Name:

Exam Style Questions

Equation of a Circle

Corbettmaths

Equipment needed: Pen, Calculator, Pair of Compasses

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents

Video 12

Answers and Video Solutions

1. The equation of a circle C, with centre O, is:

$x^2 + y^2 = 225$

(a) Find the coordinates of the centre O.

(0 , 0)

(1)

(b) Find the radius of C.

15

(1)

(c) Show the point (9, 12) lies on C.

$9^2 + 12^2 = 225$

$81 + 144 = 225$

$225 = 225$ ✓

$\therefore$ (9, 12) lies on C.

(2)

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2. A circle has centre (0, 0) and radius 6.

(a) Write down the equation of the circle.

$x^2 + y^2 = 6^2$

or

$x^2 + y^2 = 36$

(2)

(b) Does the point (–3 , 5) lie on the circle?

$(-3)^2 + 5^2 \neq 36$

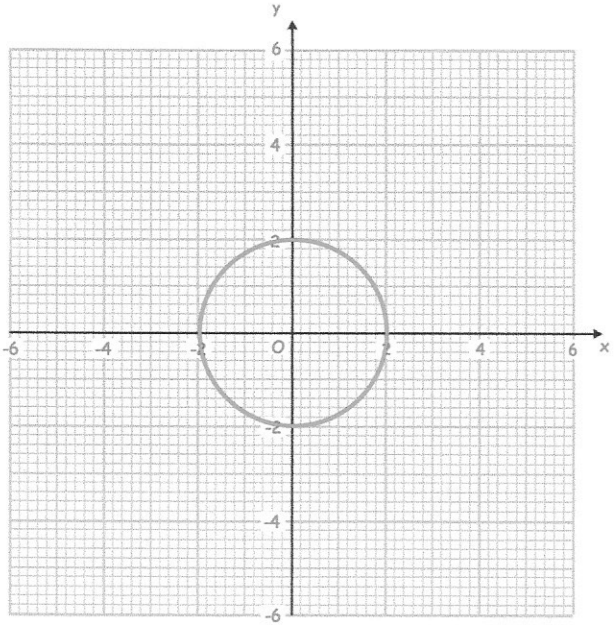
$9 + 25 \neq 36$

$34 \neq 36$

No

(2)

3. Find the equation of the circle.



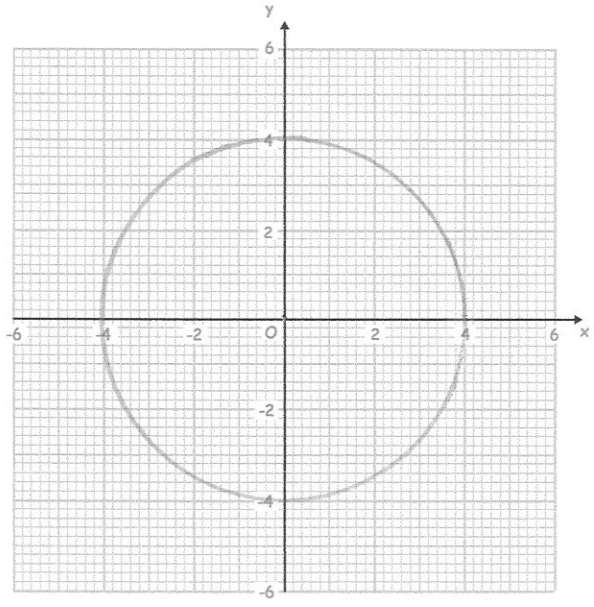
$x^2 + y^2 = 2^2$

or

$x^2 + y^2 = 4$

(2)

4. Draw the circle with equation $x^2 + y^2 = 16$



$\sqrt{16} = 4$

$r = 4$

(2)

5. A circle has centre (0, 0) and radius 9

Roberto says the equation of the circle is $x^2 + y^2 = 9$

(a) Explain Roberto's mistake

He needs to square the radius
$9^2 = 81$
$x^2 + y^2 = 81$

(1)

David says the equation of the circle is $x^2 - y^2 = 81$

(b) Explain David's mistake

He should not have used a subtract sign.
$x^2 + y^2 = 81$

(1)

