

1. Nov 2025 paper 11 question 10

A circle has equation $x^2 + y^2 + 4y - 21 = 0$ and a straight line has equation $2x + y - 8 = 0$. The line intersects the circle at two points.

(a) Find the coordinates of these two points of intersection.

[4]

[illegible]

- (b) The circle has centre C and the two points of intersection are denoted by A and B .

Find the area of the triangle ABC .

[3]

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2. Nov 2025 paper 12 question 7

The coordinates of the points P and Q are $(1, 1)$ and $(7, 11)$ respectively. The line segment PQ forms a diameter of a circle.

- (a) Find the equation of the circle. [4]

[illegible]

- (b) Find the equation of the tangent to the circle at the point Q . [3]

[illegible]

- (c) The other point on the circle with x -coordinate 7 is R .

Find the coordinates of the point of intersection of the tangent at Q with the tangent at R . [4]

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3. Nov 2025 paper 13 question 8

The points $(6, 1)$ and $(-2, 7)$ lie at the opposite ends of a diameter of a circle.

- (a) Find the equation of the circle. [3]

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- (b) There are two tangents to the circle which have gradient $-\frac{1}{2}$.

Find the exact values of the x -coordinates of the points at which these tangents touch the circle.
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4. Nov 2025 paper 15 question 1

A circle has centre $(2, 6)$ and radius 10.

- (a) State the equation of the circle. [2]

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- (b) The circle passes through the point $(8, k)$.

Find the two possible values of k .

[3]

[illegible]

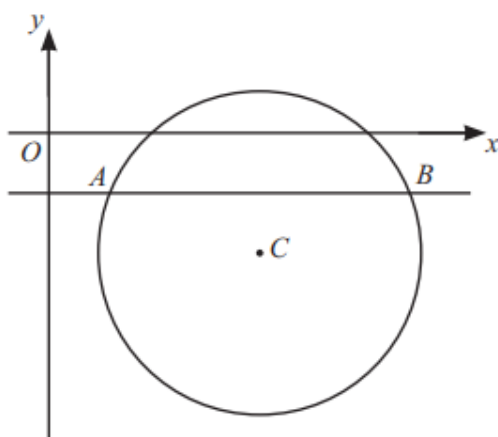
5. Nov 2025 paper 11 question 8

The circle with equation $x^2 + y^2 - 6x + 10y - 27 = 0$ intersects the line $x = -2$ at the points P and Q .

Find the area of the triangle formed by the tangents to the circle at P and Q , and the line $x = -2$. [8]

[illegible]

6. May 2025 paper 12 question 8



The diagram shows the circle with equation $x^2 + y^2 - 14x + 8y + 36 = 0$ and the line $y = -2$. The line intersects the circle at the points A and B . The centre of the circle is C .

(a) Find the coordinates of A , B and C .

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- (b) Find the angle ACB in radians. Give your answer correct to 3 significant figures. [2]

[illegible]

- (c) The chord AB divides the circle into two segments.

Find the area of the larger segment.

[4]

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7. May 2025 paper 13 question 9

Three points P , Q and R have coordinates $P(-13, 5)$, $Q(5, 1)$ and $R(2, k)$, where k is a constant. It is given that the angle PRQ is a right angle.

- (a) Show that one of the possible values of k is 10, and find the other possible value. [4]

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- (b) It is now given that $k = 10$. A circle passes through the points P , Q and R .

Find the equation of the tangent to the circle at R . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. [5]

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- (b) Find $\frac{d^2y}{dx^2}$ and hence determine the nature of each stationary point. [3]

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- (c) The curve C is transformed to the curve C_1 using a translation of $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$ followed by reflection in the x -axis.

- (i) State the coordinates of the maximum point of C_1 . [1]

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- (ii) Find the equation of C_1 in the form $y = \frac{a}{bx+c} + dx + e$, where a , b , c , d and e are integers. [3]

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8. May 2025 paper 15 question 7

In the parallelogram $ABCD$, the coordinates of A are $(3, 7)$, the coordinates of B are $(6, p)$ and the coordinates of D are $(1, p)$. It is given that the gradient of AB is $-\frac{2}{3}$.

- (a) Find the value of p . [2]

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(b) Find the coordinates of C . [2]

[2]

[illegible]

(c) Find the area of the triangle formed by the perpendicular bisector of AB and the x - and y -axes. [5]

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9. May 2025 paper15 question 10

The equation of a circle is $x^2 + y^2 + 4x - 8y - 12 = 0$.

