Polar Coordinates

1. If the polar coordinates of the points A and B are $(5, 45°)$ and $(12, 135°)$ respectively, then the distance between A and B is

   A. 3 .
   B. 7 .
   C. 13 .
   D. 17 .

   [2006-CE-MATHS 2-27]

2. If the rectangular coordinates of the point A are $(-1, 1)$, then the polar coordinates of A are

   A. $(1, 135°)$.
   B. $(1, 225°)$.
   C. $(\sqrt{2}, 135°)$.
   D. $(\sqrt{2}, 225°)$.

   [2007-CE-MATHS 2-30]

3. If the polar coordinates of the point P are $(2, 300°)$, then the rectangular coordinates of P are

   A. $(-\sqrt{3}, 1)$.
   B. $(-1, \sqrt{3})$.
   C. $(1, -\sqrt{3})$.
   D. $(\sqrt{3}, -1)$.

   [2008-CE-MATHS 2-30]

4. If the polar coordinates of the point are $(6, 210°)$, then the rectangular coordinates of the point are

   A. $(-3, -3\sqrt{3})$.
   B. $(-3, 3\sqrt{3})$.
   C. $(-3\sqrt{3}, -3)$.
   D. $(-3\sqrt{3}, 3)$.

   [2010-CE-MATHS 2-30]

5. If the polar coordinates of the point P are $(2, 150°)$, then the rectangular coordinates of P are

   A. $(-1, \sqrt{3})$.
   B. $(\sqrt{3}, -1)$.
   C. $(1, -\sqrt{3})$.
   D. $(-\sqrt{3}, 1)$.

   [2011-CE-MATHS 2-30]

HKDSE Problems

6. The rectangular coordinates of the point P are $(-3, -3\sqrt{3})$. If P is rotated anticlockwise about the origin through 90°, then the polar coordinates of its image are

   A. $(3, 150°)$.
   B. $(3, 330°)$.
   C. $(6, 150°)$.
   D. $(6, 330°)$.

   [2012-DSE-MATHS 2-23]

7. The rectangular coordinates of the point P are $(-1, \sqrt{3})$. If P is reflected with respect to the x-axis, then the polar coordinates of its image are

   A. $(2, 210°)$.
   B. $(2, 240°)$.
   C. $(4, 210°)$.
   D. $(4, 240°)$.

   [2014-DSE-MATHS 2-23]

8. The rectangular coordinates of the point A are $(\sqrt{3}, -1)$. If A is reflected with respect to the y-axis, then the polar coordinates of its image are

   A. $(1, 210°)$.
   B. $(1, 240°)$.
   C. $(2, 210°)$.
   D. $(2, 240°)$.

   [2015-DSE-MATHS 2-23]

9. The polar coordinates of the points P, Q and R are $(3, 160°)$, $(4, 280°)$ and $(6, 340°)$ respectively. The perpendicular distance from Q to PR is

   A. 2 .
   B. 3 .
   C. $2\sqrt{3}$.
   D. $3\sqrt{3}$.

   [2017-DSE-MATHS 2-25]

10. The polar coordinates of the points C, D and E are $(16,127°)$ m $(12,127°)$ and $(5,307°)$ respectively. Find the perimeter of ΔCDE.

    A. 54
    B. 78
    C. 126
    D. 130

    [2018-DSE-MATHS 2-24]

11. The point P is translated leftward by 4 units to the point Q. If the coordinates of the reflection image of Q with respect to the y-axis are $(5, -1)$, then the polar coordinates of P are

A. $(1, 45°)$
B. $(1, 225°)$
C. $(\sqrt{2}, 45°)$
D. $(\sqrt{2}, 225°)$

[2020-DSE-MATHS 2-24]

Distance between Points

1. If P is the point $(x, 0)$, Q the point $(0, 1)$ and R the point $(0, x)$, and $PQ = 2RQ$, then x satisfies

A. $x^2 - 4x + 1 = 0$.
B. $3x^2 - 8x + 3 = 0$.
C. $x^2 - 2x + 3 = 0$.
D. $3x^2 - 4x + 3 = 0$.
E. $x^2 + 2x - 3 = 0$.

[1972-CE-MATHS B1-17]

2. If d is the distance between the point (a, b) and (b, a), then $d^2 =$

A. 0.
B. $a^2 + b^2$.
C. $2(a^2 + b^2)$.
D. $(a - b)^2$.
E. $2(a - b)^2$.

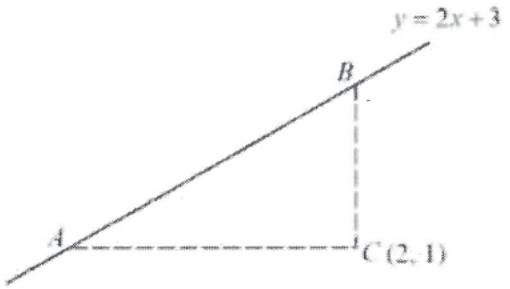
[1983-CE-MATHS 2-29]

3. 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.

[1985-CE-MATHS 2-26]

4. In the figure, A, B and C are points on a rectangular coordinate plane. AC and BC are parallel to the x-axis and y-axis respectively. If the coordinates of C are $(2, 1)$ and the equation of the straight line AB is $y = 2x + 3$, find the distance between A and B.



A. $\sqrt{5}$
B. $\frac{3\sqrt{5}}{2}$
C. $\sqrt{37}$
D. $3\sqrt{5}$
E. $\sqrt{65}$

[2001-CE-MATHS 2-34]

5. If the length of the line segment joining the points $(2, 3)$ and $(k, 1-k)$ is 4, then $k =$

A. 2.
B. 4.
C. 0 or 4.
D. –2 or 2.

[2002-CE-MATHS 2-30]

Collinear Points

6. If the points $(1, 1)$, $(3, 2)$ and $(7, k)$ are on the same straight line, then $k =$

A. 3.
B. 4.
C. 6.
D. 7.
E. 10.

[1993-CE-MATHS 2-27]

7. The points $A(4, -1)$, $B(-2, 3)$ and $C(x, 5)$ lie on a straight line. Find x.

A. –5
B. –4
C. 0
D. 2
E. 5

[1994-CE-MATHS 2-26]

Mid-Point

8. If $(-2, 3)$ is the mid-point of $(a, -1)$ and $(4, b)$, then $b =$

A. –7.
B. 7.
C. –8.
D. 8.

[2004-CE-MATHS 2-31]

9. The coordinates of the points A and B are $(-2, a)$ and $(b, 7)$ respectively. If the coordinates of the mid-point of AB are $(1, 5)$, then $a =$

A. 0.
B. 3.
C. 4.
D. 17.

[2008-CE-MATHS 2-29]

Point of Division

10. The point P divides AB internally so that $AP : PB = 2 : 1$. The coordinates of A and B are (x_1, y_1) and (x_2, y_2) respectively. The coordinates of P are

A. $\left(\frac{2x_1 + x_2}{3}, \frac{2y_1 + y_2}{3}\right)$

B. $\left(\frac{x_1 + 2x_2}{3}, \frac{y_1 + 2y_2}{3}\right)$

C. $\left(\frac{2x_1 - x_2}{3}, \frac{2y_1 - y_2}{3}\right)$

D. $\left(\frac{x_1 - 2x_2}{3}, \frac{y_1 - 2y_2}{3}\right)$

E. $\left(\frac{x_1 + x_2}{3}, \frac{y_1 + y_2}{3}\right)$

[1984-CE-MATHS 2-26]

11. $ABCD$ is a line segment. $AB : BC : CD = 3 : 2 : 1$. If $A = (4, 5)$, $D = (10, 11)$, find C.

A. (5, 6)
B. (6, 7)
C. (7, 8)
D. (8, 9)
E. (9, 10)

[1990-CE-MATHS 2-27]

12. $A(-3, 2)$ and $B(1, 3)$ are two points. C is a point on the AB produced such that $AB : BC = 1 : 2$. Find the coordinates of C.

A. $(-\frac{5}{3}, \frac{7}{3})$

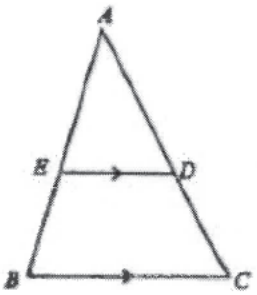
B. $(-\frac{1}{3}, \frac{8}{3})$

C. $(3, \frac{7}{2})$

D. (5, 4)
E. (9, 5)

[1996-CE-MATHS 2-53]

13. In the figure, AEB and ADC are straight lines. $ED \parallel BC$ and $ED : BC = 2 : 3$. If the coordinates of A and B are (4, 7) and (0, 1) respectively, find the coordinates of E.



A. $(\frac{4}{3}, 3)$

B. $(\frac{8}{3}, 5)$

C. $(\frac{8}{5}, \frac{5}{17})$

D. $(\frac{12}{5}, \frac{23}{5})$

E. $(\frac{8}{7}, \frac{19}{7})$

[1997-CE-MATHS 2-47]

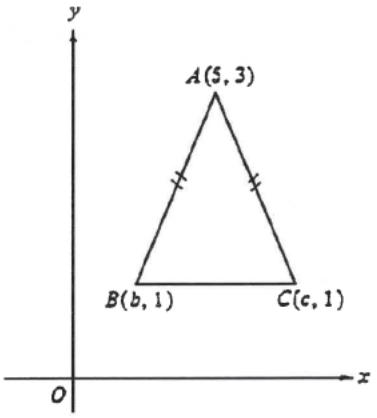
14. $A(7, 14)$ and $B(1, 2)$ are two points. C is a point on AB produced such that $AB : BC = 2 : 1$. Find the coordinates of C.

A. (–5, –10)
B. (–2, –4)
C. (3, 6)
D. (5, 10)
E. (10, 20)

[1998-CE-MATHS 2-54]

Vertices of Polygons

15. 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.

[1988-CE-MATHS 2-28]

16. $PQRS$ is a parallelogram with vertices $P = (0, 0)$, $Q = (a, b)$ and $S = (-b, a)$. Find R.

A. $(-a, -b)$
B. $(a, -b)$
C. $(a - b, a - b)$
D. $(a - b, a + b)$
E. $(a + b, a + b)$

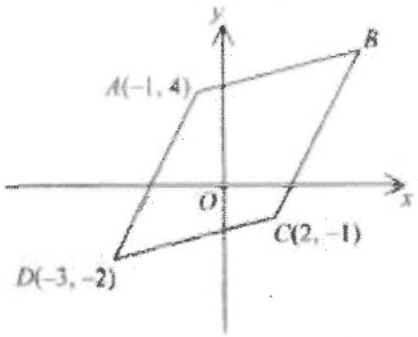
[1991-CE-MATHS 2-28]

17. The mid-points of the sides of a triangle are (3, 4), (2, 0) and (4, 2). Which of the following points is a vertex of the triangle?

