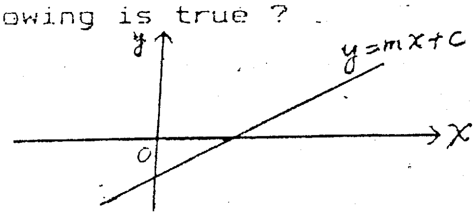
1. If the line $2x - 3y + c = 0$ passes through the point (1,1)
(83) then $c =$
A. -2 B. -1 C. 0 D. 1 E. 2

2. The equation of the line passing through $(1,-1)$ and
(83) perpendicular to the x-axis is
A. $x - 1 = 0$ B. $x + 1 = 0$ C. $y - 1 = 0$
D. $y + 1 = 0$ E. $x + y = 0$

3. A circle has its centre at (3,4) and passes through the
(83) origin. Its equation is
A. $x^2 + y^2 = 25$ B. $x^2 + y^2 - 3x - 4y = 0$
C. $x^2 + y^2 - 6x - 8y = 0$ D. $x^2 + y^2 + 6x + 8y = 0$
E. $x^2 + y^2 - 6x - 8y + 25 = 0$

4. If d is the distance between the points (a,b) and (b,a),
(83) then $d^2 =$
A. 0 B. $a^2 + b^2$ C. $2(a^2 + b^2)$ D. $(a-b)^2$ E. $2(a-b)^2$

5. In the figure, the equation of the straight line is
(83) $y = mx + c$. Which one of the following is true ?
A. $m > 0$ and $c > 0$
B. $m > 0$ and $c < 0$
C. $m < 0$ and $c > 0$
D. $m < 0$ and $c < 0$
E. $m > 0$ and $c = 0$