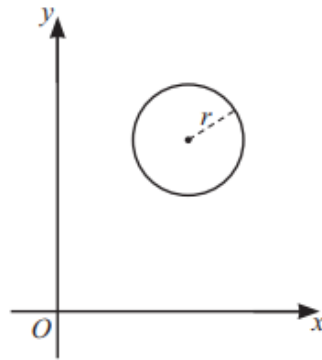
- (a) Find an equation of the tangent to the circle at the point $(2, 8)$, giving your answer in the form $ax + by + c = 0$. [4]

[illegible]

(b) Given that the line $x + 3y = k$ does **not** intersect the circle, show that $k^2 - 20k - 220 > 0$. [5]

[illegible]

10. March 2025 paper 12 question 6



The diagram shows a circle C of radius r , where $x > 0$ and $y > 0$ for all points on C . The least distance between any point on C and the x -axis is 8 units, and the least distance between any point on C and the y -axis is 5 units.

- (a) State the coordinates of the centre of the circle in terms of r . [1]

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- (b) Given that the distance between the origin and the centre of the circle is 15 units, find the value of r . [3]

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- (c) The point on the circle furthest from the origin is denoted by P .

Find the gradient of the tangent to the circle at P . [2]

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11. Nov 2024 paper 11 question 6

Circles C_1 and C_2 have equations

$$x^2 + y^2 + 6x - 10y + 18 = 0 \quad \text{and} \quad (x-9)^2 + (y+4)^2 - 64 = 0$$

respectively.

(a) Find the distance between the centres of the circles.

[4]

[illegible]

P and Q are points on C_1 and C_2 respectively. The distance between P and Q is denoted by d .

- (b) Find the greatest and least possible values of d . [3]

[illegible]

12. Nov 2024 paper 12 question 8

The equation of a circle is $x^2 + y^2 + px + 2y + q = 0$, where p and q are constants.

- (a) Express the equation in the form $(x - a)^2 + (y - b)^2 = r^2$, where a is to be given in terms of p and r^2 is to be given in terms of p and q . [2]

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The line with equation $x + 2y = 10$ is the tangent to the circle at the point $A(4, 3)$.

- (b) (i) Find the equation of the normal to the circle at the point A . [3]

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(ii) Find the values of p and q .

[5]

[illegible]

13. Nov 2024 paper 13 question 10

Points A and B have coordinates $(4, 3)$ and $(8, -5)$ respectively. A circle with radius 10 passes through the points A and B .

- (a) Show that the centre of the circle lies on the line $y = \frac{1}{2}x - 4$. [4]

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(b) Find the two possible equations of the circle.

[5]

