SQA Past paper questions

2023 – Paper 2 – Question 11

Circle C_1 has equation $(x-4)^2+(y+2)^2=37$.

Circle C_2 has equation $x^2+y^2+2x-6y-7=0$.

(a) Calculate the distance between the centres of C_1 and C_2. 3

(b) Hence, show that C_1 and C_2 intersect at two distinct points. 3

Click here for video solution.

2022 – Paper 1 – Question 14

C_1 is the circle with equation $(x-7)^2+(y+5)^2=100$.

(a) (i) State the centre and radius of C_1. 2

(ii) Hence, or otherwise, show that the point P(–2, 7) lies outside C_1. 2

C_2 is a circle with centre P and radius r.

(b) Determine the value(s) of r for which circles C_1 and C_2 have exactly one point of intersection. 2

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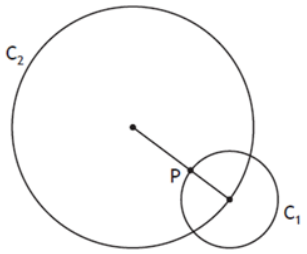
2018 – Paper 2 – Question 12

Circle C_1 has equation $(x-13)^2+(y+4)^2=100$.

Circle C_2 has equation $x^2+y^2+14x-22y+c=0$.



(a) (i) Write down the coordinates of the centre of C_1. 1

(ii) The centre of C_1 lies on the circumference of C_2.

Show that $c=-455$.

The line joining the centres of the circles intersects C_1 at P. 1

(b) (i) Determine the ratio in which P divides the line joining the centres of the circles. 2

(ii) Hence, or otherwise, determine the coordinates of P. 2

P is the centre of a third circle, C_3.

C_2 touches C_3 internally.

(c) Determine the equation of C_3. 1

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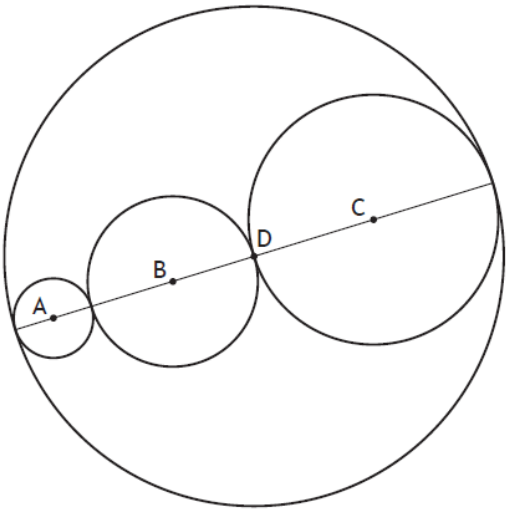
2017 – Paper 2 – Question 10

(a) Show that the points A(–7, –2), B(2, 1) and C(17, 6) are collinear.

Three circles with centres A, B and C are drawn inside a circle with centre D as shown. 3



The circles with centres A, B and C have radii r_A, r_B and r_C respectively.

- $r_A=\sqrt{10}$
- $r_B=2r_A$
- $r_C=r_A+r_B$

(b) Determine the equation of the circle with centre D. 4

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2016 – Paper 2 – Question 4

Circles C_1 and C_2 have equations $(x+5)^2+(y-6)^2=9$ and $x^2+y^2-6x-16=0$ respectively.

(a) Write down the centres and radii of C_1 and C_2. 4

(b) Show that C_1 and C_2 do not intersect. 3

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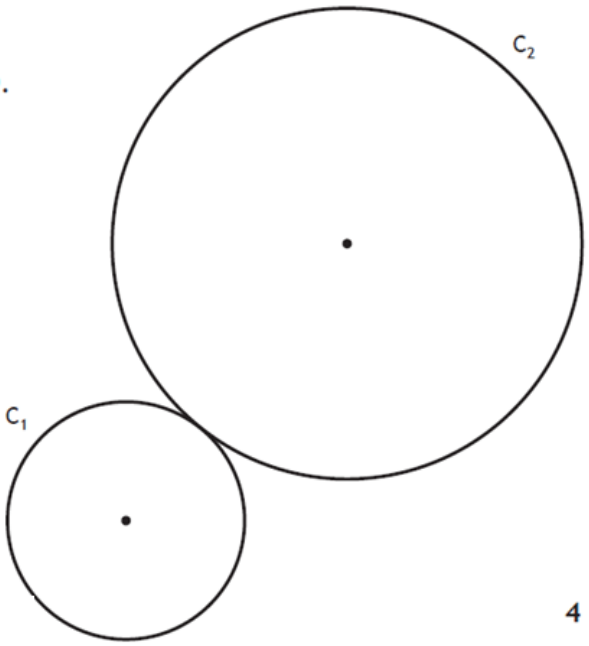
2015 – Paper 2 – Question 5

Circle C_1 has equation $x^2+y^2+6x+10y+9=0$.