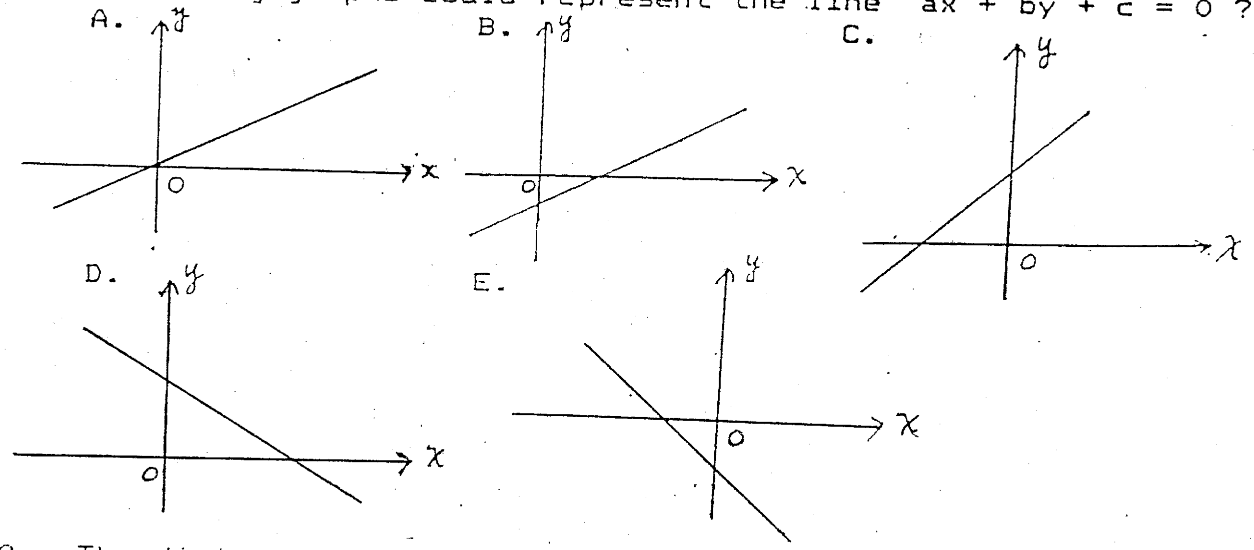


6. The point P divides AB internally so that AP : PB = 2 : 1.
(84) The coordinates of A and B are (x_1, y_1) and (x_2, y_2)
respectively. The coordinate of P are
A. $\left(\dfrac{2x_1+x_2}{3}, \dfrac{2y_1+y_2}{3}\right)$ B. $\left(\dfrac{x_1+2x_2}{3}, \dfrac{y_1+2y_2}{3}\right)$
C. $\left(\dfrac{2x_1-x_2}{3}, \dfrac{2y_1-y_2}{3}\right)$ D. $\left(\dfrac{x_1-2x_2}{3}, \dfrac{y_1-2y_2}{3}\right)$
E. $\left(\dfrac{x_1+x_2}{3}, \dfrac{y_1+y_2}{3}\right)$

7. The line $x + y + k = 0$ (k being a constant) passes through
(84) the centre of the circle $x^2 + y^2 - 2x + 4y - 6 = 0$, $k =$
A. -2 B. -1 C. 0 D. 1 E. 2

8. The equation of a circle is $x^2 + y^2 - 2x + 5y - 7 = 0$.
(84) Which of the following is/are true ?
(1) The circle passes through the point $(-1,1)$.
(2) The centre of the circle lies in the second quadrant.
(3) The circle intersects the x-axis at two points.
A. (2) only B. (3) only C. (1) and (2) only
D. (2) and (3) only E. (1), (2) and (3)

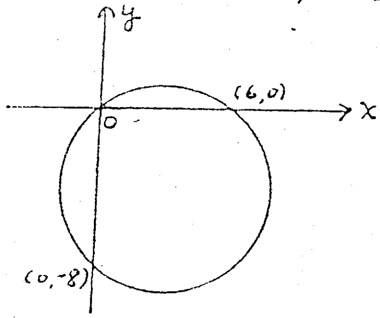
9. (84) If a, b and c are positive real numbers, which of the following graphs could represent the line $ax + by + c = 0$?



10. (85) The distance between $(1-k, k)$ and $(2, 1+k)$ is $\sqrt{26}$, $k =$
A. 4 B. 6 C. -4 or 6 D. 4 or -6 E. -4 or -6

11. (85) The equation of the perpendicular bisector of the line joining $(1,2)$ and $(7,4)$ is
A. $3x + y + 15 = 0$ B. $3x + y - 15 = 0$
C. $3x - y + 9 = 0$ D. $3x - y - 9 = 0$ E. $x + 3y - 13 = 0$

12. (85) In the figure, the circle passes through $(0,0)$ and cuts the two axes at $(6,0)$ and $(0,-8)$. Its equation is

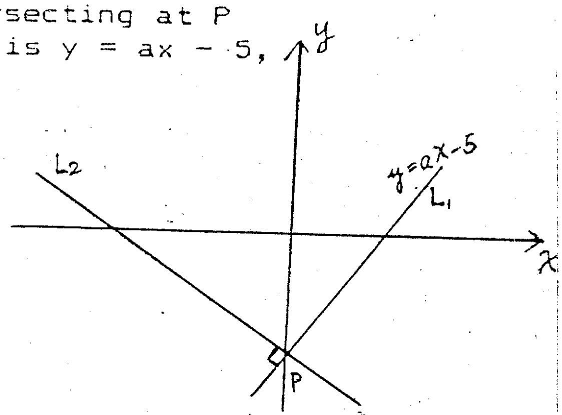


A. $x^2 + y^2 - 3x + 4y = 0$
B. $x^2 + y^2 + 3x - 4y = 0$
C. $x^2 + y^2 + 6x - 8y = 0$
D. $x^2 + y^2 - 6x + 8y = 0$
E. $x^2 + y^2 - 6x - 8y = 0$

