1. Show that line $3y = 4x - 14$ is perpendicular to line $4y = -3x + 48$.

[4]

2. A straight line goes through the points (p, q) and (r, s), where

- $p + 2 = r$
- $q + 4 = s$.

Find the gradient of the line.

_____ **[3]**

3(a). The line L has equation $2y + 3x = 1$.

Find the gradient of line L.

_____

[2]

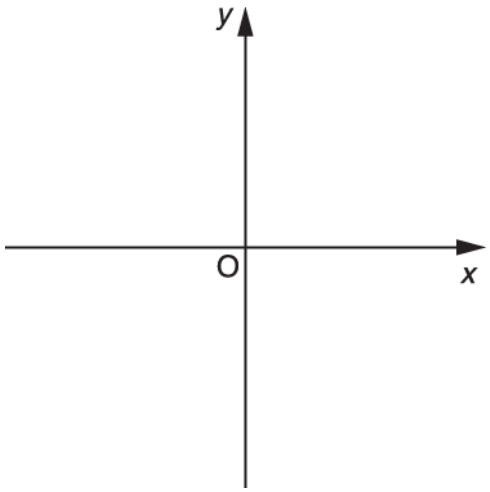
(b). Find the y-intercept of line L.

_____

[1]

4.

(i) Sketch the graph of $y = -x + 4$. Mark the value where the line crosses the y-axis.



[2]

(ii) Write down the gradient of the line $y = -x + 4$.

(ii) _____ **[1]**

5(a). A line, *L*, has equation $y = 4x - 5$.

Write down the equation of the line **parallel** to line *L* that passes through (0, 0).

_____ [2]

(b). Write down the gradient of line *L*.

_____ [1]

(c). What are the coordinates of the point where line *L* crosses the *y*-axis?

(_____, _____) [1]

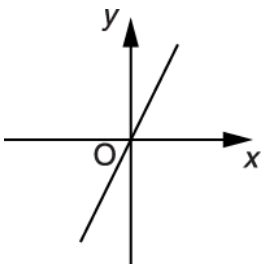
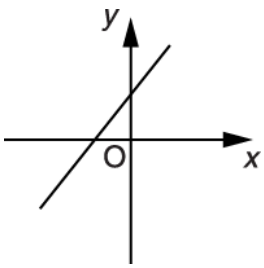
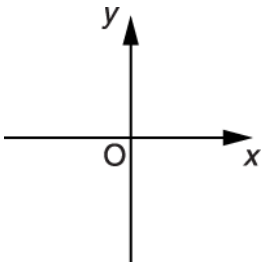
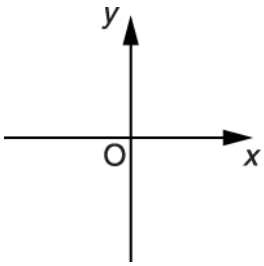
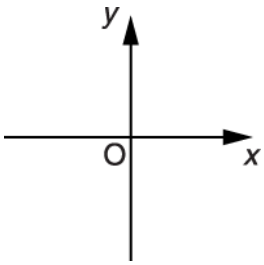
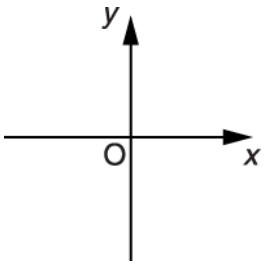
(d). Explain how you can tell that the line $y = -\frac{1}{5}x - 5$ is not perpendicular to line *L*.

_____

_____ [1]

6. Each statement below is sometimes true and sometimes false.

For each statement sketch a graph to show an example where it is true and an example where it is false.
The first one has been done for you.

Statement	True	False
A straight line graph goes through the origin.		
The gradient of a straight line graph is positive.		
A quadratic equation $ax^2 + bx + c = 0$ has two positive solutions.		

[3]

7. Here are six equations of straight lines, each labelled with a letter.

A	B	C
$y = 4x - 7$	$y = 3x + 14$	$y = 2x + 5$

D	E	F
$y = -3x + 1$	$y = 14x - 7$	$y = 4x + 3$

Choose the correct letters to make each statement true.

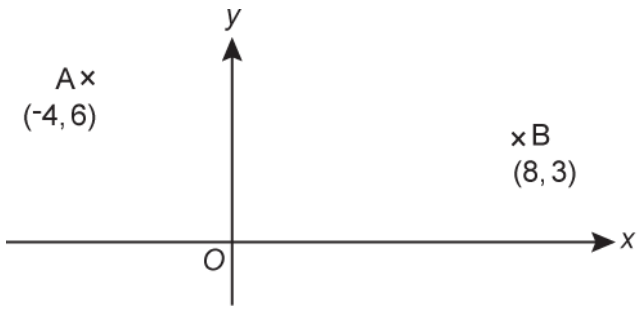
Line _____ is the steepest line.

Lines _____ and _____ are parallel.

Lines _____ and _____ meet on the *y*-axis.

[3]

8(a). Point A has coordinates (−4, 6) and point B has coordinates (8, 3).



Not to scale

(i) Find the gradient of line AB.