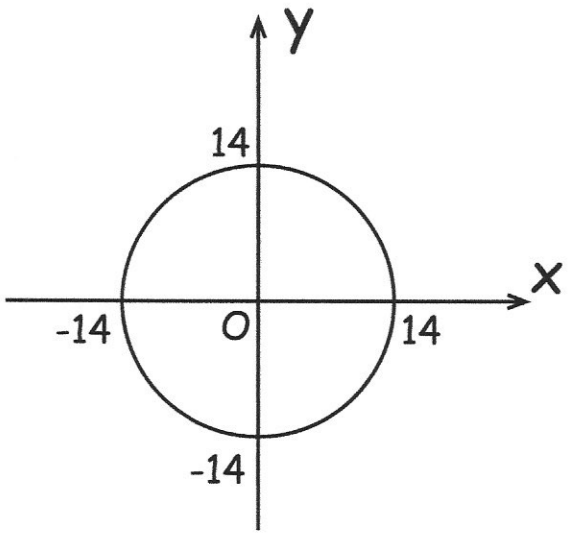
Karl says the equation of the circle is $x + y = 81$

(c) Explain Karl's mistake

He should include squared symbols
$x^2 + y^2 = 81$

(1)

6.



Write down the equation of the circle.

$x^2 + y^2 = 196$

(2)

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7. A circle has equation $x^2 + y^2 = 144$

Work out the length of the diameter of the circle.

$r = \sqrt{144}$

$= 12$

$2 \times 12 = 24$

24

(2)

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8. A circle has equation $x^2 + y^2 = 316.84$

$\sqrt{316.84} = 17.8$

Find the radius of the circle.

$r = 17.8$

17.8

(1)

9. A circle C has centre O and passes through the points A (0, 7) and B (0, –7)

AB is a diameter of the circle C.

(a) Find the coordinates of the centre O.

(0 , 0)

(1)

(b) Write down the equation of the circle.

$r = 7$

$x^2 + y^2 = 49$

(2)

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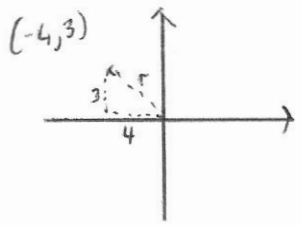
10. AB is a diameter of a circle C.
O is the centre of the circle
A has coordinates (–4, 3) and B has coordinates (4, –3).

(a) Find the centre of the circle, O.

(0 , 0)

(1)

(b) Find the equation of C



$r^2 = 3^2 + 4^2$

$r^2 = 9 + 16$

$r^2 = 25$

$r = \sqrt{25}$

$r = 5$

$x^2 + y^2 = 25$

$x^2 + y^2 = 25$

(2)

(c) Show the point D, (–3, –4) lies on C.

$(-3)^2 + (-4)^2 = 25$

$9 + 16 = 25$

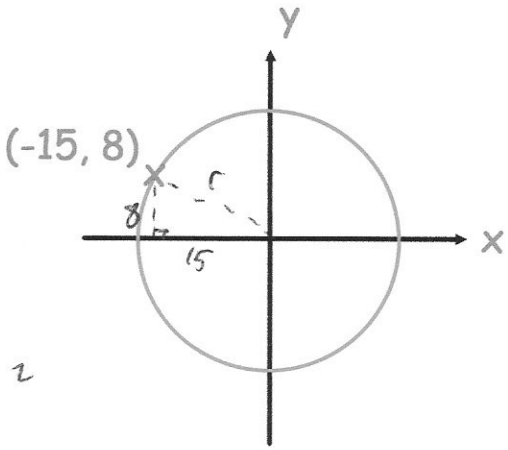
$25 = 25$ ✓

(–3, –4) is a point on C.

(2)

11. The circle below has centre (0, 0).
The point (–15, 8) is a point on the circle.

Find the equation of the circle.



$15^2 + 8^2 = r^2$

$225 + 64 = r^2$

$289 = r^2$

$r = 17$

$x^2 + y^2 = 289$

(3)

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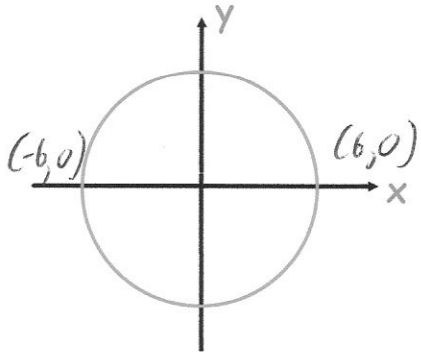
12. The circle shown has $x^2 + y^2 = 36$