13. (85) The equation of a circle is $x^2 + y^2 - 4x - 5 = 0$. Which of the following is/are true ?
I. The circle passes through the origin.
II. The centre lies on the x-axis.
III. The line $x - 5 = 0$ touches the circle.
A. II only B. III only C. I and II only
D. II and III only E. I, II and III

14. (86) Which of the following represents a circle ?
A. $2x^2 - 8y + 5 = 0$ B. $2x^2 + y^2 - 4x - 3y = 0$
C. $3x^2 + 3y^2 - 5x - 7 = 0$ D. $x^2 - y^2 - 7x + 6y + 1 = 0$
E. $x^2 + y^2 + 2xy + 7y - 1 = 0$

15. (86) In the figure, L_1 and L_2 are two straight lines perpendicular to each other and intersecting at P on the y-axis. If the equation of L_1 is $y = ax - 5$, then the equation of L_2 is



A. $y = -\frac{1}{a}x - 5$ B. $y = -\frac{1}{a}x + 5$

C. $y = -ax - 5$ D. $y = -ax + 5$

E. $y = -\frac{1}{a}x$

16. (87) Which of the following straight lines divide(s) the circle $(x - 1)^2 + (y + 1)^2 = 1$ into two equal parts ?

(1) $x - y - 2 = 0$ (2) $x + y + 2 = 0$ (3) $x - y + 2 = 0$

A. (1) only B. (2) only C. (3) only
D. (1) and (2) only E. (2) and (3) only

17. (87) The equation of a circle is $x^2 + y^2 - 4x + 2y + 1 = 0$. Which of the following is/are true ?

(1) The centre is $(-2,1)$.
(2) The radius is 2 units.
(3) The circle intersects the y-axis at two distinct points.

A. (1) only B. (2) only C. (3) only
D. (1) and (2) only E. (2) and (3) only

18. (87) Two perpendicular lines $kx+y-4=0$ and $x-2y+3 = 0$ intersect at the point (h,k). Find h and k.

A. $h = -7$, $k = -2$ B. $h = -2$, $k = 1/2$ C. $h = 1, k = 2$
D. $h = -4$, $k = -1/2$ E. $h = -3$, $k = 2$

19. (88) The line $y = mx + c$ is perpendicular to the line $y = 3 - 2x$. Find m.

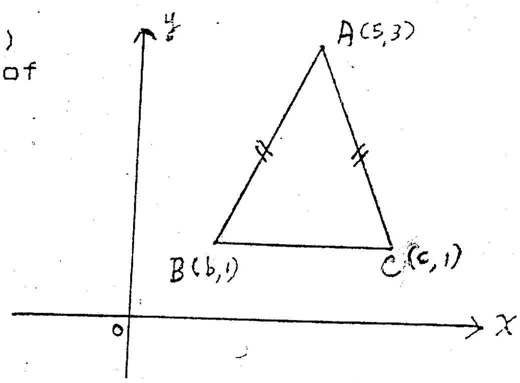
A. 2 B. $-1/2$ C. -2 D. $1/2$ E. $-1/3$

20. (88) Which of the following circles has the lines $x = 1$, $x = 5$, $y = 4$ and $y = 8$ as its tangents ?

A. $(x-1)^2 + (y-4)^2 = 4$ B. $(x-5)^2 + (y-8)^2 = 4$
C. $(x-3)^2 + (y-6)^2 = 4$ D. $(x-1)^2 + (y-8)^2 = 4$
E. $(x-5)^2 + (y-4)^2 = 4$

21. (88) In the figure, A(5,3), B(b,1) and C(c,1) are the vertices of a triangle. If AB = AC, then b + c =

A. 3
B. 5
C. 6
D. 8
E. 10



ANSWERS

1.D 2.A 3.C 4.E 5.B 6.B 7.D 8.B 9.E 10.D
11.B 12.D 13.D 14.C 15.A 16.A 17.B 18.C 19.D 20.C
21.E

Coordinate Geometry

1. $2x-3y+c=0$.

put $(1,1)$ into the eqt.