_____ [2]

(ii) Find the equation of line AB.

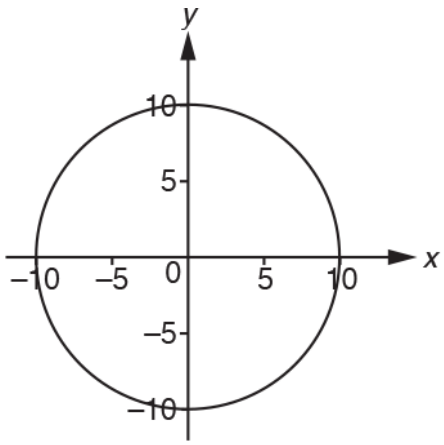
_____ [2]

(b). Point P has coordinates (0, −2).

Write down the equation of the line parallel to line AB that passes through P.

_____ [2]

9(a). The diagram shows a circle, centre the origin.



Write down the equation of the circle.

---------- [1]

(b). Point P has coordinates (8, –6). [2]
Show that point P lies on the circle.

(c). Find the equation of the tangent to the circle at point P.

---------- [5]

END OF QUESTION PAPER

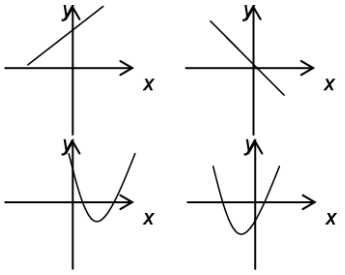
Question			Answer/Indicative content	Marks	Part marks and guidance	
1			Fully correct explanation, finding gradients of both lines and showing that the gradients' product equals –1	4	**B1** for gradient of first line is $\frac{4}{3}$ **B1** for gradient of second line is $\frac{-3}{4}$ **M1** for finding the product of *their* gradients **oe**	
			Total	4		
2			2	3	**M1** for any correct $\frac{\text{change in } y}{\text{change in } x}$ **M1** for $\frac{s-q}{r-p} = \frac{4}{2}$ If zero scored **SC1** for $\frac{\text{change in } x}{\text{change in } y} = \frac{1}{2}$	
			Total	3		
3	a		–1.5 oe	2	**M1** for y = 0.5 – 1.5*x* soi OR **SC1** for answer 1.5 oe	Any equivalent eg $\frac{3}{-2}$ for 2 marks **M1** implied by answer of –1.5*x* oe <u>Examiner's Comments</u> It was clear that many candidates knew that *y* = *mx* + *c* is the equation for a straight line and that m is the gradient. The most common answers in this part were 3 and –3 as candidates did not rearrange the equation to its explicit form, and simply quoted the coefficient of *x*. Candidates who did attempt the rearrangement generally gained at least 1 mark for getting the correct answer of–1.5 or for the answer 1.5.

Question			Answer/Indicative content	Marks	Part marks and guidance	
	b		0.5 oe	1	FT *their y* = 0.5 – 1.5*x*	FT *their y* = *a* + *bx* from (a), if b ≠ 0 Condone (0, 0.5) as answer Examiner's Comments Candidates generally gave the correct value for the intercept.
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
4		i	Straight line with negative gradient and *y*-intercept 4 marked.	2	**B1** for line with negative gradient or *y*-intercept 4 marked. Non-linear graph does not score.	Condone freehand line for 2 marks Ignore anything on *x*-axis **Examiner's Comments** Most candidates were able to draw a sketch and many indicated the correct intercept. However there were many who did not know the difference between negative and positive gradient.
		ii	–1	1		Not $-x$ etc **Examiner's Comments** Common wrong answers were 1 and 4.
			Total	**3**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
5	a		$y = 4x$	2	**B1** for $4x$, $y = mx$ (any $m \neq 0$), $y = 4x + c$ (any $c \neq 0$) **Examiner's Comments** Most candidates were able to demonstrate their understanding of $y=mx+c$ and give the correct answers for the first 3 parts of question. Common errors for the gradient were $4x$ or –5 and (0,5) or (–5,0) for the y-intercept. Some candidates were able to pick up 1 mark for just the correct gradient or the correct y intercept, while many felt the need to emphasise both parts and answered $y=4x+0$.	Condone $y = 4x + 0$ for **2** marks And $y = mx + 0$ for **1** mark
	b		4	1	Not $4x$	Allow 4/1
	c		(0, –5) cao	1		
	d		$-\frac{1}{5} \times 4 \neq -1$	1	Or gradient should be $-\frac{1}{4}$ Not -ve reciprocal etc **Examiner's Comments** This was less well answered with only the more able capable of explaining the error. Correct answers usually referred to the gradient not being the negative reciprocal or another common answer was to state the correct line should be $y = -¼x - 5$. A few strong candidates demonstrated that the product of the gradients was not equal to –1. Weaker candidates referred just to reciprocals or 'not equal to' or 'not opposite'.	Soi 'Inverse' does not mean 'reciprocal'

