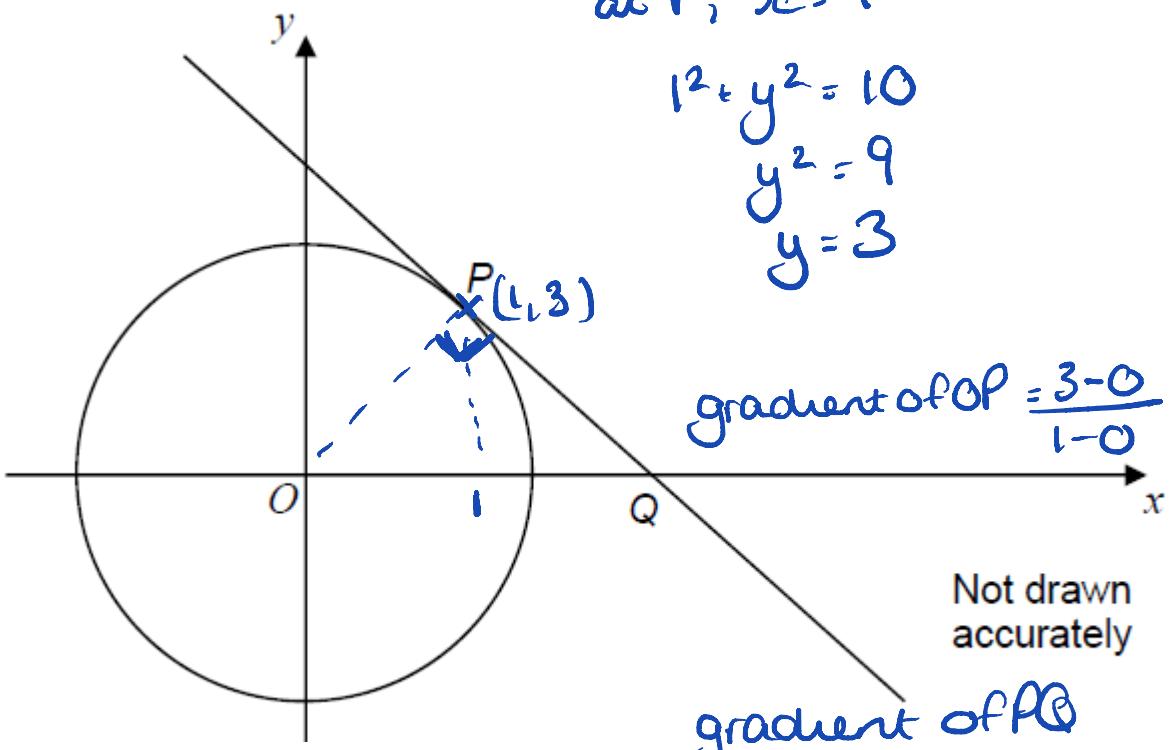
Equation of a circle (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	Mel@JustMaths
Total Marks:	

1. The diagram shows the circle $x^2 + y^2 = 10$



Not drawn accurately

P lies on the circle and has x-coordinate 1

The tangent at P intersects the x-axis at Q.

Work out the coordinates of Q.

at P, $x = 1$

$1^2 + y^2 = 10$

$y^2 = 9$

$y = 3$

gradient of OP $= \frac{3-0}{1-0} = 3$

gradient of PQ $= -\frac{1}{3}$

Equation of line PQ

$y = -\frac{1}{3}x + c$

using P (1, 3)

$3 = -\frac{1}{3}(1) + c$

$c = 3\frac{1}{3}$ or $\frac{10}{3}$

$y = -\frac{1}{3}x + \frac{10}{3}$

∴ at Q $y = 0$ $\frac{1}{3}x = \frac{10}{3}$

$x = 10$ ∴ coordinate $= (10, 0)$

[5]

2. A circle has equation $x^2 + y^2 = 4$

Circle the length of its radius.