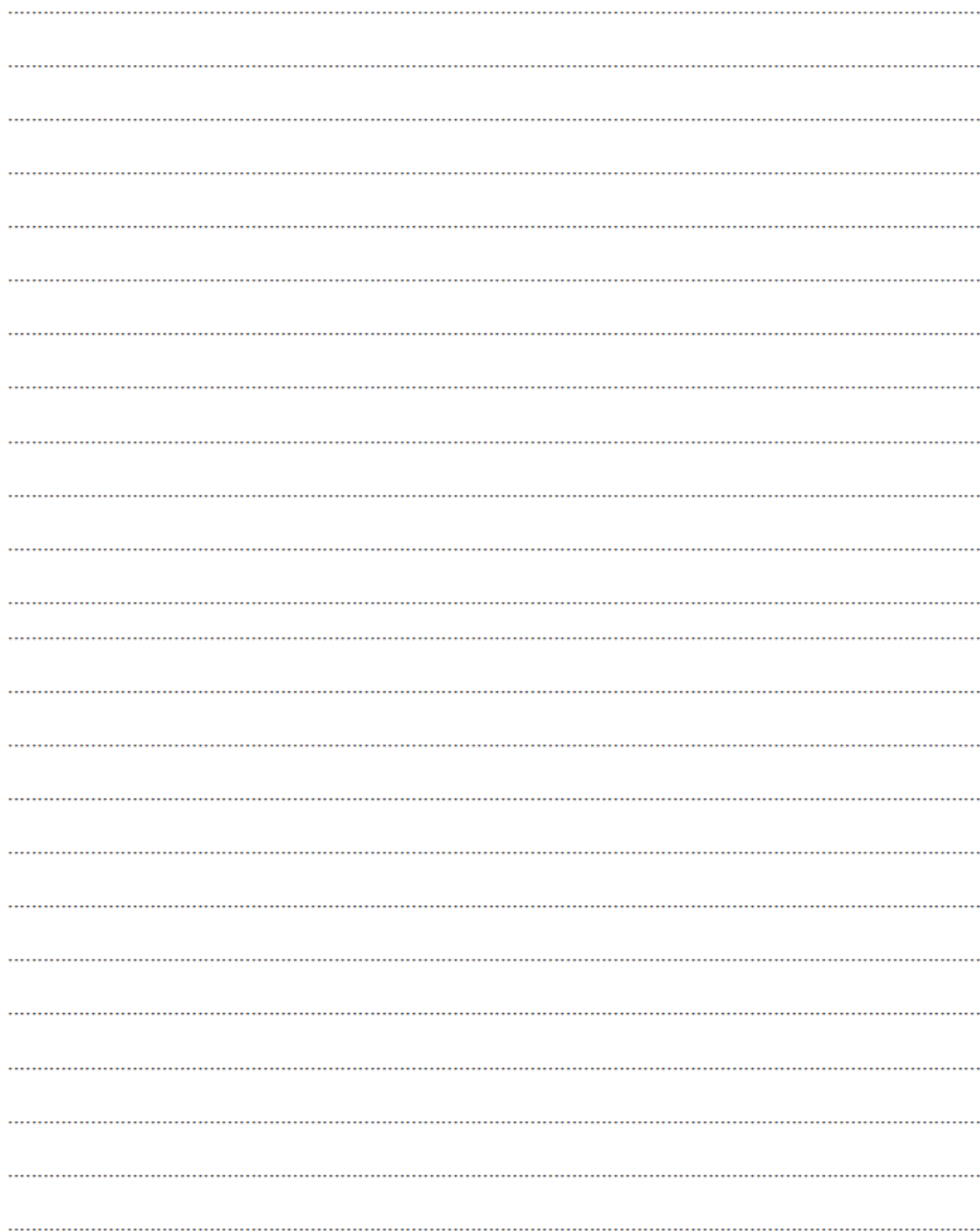
This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.[illegible]

14. May 2024 paper 11 question 10

The equation of a circle is $(x-3)^2 + y^2 = 18$. The line with equation $y = mx + c$ passes through the point $(0, -9)$ and is a tangent to the circle.

Find the two possible values of m and, for each value of m , find the coordinates of the point at which the tangent touches the circle. [8]

[illegible]



15. May 2024 paper 12 question 7

The equation of a circle is $(x-6)^2 + (y+a)^2 = 18$. The line with equation $y = 2a - x$ is a tangent to the circle.

- (a) Find the two possible values of the constant a . [5]

This image shows a full page of primary-ruled paper. It features ten sets of horizontal lines across the page. Each set consists of a solid top blue line, a dashed middle blue line, and a solid bottom blue line, providing a guide for letter height and placement in handwriting practice. The background is white, and there are no margins or other markings present.

- (b) For the greater value of a , find the equation of the diameter which is perpendicular to the given tangent. [3]