A. (3.5, 3)
B. (3, 2)
C. (3, 1)
D. (1.5, 2)
E. (1, 2)

[1992-CE-MATHS 2-31]

18. In the figure, $ABCD$ is a parallelogram. The coordinates of B are



A. (3, 2).
B. (3, 5).
C. (4, 5).
D. (4, 6).

[2005-CE-MATHS 2-32]

19. If the points (0, 0), (2, 0) and (1, b) are the vertices of an equilateral triangle, then b =

A. 1.
B. $\sqrt{3}$.
C. 1 or −1.
D. $\sqrt{3}$ or $-\sqrt{3}$.

[2006-CE-MATHS 2-31]

Transformation of Points

20. If the point (3, −2) is rotated clockwise about the origin through 90°, then the coordinates of its image are

A. (2, 3).
B. (3, 2).
C. (−2, −3).
D. (−3, −2).

[2007-CE-MATHS 2-29]

21. The coordinates of the point A are (−3, 3). If A is reflected with respect to the straight line $x = 1$ to the point B, then the distance between A and B is

A. 4.
B. 5.
C. 6.
D. 8.

[2009-CE-MATHS 2-30]

22. If the point $R(-4, -3)$ is reflected with respect to the straight line $y + 7 = 0$ to the point S, then the coordinates of S are

A. (−4, −10).
B. (−4, −11).
C. (−10, −3).
D. (−11, −3).

[2010-CE-MATHS 2-29]

23. The coordinates of the point A are (−3, 2). If A is translated downwards by 7 units to the point B, then the coordinates of the reflection image of B with respect to the straight line $x = 1$ are

A. (5, 5).
B. (5, −5).
C. (−5, 5).
D. (−5, −5).

[2011-CE-MATHS 2-29]

HKDSE Problems

24. If the point (−4, 3) is rotated anti-clockwise about the origin through 180°, then the coordinates of its image are

A. (−3, −4).
B. (3, 4).
C. (−4, −3).
D. (4, −3).

[SP-DSE-MATHS 2-26]

25. If the point (−2, −1) is reflected with respect to the straight line $y = -5$, then the coordinates of its image are

A. (−8, −1).
B. (−2, −9).
C. (−2, 11).
D. (12, −1).

[PP-DSE-MATHS 2-25]

26. The coordinates of the point A are $(-5, -2)$. A is translated rightwards by 9 units to the point B. B is then rotated anticlockwise about the origin through $90°$ to point C. Find the y-coordinate of C.

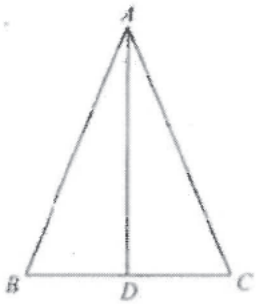
A. -4
B. -2
C. 2
D. 4

[2019-DSE-MATHS 2-25]

1. Let O be the origin. If the coordinates of the points A and B are $(6, 0)$ and $(0, 6)$ respectively, then the coordinates of the in-centre of ΔABO are

A. $(0, 0)$.
B. $(2, 2)$.
C. $(3, 3)$.
D. $(6-3\sqrt{2}, 6-3\sqrt{2})$.

[2006-CE-MATHS 2-48]

2. 

In the figure, ABC is an acute-angled triangle, $AB = AC$ and D is a point lying on BC such that AD is perpendicular to BC. Which of the following must be true?

(1) The circumcentre of ΔABC lies on AD.
(2) The orthocentre of ΔABC lies on AD.
(3) The centroid of ΔABC lies on AD.

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

[2006-CE-MATHS 2-49]

3. If ΔABC is an obtuse-angled triangle, which of the following points must lie outside ΔABC?

(1) The centroid of ΔABC
(2) The circumcentre of ΔABC
(3) The orthocentre of ΔABC

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

[2007-CE-MATHS 2-50]

4. Let O be the origin. If the coordinates of the points A and B are $(48, 0)$ and $(24, 18)$ respectively, then the y-coordinate of the orthocentre of ΔABO is

A. -7.
B. 6.
C. 8.
D. 32.

[2008-CE-MATHS 2-52]

5. The coordinates of two vertices of a triangle are $(-4, -8)$ and $(6, 2)$. If the coordinates of the circumcentre of the triangle are $(k, -4)$, then $k =$

A. -1.
B. 0.
C. 1.
D. 2.

[2009-CE-MATHS 2-52]

HKDSE Problems

6. Let O be the origin. If the coordinates of the points A and B are $(18, -24)$ and $(18, 24)$ respectively, then the x-coordinate of the orthocentre of ΔOAB is

A. -14.
B. 10.
C. 12.
D. 25.

[PP-DSE-MATHS 2-42]

7. Let O be the origin. If the coordinates of the points A and B are $(0, 12)$ and $(30, 12)$ respectively, then the y-coordinate of the circumcentre of ΔOAB is

A. 6.
B. 8.
C. 12.
D. 15.

[2013-DSE-MATHS 2-43]

8. Let O be the origin. The coordinates of the points P and Q are $(0, 60)$ and $(96, 48)$ respectively. The x-coordinate of the orthocentre of ΔOPQ is

A. 6.
B. 32.
C. 45.
D. 48.

[2015-DSE-MATHS 2-42]

9. Let O be the origin. The coordinates of the points P and Q are $(p, 0)$ and $(0, q)$ respectively, where p and q are positive numbers. If the in-centre of ΔOPQ lies on the straight line $3x + 4y = 3p$, then $p : q =$

A. $2 : 3$.
B. $4 : 3$.
C. $4 : 9$.
D. $7 : 24$.

[2017-DSE-MATHS 2-41]

10. It is given that a is a positive constant. The straight line $2x + 5y = a$ cuts the x-axis and the y-axis at the points P and Q respectively. Let R be a point lying on the y-axis such that the x-coordinates of the orthocenter of ΔPQR is 10. Find the y-coordinates of R.

A. -25
B. -4
C. 4
D. 25

[2018-DSE-MATHS 2-40]

11. If ΔABC is a right-angled triangle with $\angle ABC = 90°$, which of the following is/are true?

I. The orthocenter of ΔABC lies on AC.
II. The centroid of ΔABC lies inside ΔABC.
III. The in-centre of ΔABC lies outside ΔABC.

A. I only
B. II only
C. I and III only
D. II and III only

[2019-DSE-MATHS 2-41]

12. The equations of three sides of a triangle are $4x + 3y = 24$, $4x - 3y = 24$ and $x = a$, where a is a constant. If the x-coordinates of the in-centre of the triangle is 31, then $a =$

A. 15
B. 31
C. 45
D. 51

[2020-DSE-MATHS 2-40]

Slope of Straight Lines

1. The gradient of the straight line $(x + y + 1) + k(x - y - 1) = 0$ is

A. $\frac{1+k}{k-1}$.

B. $\frac{1+k}{1-k}$.

C. $\frac{1-k}{1+k}$.

D. $\frac{k-1}{1+k}$.

E. 1.

[1977-CE-MATHS 2-36]

2. The slope of the straight line passing through $(-3, 4)$ and $(4, -3)$ is

A. 7.

B. -7.

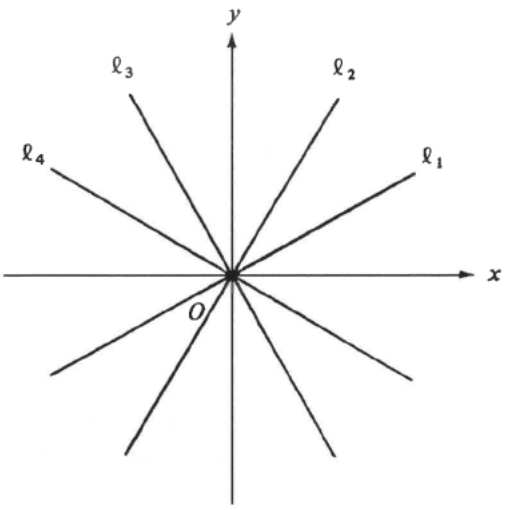
C. $\frac{1}{7}$.

D. 1.

E. -1.

[SP-CE-MATHS 2-42]

3. In the figure, the slopes of the straight lines ℓ_1, ℓ_2, ℓ_3 and ℓ_4 are m_1, m_2, m_3 and m_4 respectively. Which of the following is true?



A. $m_1 > m_2 > m_3 > m_4$

B. $m_2 > m_1 > m_3 > m_4$

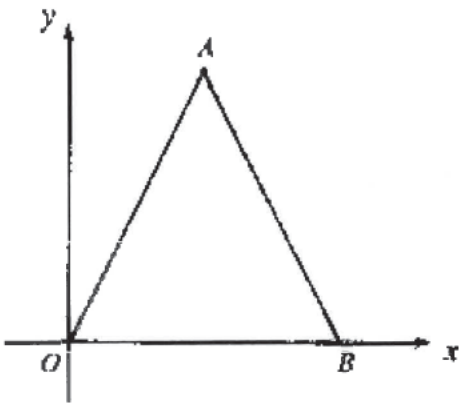
C. $m_1 > m_2 > m_4 > m_3$

D. $m_2 > m_1 > m_4 > m_3$

E. $m_4 > m_3 > m_2 > m_1$

[1990-CE-MATHS 2-29]

4. In the figure, $OA = AB$. If the slope of AB is m, find the slope of OA.



A. -1

B. $\frac{1}{m}$

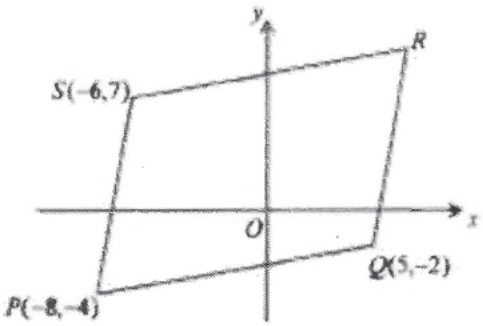
C. $-\frac{1}{m}$

D. m

E. $-m$

[1995-CE-MATHS 2-28]

5. In the figure, $PQRS$ is a parallelogram. Find the slope of PR.



A. $\frac{13}{15}$

B. $\frac{15}{13}$

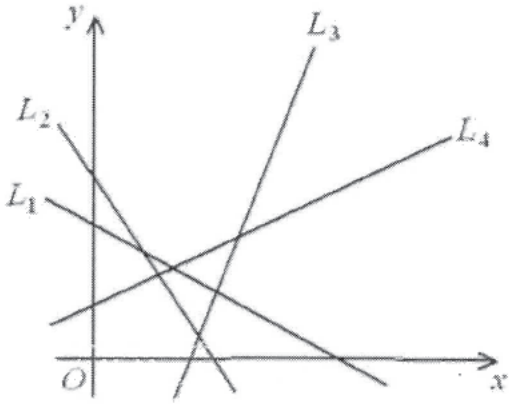
C. $\frac{9}{11}$

D. $\frac{11}{9}$

E. -5

[1998-CE-MATHS 2-33]

6. In the figure, L_1, L_2, L_3 and L_4 are straight lines. If m_1, m_2, m_3 and m_4 are the slopes of L_1, L_2, L_3 and L_4 respectively, which of the following must be true?



A. $m_1 < m_2 < m_3 < m_4$

B. $m_1 < m_2 < m_4 < m_3$

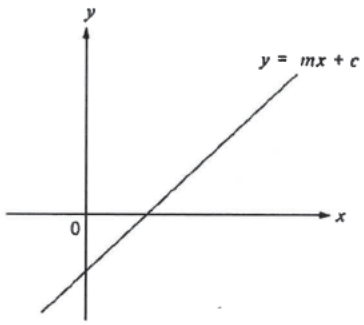
C. $m_2 < m_1 < m_3 < m_4$

D. $m_2 < m_1 < m_4 < m_3$

[2008-CE-MATHS 2-32]

Coefficients of Straight Lines

7. In the figure, the equation of the straight line is $y = mx + c$. Which one of the following is true?



A. $m > 0$ and $c > 0$

B. $m > 0$ and $c < 0$

C. $m < 0$ and $c > 0$

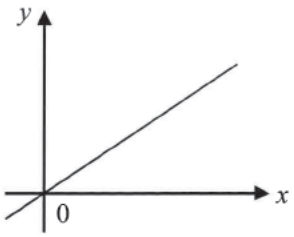
D. $m < 0$ and $c < 0$

E. $m > 0$ and $c = 0$

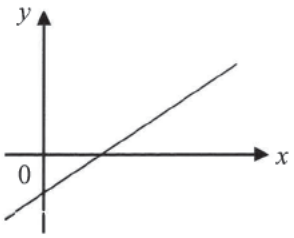
[1983-CE-MATHS 2-35]

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

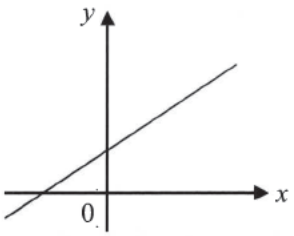
A.