Question			Answer/Indicative content	Marks	Part marks and guidance
			Total	5	

Question			Answer/Indicative content	Marks	Part marks and guidance	
6				1	both correct, first line any with positive gradient, second line any with negative gradient or horizontal or vertical line	accept any clear intention of correct graphs, ie not ruled but attempt at straight line
				2	both correct, first graph any with two positive solutions, second any with one/no positive solutions Or **B1** for any one parabola seen **Examiner's Comments** Understanding of the sign of the gradient of a straight line was good and the majority of candidates sketched a correct pair of lines for this statement. Candidates were less successful in identifying the quadratic graphs correctly, however a good proportion of them could sketch a parabola for this part and so gained some credit. Common misconceptions about the signs of the roots appeared to be that they were related to the *y* -intercept being positive or negative or to the orientation of the parabola rather than where the curve crossed the *x*-axis. It was apparent that, as the graphs for the first two statements were linear, some candidates assumed that the third must also be linear.	accept any clear intention of correct graphs, ie not ruled but attempt at straight line Accept any clear intention of correct graphs, ie attempt at parabola Condone more than one parabola on axes for B1
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
7			E	1		accept equations in the place of letters
			A F	1	in either order	
			A E	1	in either order	
					<u>Examiner's Comments</u> Most candidates did not gain full marks here and one confusion was over which number indicated the gradient; those who decided it was the last number gave B as the steepest, A and E as parallel and A and F meeting on the y-axis. Others thought that B and D were parallel, probably because they have the same number as coefficient of x without taking regard of the sign.	
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
8	a	i	$-\frac{1}{4}$ oe	2 2 AO1.3a	**M1** for $\frac{\pm(3-6)}{\pm(8-^{-}4)}$ or answer $\frac{1}{4}$oe or answer $-\frac{1}{4}x$ **Examiner's Comment** In (a)(i), most candidates attempted to use rise/run or difference in *y*/difference in x, and gained at least 1 mark despite having some difficulties in calculating with negative numbers. Common wrong answers were ¼, 4 or –4. Those who answered (a)(i) correctly generally proceeded to get the correct equation in (a)(ii). To find the value of the *y*-intercept, the strongest candidates often substituted a point into $y = mx + c$, whilst others often used a similar triangle approach on the diagram. Part (b) was fairly well answered and many candidates who had lost marks earlier on were able to gain full credit by follow through from their previous answer. Weaker candidates often realised that the y-intercept was –2 for 1 mark, however, some strong candidates confused 'parallel' with 'perpendicular' when giving their answer.	

Question			Answer/Indicative content	Marks	Part marks and guidance		
		ii	$y = -\frac{1}{4}x + 5$ oe	2 2 AO1.3b	M1 for substitution of (–4, 6) or (8, 3) into $y =$ *their* (a)(i) $x + c$ or into $y - y_1 =$ *their* (a)(i)$(x - x_1)$ or intercept clearly identified as 5 (may be on diagram or in equation)	eg final answer for 2 marks $y - 3 = -\frac{1}{4}(x - 8)$ oe or $y - 6 = -\frac{1}{4}(x - -4)$ oe Missing "y =" scores M1 max.	
	b		$y = -\frac{1}{4}x - 2$ oe or FT	2FT 3 AO2.1a	B1FT for $y =$ *their* mx [+ a] where m is FT B1 for $y = bx - 2$, $b \neq 0$	FT is for *their* gradient in (a)(ii) (if no answer in (a)(ii) then use (a)(i)) Condone missing "$y =$" if already penalised in (a)(ii), otherwise missing *"y* =" is B1 max	
			Total	6			

Question			Answer/Indicative content	Marks	Part marks and guidance		
9	a		$x^2 + y^2 = 100$ oe	1	Only a few candidates were able to write down the equation of the circle. Many candidates merely plotted (8, –6) on the diagram when asked to show the point lay on the circle whereas a calculation such as Pythagoras was required. It was rather alarming that some of these plots showed the point marked in the wrong quadrant and also not on the circle. Only a small number of candidates attempted to find the equation of the tangent but did so with some success.		
	b		$8^2 + (-6)^2 = 100$, so it's on the circle oe	2	M1 for $8^2 + ([-]6)^2$ seen or for substituting $x = 8$ and $y = -6$ into *their* part (a)	Alternative using Pythagoras $\sqrt{8^2 + 6^2} = 10$ *their* part (a) must be an equation in both x and y.	
	c		$3y - 4x + 50 = 0$ oe	5	B2 for [tangent gradient =] $\frac{4}{3}$ oe or M1 for	Equivalents include: $y = \frac{4}{3}x - \frac{50}{3}$ Condone decimals with at least 2 decimal places rot: Eg. $y = 1.33x - 16.67$	

Question			Answer/Indicative content	Marks	Part marks and guidance		
					$\pm\frac{6}{8}$ or $\pm\frac{8}{6}$ oe AND **M2** for y + 6 = *their* $\frac{4}{3}(x-8)$ oe or **M1** for *y* = *their* $\frac{4}{3}x$ + 'c'	Equivalent for **M2** includes *y = their* $\frac{4}{3}x + c$ and then attempt to find *c* by substituting in *y* = -6 and *x* = 8	
			Total	8			