpendicular to each other. SO their normals BO and CO are perpendicular.

$\therefore \quad \angle BOC = 90^\circ$



In right angled triangle OBC, $\angle 2 + \angle 3 = 90^\circ$ ……….(i)

$\angle 1 = \angle 2$

[Angle of incident = Angle of reflection]

$\angle 3 = \angle 4$

[Angle of incident = Angle of reflection]

On adding, $\angle 1 + \angle 4 = \angle 2 + \angle 3$

$\Rightarrow \quad \angle 1 + \angle 4 = 90^\circ$ ……….(ii)

On adding eq. (i) and (ii), we get,

$\angle 2 + \angle 3 + \angle 1 + \angle 4 = 180^\circ$

$\angle ABC + \angle BCD = 180^\circ$

But $\angle ABC$ and $\angle BCD$ are consecutive interior angles formed when the transversal BC intersect AB and CD.

$\therefore \quad AB \parallel CD$

29. In Δs AOE and COD,

$\angle A = \angle C$ and $\angle AOE = \angle COD$ [Vertically opposite angles]

$\therefore \quad \angle A + \angle AOE = \angle C + \angle COD$

$\Rightarrow \quad 180^\circ - \angle AEO = 180^\circ - \angle CDO$ [$\because \angle A + \angle AEO = 180^\circ$ and $\angle C + \angle COD + \angle CDO = 180^\circ$]

$\Rightarrow \quad \angle AEO = \angle CDO$ ………(i)

Now, $\angle AEO + \angle OEB = 180^\circ$ [Angles of a linear pair]

And $\angle CDO + \angle ODB = 180^\circ$ [Angles of a linear pair]

$\Rightarrow \quad \angle AEO + \angle OEB = \angle CDO + \angle ODB$

$\Rightarrow \quad \angle OEB = \angle ODB$

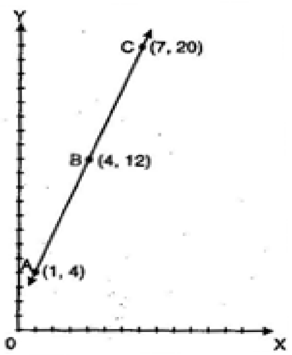
$\Rightarrow \quad \angle CEB = \angle ADB$ ………(ii) [$\because \angle OEB = \angle CEB$ and $\angle ODB = \angle ADB$]

In Δ ADB and Δ CBE, $\angle A = \angle C$ [Given]

$\angle ADB = \angle CEB$ [From eq. (ii)]

And AB = BC [Given]

$\Delta ADB \cong \Delta CBE$ [By AAS]



30. We have, $8x-3y+4=0$

$\Rightarrow \quad 3y=8x+4$

$\Rightarrow \quad y=\frac{8x}{3}+\frac{4}{3}$

Table of coordinates:

x	1	4	7
y	4	12	20
points	A	B	C

Join the points A, B, C.

The straight line AC is the graph of the linear equation $8x-3y+4=0$.

31. Let S_1 and S_2 be the two squares. Let the side of the square S_2 be x cm in length.

Then the side of square S_1 is $(x+4)$ cm.

$\therefore \quad$ Area of square $S_1 = (x+4)^2$

And $\quad$ Area of square $S_2 = x^2$

We are given that, Area of square S_1 + Area of square S_2 = 400 cm^2

$\Rightarrow \quad (x+4)^2+x^2=400 \qquad \Rightarrow \quad x^2+8x+16+x^2=400$

$\Rightarrow \quad 2x^2+8x-384=0 \qquad \Rightarrow \quad x^2+4x-192=0$

$\Rightarrow \quad x^2+16x-12x-192=0 \qquad \Rightarrow \quad x(x+16)-12(x+16)=0$

$\Rightarrow \quad (x+16)(x-12)=0 \qquad \Rightarrow \quad x=-16,12$

As the length of the side of a square cannot be negative, therefore $x=12$

$\therefore \quad$ Side of square $S_1 = x+4$ = 12 + 4 = 16 cm and side of square S_2 = 12 cm.