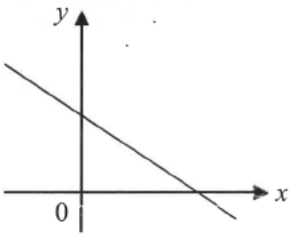
B.



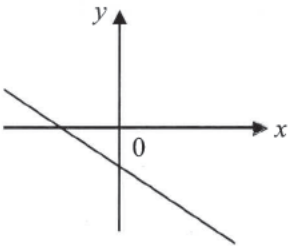
C.



D.



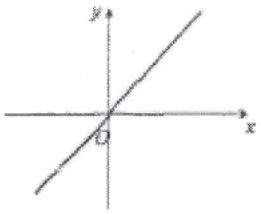
E.



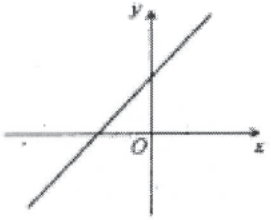
[1984-CE-MATHS 2-29]

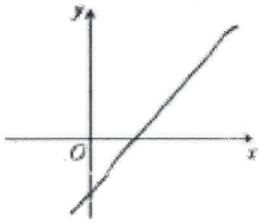
9. If a, b and c are all positive, which of the following may represent the graph of $ax + by + c = 0$?

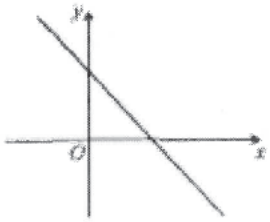
A.

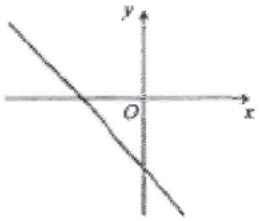


B.



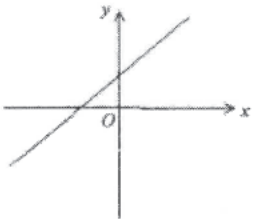
C.


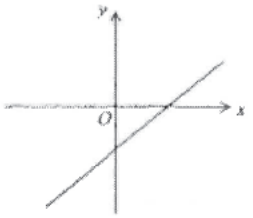
D.


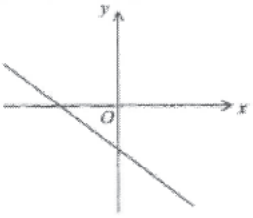
E.


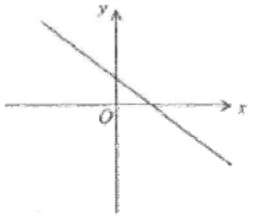
[1996-CE-MATHS 2-29]

10. If $a < 0$ and $b > 0$, which of the following may represent the graph of $y = ax + b$?

A.


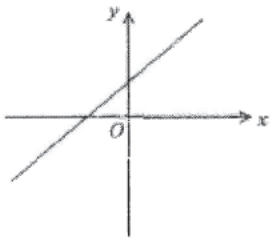
B.


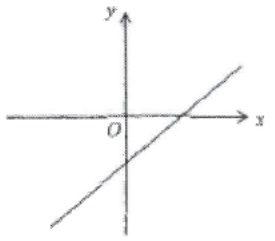
C.


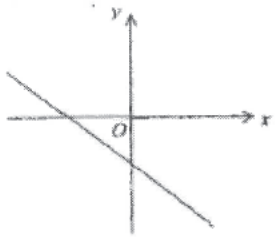
D.


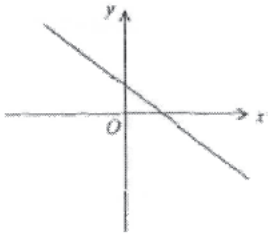
[2002-CE-MATHS 2-4]

11. If $a > 0$, $b > 0$ and $c < 0$, which of the following may represent the graph of the straight line $ax + by + c = 0$?

A.


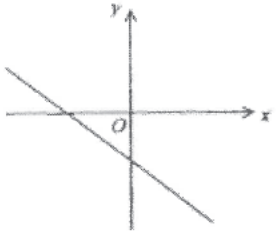
B.


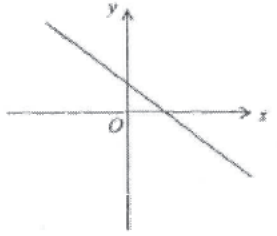
C.


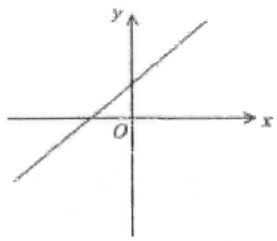
D.


[2004-CE-MATHS 2-29]

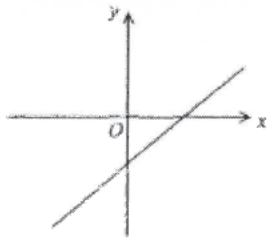
12. If $k < 0$, which of the following may represent the graph of the straight line $x - y = k$?

A.


B.


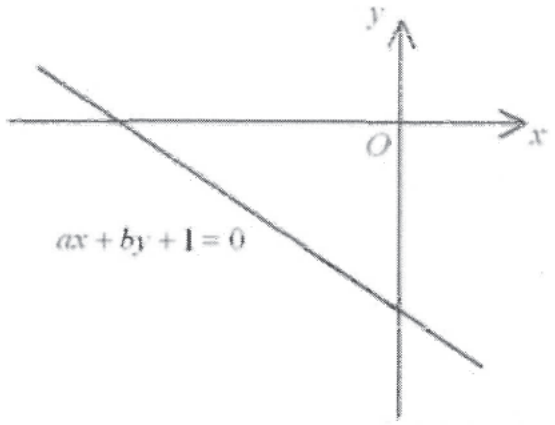
C.


D.



[2006-CE-MATHS 2-28]

13.



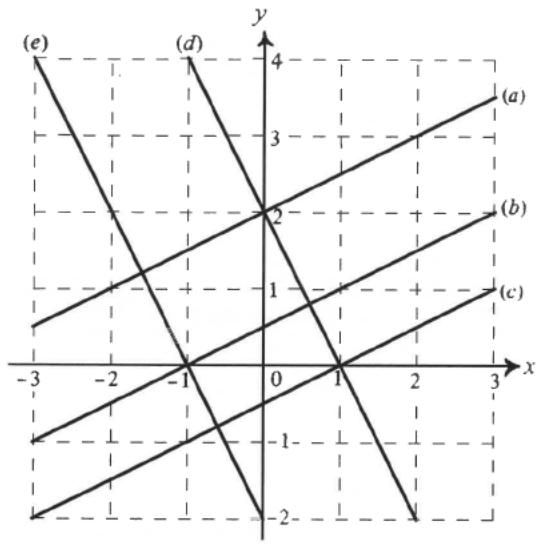
The figure shows the graph of the straight line $ax + by + 1 = 0$. Which of the following is true?

A. $a > 0$ and $b > 0$
B. $a > 0$ and $b < 0$
C. $a < 0$ and $b > 0$
D. $a < 0$ and $b < 0$

[2007-CE-MATHS 2-32]

Equations of Straight Lines

14.



Five straight lines (a), (b), (c), (d) and (e) are drawn in the figure above. Which one is the graph of $x - 2y = 1$?

A. (a)
B. (b)
C. (c)
D. (d)
E. (e)

[SP-CE-MATHS 2-14]

15. If the line $2x - 3y + c = 0$ passes through the point $(1, 1)$, then $c =$

A. -2.
B. -1.
C. 0.
D. 1.
E. 2.

[1983-CE-MATHS 2-26]

16. The equation of the line passing through $(1, -1)$ and perpendicular to the x-axis is

A. $x - 1 = 0$.
B. $x + 1 = 0$.
C. $y - 1 = 0$.
D. $y + 1 = 0$.
E. $x + y = 0$.

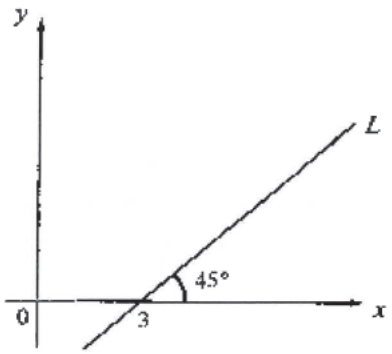
[1983-CE-MATHS 2-27]

17. 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. $x + 3y - 13 = 0$.

[1985-CE-MATHS 2-27]

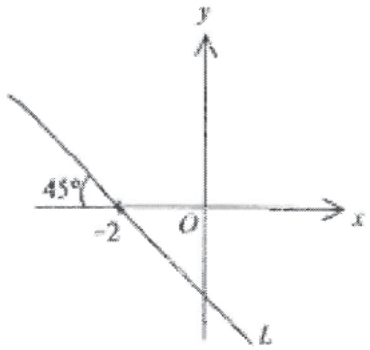
18. In the figure, the equation of the straight line L is



A. $x - 3 = 0$.
B. $x - y - 3 = 0$.
C. $x - y + 3 = 0$.
D. $x + y - 3 = 0$.
E. $x + y + 3 = 0$.

[1995-CE-MATHS 2-27]

19. In the figure, the equation of the straight line L is



A. $x + y + 2 = 0$.
B. $x + y - 2 = 0$.
C. $x - y + 2 = 0$.
D. $x - y - 2 = 0$.

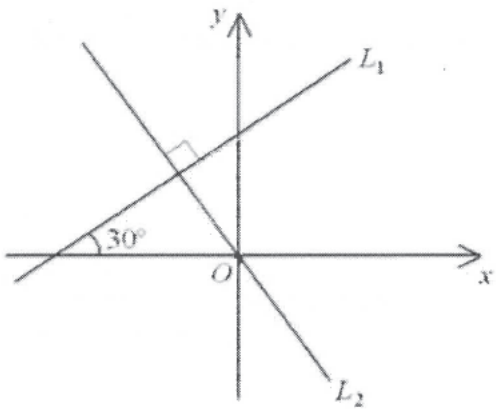
[2002-CE-MATHS 2-31]

20. If the straight line $5x - 3y = 30$ cuts the x-axis and the y-axis at A and B respectively, then the coordinates of the mid-point of AB are

A. $(3, -5)$.
B. $(-3, 5)$.
C. $(5, -3)$.
D. $(-5, 3)$.

[2006-CE-MATHS 2-30]

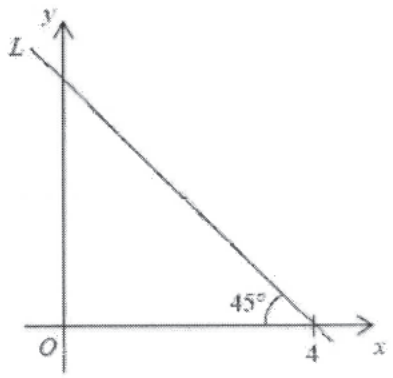
21. In the figure, the straight lines L_1 and L_2 are perpendicular to each other. Find the equation of L_2.