Find the circumference of the circle.
Give your answer in terms of π

$\sqrt{36} = 6$

$r = 6$



$C = \pi \times d$

$= \pi \times 12$

$C = 12\pi$

$C = 12\pi$

(3)

13. A circle has the equation $x^2 + y^2 = 121$

Find the area of the circle.
Give your answer in terms of π

$r = 11$

$A = \pi r^2$

$= \pi \times 11^2$

$= \pi \times 121$

121π

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(3)

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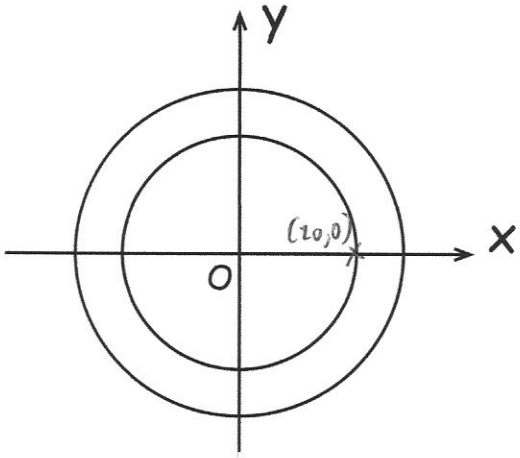
14. Shown below are two circles with centre O.



The equation of the smaller circle is $x^2 + y^2 = 400$

The radius of the smaller circle : the radius of the larger circle = 5 : 6

Work out the equation of the larger circle.

$r = 20$

$20 \div 5 = 4$

$4 \times 6 = 24$

$x^2 + y^2 = 576$

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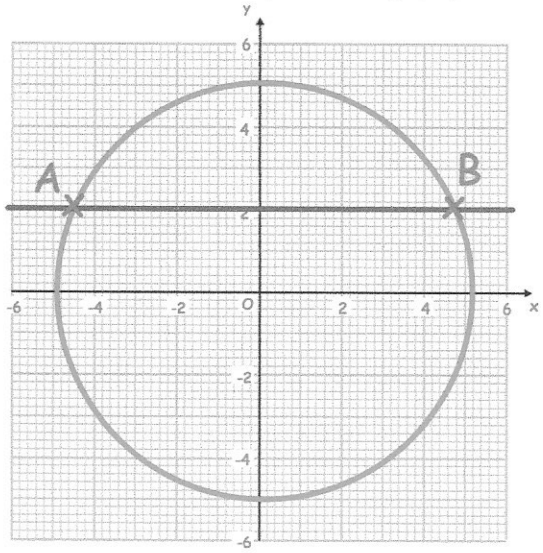
(3)

15. A circle has equation $x^2 + y^2 = 25$

A straight line meets the circle at the points A (a, 2) and B (b, 2).



(a) Write down the equation of the straight line.

$y = 2$

(1)

(b) Find the coordinates of the points A and B.
Give your answers in surd form.

$x^2 + 2^2 = 25$

$x^2 + 4 = 25$

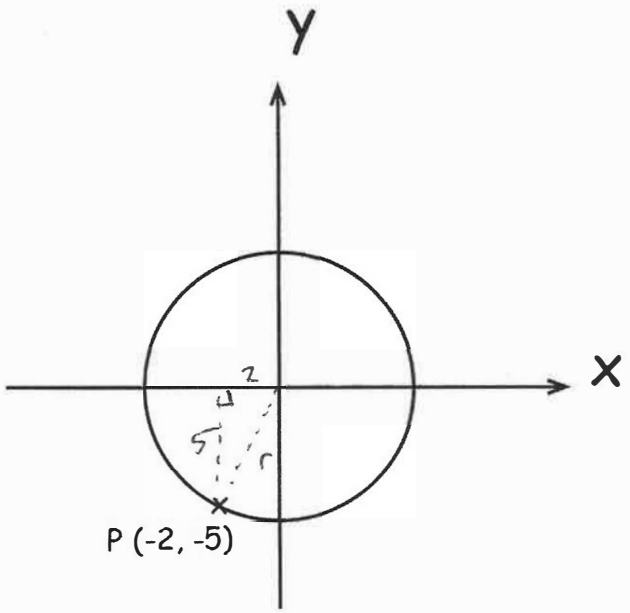
$x^2 = 21$

$x = \pm\sqrt{21}$

A = $(-\sqrt{21}, 2)$ and B = $(\sqrt{21}, 2)$

(4)

16.