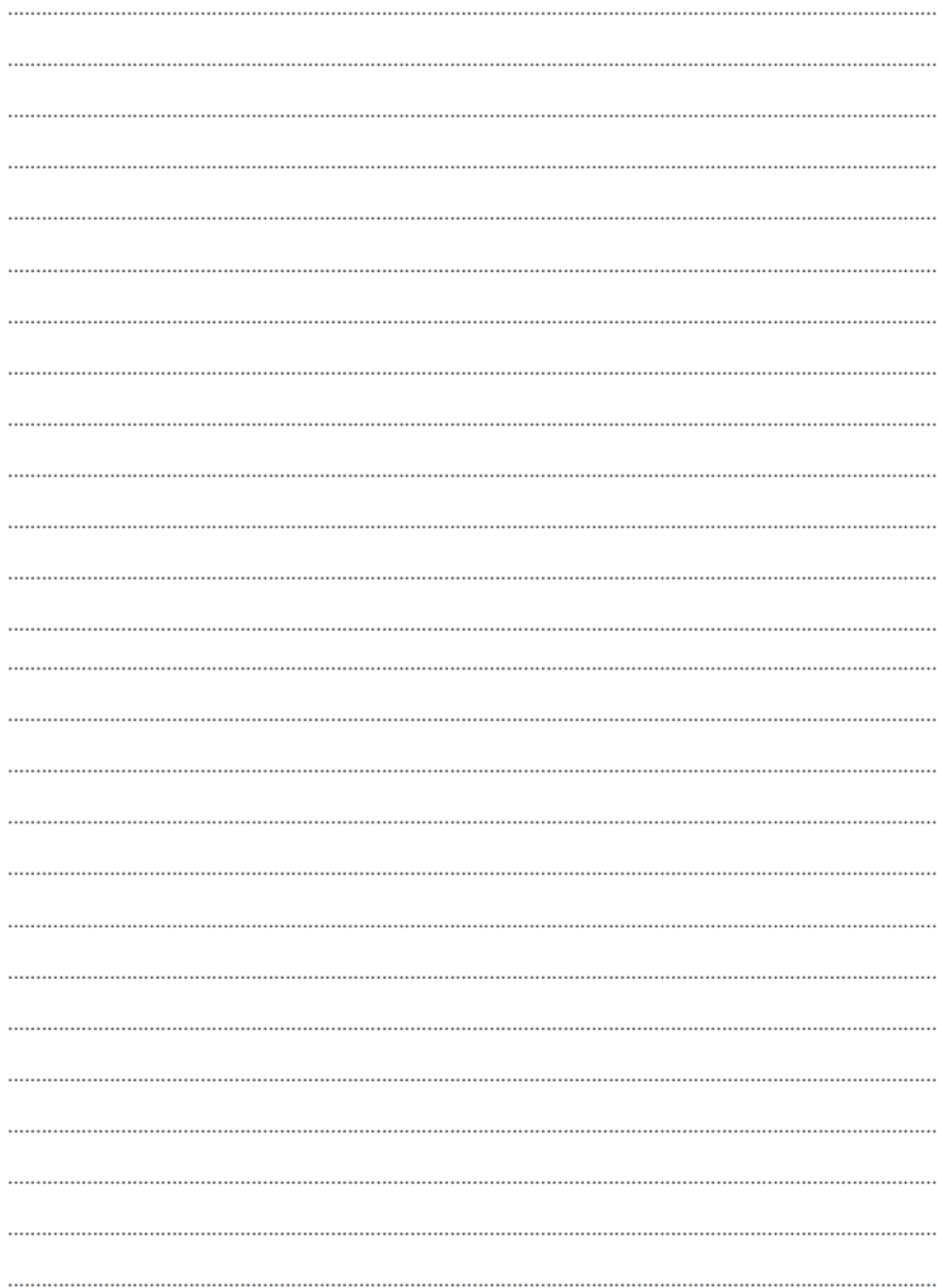
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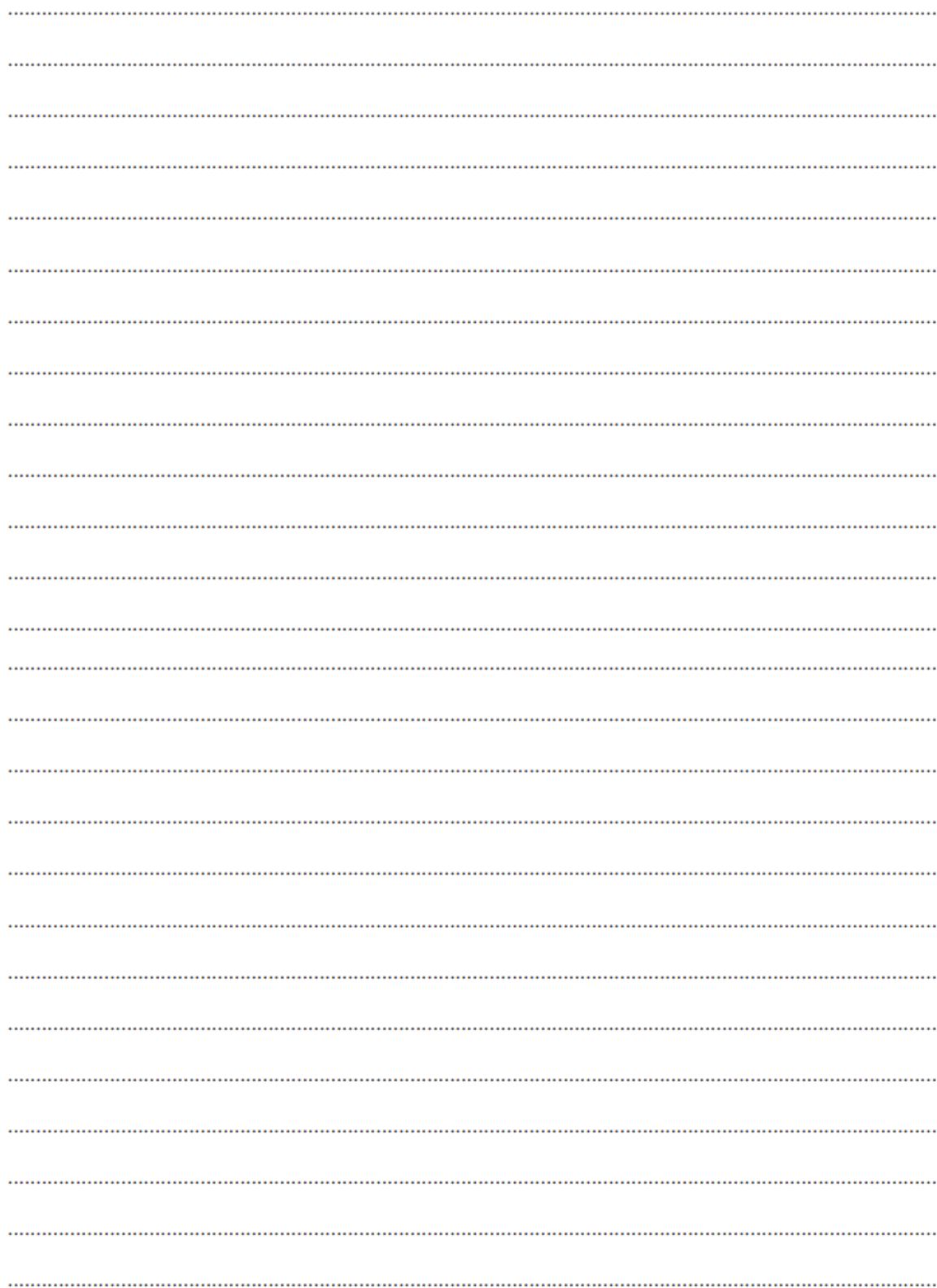
16. May 2024 paper 13 question 8