A. $x - \sqrt{3}y = 0$
B. $x + \sqrt{3}y = 0$
C. $\sqrt{3}x - y = 0$
D. $\sqrt{3}x + y = 0$

[2008-CE-MATHS 2-31]

22. In the figure, the equation of the straight line L is



A. $x + y = 4$.
B. $x - y = 4$.
C. $x + y = -4$.
D. $x - y = -4$.

[2009-CE-MATHS 2-32]

Parallel Lines

23. If the two lines $2x - y + 1 = 0$ and $ax + 3y - 1 = 0$ do not intersect, then $a =$

A. -6.
B. -2.
C. 2.
D. 3.
E. 6.

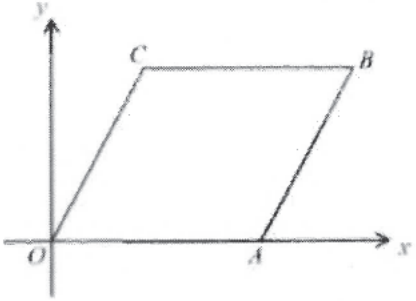
[1992-CE-MATHS 2-28]

24. Find the equation of the straight line passing through $(-1, 1)$ and parallel to $5x + 4y = 0$.

A. $4x - 5y + 9 = 0$
B. $4x + 5y + 1 = 0$
C. $5x - 4y + 9 = 0$
D. $5x + 4y - 1 = 0$
E. $5x + 4y + 1 = 0$

[1998-CE-MATHS 2-32]

25. In the figure, $OABC$ is a parallelogram. If the equation of OC is $2x - y = 0$ and the length of CB is 3, find the equation of AB.



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

[1999-CE-MATHS 2-32]

26. Consider the three straight lines

L_1: $6x + 4y - 3 = 0$,

L_2: $y = -\frac{3}{2}x + 4$ and

L_3: $6x - 4y + 3 = 0$.

Which of the following is/are true?

(1) $L_1 // L_2$
(2) $L_2 // L_3$
(3) $L_1 \perp L_3$

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

[2000-CE-MATHS 2-18]

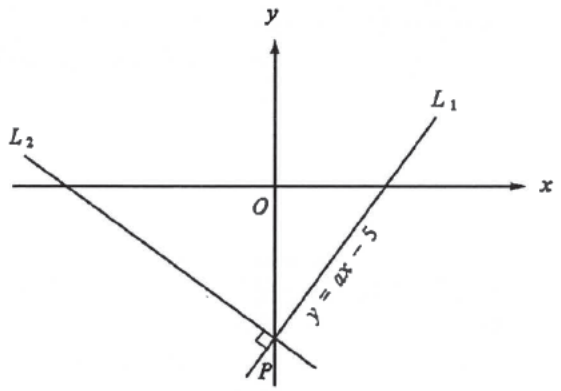
Perpendicular Lines

27. If the slopes of two perpendicular straight lines can be represented by two numbers m_1 and m_2, then we must have

A. $m_1 + m_2 = -1$.
B. $m_1 + m_2 = 1$.
C. $m_1 - m_2 = 0$.
D. $m_1 m_2 = 1$.
E. $m_1 m_2 = -1$.

[SP-CE-MATHS 2-43]

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

[1986-CE-MATHS 2-22]

29. The line $y = mx + c$ is perpendicular to the line $y = 3 - 2x$. Find m.

A. 2
B. $-\frac{1}{2}$
C. -2
D. $\frac{1}{2}$
E. $-\frac{1}{3}$

[1988-CE-MATHS 2-26]

30. The equation of the straight line perpendicular to $2x + y - 3 = 0$ and passing through $(1, -1)$ is

A. $x + 2y + 1 = 0$.
B. $x - 2y - 3 = 0$.
C. $-x + 2y - 1 = 0$.
D. $2x + y - 1 = 0$.
E. $2x - y - 3 = 0$.

[1989-CE-MATHS 2-28]

31. If the lines $y = mx + b$ and $\frac{x}{a} + \frac{y}{b} = 1$ are perpendicular, find m.

A. $\frac{a}{b}$
B. $\frac{b}{a}$
C. ab
D. $-\frac{a}{b}$
E. $-\frac{b}{a}$

[1990-CE-MATHS 2-28]

32. Let A and B be the points $(4, -7)$ and $(-6, 5)$ respectively. The equation of the line passing through the mid-point of AB and perpendicular to $3x - 4y + 14 = 0$ is

A. $3x - 4y - 1 = 0$.
B. $3x + 4y + 7 = 0$.
C. $4x - 3y + 1 = 0$.
D. $4x + 3y - 7 = 0$.
E. $4x + 3y + 7 = 0$.

[1991-CE-MATHS 2-27]

33. Find the equation of the straight line which passes through $(3, -1)$ and is perpendicular to $2x - y + 1 = 0$.

A. $x + 2y - 1 = 0$
B. $x + 2y + 1 = 0$
C. $x - 2y - 5 = 0$
D. $2x + y - 5 = 0$
E. $2x - y - 7 = 0$

[1996-CE-MATHS 2-31]

34. Which of the following lines is perpendicular to the line $\frac{x}{2} + \frac{y}{3} = 1$?

A. $3x + 2y = 1$
B. $3x - 2y = 1$
C. $2x + 3y = 1$
D. $2x - 3y = 1$
E. $\frac{x}{2} - \frac{y}{3} = 1$

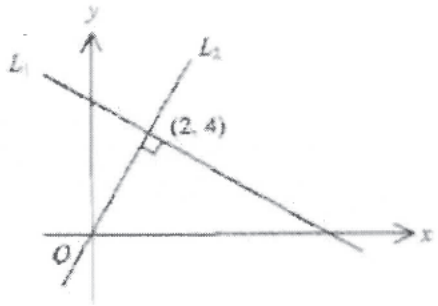
[1997-CE-MATHS 2-22]

35. If the straight lines $2x - 3y + 1 = 0$ and $5x + ky - 1 = 0$ are perpendicular to each other, find k.

A. $-\frac{15}{2}$
B. $-\frac{10}{3}$
C. $\frac{3}{10}$
D. $\frac{10}{3}$
E. $\frac{15}{2}$

[2001-CE-MATHS 2-6]

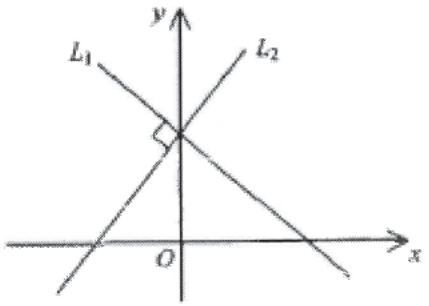
36. In the figure, the straight lines L_1 and L_2 intersect at $(2, 4)$. Find the equation of L_1.



A. $x + 2y = 10$
B. $x - 2y = -6$
C. $2x + y = 8$
D. $2x - y = 0$

[2003-CE-MATHS 2-29]

37.



In the figure, L_1 and L_2 are two straight lines intersecting at a point on the y-axis. If the equation of L_1 is $x + 2y - 2 = 0$, then the equation of L_2 is

A. $2x - y + 1 = 0$.
B. $2x - y - 2 = 0$.
C. $2x + y + 1 = 0$.
D. $2x + y - 2 = 0$.

[2004-CE-MATHS 2-30]

38. If the equation of the straight line L is $x - 2y + 3 = 0$, then the equation of the straight line passing through the point $(2, -1)$ and perpendicular to L is

A. $x + 2y + 3 = 0$.
B. $x + 2y - 3 = 0$.
C. $2x + y + 3 = 0$.
D. $2x + y - 3 = 0$.

[2005-CE-MATHS 2-33]

39. The straight line $4x + y - 2 = 0$ is perpendicular to the straight line

A. $4x + y - 9 = 0$.
B. $4x - y + 9 = 0$.
C. $x + 4y - 9 = 0$.
D. $x - 4y + 9 = 0$.

[2006-CE-MATHS 2-29]

40. Find the equation of the straight line which is perpendicular to the straight line $x + 2y + 3 = 0$ and passes through the point $(1, 3)$.

A. $x + 2y - 7 = 0$
B. $x - 2y + 5 = 0$
C. $2x + y - 5 = 0$
D. $2x - y + 1 = 0$

[2007-CE-MATHS 2-31]

41. The straight line $2x + 7y = 5$ is perpendicular to the straight line

A. $2x + 7y + 5 = 0$.
B. $2x - 7y + 5 = 0$.
C. $7x + 2y + 5 = 0$.
D. $7x - 2y + 5 = 0$.

[2010-CE-MATHS 2-31]

42. If the straight line $x + 3y - 211 = 0$ is perpendicular to the straight line $kx - 3y + 211 = 0$, then $k =$

A. -9.
B. -1.
C. 1.
D. 9.

[2011-CE-MATHS 2-31]

Intersection of Lines

43. 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. $h = -2,\ k = \frac{1}{2}$
C. $h = 1,\ k = 2$
D. $h = -4,\ k = -\frac{1}{2}$
E. $h = -3,\ k = 2$

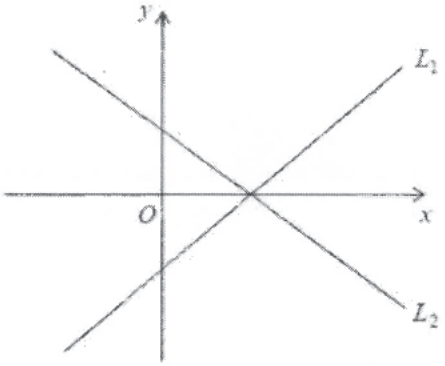
[1987-CE-MATHS 2-28]

44. If the straight lines $x - 2y + 5 = 0$ and $ax - y + 1 = 0$ intersect at $(1, b)$, find a and b.

A. $a = -4,\ b = -3$
B. $a = -1,\ b = 0$
C. $a = 1,\ b = 3$
D. $a = 2,\ b = -3$
E. $a = 2,\ b = 3$

[2001-CE-MATHS 2-33]

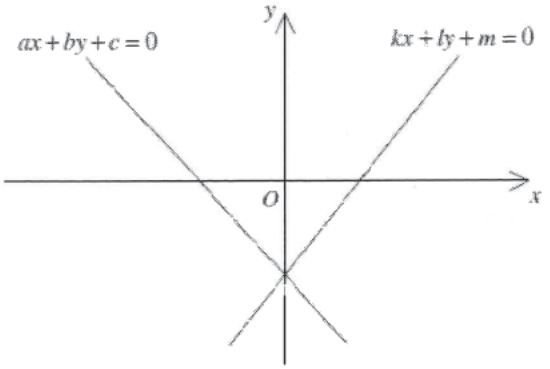
45. In the figure, the straight line $L_1 : y = ax + b$ and the straight line $L_2 : y = cx + d$ intersect at a point on the positive x-axis. Which of the following must be true?



A. $ab > 0$
B. $cd > 0$
C. $ac = bd$
D. $ad = bc$

[2009-CE-MATHS 2-33]

46.



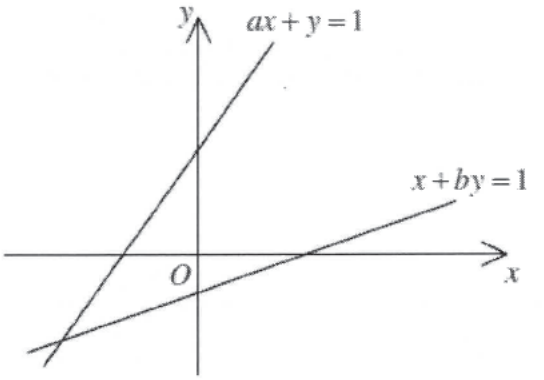
In the figure, the two straight lines intersect at a point on the negative y-axis. Which of the following must be true?

