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4. The points P and Q have coordinates $(-11, 6)$ and $(-3, 12)$ respectively.

Given that PQ is a diameter of the circle C,

(a) (i) find the coordinates of the centre of C,

(ii) find the radius of C.

(4)

(b) Hence find an equation of C.

(2)

(c) Find an equation of the tangent to C at the point Q giving your answer in the form $ax + by + c = 0$ where a, b and c are integers to be found.

(3)

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Question 4 continued

Q4

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5. Ben is saving for the deposit for a house over a period of 60 months.

Ben saves £100 in the first month and in each subsequent month, he saves £5 more than the previous month, so that he saves £105 in the second month, £110 in the third month, and so on, forming an arithmetic sequence.

(a) Find the amount Ben saves in the 40th month.

(2)

(b) Find the total amount Ben saves over the 60-month period.

(3)

Lina is also saving for a deposit for a house.

Lina saves £600 in the first month and in each subsequent month, she saves £10 less than the previous month, so that she saves £590 in the second month, £580 in the third month, and so on, forming an arithmetic sequence.

Given that, after n months, Lina will have saved exactly £18 200 for her deposit,

(c) form an equation in n and show that it can be written as

$$n^2 - 121n + 3640 = 0$$

(3)

(d) Solve the equation in part (c).

(2)

(e) State, with a reason, which of the solutions to the equation in part (c) is **not** a sensible value for n.

(1)

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