The point P (–2, –5) is a point on a circle with centre (0, 0).

Work out the diameter of the circle.
Give your answer as a surd.

$r^2 = 2^2 + 5^2$

$= 4 + 25$

$= 29$

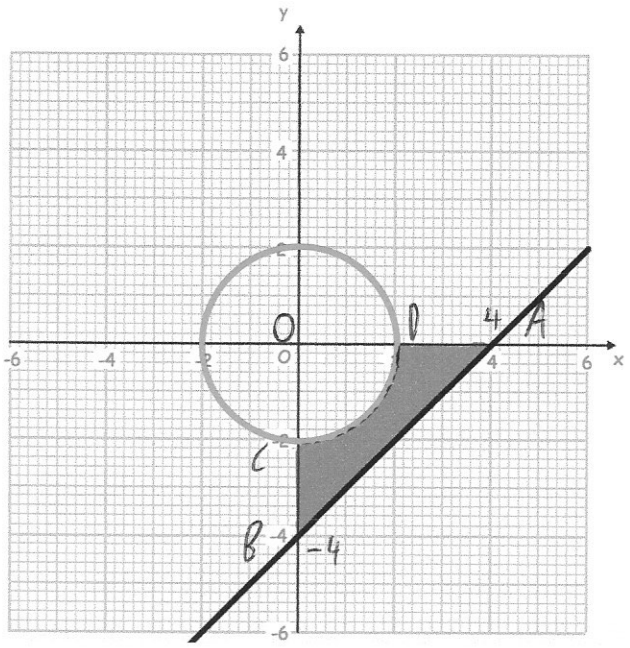
$r = \sqrt{29}$

$2 \times \sqrt{29} = 2\sqrt{29}$

$2\sqrt{29}$

(3)

17. The circle below has equation $x^2 + y^2 = 4$
The line has equation $y = x - 4$



(a) Find the area of the shaded region.

Area of $\triangle OAB$

$= \frac{1}{2}(4) \times 4$

$= 2 \times 4 = 8$

Area of sector ODC

$= \frac{1}{4}(\pi \times 2^2)$

$= \frac{1}{4}(\pi \times 4)$

$= \pi$

$8 - \pi$

or

4·8584

(4)

(b) Find the perimeter of the shaded area.

$AD = 2$

$BC = 2$

Arc $DC = \frac{1}{4}(\pi \times 4) = \pi$

Line AB

$4^2 + 4^2 = AB^2$

$16 + 16 = AB^2$

$AB^2 = 32$

$AB = \sqrt{32}$

$2 + 2 + \pi + \sqrt{32}$

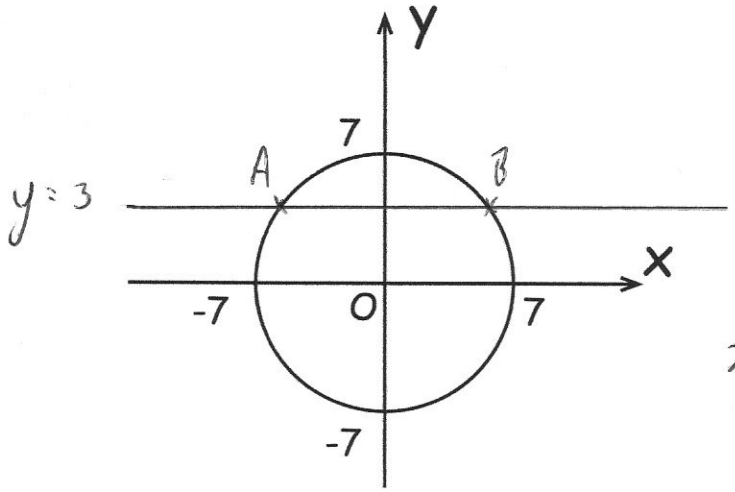
$4 + \pi + 4\sqrt{2}$

or

12·798

(4)