$\sqrt{4}$ (2) 4 8 16

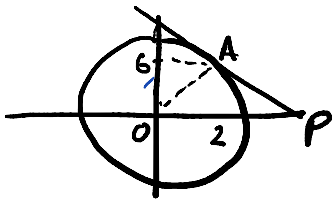
[1]

3. The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point A.

A is the point (2, 6).

The line l crosses the x-axis at the point P.

Work out the area of triangle OAP.



gradient OA $= \frac{6}{2} = 3$

$\therefore$ gradient AP $= -\frac{1}{3}$

equation AP $y = -\frac{1}{3}x + c$ using 2, 6

$6 = -\frac{1}{3}(2) + c \quad \therefore c = 6\frac{2}{3}$

$y = -\frac{1}{3}x + \frac{20}{3}$

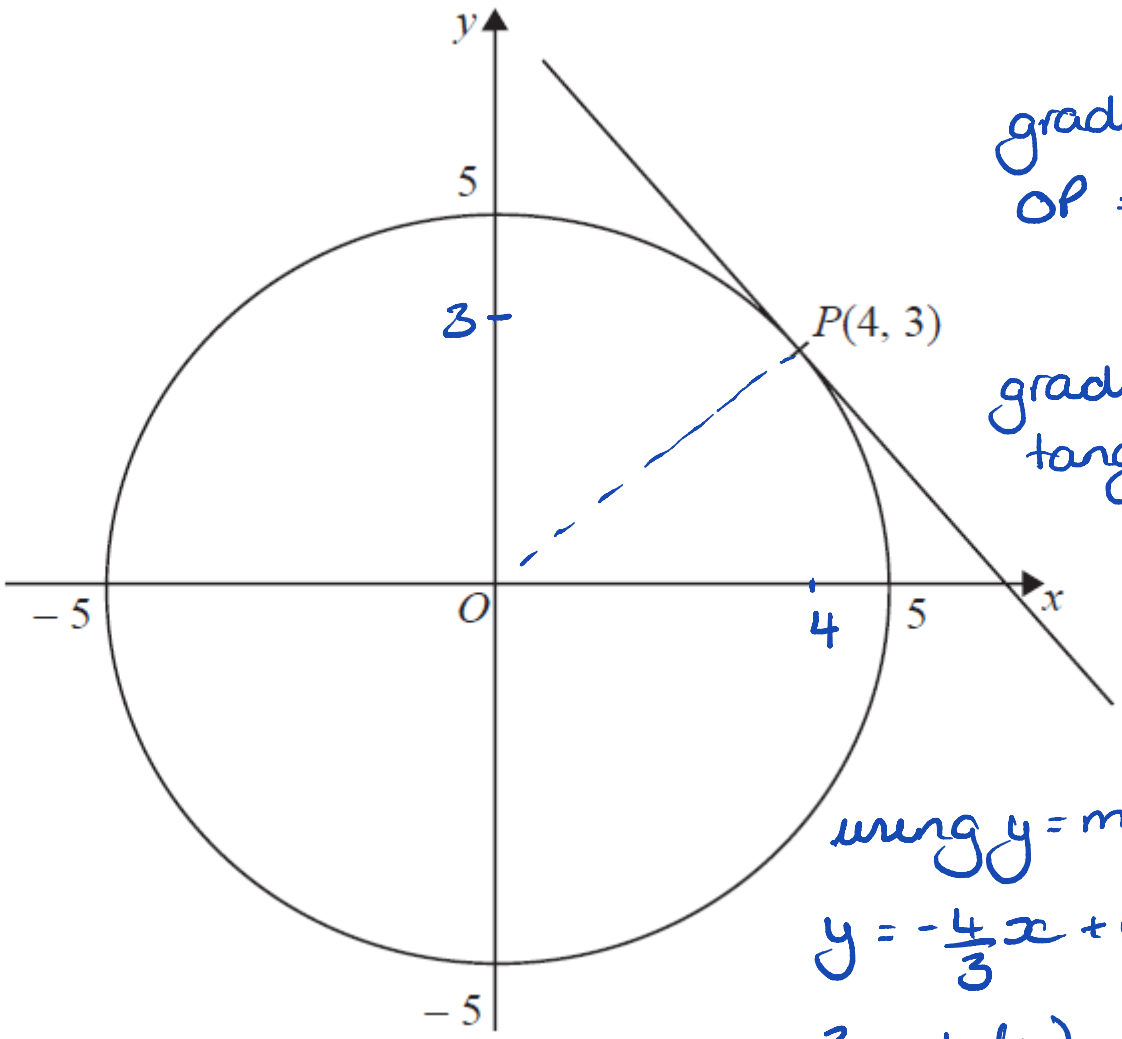
when it crosses P $y = 0 \therefore$

$\frac{1}{3}x = \frac{20}{3} \quad x = 20$

area of triangle $= \frac{1}{2} 20 \times 6$

$= 60$ units^2 [5]

4. Here is a circle, centre O, and the tangent to the circle at the point P(4, 3) on the circle.



gradient OP $= \frac{3}{4}$

gradient of tangent $= -\frac{4}{3}$

using $y = mx + c$

$y = -\frac{4}{3}x + c$

$3 = -\frac{4}{3}(4) + c$

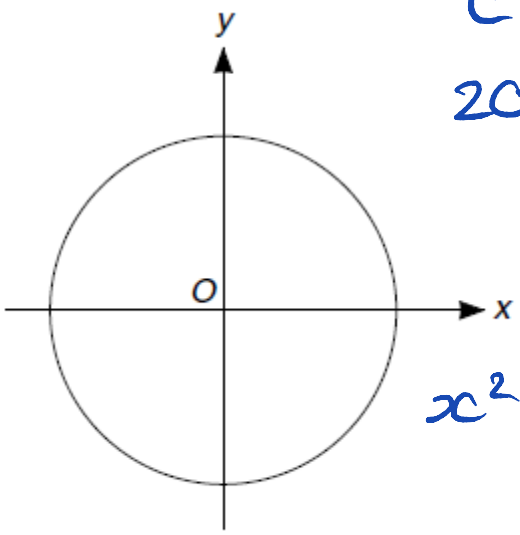
$c = 3 + \frac{16}{3} = \frac{25}{3}$

Find an equation of the tangent at the point P.

$y = -\frac{4}{3}x + \frac{25}{3}$ or

$3y = -4x + 25$ [3]

5. (a) The diagram shows a circle, centre O.



$C = \pi D$

$20\pi = \pi D$