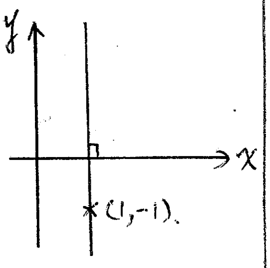
$2(1)-3(1)+c=0$

$2-3+c=0$

$c=1$. (D.)

2. ⊥ to x-axis

the slope → ∞.



$[y-(-1)]=m(x-1)$.

$y+1=m(x-1)$

$m=\frac{y+1}{x-1}$

$m\to\infty$ ∴ $x-1=0$ (A.)

3. the eqt. of circle

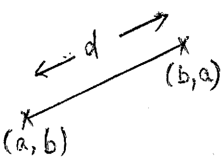
$(x-3)^2+(y-4)^2=r^2$

$(x-3)^2+(y-4)^2=(3-0)^2+(4-0)^2$

$x^2-6x+9+y^2-8y+16=9+16$.

$x^2+y^2-6x-8y=0$. (C.)

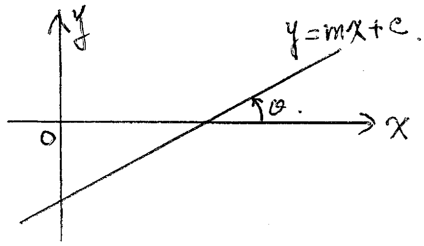
4.



$d^2=(a-b)^2+(b-a)^2$

$=2(a-b)^2$. (E.)

5.



since $\theta<90°$

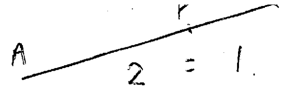
∴ $m=\tan\theta>0$.

For $x=0$, $y=c$.

From the graph, y-intercept <0

∴ $c<0$ (B.)

6.



$A=(x_1,y_1)$; $B=(x_2,y_2)$.

$\therefore P=\left(\frac{x_1+2x_2}{3},\ \frac{y_1+2y_2}{3}\right)$

(B.)

7. $x^2+y^2-2x+4y-6=0$.

the centre of circle.

$=\left(\frac{-(-2)}{2},\ -\frac{4}{2}\right)$

$=(1,-2)$

For the line $x+y+k=0$.

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

$k=1$. (D.)

8. the eqt. of circle.

$x^2+y^2-2x+5y-7=0$.

(1) For the pt. $(-1,1)$.

$L.H.S.=(-1)^2+(1)^2-2(-1)+5(1)-7$

$=1+1+2+5-7$

$=2\neq0=R.H.S.$

∴ it is not true.

(2). the centre of circle.

$=\left(\frac{-(-2)}{2},\ \frac{-5}{2}\right)$

$=(1,-5/2)$

lies on 4^{th} quadrant.

∴ it is not true.

(3) intersects x-axis.

put $y=0$.

it becomes,

$x^2-2x-7=0$.

$\Delta=(-2)^2-4(1)(-7)$

$=4+28$

$=32>0$.

∴ it intersects x-axis at two pts. (B.)

9. $ax+by+c=0$.

where $a,b,c>0$. P.1

For $x=0$,

$by+c=0$

$y=-\frac{c}{b}$.

∴ y-intercept <0.

For $y=0$

$ax+c=0$

$x=-c/a$.

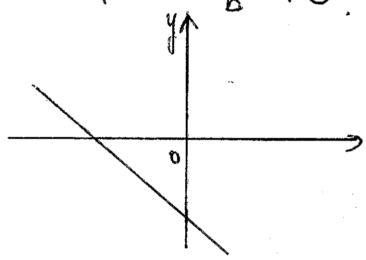
x-intercept <0.

$ax+by+c=0$

$by=-ax-c$

$y=-\frac{a}{b}x-\frac{c}{b}$.

the slope $=-\frac{a}{b}<0$.