(1) $ac > 0$
(2) $km > 0$
(3) $am = ck$
(4) $bm = cl$

A. (1) and (3) only
B. (1) and (4) only
C. (2) and (3) only
D. (2) and (4) only

[2010-CE-MATHS 2-32]

47. The figure shows the graph of $ax + y = 1$ and the graph of $x + by = 1$. Which of the following is true?



A. $a > 0$
B. $b > 0$
C. $ab < 1$
D. $ab > 1$

[2011-CE-MATHS 2-32]

Division of Points by Lines

48. $A(-4, 2)$ and $B(1, -3)$ are two points. C is a point on the y-axis such that $AC = CB$. Find the coordinates of C.

A. $(-\frac{3}{2}, -\frac{1}{2})$
B. $(-1, 0)$
C. $(1, 0)$
D. $(0, -1)$
E. $(0, 1)$

[1999-CE-MATHS 2-31]

49. $A(-1, -4)$ and $B(3, 4)$ are two points. The line $x - y = 0$ cuts AB at P so that $AP : PB = r : 1$. Find r.

A. 3
B. 2
C. 1
D. $\frac{1}{2}$
E. $\frac{1}{3}$

[2000-CE-MATHS 2-50]

50. $P(-10, -8)$ and $Q(4, 6)$ are two points. If R is a point on the x-axis such that $PR = RQ$, then the coordinates of R are

A. $(-4, 0)$.
B. $(-3, -1)$.
C. $(-3, 0)$.
D. $(-2, 0)$.

[2003-CE-MATHS 2-31]

51. $A(2, 5)$ and $B(6, -3)$ are two points. If P is a point lying on the straight line $x = y$ such that $AP = PB$, then the coordinates of P are

A. $(-2, -2)$.
B. $(-2, 4)$.
C. $(1, 1)$.
D. $(4, 1)$.

[2005-CE-MATHS 2-31]

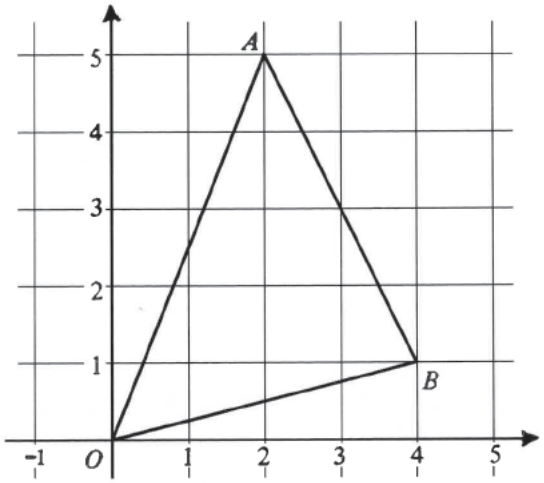
52. The coordinates of the points A and B are $(3, 9)$ and $(7, 1)$ respectively. If P is a point lying on the straight line $y = x + 1$ such that $AP = PB$, then the coordinates of P are

A. $(3, 2)$.
B. $(3, 4)$.
C. $(5, 5)$.
D. $(5, 6)$.

[2009-CE-MATHS 2-31]

Bounded Area

53. In the figure what is the area of ΔOAB?



A. 5
B. 9
C. 15
D. 18
E. 20

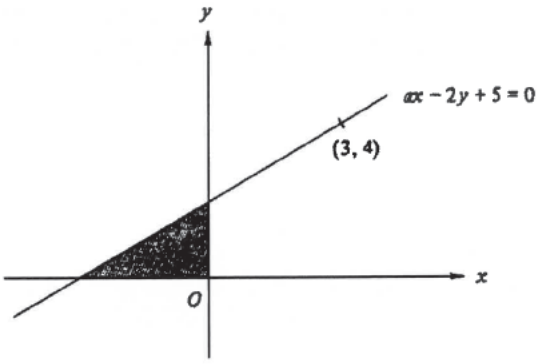
[SP-CE-MATHS 2-41]

54. The area of the triangle enclosed by the line $y = -3x + 12$, the x-axis and the y-axis is

A. 48.
B. 36.
C. 24.
D. 13.
E. 4.

[1978-CE-MATHS 2-45]

55. In the figure, the line $ax - 2y + 5 = 0$ passes through the point $(3, 4)$. What is the area of the shaded part?



A. 6
B. $\frac{25}{4}$
C. 10
D. 12
E. $\frac{25}{2}$

[1989-CE-MATHS 2-29]

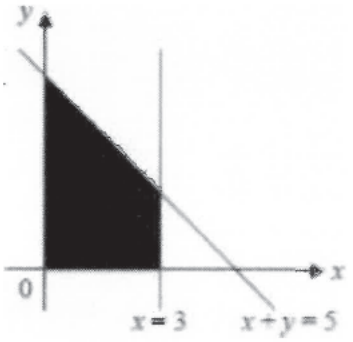
56. $A(0, 0)$, $B(5, 0)$ and $C(2, 6)$ are the vertices of a triangle. $P(9, 5)$, $Q(6, 6)$ and $R(2, -9)$ are three points. Which of the following triangles has/have area(s) greater than the area of ΔABC?

(1) ΔABP
(2) ΔABQ
(3) ΔABR

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

[1993-CE-MATHS 2-28]

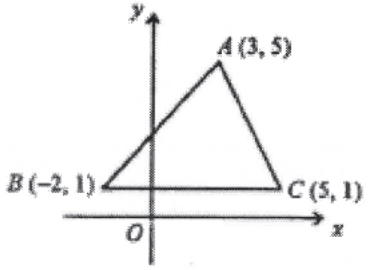
57. In the figure, the shaded part is bounded by the axes, the lines $x = 3$ and $x + y = 5$. Find its area.



A. 10.5
B. 12
C. 15
D. 19.5
E. 21

[1994-CE-MATHS 2-27]

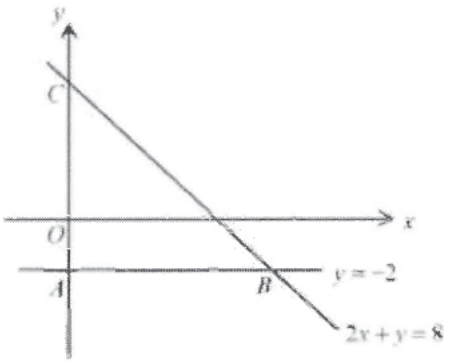
58. In the figure, find the area of ΔABC.



A. 6
B. 7.5
C. 14
D. 17.5
E. 28

[1997-CE-MATHS 2-21]

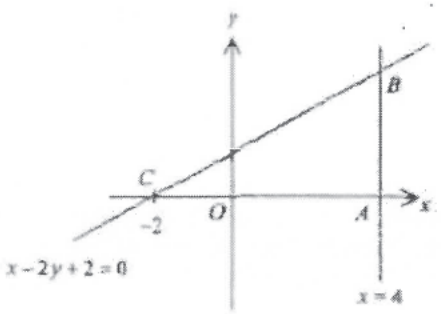
59. In the figure, find the area of ΔABC.



A. 12
B. 15
C. 16
D. 20
E. 25

[2000-CE-MATHS 2-17]

60. In the figure, the area of ΔABC is



A. 3 .
B. 8 .
C. 9 .
D. 18 .

[2002-CE-MATHS 2-32]

Family of Straight Lines

61. $(x + y) + k(x - 3) = 0$ represents a family of straight lines passing through a fixed point. The fixed point is

A. $(3, -3)$.
B. $(3, 0)$.
C. $(3, 3)$.
D. $(-3, 0)$.
E. $(-3, 3)$.

[1979-CE-MATHS 2-52]

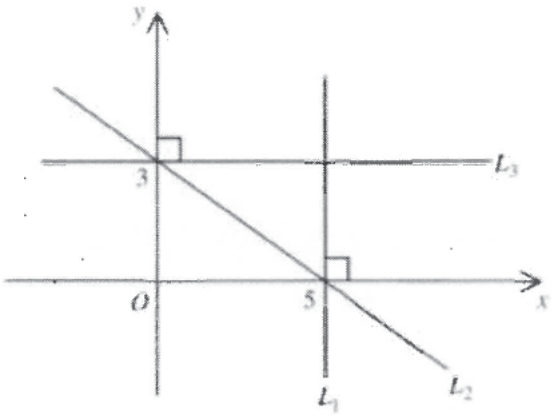
62. If the straight line $2x + y + k = 0$ passes through the point of intersection of the two straight lines $x + y - 3 = 0$ and $x - y + 1 = 0$, find k.

A. –4
B. –2
C. 2
D. 4

[2003-CE-MATHS 2-30]

HKDSE Problems

63.



In the figure, the x-intercepts of the straight lines L_1 and L_2 are 5 while the y-intercepts of the straight lines L_2 and L_3 are 3. Which of the following are true?

(1) The equation of L_1 is $x = 5$.
(2) The slope of L_2 is $\frac{3}{5}$.
(3) The point (2, 3) lies on L_3.

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

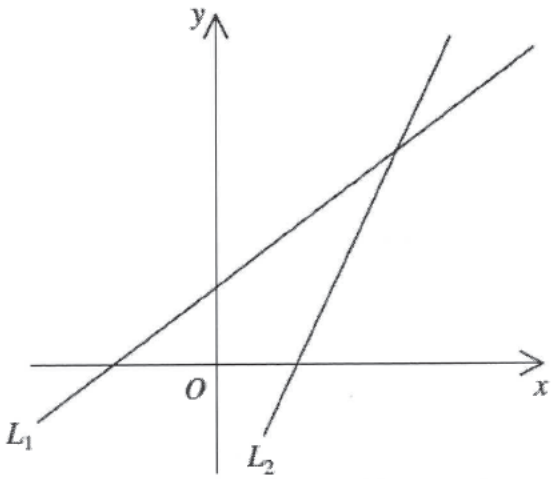
[PP-DSE-MATHS 2-7]

64. The coordinates of the points A and B are (1, –3) and (–5, 7) respectively. If P is a point lying on the straight line $y = x + 2$ such that $AP = PB$, then the coordinates of P are

A. (–2, 0).
B. (–2, 2).
C. (0, 2).
D. (3, 5).

[PP-DSE-MATHS 2-26]

65.



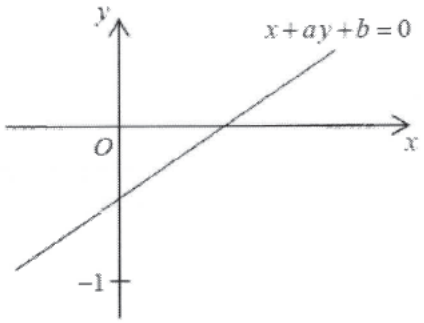
In the figure, the equations of the straight lines L_1 and L_2 are $ax + y = b$ and $cx + y = d$ respectively. Which of the following are true?

(1) $a < 0$
(2) $a < c$
(3) $b > d$
(4) $ad > bc$

A. (1), (2) and (3) only
B. (1), (2) and (4) only
C. (1), (3) and (4) only
D. (2), (3) and (4) only

[2012-DSE-MATHS 2-25]

66.

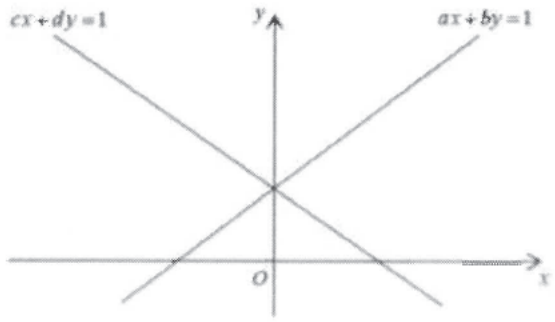


The figure shows the graph of the straight line $x + ay + b = 0$. Which of the following are true?