The centre of circle C_2 is $(9, 11)$.

Circles C_1 and C_2 touch externally.



(a) Determine the radius of C_2. 4

A third circle, C_3, is drawn such that:

- both C_1 and C_2 touch C_3 internally
- the centres of C_1, C_2 and C_3 are collinear.

(b) Determine the equation of C_3. 4

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2011 – Paper 2 – Question 7

Circle C_1 has equation $(x+1)^2+(y-1)^2=121$.

A circle C_2 with equation $x^2+y^2-4x+6y+p=0$ is drawn inside C_1.

The circles have no points of contact.

What is the range of values of p? **9**

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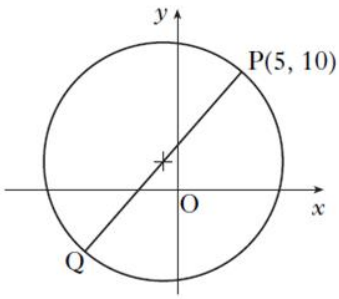
2009 – Paper 2 – Question 4

(*a*) Show that the point P(5, 10) lies on circle C_1 with equation $(x+1)^2+(y-2)^2=100$. **1**

(*b*) PQ is a diameter of this circle as shown in the diagram. Find the equation of the tangent at Q. **5**



(*c*) Two circles, C_2 and C_3, touch circle C_1 at Q.

The radius of each of these circles is twice the radius of circle C_1.

Find the equations of circles C_2 and C_3. **4**

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2008 – Paper 2 – Question 4

(*a*) Write down the centre and calculate the radius of the circle with equation $x^2+y^2+8x+4y-38=0$. **2**

(*b*) A second circle has equation $(x-4)^2+(y-6)^2=26$.

Find the distance between the centres of these two circles and hence show that the circles intersect. **4**

(*c*) The line with equation $y=4-x$ is a common chord passing through the points of intersection of the two circles.

Find the coordinates of the points of intersection of the two circles. **5**

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2001 – Paper 1 – Question 11

Circle P has equation $x^2 + y^2 - 8x - 10y + 9 = 0$. Circle Q has centre $(-2, -1)$ and radius $2\sqrt{2}$.

(a) (i) Show that the radius of circle P is $4\sqrt{2}$.

(ii) Hence show that circles P and Q touch. 4

(b) Find the equation of the tangent to circle Q at the point $(-4, 1)$. 3

(c) The tangent in (b) intersects circle P in two points. Find the x-coordinates of the points of intersection, expressing your answers in the form $a \pm b\sqrt{3}$. 3

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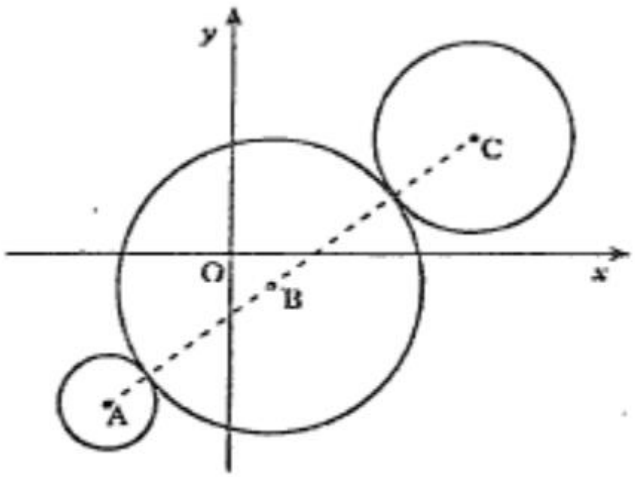
1995 – Paper 2 – Question 8

When newspapers were printed by lithograph, the newsprint had to run over three rollers, illustrated in the diagram by three circles. The centres A, B and C of the three circles are collinear.



The equations of the circumferences of the outer circles are $(x+12)^2 + (y+15)^2 = 25$ and $(x-24)^2 + (y-12)^2 = 100$.

Find the equation of the central circle. (8)

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