(E.)

10. $(1-k,k)$ & $(2,1+k)$.

$(1-k-2)^2+[k-(1+k)]^2=(\sqrt{26})^2$

$(-k-1)^2+(-1)^2=26$

$(k+1)^2=25$.

$k+1=\pm5$

$k=4$ or -6. (D.)

11. the mid-pt. of $(1,2)$ & $(7,4)$

$=\left(\frac{1}{2}(1+7),\ \frac{1}{2}(2+4)\right)$

$=(4,3)$

the slope of the two pts.

$=\frac{4-2}{7-1}=\frac{2}{6}=\frac{1}{3}$.

the slope of required eqt.

$=-1/\frac{1}{3}=-3$.

the eqt.

$y-3=-3(x-4)$

$y-3=-3x+12$

$3x+y-15=0$. (B.)

12. Let the eqt. be

$$x^2+y^2+2gx+2fy+c=0.$$

For $(0,0)$

$$0^2+0^2+2g(0)+2f(0)+c=0$$

$\therefore c=0.$

For $(6,0)$.

$$6^2+0^2+2g(6)+2f(0)=0.$$

$$36+12g=0$$

$$g=-3.$$

For $(0,-8)$.

$$0+(-8)^2+2g(0)+2f(-8)=0.$$

$$64-16f=0$$

$$f=4.$$

$\therefore$ the eqt is.

$$x^2+y^2+2(-3)x+2(4)y=0$$

$$x^2+y^2-6x+8y=0. \quad (D.)$$

13. the eqt.

$$x^2+y^2-4x-5=0.$$

(I). For $(0,0)$.

$$L.H.S. = 0^2+0^2-4(0)-5$$

$$=-5 \neq 0 = R.H.S.$$

$\therefore$ it is not true.

(II) the centre $= \left(\frac{-(-4)}{2}, 0\right)$

$= (2,0)$

lies on x-axis.

(III) the line $x-5=0$.

sub. into circle.

$$5^2+y^2-4(5)-5=0.$$

$$y^2=0.$$

$$y=0.$$

$\therefore$ it touches the circle.

(II) & (III) only. (D.)

A, $2x^2-8y-5=0.$

no y^2 terms.

B, $2x^2+y^2-4x-3y=0.$

coef. of x^2 & y^2 is not equal.

C, $3x^2+3y^2-5x-7=0.$

is a circle.

D, $x^2-y^2-7x+6y+1=0.$

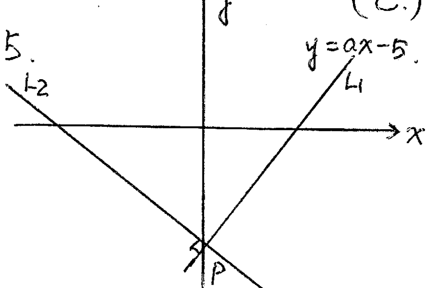
coef. of x^2 & y^2 is not equal

E, $x^2+y^2+2xy+7y-1=0$

the circle, no xy term.

(C.)

15.



Let m be the slope of L_2.

slope of $L_1 = a$.

$$\therefore ma=-1$$

$$m=-\frac{1}{a}.$$

(L_1): $y=ax-5.$

when $x=0$, $y=-5.$

$\therefore P(0,-5).$

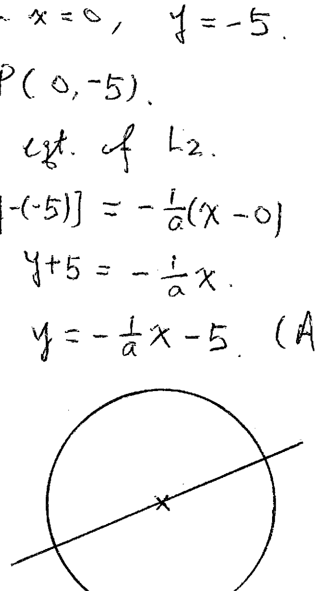
the eqt. of L_2.

$$[y-(-5)] = -\frac{1}{a}(x-0)$$

$$y+5=-\frac{1}{a}x.$$

$$y=-\frac{1}{a}x-5. \quad (A.)$$

16.



when the line divide the circle into two equal parts, it passes through the centre of circle.

the centre $= (1,-1)$.