$\therefore D = 20$

$r = 10$

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

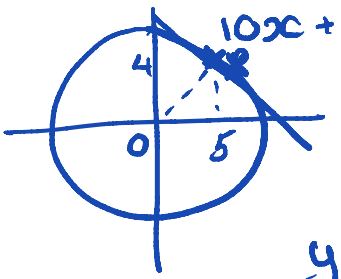
The circumference of the circle is 20π cm.

Find the equation of the circle.

a) $x^2 + y^2 = 100$ [4]

b) The line $10x + py = q$ is a tangent at the point (5, 4) in another circle with centre (0, 0).

Find the value of p and the value of q.



$10x + py = q$

gradient $OX = \frac{4}{5}$

gradient tangent $= -\frac{5}{4}$

tangent $y = -\frac{5}{4}x + c$

$4 = -\frac{5}{4}(5) + c \quad c = \frac{41}{4}$

$y = -\frac{5}{4}x + \frac{41}{4}$

$4y + 5x = 41$

$\times 2 \quad 8y + 10x = 82$

b) p = 8

q = 82

[4]

6. A circle has equation $x^2 + y^2 = \frac{1}{4}$

$\sqrt{\frac{1}{4}}$

Circle the length of its radius. [1]

$\frac{1}{16}$ $\frac{1}{8}$ $\frac{1}{4}$ $\frac{1}{2}$

CREDITS AND NOTES

Question	Awarding Body
1	AQA
2	AQA
3	Pearson Edexcel
4	Pearson Edexcel
5	OCR
6	AQA

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:

AQA http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300

OCR http://ocr.org.uk/gcsemaths

Pearson Edexcel http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material