A circle with equation $x^2 + y^2 - 6x + 2y - 15 = 0$ meets the y -axis at the points A and B . The tangents to the circle at A and B meet at the point P .

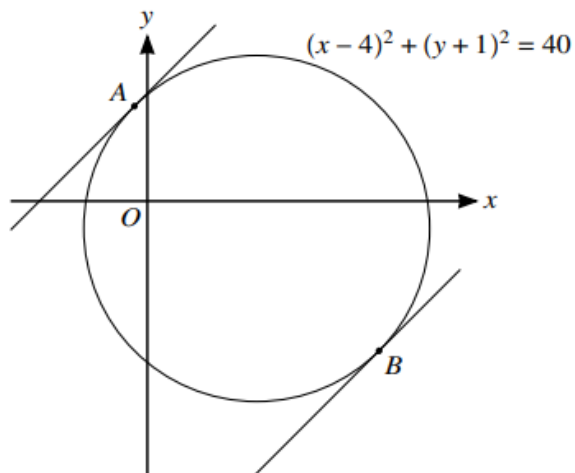
Find the coordinates of P . [8]

[illegible]





17. Nov 2023 paper 11 question 11



The diagram shows the circle with equation $(x - 4)^2 + (y + 1)^2 = 40$. Parallel tangents, each with gradient 1, touch the circle at points A and B .

- (a) Find the equation of the line AB , giving the answer in the form $y = mx + c$. [3]

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(b) Find the coordinates of A , giving each coordinate in surd form.

[4]

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(c) Find the equation of the tangent at A , giving the answer in the form $y = mx + c$, where c is in surd form. [2]

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18. Nov 2023 paper 12 question 11

The coordinates of points A , B and C are $(6, 4)$, $(p, 7)$ and $(14, 18)$ respectively, where p is a constant. The line AB is perpendicular to the line BC .