(1) $x-y-2=0.$

$$L.H.S. = 1-(-1)-2$$

$$=1+1-2$$

$$=0=R.H.S.$$

(2). $x+y+2=0$

$$L.H.S. = 1+(-1)+2$$

$$=2\neq 0 = R.H.S.$$

(3). $x-y+2=0$

$$L.H.S. = 1-(-1)+2$$

$$=4\neq 0 = R.H.S.$$

$\therefore$ (1) only (A.)

17. the eqt. of circle.

$$x^2+y^2-4x+2y+1=0.$$

(1). the centre $= \left(\frac{-(-4)}{2}, -\frac{2}{2}\right)$

$= (2,-1)$

$\neq (-2,1).$

(2). the radius.

$$=\sqrt{\left(-\frac{4}{2}\right)^2+\left(\frac{2}{2}\right)^2-1}$$

$$=\sqrt{4+1-1}$$

$$=2$$

(3) intersects the y-axis,

put. $x=0$

$$\therefore y^2+2y+1=0$$

$$\Delta=(2)^2-4(1)(1)$$

$$=0.$$

$\therefore$ it intersects y-axis at one point.

$\therefore$ (2) only (B.)

18. $\begin{cases} kx+y-4=0 \\ x-2y+3=0 \end{cases}$

Since they are $\perp$ar.

$\therefore \begin{cases} y=-kx+4 \\ y=\frac{1}{2}x+\frac{3}{2} \end{cases}$

$\therefore \quad -k\cdot\frac{1}{2}=-1$

$\therefore \quad k=2$

the pt. (h,k) lies on both lies.

$\therefore \quad h-2k+3=0$

$h-2(2)+3=0$

$h=1$. (C.)

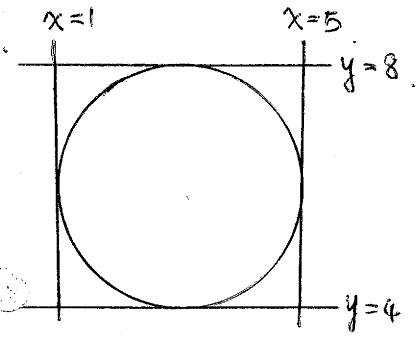
19. $\begin{cases} y=mx+c \\ y=3-2x \end{cases}$

they are $\perp$ar.

$\therefore \quad m(-2)=-1$

$m=\frac{1}{2}$. (D.)

20.



$\therefore$ the centre $=\left(\frac{5+1}{2},\ \frac{8+4}{2}\right)$

$=(3,6)$

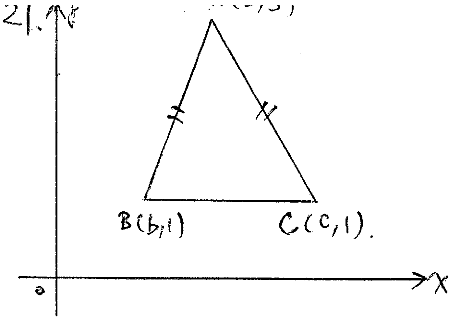
radius $=\frac{5-1}{2}=2$.

$\therefore$ the eqt. of circle.

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

$(x-3)^2+(y-6)^2=4$ (C.)

21.



For x-coordinate,

A is a mid-pt of BC.

$\therefore \quad 5=\frac{1}{2}(b+c)$

$\therefore b+c=10$ (E.)