(1) $a < 0$
(2) $b < 0$
(3) $a < b$

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

[2013-DSE-MATHS 2-14]

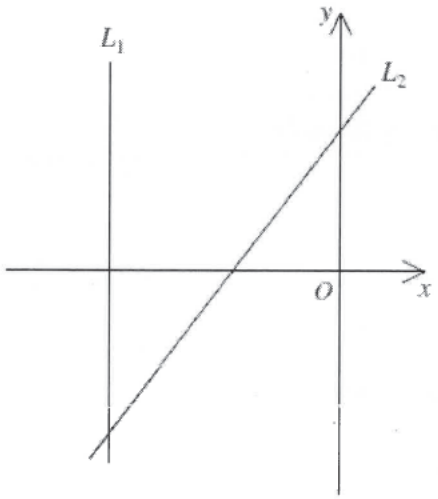
67. 

In the figure, the two straight lines intersect at a point on the positive y-axis. Which of the following are true?

(1) $a < 0$
(2) $c > 0$
(3) $b = d$

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

[2014-DSE-MATHS 2-25]

68. 

In the figure, the equations of the straight lines L_1 and L_2 are $ax = 1$ and $bx + cy = 1$ respectively. Which of the following are true?

(1) $a < 0$
(2) $a < b$
(3) $c > 0$

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

[2015-DSE-MATHS 2-25]

69. If the straight lines $hx + ky + 15 = 0$ and $4x + 3y - 5 = 0$ are perpendicular to each other and intersect at a point on the x-axis, then k =

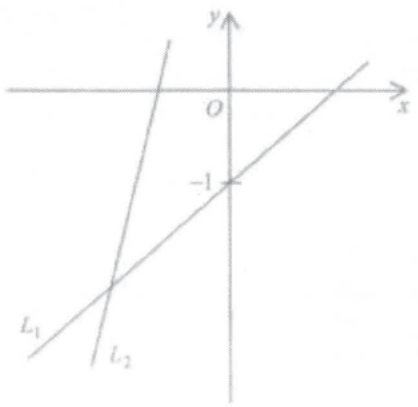
A. -12.
B. -4.
C. 3.
D. 16.

[2016-DSE-MATHS 2-25]

70. The coordinates of the points A and B are $(9, -2)$ and $(-1, 8)$ respectively. If C is a point lying on the straight line $x - 2y = 0$ such that $AC = BC$, then the x-coordinate of C is

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

[2016-DSE-MATHS 2-26]

71. 

In the figure, the equations of the straight lines L_1 and L_2 are $x + my = n$ and $x + py = q$ respectively. Which of the following are true?

(1) $m < p$
(2) $n > q$
(3) $n + m < p + q$

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

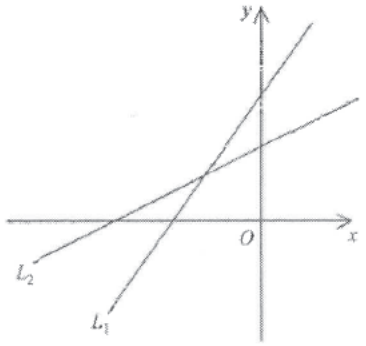
[2017-DSE-MATHS 2-23]

72. The straight line L is perpendicular to the straight line $9x - 5y + 45 = 0$. If the x-intercept of L is -3, then the equation of L is

A. $5x + 9y + 15 = 0$.
B. $5x + 9y + 27 = 0$.
C. $9x - 5y + 15 = 0$.
D. $9x - 5y + 27 = 0$.

[2017-DSE-MATHS 2-24]

73. In the figure, the equations of the straight line L_1 and L_2 are $3x + ay = b$ and $cx + y = d$ respectively. Which of the following is/are true?



I. $ac < 3$
II. $ad < b$
III. $bc < 3d$

A. II only
B. III only
C. I and II only
D. I and III only

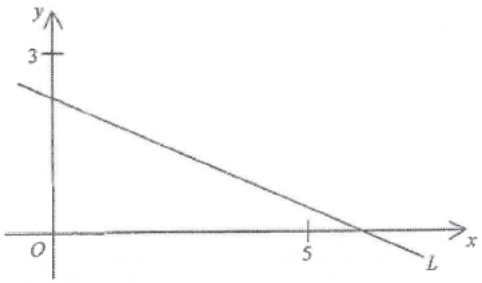
[2018-DSE-MATHS 2-6]

74. The equation of the straight line L_1 is $4x + 3y - 36 = 0$. The straight line L_2 is perpendicular to L_1 and intersects L_1 at a point lying on the y-axis. Find the area of the region bounded by L_1, L_2 and the x-axis.

A. 96
B. 108
C. 150
D. 192

[2018-DSE-MATHS 2-26]

75. In the figure, the equation of straight line L is $ax + by + 15 = 0$. Which of the following area true?



I. $a > b$
II. $a > -3$
III. $b > -5$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

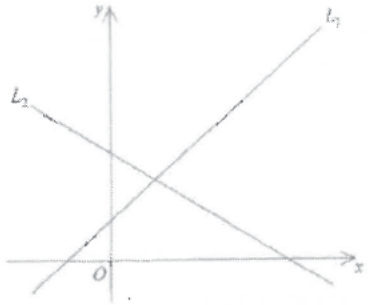
[2019-DSE-MATHS 2-23]

76. Find the constant k such that the straight line $3x + 2y + k = 0$ and $kx + 12y - 6 = 0$ are perpendicular to each other.

A. -8
B. -4
C. 4
D. 8

[2019-DSE-MATHS 2-24]

77. In the figure, the equations of the straight line L_1 and L_2 are $x + ay + b = 0$ and $bx + y + c = 0$ respectively. Which of the following are true?



I. $c < 0$
II. $ab < 1$
III. $ac < b$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

[2020-DSE-MATHS 2-8]

78. The equation of the straight line L is $kx + 4y - 2k = 0$, where k is a constant. If L is perpendicular to the straight line $6x - 9y + 4 = 0$, find the y-intercept of L.

A. -3
B. -2
C. 2
D. 3

[2020-DSE-MATHS 2-26]

1. Two circles are given by:

$x^2 + y^2 - 8x - 2y - 7 = 0$,
$x^2 + y^2 + 8x + 2y + 7 = 0$.

Which of the following is/are correct?

(1) The circles have the same centre.
(2) The circles have equal radius.
(3) The circles pass through the origin.

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. None of (1), (2) nor (3)

[1977-CE-MATHS 2-39]

2. Which of the following points is the centre of the circle $x^2 + y^2 + 6x + 8y - 100 = 0$?

A. (0, 0)
B. (3, 4)
C. (6, 8)
D. (–3, –4)
E. (–6, –8)

[SP-CE-MATHS 2-44]

3. A circle, whose centre is (a, b), passes through the origin. Its equation is

A. $x^2 + y^2 + ax + by = 0$.
B. $x^2 + y^2 - ax - by = 0$.
C. $x^2 + y^2 + 2ax + 2by = 0$.
D. $x^2 + y^2 - 2ax - 2by = 0$.
E. $x^2 + y^2 - 2ax - 2by + a^2 + b^2 = 0$.

[1979-CE-MATHS 2-19]

4. A circle has its centre at (3, 4) and passes through the 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. $x^2 + y^2 - 6x - 8y + 25 = 0$.

[1983-CE-MATHS 2-28]

5. The line $x + y + k = 0$ (k being a constant) passes through the centre of the circle $x^2 + y^2 - 2x + 4y - 6 = 0$. $k =$

A. –2.
B. –1.
C. 0.
D. 1.
E. 2.

[1984-CE-MATHS 2-27]

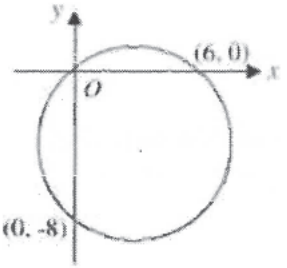
6. The equation of a circle is $x^2 + y^2 - 2x + 5y - 7 = 0$. Which of the following is/are true?

(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)

[1984-CE-MATHS 2-28]

7. 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. $x^2 + y^2 - 6x - 8y = 0$.

[1985-CE-MATHS 2-28]

8. The equation of a circle is $x^2 + y^2 - 4x - 5 = 0$. Which of the following is/are true?

(1) The circle passes through the origin.
(2) The centre lies on the x-axis.
(3) The line $x - 5 = 0$ touches the circle.

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

[1985-CE-MATHS 2-29]

9. 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. $x^2 + y^2 + 2xy + 7y - 1 = 0$

[1986-CE-MATHS 2-21]

10. 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

[1987-CE-MATHS 2-26]

11. 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

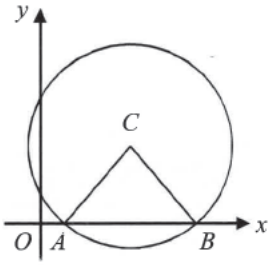
[1987-CE-MATHS 2-27]

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

[1988-CE-MATHS 2-27]

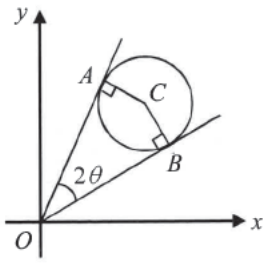
13. In the figure, C is the centre of the circle $x^2+y^2-8x-7y+12=0$. If the circle cuts the x-axis at A and B, find the area of ΔCAB.



A. $\frac{7}{4}$
B. $\frac{7}{2}$
C. 7
D. 8
E. 14

[1989-CE-MATHS 2-30]

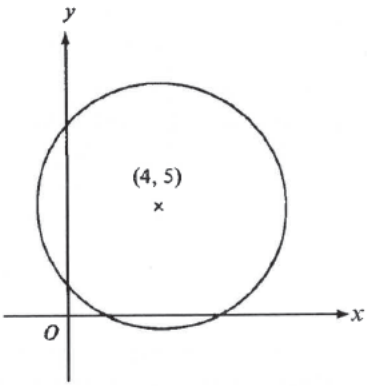
14. In the figure, C is the centre of the circle $x^2+y^2-6x-8y+21=0$. OA and OB are tangents. If $\angle AOB=2\theta$, find $\sin\theta$.



A. $\frac{\sqrt{21}}{5}$
B. $\frac{4}{5}$
C. $\frac{3}{5}$
D. $\frac{2}{\sqrt{21}}$
E. $\frac{2}{5}$

[1989-CE-MATHS 2-31]

15. In the figure, a circle cuts the x-axis at two points 6 units apart. If the circle has centre $(4, 5)$, then its equation is



A. $(x-4)^2+(y-5)^2=25$.
B. $(x-4)^2+(y-5)^2=34$.
C. $(x-4)^2+(y-5)^2=52$.
D. $(x+4)^2+(y+5)^2=34$.
E. $(x+4)^2+(y+5)^2=25$.