(a) Given that $p < 10$, find the value of p . [4]

[illegible]

A circle passes through the points A , B and C .

(b) Find the equation of the circle. [3]

[illegible]

- (c) Find the equation of the tangent to the circle at C , giving the answer in the form $dx + ey + f = 0$, where d , e and f are integers. [3]

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19. Nov 2023 paper 13 question 2

The circle with equation $(x - 3)^2 + (y - 5)^2 = 40$ intersects the y -axis at points A and B .

- (a) Find the y-coordinates of A and B , expressing your answers in terms of surds. [2]

[illegible]

- (b) Find the equation of the circle which has AB as its diameter. [2]

[illegible]

20. March 2023 paper 12 question 5

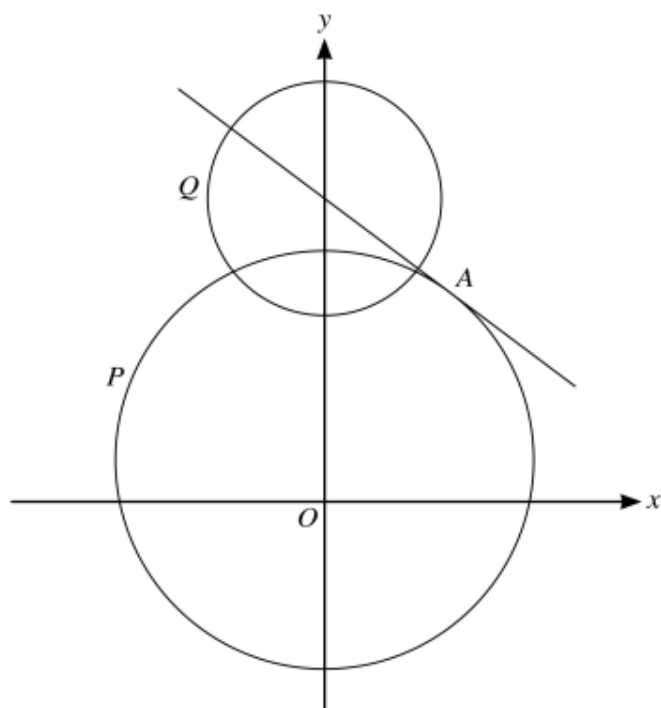
Points $A(7, 12)$ and B lie on a circle with centre $(-2, 5)$. The line AB has equation $y = -2x + 26$.

Find the coordinates of B .

[6]

[illegible]

21. May 2023 paper 11 question 12



The diagram shows a circle P with centre $(0, 2)$ and radius 10 and the tangent to the circle at the point A with coordinates $(6, 10)$. It also shows a second circle Q with centre at the point where this tangent meets the y -axis and with radius $\frac{5}{2}\sqrt{5}$.

(a) Write down the equation of circle P . [1]

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- (b) Find the equation of the tangent to the circle P at A . [2]

- (c) Find the equation of circle Q and hence verify that the y -coordinates of both of the points of intersection of the two circles are 11. [3]

[illegible]

- (d) Find the coordinates of the points of intersection of the tangent and circle Q , giving the answers in surd form. [3]

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22. May 2023 paper 12 question 10

The equation of a circle is $(x - a)^2 + (y - 3)^2 = 20$. The line $y = \frac{1}{2}x + 6$ is a tangent to the circle at the point P .

- (a) Show that one possible value of a is 4 and find the other possible value. [5]

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23. May 2023 paper 13 question 5

A circle has equation $(x - 1)^2 + (y + 4)^2 = 40$. A line with equation $y = x - 9$ intersects the circle at points A and B .