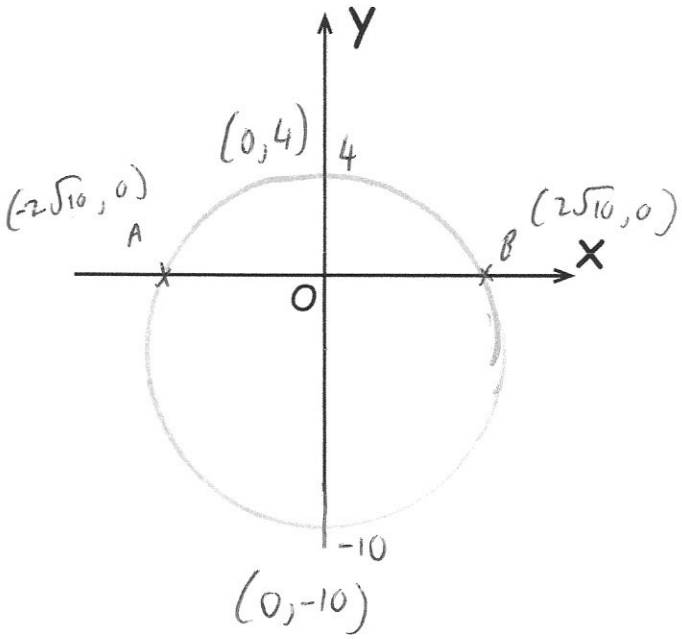
18. Shown is a sketch of the circle with equation $x^2 + y^2 = 49$



$x^2 + 3^2 = 49$
$x^2 + 9 = 49$
$x^2 = 40$
$x = \pm\sqrt{40}$
$x = \pm 2\sqrt{10}$

The circle is translated 3 squares downwards.

Sketch the circle and label the coordinates where the circle crosses both the x-axis and y-axis.



(4)

19. A circle has equation $x^2 + y^2 = 40$

A line has equation $y = 3x$

The line intersects the circle at two points, P and Q.

Find the coordinates of P and Q.

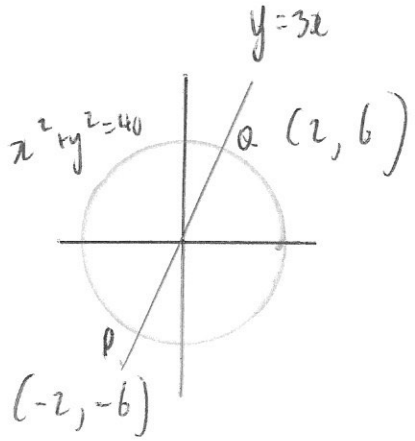
$x^2 + (3x)^2 = 40$

$x^2 + 9x^2 = 40$

$10x^2 = 40$

$x^2 = 4$

$x = \pm 2$



P(-2, -6) Q(2, 6)

(4)

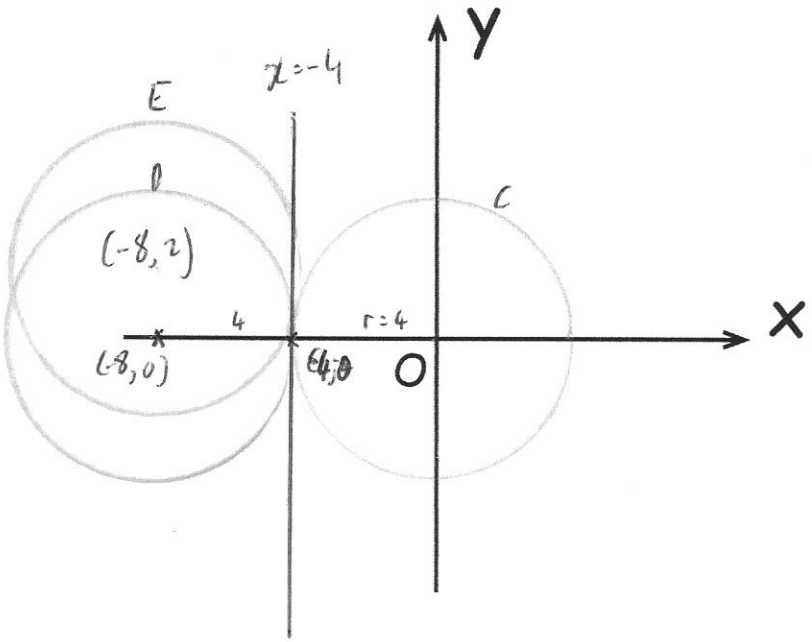
20. The circle C has equation $x^2 + y^2 = 16$

The circle C is reflected in the line $x = -4$ to give the circle D.

The circle D is translated by the vector $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$ to give the circle E.

2 squares upwards

Write down the coordinates of the centre of circle E.



(-8, 2)

.....

(4)