GCSE 7+ Session 5
Independent Practice
Lines and Circles

KING'S MATHS SCHOOL

Revise, refresh, recall *the core knowledge and skills:*

1 Copy and complete this table, filling in the empty cells. The first row is an example.

Equation of line	y-intercept	gradient	x-intercept
$y = 4x - 7$	$(0, -7)$	4	$\left(1\frac{3}{4}, 0\right)$
$5y = 2x - 4$			
$4y + x + 6 = 0$			
	$(0, -3)$	2	
	$(0, 3)$	0	
	$(0, -4)$	$\frac{2}{3}$	
	$(0, 6)$		$(2, 0)$
		$-\frac{4}{5}$	$(-2, 0)$

2 Work out the equation of the lines joining

a) $(0, 3)$ and $(6, 1)$ b) $(0, 3)$ and $(-6, -1)$ c) $(6, 3)$ and $(6, 1)$

3 a) Work out the co-ordinate(s) of any point(s) of intersection of

- the line $y = 10 - 3x$
- the circle with centre $(0, 0)$ and radius $2\sqrt{5}$

b) Repeat, for the same circle but now with the line $y = 10 - 2x$.

What do you notice?

Practice makes permanent: *these questions will help you embed and make secure your factual knowledge, procedural fluency and conceptual understanding:*

4 Work out a) the co-ordinates of the vertices of

b) the area of

the triangle formed by the lines $2y = x - 3$, $2x + y = 1$ and $3y + x = 8$.

5 A line has gradient $-\frac{1}{2}$. $(5, 2)$ is a point on the line.

Complete the coordinates of these points which are also on the same line:

a) $(9, \_\_)$ b) $(-4, \_\_)$ c) $(\_\_, -2)$

6 Work out the co-ordinate(s) of the point(s) of intersection of the quadratic curve $y = x^2 - 4x - 2$ and the lines

a) $y = -6$ b) $y = 2x - 11$ c) $2y = x - 8$

Say whether each line is a chord or a tangent.

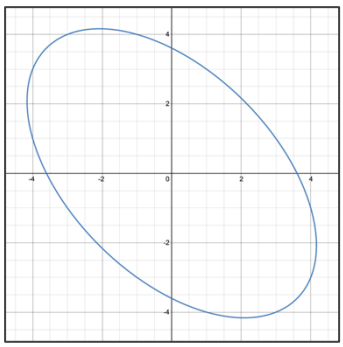
Productive struggle: *these harder questions require deeper thinking.*

7 Work out the area of the triangle with vertices $(-2, 0)$, $(3, 5)$ and $(4, -2)$.

8 Work out the area of the quadrilateral formed by the lines:

$$2y = 3x + 10,\ 2y = -3x - 2,\ 2y = x - 2,\ 2y = -x + 10$$

9 The curve with equation $x^2 + xy + y^2 = 13$ is called an **ellipse**.



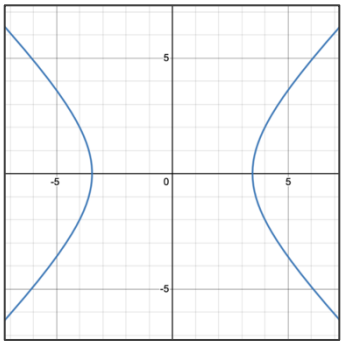
Is either of the lines

a) $y = -x + 4$

b) $y = 2.5x + 13$

a tangent to this ellipse?

10 The curve with equation $x^2 - y^2 = 12$ is called a **hyperbola**.



Work out the co-ordinate(s) of any point(s) of intersection of this hyperbola and each of the lines

a) $y = 2x - 6$

b) $x = 2y + 8$

c) $y = 3x - 6$

d) $y = x - 6$

Describe (in words) the geometrical relationship between each line and the hyperbola.

11 Do the two circles

- one with equation $x^2 + y^2 = 36$
- one with centre $(6, 8)$ and radius 4

intersect at two different points, touch at one point, or not intersect at all?