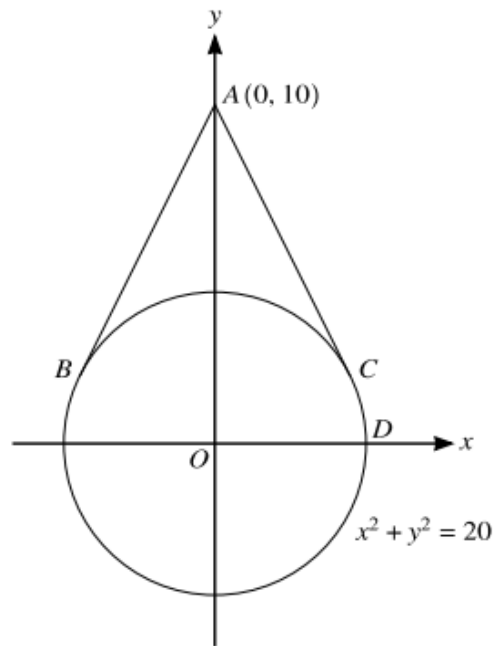
- (a) Find the coordinates of the two points of intersection. [4]

[illegible]

- (b) Find an equation of the circle with diameter AB . [3]

[illegible]

24. Nov 2022 paper 11 question 11



The diagram shows the circle with equation $x^2 + y^2 = 20$. Tangents touching the circle at points B and C pass through the point $A(0, 10)$.

- (a) By letting the equation of a tangent be $y = mx + 10$, find the two possible values of m . [4]

[illegible]

- (b) Find the coordinates of B and C .

[3]

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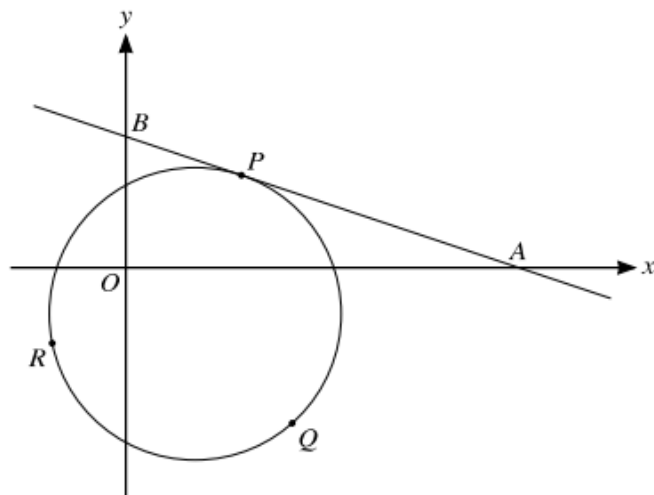
The point D is where the circle crosses the positive x -axis.

- (c) Find angle BDC in degrees.

[3]

[illegible]

25. Nov 2021 paper 12 question 12



The diagram shows the circle with equation $x^2 + y^2 - 6x + 4y - 27 = 0$ and the tangent to the circle at the point $P(5, 4)$.

- (a) The tangent to the circle at P meets the x -axis at A and the y -axis at B .

Find the area of triangle OAB , where O is the origin.

[5]

[illegible]

26. Nov 2021 paper 13 question 9

The line $y = 2x + 5$ intersects the circle with equation $x^2 + y^2 = 20$ at A and B .

- (a) Find the coordinates of A and B in surd form and hence find the exact length of the chord AB .

[7]

[illegible]

(b) Find the two possible values of m . [5]

[5]

[illegible]

27. May 2021 paper 11 question 10

The equation of a circle is $x^2 + y^2 - 4x + 6y - 77 = 0$.

- (a) Find the x -coordinates of the points A and B where the circle intersects the x -axis. [2]

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28. May 2021 paper 12 question 7

The point A has coordinates $(1, 5)$ and the line l has gradient $-\frac{2}{3}$ and passes through A . A circle has centre $(5, 11)$ and radius $\sqrt{52}$.

- (a) Show that l is the tangent to the circle at A . [2]

[illegible]

- (b) Find the equation of the other circle of radius $\sqrt{52}$ for which l is also the tangent at A . [3]

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29. May 2021 paper 13 question 10

Points $A(-2, 3)$, $B(3, 0)$ and $C(6, 5)$ lie on the circumference of a circle with centre D .

- (a) Show that angle $ABC = 90^\circ$. [2]

[illegible]

- (b)** Hence state the coordinates of D . [1]

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- (c) Find an equation of the circle. [2]

[illegible]

(d) Find an equation of the tangent to the circle at E . [5]

[5]

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30. March 2021 paper 12 question 8

The points $A(7, 1)$, $B(7, 9)$ and $C(1, 9)$ are on the circumference of a circle.

(a) Find an equation of the circle.

[5]

A series of horizontal dashed lines spanning the width of the page, intended as a guide for handwriting practice.

- (b) Find an equation of the tangent to the circle at B .

[2]

[illegible]