[1990-CE-MATHS 2-30]

16. The circle $x^2+y^2+4x+ky+4=0$ passes through the point $(1, 3)$. The radius of the circle is

A. $\sqrt{68}$.
B. $\sqrt{48}$.
C. $\sqrt{17}$.
D. 6.
E. 3.

[1991-CE-MATHS 2-26]

17. If $0 < k < h$, which of the following circles intersect(s) the y-axis?

(1) $(x-h)^2 + (y-k)^2 = k^2$
(2) $(x-h)^2 + (y-k)^2 = h^2$
(3) $(x-h)^2 + (y-k)^2 = h^2 + k^2$

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

[1992-CE-MATHS 2-29]

18. If the line $y = mx + 3$ divides the circle $x^2 + y^2 - 4x - 2y - 5 = 0$ into two equal parts, find m.

A. $-\frac{1}{4}$
B. -1
C. 0
D. $\frac{5}{4}$
E. 2

[1992-CE-MATHS 2-30]

19. A circle of radius 1 touches both the positive x-axis and the positive y-axis. Which of the following is/are true?

(1) Its centre is in the first quadrant.
(2) Its centre lies on the line $x - y = 0$.
(3) Its centre lies on the line $x + y = 1$.

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

[1993-CE-MATHS 2-29]

20. What is the area of the circle $x^2 + y^2 - 10x + 6y - 2 = 0$?

A. 32π
B. 34π
C. 36π
D. 134π
E. 138π

[1993-CE-MATHS 2-30]

21. AB is a diameter of the circle $x^2 + y^2 - 2x - 2y - 18 = 0$. If A is $(3, 5)$, then B is

A. $(2, 3)$.
B. $(1, -1)$.
C. $(-1, -3)$.
D. $(-5, -7)$.
E. $(-7, -9)$.

[1994-CE-MATHS 2-28]

22. The equations of two circles are

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

Which of the following is/are true?

(1) The two circles have the same centre.
(2) The two circles have equal radii.
(3) The two circles pass through the origin.

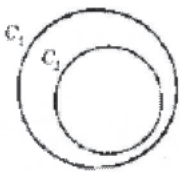
A. (1) only
B. (2) only
C. (3) only
D. (1) and (3) only
E. (2) and (3) only

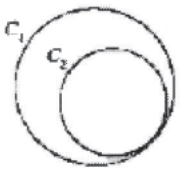
[1994-CE-MATHS 2-29]

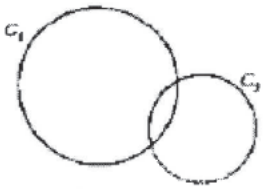
23. The table below shows the centres and the radii of two circles C_1 and C_2.

	centre	radius
C_1	$(2, 2)$	3
C_2	$(5, -2)$	2

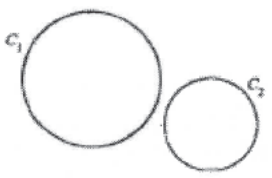
Which of the following may represent the relative positions of C_1 and C_2?

A.


B.


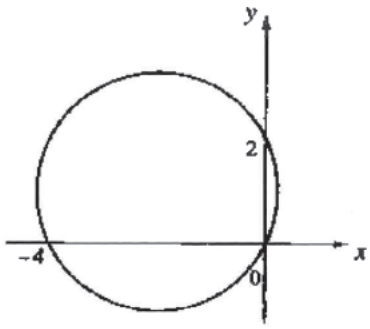
C.


D.


E.


[1995-CE-MATHS 2-29]

24. In the figure, the equation of the circle is



A. $x^2 + y^2 - 5 = 0$.
B. $x^2 + y^2 - 2x + y = 0$.
C. $x^2 + y^2 + 2x - y = 0$.
D. $x^2 + y^2 - 4x + 2y = 0$.
E. $x^2 + y^2 + 4x - 2y = 0$.

[1995-CE-MATHS 2-30]

25. The equation of the circle centred at (a, b) and tangential to the x-axis is

A. $x^2 + y^2 - 2ax - 2by + a^2 = 0$.
B. $x^2 + y^2 - 2ax - 2by + b^2 = 0$.
C. $x^2 + y^2 - 2ax - 2by + a^2 + b^2 = 0$.
D. $x^2 + y^2 + 2ax + 2by + a^2 = 0$.
E. $x^2 + y^2 + 2ax + 2by + b^2 = 0$.

[1996-CE-MATHS 2-30]

26. C_1: $x^2 + y^2 = 4$ and C_2: $x^2 + y^2 = 9$ are two circles. A chord AB of C_2 touches C_1. Find the length of AB.

A. $\sqrt{5}$
B. $2\sqrt{5}$
C. $\sqrt{65}$
D. $2\sqrt{65}$
E. 10

[1996-CE-MATHS 2-54]

27. The equation of a circle is given by $x^2 + y^2 - 4x + 6y - 3 = 0$. Which of the following statements is/are true?

(1) The centre of the circle is $(-2, 3)$.
(2) The radius of the circle is 4.
(3) The origin is inside the circle.

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

[1997-CE-MATHS 2-45]

28. A circle has $(a, 0)$ and $(0, b)$ as the end points of a diameter. Which of the following points lie(s) on this circle?

(1) $(-a, -b)$
(2) $(0, 0)$
(3) (a, b)

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

[1997-CE-MATHS 2-46]

29. The circle $x^2 + y^2 - 2x - 7y - 8 = 0$ intersects the x-axis at A and B. Find the length of AB.

A. 2
B. 6
C. 7
D. 9
E. $\sqrt{85}$

[1998-CE-MATHS 2-52]

30. The equations of two circles are

$x^2 + y^2 + ax - by = 0$ and
$x^2 + y^2 - ax + by = 0$.

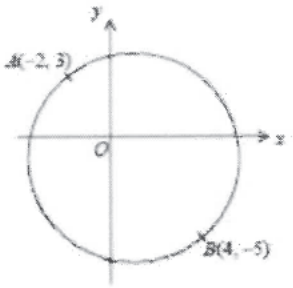
Which of the following must be true?

(1) The two circles have the same centre.
(2) The two circles have equal radii.
(3) The line joining the centres of the two circles passing through the origin.

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

[1998-CE-MATHS 2-53]

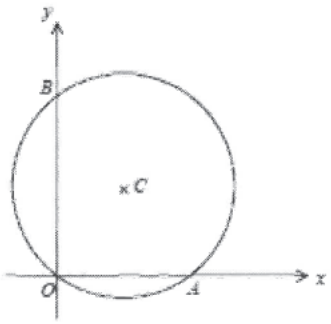
31. In the figure, find the equation of the circle with AB as a diameter.



A. $x^2 + y^2 - 2x + 2y - 23 = 0$
B. $x^2 + y^2 - 2x + 2y - 3 = 0$
C. $x^2 + y^2 + 2x - 2y - 23 = 0$
D. $x^2 + y^2 + 2x - 2y - 3 = 0$
E. $x^2 + y^2 - 25 = 0$

[1999-CE-MATHS 2-51]

32.



The figure shows a circle centred at C and passing through $O(0, 0)$, $A(6, 0)$ and $B(0, 8)$. Which of the following must be true?

(1) C lies on the line $\frac{x}{6} + \frac{y}{8} = 1$.
(2) The radius of the circle is 10.
(3) OC is perpendicular to AB.

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

[1999-CE-MATHS 2-52]

33. Two circles with equations $(x+1)^2 + (y+1)^2 = 25$ and $(x-11)^2 + (y-8)^2 = 100$ touch each other externally at a point P. Find the coordinates of P.

A. $(-3, -2)$
B. $(\frac{7}{5}, \frac{4}{5})$
C. $(3, 2)$
D. $(5, \frac{7}{2})$
E. $(7, 5)$

[1999-CE-MATHS 2-53]

34. If the centre of the circle $x^2 + y^2 + kx + (k+1)y - 3 = 0$ lies on $x + y + 1 = 0$, find k.

A. $\frac{3}{2}$
B. $\frac{1}{2}$
C. 0
D. -1
E. $-\frac{3}{2}$

[2000-CE-MATHS 2-48]

35. If the straight line $y = mx + 1$ is tangent to the circle $(x-2)^2 + y^2 = 1$, then $m =$

A. $-\frac{4}{3}$.
B. 0.
C. $\frac{4}{3}$.
D. 0 or $-\frac{4}{3}$.
E. 0 or $\frac{4}{3}$.

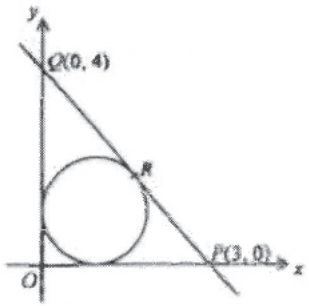
[2000-CE-MATHS 2-49]

36. Consider the circle $x^2 + y^2 - 8x - 6y + 21 = 0$. Find the equation of the chord whose mid-point is $(5, 2)$.

A. $9x + 5y - 55 = 0$
B. $3x + 4y - 23 = 0$
C. $x + y - 7 = 0$
D. $x - y + 3 = 0$
E. $x - y - 3 = 0$

[2001-CE-MATHS 2-53]

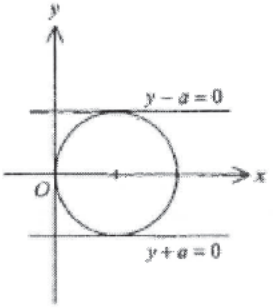
37. In the figure, the inscribed circle of ΔOPQ touches PQ at R. Find the coordinates of R.



A. $\left(\frac{3}{2}, 2\right)$
B. $\left(\frac{6}{5}, \frac{12}{5}\right)$
C. $\left(\frac{9}{5}, \frac{8}{5}\right)$
D. $\left(\frac{9}{7}, \frac{16}{7}\right)$
E. $\left(\frac{12}{7}, \frac{12}{7}\right)$

[2001-CE-MATHS 2-54]

38. In the figure, $x = 0$, $y - a = 0$ and $y + a = 0$ are tangents to the circle. The equation of the circle is



A. $x^2 + y^2 = a^2$.
B. $x^2 + y^2 - 2ax = 0$.
C. $x^2 + y^2 - 2ay = 0$.
D. $x^2 + y^2 + 2ax + 2ay + a^2 = 0$.

[2002-CE-MATHS 2-52]

39. The equation of a circle is given by $(x-a)^2 + (y+b)^2 = a^2 + b^2$, where $a > 0$ and $b > 0$. Which of the following must be true?

(1) The centre of the circle is $(a, -b)$.
(2) The circle passes through the origin.
(3) The circle cuts the x-axis at two distinct points.

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

[2002-CE-MATHS 2-53]

40. The circle $(x-4)^2 + y^2 = 36$ intersects the positive x-axis and positive y-axis at A and B respectively. Find AB.

A. $\sqrt{30}$
B. $2\sqrt{30}$
C. $\sqrt{34}$
D. $2\sqrt{34}$

[2003-CE-MATHS 2-54]

41. If the straight line $x + y - 3 = 0$ divides the circle $x^2 + y^2 + 2x - ky - 4 = 0$ into two equal parts, then $k =$

A. -4.
B. 4.
C. -8.
D. 8.

[2004-CE-MATHS 2-52]

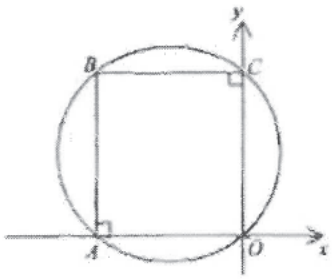
42. The equation of a circle is $x^2 + y^2 - 4x + 2y + 1 = 0$. Which of the following is/are true?

(1) The circle touches the y-axis.
(2) The origin lies outside the circle.
(3) The centre of the circle lies in the second quadrant.

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

[2004-CE-MATHS 2-53]

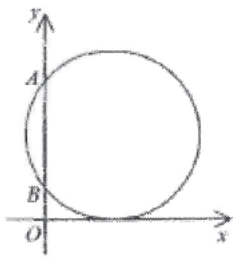
43. In the figure, O is the origin. If the equation of the circle passing through O, A, B and C is $(x+3)^2 + (y-4)^2 = 25$, then the area of the rectangle $OABC$ is



A. 36.
B. 48.
C. 50.
D. 64.

[2005-CE-MATHS 2-53]

44. In the figure, the circle passing through $A(0, 8)$ and $B(0, 2)$ touches the positive x-axis. The equation of the circle is



A. $x^2 + y^2 - 8x - 10y + 16 = 0$.
B. $x^2 + y^2 + 8x + 10y + 16 = 0$.
C. $x^2 + y^2 - 10x - 10y + 16 = 0$.
D. $x^2 + y^2 + 10x + 10y + 16 = 0$.

[2005-CE-MATHS 2-54]

45. Consider the circle $x^2 + y^2 - 4x + 6y - 40 = 0$. Find the slope of the diameter passing through the point $(1, 2)$.

A. -5
B. -3
C. $\frac{-1}{3}$
D. $\frac{-1}{5}$

[2006-CE-MATHS 2-50]

46. A circle C cuts the y-axis at A and B. If $AB = 8$ and the coordinates of the centre of C are $(-3, 5)$, then the equation of C is

A. $x^2 + y^2 + 6x - 10y = 0$.
B. $x^2 + y^2 - 6x + 10y = 0$.
C. $x^2 + y^2 + 6x - 10y + 9 = 0$.
D. $x^2 + y^2 - 6x + 10y + 9 = 0$.

[2006-CE-MATHS 2-51]

47. A circle C touches the y-axis. If the coordinates of the centre of C are $(-3, 4)$, then the equation of C is

A. $(x-3)^2 + (y+4)^2 = 9$.
B. $(x-3)^2 + (y+4)^2 = 16$.
C. $(x+3)^2 + (y-4)^2 = 9$.
D. $(x+3)^2 + (y-4)^2 = 16$.

[2007-CE-MATHS 2-51]

48. Let a be a constant. If the circle $x^2 + y^2 + ax - 6y - 3 = 0$ passes through the point $(-2, 3)$, then the area of the circle is

A. 8π.
B. 10π.
C. 16π.
D. 55π.

[2007-CE-MATHS 2-52]

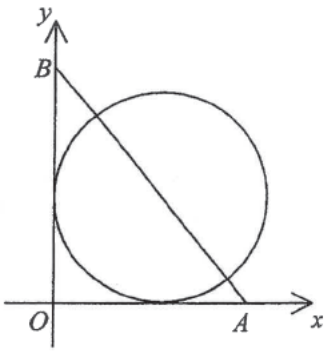
49. The equation of a circle is $x^2 + y^2 - 4x - 8y + 11 = 0$. Which of the following are true?

(1) The coordinates of the centre of the circle are $(2, 4)$.
(2) The radius of the circle is 3.
(3) The origin lies outside the circle.

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

[2008-CE-MATHS 2-53]

50. In the figure, the circle touches the positive x-axis and the positive y-axis. The coordinates of the points A and B are $(21, 0)$ and $(0, 28)$ respectively. If AB passes through the centre of the circle, find the equation of the circle.



A. $x^2 + y^2 - 12x - 12y + 36 = 0$
B. $x^2 + y^2 - 21x - 28y + 196 = 0$
C. $x^2 + y^2 - 24x - 24y + 144 = 0$
D. $x^2 + y^2 - 42x - 56y + 441 = 0$

[2009-CE-MATHS 2-53]

51. Let O be the origin. If A and B are points lying on the x-axis and the y-axis respectively such that the equation of the circumcircle of ΔOAB is $x^2 + y^2 - 16x - 12y = 0$, then the equation of the straight line passing through A and B is

A. $3x + 4y - 48 = 0$.
B. $3x + 4y + 48 = 0$.
C. $4x + 3y - 48 = 0$.
D. $4x + 3y + 48 = 0$.

[2010-CE-MATHS 2-51]

52. A circle cuts the x-axis at P and Q such that $PQ = 6$. If the coordinates of the centre of the circle are $(-5, 2)$, find the equation of the circle.

A. $x^2 + y^2 - 10x + 4y - 5 = 0$
B. $x^2 + y^2 - 10x + 4y + 16 = 0$
C. $x^2 + y^2 + 10x - 4y - 5 = 0$
D. $x^2 + y^2 + 10x - 4y + 16 = 0$

[2010-CE-MATHS 2-52]

53. A circle C touches the x-axis and passes through the point $(-3, 1)$. If the centre of C lies on the y-axis, then the equation of C is

A. $x^2 + y^2 - 5y = 0$.
B. $x^2 + y^2 - 10y = 0$.
C. $x^2 + y^2 + 3x - y = 0$.
D. $x^2 + y^2 + 6x - 2y + 10 = 0$.

[2011-CE-MATHS 2-51]

HKDSE Problems

54. The equation of a circle is $2x^2 + 2y^2 + 8x - 12y + 3 = 0$. Which of the following are true?

(1) The coordinates of the centre of the circle are $(-2, 3)$.
(2) The radius of the circle is 7.
(3) The point $(2, 3)$ lies outside the circle.

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

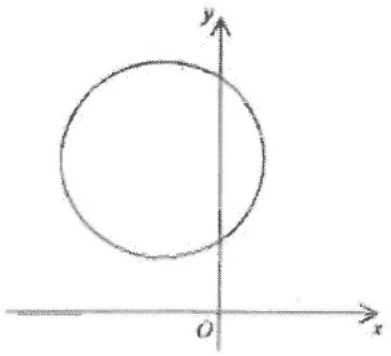
[PP-DSE-MATHS 2-27]

55. If the straight line $x - y = 0$ and the circle $x^2 + y^2 + 6x + ky - k = 0$ do not intersect with each other, find the range of values of k.

A. $2 < k < 18$
B. $-18 < k < -2$
C. $k < 2$ or $k > 18$
D. $k < -18$ or $k > -2$

[PP-DSE-MATHS 2-41]

56.



In the figure, the radius of the circle and the coordinates of the centre are r and (h, k) respectively. Which of the following are true?

(1) $h + k > 0$
(2) $r - h > 0$
(3) $r - k > 0$

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

[2012-DSE-MATHS 2-26]

57. Find the range of values of k such that the circle $x^2 + y^2 + 2x - 4y - 13 = 0$ and the straight line $x - y + k = 0$ intersect at two distinct points.

A. $-9 < k < 3$
B. $-3 < k < 9$
C. $k < -9$ or $k > 3$
D. $k < -3$ or $k > 9$

[2012-DSE-MATHS 2-42]

58. The equation of the circle C is $2x^2 + 2y^2 - 4x + 8y - 5 = 0$. The coordinates of the points P and Q are $(-1, 2)$ and $(4, 0)$ respectively. Which of the following is/are true?

(1) The radius of C is 5.
(2) The mid-point of PQ lies outside C.
(3) If G is the centre of C, then $\angle PGQ$ is an acute angle.

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

[2013-DSE-MATHS 2-25]

59. Find the range of values of k such that the circle $x^2 + y^2 + 2x - 2y - 7 = 0$ and the straight line $3x - 4y + k = 0$ intersect.

A. $-8 < k < 22$
B. $-8 \le k \le 22$
C. $k < -22$ or $k > 8$
D. $k \le -22$ or $k \ge 8$

[2013-DSE-MATHS 2-42]

60. If a diameter of the circle $x^2 + y^2 - 8x + ky - 214 = 0$ passes through the point $(6, -5)$ and the slope of the diameter is -4, then $k =$

A. -6.
B. -4.
C. 13.
D. 70.

[2014-DSE-MATHS 2-26]

61. If the straight line $x - y = k$ and the circle $x^2 + y^2 + 2x - 4y - 1 = 0$ intersect at A and B, then the x-coordinate of the mid-point of AB is

A. $1 + k$.
B. $1 - k$.
C. $\frac{1+k}{2}$.
D. $\frac{1-k}{2}$.

[2014-DSE-MATHS 2-42]

62. A circle C passes through the point $(0, 3)$. If the coordinates of the centre of C are $(-4, 3)$, then the equation of C is

A. $x^2 + y^2 - 8x + 6y + 9 = 0$.
B. $x^2 + y^2 - 8x + 6y + 16 = 0$.
C. $x^2 + y^2 + 8x - 6y + 9 = 0$.
D. $x^2 + y^2 + 8x - 6y + 16 = 0$.

[2015-DSE-MATHS 2-26]

63. Find the constant k such that the circle $x^2 + y^2 + 2x - 6y + k = 0$ and the straight line $x + y + 4 = 0$ intersect at only one point.

A. -16
B. -8
C. 8
D. 16

[2015-DSE-MATHS 2-41]

64. The equation of the circle C is $3x^2 + 3y^2 - 12x + 30y + 65 = 0$. Which of the following are true?

(1) The radius of C is 14.
(2) The origin lies outside C.
(3) The coordinates of the centre of C are $(2, -5)$.

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

[2016-DSE-MATHS 2-27]

65. The straight line $2x - y - 6 = 0$ and the circle $x^2 + y^2 - 8y - 14 = 0$ intersect at P and Q. Find the y-coordinate of the mid-point of PQ.

A. -4
B. -2
C. 2
D. 4

[2016-DSE-MATHS 2-41]

66. The equations of the circles C_1 and C_2 are $x^2 + y^2 + 8x - 4y - 5 = 0$ and $2x^2 + 2y^2 + 8x - 4y - 5 = 0$ respectively. Let G_1 and G_2 be the centres of C_1 and C_2 respectively. Denote the origin by O. Which of the following is/are true?

(1) G_1, G_2 and O are collinear.
(2) The radii of C_1 and C_2 are equal.
(3) O is equidistant from G_1 and G_2.

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

[2017-DSE-MATHS 2-26]

67. The equation of the circle C is $5x^2 + 5y^2 - 30x + 10y + 6 = 0$. Which of the following is true?

A. The origin lies inside C.
B. C lies in the second quadrant.
C. The circumference of C is less than
D. The coordinates of the centre of C are $(15,-5)$

[2018-DSE-MATHS 2-27]

68. Denote the circle $2x^2 + 2y^x + 4x - 12y + 15 = 0$ by C. Which of the following is/are true?

I. The area of C is 25π.
II. The point $(-3,3)$ lies outside C.
III. The centre of C lies in the fourth quadrant.

A. I only
B. II only
C. I and III only
D. II and III only

[2019-DSE-MATHS 2-27]

69. Let k be a constant. The straight line $3x - y - 2 = 0$ and the circle $5x^2 + 5y^2 + kx + 4y - 20 = 0$ intersect at the points P and Q. If the x-coordinates of the mid-point of PQ is 2, find k.

A. -152
B. -52
C. 148
D. 248

[2019-DSE-MATHS 2-37]

70. The equations of the circles C_1 and C_2 are $2x^2 + 2y^2 + 4x + 8y - 149 = 0$ and $x^2 + y^2 - 8x - 20y - 53 = 0$ respectively. Which of the following is/are true?

I. The centre of C_1 lies on C_2.
II. The radii of C_1 and C_2 are equal.
III. C_1 and C_2 intersect at two distinct points.

A. I only
B. II only
C. I and III only
D. II and III only

[2020-DSE-MATHS 2-27]

71. Find the range of values of c such that the circle $x^2 + y^2 - 6x + cy - 7 = 0$ and the straight line $x - y + 9 = 0$ intersect.

A. $-56 \leq c \leq 8$
B. $-8 \leq c \leq 56$
C. $c \leq -56$ or $c \geq 8$
D. $c \leq -8$ or $c \geq 56$

[2020-DSE-MATHS 2-41]